



Physical activity and motivation in young adults with a physical disability

A multidimensional study based on a cross-sectional survey and an intervention-study

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LIST OF PAPERS

The dissertation is based on the following research papers, which are referred to in the text by their Roman numerals:

Paper I:

Saebu, M. (2010). Physical disability and physical activity: A review of the literature on correlates and associations. *European Journal of Adapted Physical Activity*, 3(2), 37-55. Published with permission of the European Journal of Adapted Physical Activity.

Paper II:

Saebu, M., & Sorensen, M. (2010). Factors associated with physical activity among young adults with a disability. *Scandinavian Journal of Medicine & Science in Sports*. doi:10.1111/j.1600-0838.2010.01097.x

Paper III:

Saebu, M., Sorensen, M., & Halvari, H. (2011). Motivation for physical activity in young adults with a physical disability during a rehabilitation stay: A longitudinal test of Self-Determination Theory. *Journal of Applied Social Psychology*, (Accepted for publication 29th of March, 2011).

Paper IV:

Saebu, M., Halvari, H., & Sorensen, M. (2011). Autonomy support and perceived health after in-patient physical activity rehabilitation in young adults with a disability: The mediating role of needs satisfaction. *Adapted Physical Activity Quarterly*, (in review).

ABSTRACT

Twenty years of experience at a rehabilitation centre has left me with an impression that young adults with a physical disability generally were not very engaged in physical activity, and a question whether this was a result of barriers related to the disability, the functioning, or environmental- or personal factors. An initial literature research also indicated that adults with a physical disability are on average less physically active than their able-bodied peers. However, the reason for this difference seemed to be an understudied issue. Therefore the aim of this thesis was to understand and try to find explanations for the physical activity behaviour of young adults with a physical disability, and whether this behaviour, motivation for it, and outcomes of it, could be influenced through an intervention.

The first study was a literature review which indicated that data on physical activity for young adults with a disability is scarce, and more knowledge about participation in physical activity for this population was needed (paper I). The main purpose for the second study was to examine a) total physical activity; and b) the relative importance of functioning and disability, environmental, and personal factors for total physical activity among young adults with a disability, through a survey (paper II). On the basis of the results from the second study an intervention was introduced, in order to study the outcomes of an autonomy supportive adapted physical activity program on physical activity and motivation variables, and the role of needs satisfaction in the process (paper III). In the last paper we examined whether an autonomy-supportive rehabilitation intervention based on adapted physical activity would increase perceived health, and the mediating role of need satisfaction in such a change (paper IV).

The literature review (study 1) was based on an electronic literature search. In the second study, 998 young adults with a disability were invited to participate in a cross-sectional study, and 327 informants responded to a questionnaire (study 2). In the last study (study 3), 44 persons participated in an autonomy supportive intervention based on adapted physical activity. The study had a longitudinal design, and repeated measures data were collected through an internet-based questionnaire.

The literature search (study 1) produced 4,189 articles; however, only 57 met all of the specified criteria. Significant correlates were identified in relation to type of disability and functioning, but also among environmental factors (e.g., costs, accessibility, built environment, information and social support) and personal factors (e.g. age, exercise, self-efficacy, depression, and mental health). Very few studies had investigated motivational

issues. The sample in the cross sectional study (study 2) reported some differences in physical activity related to type and onset of disability, but analyses revealed that personal factors explained more of the variance in total physical activity than both environmental factors and factors related to functioning and disability. As for the general population, autonomous motivation and identity as an active person were the factors most strongly associated with physical activity behaviour (Trost, Owen, Bauman, Sallis, & Brown, 2002).

Results from the intervention study (study 3) demonstrated that perceived autonomy support positively predicted psychological needs satisfaction at the end of the intervention. Furthermore, needs satisfaction was positively linked to changes in autonomous motivation for physical activity, and was also indirectly associated with physical activity increases during the intervention period. The autonomy-supportive physical activity intervention also led to a positive change in perceived physical health over twelve months. Finally, psychological needs satisfaction was positively linked to changes in perceived mental health during the intervention.

The literature search revealed a lack of documentation on environmental, personal and functional factors which may be associated with physical activity in this population. There was also a lack of theory-based studies and studies investigating motivational issues. The importance of autonomy-support and autonomous motivation regulation should have important implications for how one motivates people with disabilities to engage in physical activity, and how rehabilitation is implemented. In order to motivate individuals with a disability, increasing perceptions of autonomy and autonomous motivation are the strategies which have the potential to make the greatest impact.

In rehabilitation, the focus has often been on the health imperatives of physical activity, supervised by medical expertise. In terms of self-determination theory, this is a more controlled motivation with emphasis on the health benefits as opposed to autonomous motivation driven by positive experiences of the activity in itself. The present study indicates that autonomous motivation, autonomy support, and need satisfaction play a more important role in predicting physical activity and physical- and mental health among young adults with physical disabilities. This should encourage health care practitioners to emphasise autonomy supportiveness in rehabilitation settings.

Keywords: disability, rehabilitation, physical activity, self-determination, motivation, physical and mental health

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INTRODUCTION

Physical activity is a public health issue, and there is a lot of knowledge about the benefits of and levels of physical activity for able-bodied persons. In addition, there is also a solid amount of research on correlates and associations of physical activity, including motivational issues, in the general population (Bauman, Sallis, Dzewaltowski, & Owen, 2002; Sallis & Hovell, 1990; Trost et al., 2002). However, it is also known that there are variations in physical activity level, perceptions of barriers for physical activity, and motives for physical activity among subgroups of the population such as gender, age and socioeconomic status (Sorensen & Gill, 2008). There is limited knowledge about the extent to which this knowledge about the general population extends to individuals with a disability. Existing knowledge indicates that living with a disability implies extra challenges regarding physical activity (Cardinal, Kosma, & McCubbin, 2004), but more knowledge is needed. Physical activity is about movement. Impairment, either mobility impairment or a sensory impairment or secondary conditions may limit a person's mobility or activity level and make physical activity more difficult and less rewarding (Finch, Owen, & Price, 2001).

Further, environmental factors may affect the level of physical activity among persons with a disability. Attitudes of other people, built environment, lack of adapted facilities, equipment and/or activities may limit the activity level. Need for assistance and transport may also be a limitation for those in need of such services (Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004), but we need knowledge about the relative importance of these factors.

According to International Classification of Functioning and Health (ICF: WHO, 2001), personal factors including demographic-, biological-, psychological-, cognitive-, and emotional correlates have been widely studied among able-bodied (Bauman et al., 2002; Trost et al., 2002). However, living with impairment may affect experiences in a way which also impacts motivation and attitudes towards physical activity. A central focus in rehabilitation has been on the health benefits of physical activity among persons with a disability. However, our knowledge of motivation in these groups is scarce.

In sum, at least two of these aspects indicate differences between able-bodied and persons with a disability which may impact physical activity. There is therefore a need for investigation of these differences in order to explain and understand the issues involved when facilitating physical activity for persons with a disability in leisure time activities, in both school and rehabilitation environments.

Definition of central concepts

Physical activity. The term physical activity is an overarching concept, and includes many other terms related to activity; for example, work, sports, exercise, recreation, play, fitness, and physical education. In addition, for many people with a disability, the activities of daily life will require more effort than for many non-disabled (Kemp & Thompson, 2002). This aspect must be considered when choosing measurement instruments (Washburn, Zhu, McAuley, Frogley, & Figoni, 2002). In the present study physical activity was defined as activity; during work, house and yard work, transportation from place to place, leisure time recreation, exercise or sport, and was assessed in metabolic equivalent – minutes pr. week (MET minutes pr. week) as measured by the International Physical Activity Questionnaire – IPAQ (Craig et al., 2003).

Disability. Disability, according to the World Health Organisation, is defined as "...an umbrella term, covering impairments, activity limitations, and participation restrictions. An impairment is a problem in body function or structure... “ (WHO, 2011). Such impairments may include physical and sensory disabilities. In this thesis, disability was defined as a mobility or sensory impairment. Cognitive, mental and developmental disabilities, although important, were not included in this study. In some sections of the thesis the term “physically disabled” or “physical disability” has been used, but refers to the same concept.

Motivation. Motivation can be understood as a dynamic process and concerns the energy, direction and persistence related to the behaviour. In this dissertation, motivation for physical activity is presented from a social-cognitive approach, explained through the motivational frameworks of self-determination theory (Ryan & Deci, 2000a). *Autonomous motivation* comprises *intrinsic motivation* where the behaviour is energised by the pleasure and satisfaction derived from the behaviour, and the types of motivation in which people have *identified* with an activity’s value and ideally have *integrated* it into their sense of self. *Controlled motivation* consists of *external* motivation regulation (behaviour is a function of reward or punishment) or *introjected* regulation (e.g., avoidance of shame or an approval motive) (Deci & Ryan, 2008).

Autonomy. Refers to being the perceived origin of one’s own behaviour. Autonomy concerns acting from interest and integrated values (Ryan & Connell, 1989).

Exercise self-efficacy and perceived competence. In the present dissertation, exercise self-efficacy refers to perceived confidence related to overcoming barriers and challenges in physical activity in general, as measured by the Exercise Self-Efficacy Scale (Kroll, Kehn, Ho, & Groah, 2007). Further, the construct of efficacy is very similar to the perceived competence concept (Fortier, Sweet, O'Sullivan, & Williams, 2007), which is a central concept in self-determination theory. Perceived competence refers to a felt sense of confidence and effectance, e.g. in a physical activity context (Ryan & Deci, 2002).

Relatedness. Relatedness refers to feeling connected to others, to caring and being cared for by those others, and to have a sense of belongingness with other individuals and with one's community or group (Ryan, Deci, & Grolnick, 1995).

Mental health and well-being. In self-determination theory, both the terms mental health and well-being have been used (Ryan & Deci, 2002; Ryan & Deci, 2000a). In this thesis the term mental health is preferred, according to constructs mostly used in rehabilitation settings, and as measured by the Short Form 12 (SF-12), including vitality, emotional role and social functioning (Gandek et al., 1998; Ware, Kosinski, & Keller, 1996).

Physical health. Physical health in this thesis is defined as measured by SF-12, including subscales for physical functioning, physical role, bodily pain and more general health (Gandek et al., 1998; Ware et al., 1996)

International classification of functioning and health (ICF). The ICF is a comprehensive classification system designed to capture functioning, and not only medical descriptions of limitations (WHO, 2001). ICF has two parts, each with two components. Part 1 is about *functioning and disability* related to: a) body functions and structures; and b) activities and participation. Part 2 consists of *contextual factors*, including both: c) environmental factors; and d) personal factors.

BACKGROUND

Physical activity for persons with a disability has long practical traditions in Scandinavia. As a first approach to reveal the status of the field in the Nordic countries, a literature search was performed.

Initial literature search

The relatively narrow scope of the search was due to the large differences in the living conditions and opportunities for physical activity for populations with disabilities in different parts of the world. In addition, the Nordic countries have a relatively common cultural approach and climate, which may affect activity level. Socioeconomic status is also quite equal in the Nordic countries. Since the research field is new, the search was limited for the period from 1980 until the start of the project period. Most of the research before 1980 reflected early experiences with physical activity and disability, describing the health benefits of physical activity.

PubMed, PsycINFO and SPORTDiscus were systematically searched for relevant articles (see Table 1). These data-bases were chosen because together they provide an overview of studies and articles covering disability and physical activity/exercise in relation to sport, psychology, and rehabilitation. English-language peer-reviewed primary literature which examined physical activity (or exercise) and disability among adults with disabilities was included in the review. Disability was defined as a mobility or sensory impairment. Cognitive-, mental health- and developmental disabilities were not included in this literature search. The search included articles for the age group of persons with a physical disability age 18-65 years (excluding children and older adults) for the period from 1980-2006. In addition, we excluded articles concerning physical activity in school and education, lower back pain, and fibromyalgia.

According to Table 1 and 2, the literature search showed that there were few Nordic studies on physical activity among persons with a disability, and fewer when it comes to correlates and associations, but some do exist. For physical activity levels, the few studies that investigated activity among persons with a disability reported quite low levels, but were not precise in their descriptions. However, Jahnsen, Villien, Aamodt, Stanghelle, & Holm (2003) reported that among 403 Norwegian adults with CP, 46% were regularly physically active, defined as a minimum of one hour a week. International recommendations are a minimum of half an hour a day, five days a week (Haskell et al., 2007), but there are

challenges regarding the lack of relevant or validated measures to assess physical activity among people with a disability (Cervantes & Porretta, 2010). These challenges are also present in the Nordic countries. Further, factors that may correlate with reduced physical activity are severity of disability and poor health (Jahnsen, Villien, Aamodt, Stanghelle, & Holm, 2003; Kristen, Patriksson, & Fridlund, 2002; Lahtinen, 1989), and pain (Willen & Grimby, 1998).

Table 1. Database, search terms and numbers in a systematic literature search for Nordic literature in the period from 1980-2006 and 2007-2010

Base	Search terms	Period	Nordic
PubMed	Disabled persons AND exercise	1980 - 2006	22
	AND Finland, Suomi, Sweden, Denmark, Norway, Iceland	2007 - 2010	6
SPORTDiscus	Disability AND physical activity	1980 - 2006	88
	AND Finland, Suomi, Sweden, Denmark, Norway, Iceland	2007 - 2010	42
PsycINFO	Disability AND exercise	1980 - 2006	9
	AND Finland, Suomi, Sweden, Denmark, Norway, Iceland	2007 - 2010	1

Nevertheless, there are reasons to believe that environmental factors may affect levels of physical activity among persons with a disability in the Nordic countries, as outlined in the general population (Trost et al., 2002). Few results emerged, but a qualitative study indicated the importance of supportive environmental solutions (Wahman, Biguet, & Levi, 2006). In the same study, social environment seemed to be important for the activity level, where themes such as “motivational power from role models” and “capturing new frames of reference” also emerged as important among persons with SCI (Wahman et al., 2006).

Few studies showed results providing strong support for personal factors as important correlates, but in a qualitative study advantages such as making new friends, learning new skills, having a good time and building identity were outlined (Kristen et al., 2002). Having learnt an activity as a child, were important to achieve a higher activity level for adults with CP (Jahnsen et al., 2003). Studies of motivation were few, but the results indicated that Paralympic athletes perceived a more mastery-oriented climate than able-bodied Olympic athletes (Pensgaard, Roberts, & Ursin, 1999).

Table 2. Nordic research – physical activity and disability in the period from 1980 through 2006

Author/Date	Title	Method	Results
(Jahnsen et al., 2003)	Physiotherapy and Physical Activity - Experiences of Adult with Cerebral Palsy, with Implications for Children	Postal survey on adults with cerebral palsy (CP) in Norway and their experiences with physiotherapy and physical activity. The respondents were 406 persons with CP, without intellectual disabilities, 49% females and 51% males between 18 and 72 years (mean=34 years). Type, amount and experiences of physiotherapy and physical activity were reported in addition to demographic, diagnostic and locomotion data, and data on new health problems, such as deterioration, chronic pain and fatigue.	Almost all the respondents (92%) received physiotherapy as children, while 40% had physiotherapy and 46% performed physical activity regularly as adults. The study documents that physical activity may contribute to prevent deterioration, chronic pain and fatigue in adults with CP; however, grade of CP is the strongest predictive variable. The strongest predictive variable, significantly associated with regular physical activity as an adult, was having learnt how to take personal responsibility for personal health during childhood.
(Kristen et al., 2002)	Conceptions of children and adolescents with physical disabilities about their participation in a sports programme.	The aim of this study was to describe the conceptions of children and adolescents with physical disabilities about their participation in a sports programme. Using questions based on a holistic view of the human being, 20 children and adolescents were interviewed. The method of analysis used was inspired by phenomenography.	Six categories emerged: getting new friends, learning, strengthening one's physique, becoming someone, experiencing nature and having a good time. The findings revealed a great diversity of sports participation. Further, the conceptions mirror the difficulty of dividing people into groups and of delimiting important areas. The findings highlight the importance of programmes where actors from different sections of society cooperate.
(Lahtinen, 1989)	Sporting behavior of special groups in Finland	This article describes several Finnish studies of the sporting behavior of persons on disability pension, war veterans, those chronically ill or disabled, the mentally handicapped, and the visually impaired.	Sporting behavior depends on one's free time, interests, earlier practices, age, gender, and state of health. Poor health or a disability limits sporting activity, but it may also lead to more rehabilitative sport and exercise. The findings of the studies reveal features that need to be developed in sport for special groups
(Pensgaard et al., 1999)	Motivational Factors and Coping Strategies of Norwegian Paralympic and Olympic Winter Sport Athletes	Participants were Norwegian athletes from the 1994 Winter Olympics (n = 69) and Paralympics (n = 30) at Lillehammer. Quantitative data came from questions concerning expectations and satisfactions, and three instruments (Perception of Success Questionnaire, Perceived Motivational Climate Questionnaire, and the COPE Inventory). Qualitative data came from interviews.	MANOVA analyses revealed that Paralympic and Olympic athletes had similar motivational profiles, but the Paralympic athletes perceived a more mastery-oriented climate, $F(1, 98) = 12.6, p < .001$. Both groups used similar types of coping strategies, except that Olympic athletes employed more redefinition and growth strategies, $F(1, 97) = 6.72, p < .01$. Paralympic athletes were also significantly more satisfied with effort and results. Paralympic and Olympic athletes were significantly different on only 4 of 11 variables.

Author/Date	Title	Method	Results
(Sorensen & Kahrs, 2006)	Integration of Disability Sport in The Norwegian Sport Organisations: Lessons Learned	The Norwegian Olympic Committee and Confederation of Sports' commitment to integrate disability sport in the sport organisations for the able-bodied was evaluated based upon a description of an ideal, inclusive sports organisation. Data were collected primarily through interviews and questionnaires.	The results indicate that the integration process proceeded more slowly than originally intended. There were still unresolved matters on the structural/organisational level, and the sports federations' officials were uncertain about the extent of their responsibility and the role of the new sports organisation for persons with a disability. More relevant competence was needed in the organisation. All organisations reported improved attitudes toward individuals with a disability and indicated that integration was a demanding enterprise.
(Stein, 1991)	Physical activity from rehabilitation to independent community function: the role of physical activity in handicapping conditions	Difficulties encountered by physicians and other medical specialists in introducing and furthering physical activity, sports, and recreational programs for individuals with various handicapping conditions are discussed. Early developments and recent progress made in these areas are presented. Attitudes, affects and motivation of program participants are explored as factors that influence accomplishments of individuals with various physical, sensory, and mental disabilities.	Success stories from Norway, Israel, Finland, and the United States accentuate positive results. An information processing model is presented in which emphasis is placed on how handicapping conditions affect an individual's ability to learn and perform physical and motor acts as opposed to medically related factors and characteristics. Basic principles and philosophies are translated into recommendations in general and to the medical establishment in particular.
(Wahman et al., 2006)	What promotes physical activity after spinal cord injury? An interview study from a patient perspective	Qualitative multiple case studies. Sixteen participants with SCI were interviewed. Four main themes of promoting factors could be identified.	Participants used cognitive and behavioural strategies; finding supporting environmental solutions; exploring motivation post injury; and capturing new frames of reference. By utilising the motivational power of role models, together with the other motivational factors identified in this study, such as identifying relevant individual motives post injury and capturing new frames of reference, the process towards physical active life may be facilitated.
(Willen & Grimby, 1998)	Pain, physical activity, and disability in individuals with late effects of polio	The aim of this study was to provide a description of pain and its relationship to the effects of polio, physical activity, and disability. Assessment instruments used were: a pain questionnaire, a pain drawing, a visual analogue scale (VAS), a 30-m walk indoors, isokinetic muscle strength, serum creatine kinase concentration, the Physical Activity Scale for the Elderly, and the Nottingham Health Profile (NHP). Participants were thirty-two consecutive individuals with late effects of polio.	More than 50% of the individuals had pain every day, mostly during physical activity. The NHP questionnaire demonstrated that all six dimensions (energy, pain, physical mobility, sleep, emotional reactions, and social isolation) were affected. The dimensions pain and physical mobility both strongly correlated with energy. There is a relationship between physical activity in daily life and experience of pain. In many postpolio individuals who experience a high level of pain, spontaneous and maximal walking speed are approximately the same. It is strongly recommended that individuals with late effects of polio, experiencing aching and especially cramping pain, modify their level of physical activity

New Nordic research –physical activity and disability in the period from 2007 through 2010

Author/Date	Title	Method	Results
(Lannem, Sorensen, Frosle, & Hjeltnes, 2009)	Incomplete spinal cord injury, exercise and life satisfaction	Study design: Cross-sectional survey. Objective: This study investigates the role of physical exercise, perceived exercise mastery and fitness on the life satisfaction of a sample of individuals with incomplete spinal cord injury (SCI). Setting: Sunnaas Rehabilitation Hospital and the Norwegian School of Sport Sciences, Norway. Methods: A questionnaire measuring life satisfaction, self-rated physical exercise and self-perceptions were mailed to persons with incomplete SCI.	Of the 69 participants, 68% performed physical activity regularly once or more a week. Participants who were exercising regularly once a week or more scored significantly higher on the summed life satisfaction scale ($P = 0.002$) and on perceived fitness ($P = 0.004$), but significantly lower on perceived exercise mastery ($P = 0.012$) than those who were non-exercisers. Participants in this study with incomplete SCI who exercised regularly experienced a significantly higher life satisfaction and perceived exercise fitness, but lower perceived exercise mastery than their inactive peers. Perceived exercise fitness was the psychological variable that contributed meaningfully to life satisfaction in this study
(Roe, Dalen, Lein, & Bautz-Holter, 2008)	Comprehensive rehabilitation at Betostolen Healthsports Centre: influence on mental and physical functioning	A total of 228 subjects admitted for rehabilitation completed the Medical Outcome Study Short Form 12 (SF-12) on admission and on discharge after approximately 4 weeks. A total of 174 subjects also completed SF-12 3 months after discharge. The physical and mental sum scores and the scores for the 8 subscales of SF-12 were calculated. In a stepwise backward multiple regression model, demographic and medical factors influencing improvement during rehabilitation were explored.	Physical- as well as mental functioning was reduced on admission. Bodily pain and emotional factors represented the most dominant components. Both physical and mental functioning improved during the stay, and the improvement in physical functioning remained stable 3 months after discharge. The improvement in physical functioning was greatest for those subjects living in urban areas and having a painful musculoskeletal diagnosis. The improvement in mental functioning was greatest for females. This approach to rehabilitation appears to be effective for improving physical functioning in the relevant group of individuals.
(Sandstrom, Samuelsson, & Oberg, 2009)	Prerequisites for carrying out physiotherapy and physical activity - experiences from adults with cerebral palsy	The aim of this study was to get a deeper understanding into how adults with cerebral palsy (CP) experience physiotherapy and physical activity in a perspective from childhood to adulthood; and how personal and environmental factors influence possibilities for physiotherapy and physical activity. Data was collected through interviews with 22 community-living adults (35 - 68 years) with CP, from five counties in Sweden. The questions were open. The material was analysed through qualitative content analysis.	The narratives from the 22 informants, based on experiences from childhood to adulthood, resulted in a description of prerequisites for carrying out physiotherapy and physical activity. Five different themes were identified: (i) Being enjoyable, (ii) Giving effects, (iii) Being comprehensible, (iv) Being integrated in daily life, and (v) Supportive healthcare with competent professionals. Conclusion: The information from the interviews elucidates the importance of a lifelong support from healthcare professionals. Physiotherapists with attentiveness to different life situations in combination with good understanding and knowledge in CP could facilitate continuous physical activity in people growing up and ageing with CP.

Author/Date	Title	Method	Results
<p>(Sjöquist, Almqvist, Åsenlöf, Lampa, & Opava, 2010)</p>	<p>Physical-activity coaching and health status in rheumatoid arthritis: A person-oriented approach</p>	<p>Two hundred and twenty-eight patients (74% women, mean age 56 years, disease duration 1 year) with RA, from 10 rheumatology clinics in Sweden, participated. The patients were assigned at random to intervention or control. The intervention group underwent 1 year of coaching to adopt health-enhancing physical activity (moderately intensive, 30 min/day, > 4 days/week). The cluster analysis included five correlates of general health perception: disease activity; pain; timed standing; activity limitation; and self-reported physical activity. The primary outcome of the coaching intervention was self-reported health status.</p>	<p>The eight clusters identified both at baseline and post interventions were operationalized according to the number of cluster variables affected: less (LE) affected or more (MO) affected, respectively. Clusters with LE affected variables had significantly better general health perception at baseline than those with MO affected variables. Further, coached individuals in MO affected clusters significantly improved self-reported health status compared both to those coached in LE affected clusters and to those in MO affected clusters in the control group. This person-based approach contributed more than did the results in a previous randomized controlled trial, to the understanding of which patients benefit most from the present physical-activity coaching intervention. The intervention may thus be most beneficial for individuals more severely affected by their disease at baseline.</p>
<p>(Standal & Jespersen, 2008)</p>	<p>Peers as Resources for Learning: A Situated Learning Approach to Adapted Physical Activity in Rehabilitation</p>	<p>The purpose of this study was to investigate the learning that takes place when people with disabilities interact in a rehabilitation context. Data were generated through in-depth interviews and close observations in a 2-week-long rehabilitation program, where the participants learned both wheelchair skills and adapted physical activities.</p>	<p>The findings from the qualitative data analysis are discussed in the context of situated learning (Lave & Wenger, 1991; Wenger, 1998). The results indicate that peer learning extends beyond skills and techniques, to include ways for the participants to make sense of their situations as wheelchair users. Also, it was found that the community of practice established between the participants represented a critical corrective to instructions provided by rehabilitation professionals</p>

This study was the only one in this domain with a theory-based approach. We also mention that the sample included elite-sports athletes, which is a sub-category in the population of persons with a disability. In sum, we have limited knowledge about activity level and correlates of physical activity in the domain of disability in the Nordic countries up to 2007.

Nordic research indicates that persons with a disability are less physically active than their non-disabled peers. Given the relatively long traditions of sport and physical activity for people with disabilities in Scandinavia, there are surprisingly few studies examining the reasons for this difference. Therefore, more knowledge about the correlates of physical activity for young adults with a disability was needed. Due to the limited amount of Nordic research, there was a necessity to perform a more comprehensive review on international literature, with a focus on correlates and associations for physical activity among persons with a disability. Consequently, a more extensive review with an international approach was undertaken and is presented in paper I.

The international literature search in study 1 showed that there are relatively few studies examining activity level and correlates of physical activity among people with a disability, but that there was a strong focus on the health benefits of physical activity. Following, the next section of this dissertation is devoted to this issue.

Health benefits of physical activity for persons with a disability

Regular physical activity for persons with chronic diseases and disabilities provides considerable health benefits as well as the potential to prevent secondary conditions (Heath & Fentem, 1997; Physical Activity Guidelines Advisory Committee, 2008). The PAGAC report concluded that there is evidence that regular physical activity for people with a disability improves cardiorespiratory fitness, reduces cardiovascular risk, increases muscle strength, increases flexibility and bone mineral density, improves functional health (including walking speed and distance, functional independence and balance), reduces secondary conditions like fatigue and pain, helps in the maintenance of a healthy weight, improves metabolic health, and improves mental health (eg. depression, quality of life and well being) (Physical Activity Guidelines Advisory Committee, 2008). Lannem, Sorensen, Froylsie and Hjeltnes (2009) reported that individuals with spinal cord injury seemed to demonstrate less satisfaction with life, compared to the normal population. However, they also reported that on average, the persons with spinal cord injuries who were exercising scored higher on life satisfaction than non-exercisers. There are also studies which indicate that physical activity

may impact perceived physical and mental health as well as quality of life for adults with a disability (Roe et al., 2008), and that change in physical activity is indirectly associated with improved health-related quality of life in individuals with a disability (Motl & McAuley, 2009; Stuifbergen, Blozis, Harrison, & Becker, 2006).

However, epidemiological studies have identified several subgroups of the population which are expected to have lower levels of physical activity (Pate et al., 1995), and persons with disabilities belong to one of these subgroups. Persons with disability are a heterogeneous group for which regular physical activity is of great importance, but this has received relatively little attention (Rimmer, Braddock, & Pitetti, 1996). In general, people with a disability are less active (Boslaugh & Andresen, 2006) and have a lower work capacity than persons without disability (Fernandez, Pitetti, & Betzen, 1990). An inactive lifestyle increases the importance of the disability itself, and makes this a public health issue. Reduced endurance, muscle strength and flexibility lead to decreased function and ability, resulting in reduced personal independence.

A central issue is how much physical activity is enough to gain the health benefits described. Norwegian physical activity recommendations for adults are about half an hour per day (3.5 hours per week.) An example of moderate physical activity is walking at a moderate pace (Helsedirektoratet, 2005), with an expectation that this provides significant health benefits (Anderssen & Strømme, 2001). Recent research points out that there is a need for about an hour a day of moderate physical activity to counteract the development of obesity (Saris et al., 2003). However, mental and social effects (Sherrill & Williams, 1996) can be achieved without worry about intensity or counting the hours and minutes, so the question of what is enough is not fully answered in such terms.

As outlined in the introduction, existing knowledge indicates that living with a disability implies extra challenges regarding physical activity, in comparison to the general population. For identifying factors that may impact physical activity among people with disabilities, there is a need for a conceptual framework.

Classification of functioning, disability and health

Definitions used for assessment of disability can be understood by linking them to a conceptual framework of the consequences of disease and injury, instead of connecting them to limitations in ability to perform life activities because of an impairment, which represents the traditional way of understanding disability. The International Classification of Functioning, Disability and Health (ICF) is such a conceptual framework (WHO, 2001).

Rimmer (2006) recommended the use of the International Classification of Functioning, Disability and Health (ICF) as a framework for identifying factors which may impact physical activity among people with disabilities. The ICF is a comprehensive classification system designed to capture functioning, and not only medical descriptions of limitations. ICF has two parts, each with two components. Part 1 is about functioning and disability related to: a) body functions and structures; and b) activities and participation. Part 2 consists of contextual factors, including both: c) environmental factors; and d) personal factors. With this structure, this classification system may help select the more important factors among the multitude of factors related to physical activity for this population. There is also a need to establish the relative importance of the various ICF factors in the physical activity context.

Within the factor of functioning and disability, research indicates that severity of the disability is negatively correlated with physical activity (Becker & Stuifbergen, 2004; Jahnsen et al., 2003). In addition, there has been a call for research on potential differences in activity patterns between persons with congenital versus acquired disabilities, and between groups of people with different disabilities (Rimmer et al., 1996). Consequently, information about the *type and the severity of the disability* seems important to include.

Evidence exists which shows that for people with disabilities, environmental barriers to physical activity limit participation in community activities (Rimmer, Wang, & Smith, 2008; Rimmer, 2005). It would appear that information about *environmental factors* should be included to fully understand the correlates of physical activity.

Personal factors have been cited as important also (Martin, 2006). One of the most important personal factors for physical activity is motivation. Motivation for physical activity is widely studied among able-bodied, both in sport (e.g., Roberts, Treasure, & Conroy, 2007), organized exercise (e.g., McAuley, Peña, & Jerome, 2001), physical education (e.g., Biddle, 2001) and physical activity in general (e.g., Trost et al., 2002). For people with disabilities, the extant research is scarce, but some studies do exist. Martin (2006) found that enjoyment was a critical personal factor in commitment to disability sport. Martin, Smith and Adamsmushett (1995) reported that adolescent swimmers with a disability reported strong personal athletic identity. Scelza, Kalpakjian, Zemper and Tate (2005) reported that lack of motivation, lack of energy, and lack of interest were the most frequently cited barriers to exercise among individuals with a disability. These findings indicate that factors other than health benefits are important for motivation for physical activity among persons with disabilities. Therefore, there is a need to investigate how motivational variables interact with physical activity.

Motivation, disability and physical activity

In the field of rehabilitation, it has proven to be a challenge to maintain the same level of physical activity in everyday life as during rehabilitation (van der Ploeg et al., 2007). Much research is aimed at developing rehabilitation programs for persons with disabilities (Rimmer, 2002; van der Ploeg, van der Beek, van der Woude, & van Mechelen, 2004), and common to these studies is an assumption that people with disabilities want to be physically active in order to improve their functioning and health (Shifflett, Cator, & Megginson, 1994; Stuifbergen et al., 2006). One reason for this is strong evidence of the importance of physical activity in studies where functional health is the dependent variable (e.g., Ditor et al., 2003; Stuifbergen, Becker, Blozis, Timmerman, & Kullberg, 2003; Taylor, Dodd, & Larkin, 2004). However, we have little knowledge about to what extent the health benefits are actually important as motivation, or if it could be that people with disabilities also can become demotivated by activities which are primarily focused on functional training rather than enjoyment, fun and inspiration. We have limited knowledge about what it means for the participants' motivation for physical activity later in life. We observe, however, that many persons with disabilities, even at a young age, are typically encouraged to be physically active, because of the health benefits (Jahnsen et al., 2003).

In order to identify and understand the motivational mediators of physical activity in this population, a theoretical framework was needed.

Theoretical framework

Self-determination theory (SDT) has been strongly recommended as a suitable framework for understanding motivated physical activity behaviour (Biddle & Nigg, 2000; Landry & Solmon, 2002). Moreover, SDT has been recently used for physical activity interventions (Chatzisarantis & Hagger, 2009; Fortier et al., 2007), and over the past 15 years a growing body of work has also applied SDT in studies of health-related behaviour change (Patrick & Williams, 2008; Ryan & Deci, 2007; Williams, Freedman, & Deci, 1998). Further, autonomous functioning and self-determination may be a particular challenge for people with a disability, since relatively many are dependent of help and assistance both in physical activity and daily activities. Limited work has been done in adapted physical activity using SDT, with the exception of one study which examined the contribution of two different models of psychological need satisfaction to well-being in a sample of athletes with a disability (Lighthouse, Wilson, & Oster, 2010). In our opinion, there is a need for additional

research using self-determination theory as a framework in a rehabilitation setting among non-athlete participants. The SDT theory was therefore used as a theoretical framework in the present studies.

SDT differentiates motivation in terms of the degree to which it has been internalized, suggesting that the more fully it is internalized, the more it will be the basis for autonomously regulated behaviour.

Autonomy support, autonomous motivation and perceived competence. The most central distinction in SDT is between autonomous motivation and controlled motivation. When people are autonomously motivated, they experience volition and choice of their actions. When people are controlled, they experience pressure to think, feel, or behave in particular ways (Deci & Ryan, 2008).

Patients who are regularly physically active would be autonomous if they freely chose to exercise because they enjoy being physically active, or are personally committed to improving their health. Practitioners may facilitate autonomous motivation and perceived competence for change by supporting patients as they explore resistances and barriers to change, and helping them identify congruent pathways to health (Ryan, Patrick, Deci, & Williams, 2008). In Self-Determination Theory, such environments are termed autonomy-supportive contexts and defined as: “ones in which significant others offer choice, provide a meaningful rationale, minimize pressure, and acknowledge the target individual’s feelings and perspectives” (Williams, Grow, Freedman, Ryan, & Deci, 1996, p. 117).

Effective behaviour change requires people to be both autonomously motivated and to perceive themselves as competent in doing it (Deci & Ryan, 2000). People perceive themselves to be competent when they feel capable of attaining important health outcomes, such as meeting a physical activity goal. Autonomy-supportive patient care has been found to enhance autonomous motivation and perceptions of competence, which improved health outcomes (Williams, McGregor, Zeldman, Freedman, & Deci, 2004; Williams, Freedman, & Deci, 1998).

Along with a sense of autonomy, internalization requires that a person experience the confidence and competence to change. In SDT, support for competence is integrated in the concept of autonomy support defined above and afforded when practitioners provide effectance, relevant inputs and feedback. This means that the patient is afforded the skills and tools for change, encouraged to choose among them, and is supported when competence or control-related barriers emerge. Patients are not over-challenged, but rather helped to

experience mastery in terms of the health behaviour change that needs to be engaged (Ryan et al., 2008).

Recent research has revealed that autonomous motivation and perceived competence for making change were important for involvement in physical activity among able-bodied (Bagoien & Halvari, 2005; Chatzisarantis & Hagger, 2009; Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Hagger, Chatzisarantis, Barkoukis, Wang, & Baranowski, 2005; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). Due to a lack of self-determination theory research on persons with a disability in rehabilitation settings, we examined some studies of other health related behaviours as a basis for our hypotheses.

Autonomous motivation and perceived competence were found to be important for; better self-management of diabetes behaviours and better glucose control for patients with diabetes (Williams et al., 2004; Williams et al., 1998); active participation in an alcohol treatment program (Ryan, Plant, & Omalley, 1995); adherence to exercise programs and long term weight management in overweight and obese middle-aged women (Palmeira et al., 2007; Teixeira et al., 2006) and in morbidly obese patients (Williams et al., 1996); smoking cessation (Williams, Gagne, Ryan, & Deci, 2002) and long-term medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998). In sum, it seems as if autonomous motivation and perceived competence may be important for participation in and adherence to various health-related behaviours.

In sum, to increase autonomous motivation, the satisfaction of basic psychological needs for autonomy, competence and relatedness are supposed to be important. The theory argues that all three needs are essential and that if any is thwarted there will be distinct functional costs. Thus the satisfaction of all three needs was included in this study of participants with a disability, because optimal functioning seems to be important for their engagement in physical activity (Finch et al., 2001; Jahnsen et al., 2003).

Psychological needs satisfaction, well-being and mental health. SDT specifically suggests that autonomy is an essential basis for psychological growth and well-being (Ryan & Deci, 2000b), and previous research has emphasised the importance of autonomy support in several health-care related studies (e.g., Halvari & Halvari, 2006; Teixeira et al., 2006; Williams et al., 2006). Further, studies have examined the relation between need satisfaction and well-being in specific settings, finding for example that employees' reports of satisfaction of their needs for autonomy, competence, and relatedness in the workplace were related to self-esteem and general health (Ilardi, Leone, Kasser, & Ryan, 1993) and to vitality and the

inverse of anxiety and somatization (Baard, Deci, & Ryan, 2004). Further, there are studies on need satisfaction and well-being in relationship functioning (e.g. Patrick, Knee, Canevello, & Lonsbary, 2007), in daily life (e.g. Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), and in exercise (e.g. Wilson, Longley, Muon, Rodgers, & Murray, 2006). In health care, a study conducted in a nursing home by Kasser and Ryan (1999), extending earlier work by Vallerand and O'Connor (1989), reported that satisfaction of the needs for autonomy and relatedness in their daily lives was positively related to well-being and perceived health among the nursing home residents. However, to our knowledge, no study has been conducted on perceived need satisfaction in the domain of rehabilitation and disability.

In sum, the studies reported above demonstrated that the satisfaction of the three basic psychological needs was directly related to mental health in different domains. Need satisfaction is optimized by the internalization and integration of societal and culturally accepted values and behaviours, suggesting that individuals are likely to express their competence, autonomy, and relatedness differently within cultures that hold different values (Ryan & Deci, 2000b). Wilson et al (2006) emphasised the importance of need satisfaction and well-being in exercise, indicating that there were several sources for need satisfaction in an exercise setting among able-bodied.

Need for new information

There is a lack of knowledge about the issues regarding physical activity among young adults with a disability in the Nordic countries, but several international studies indicate that people with a physical disability are less likely to engage in regular physical activity than non-disabled (Boslaugh & Andresen, 2006; Rimmer, Rubin, Braddock, & Hedman, 1999). However, there is little knowledge about the correlates of actual physical activity in this population (Paper I and II). Research on motivation for physical activity among people with a disability is scarce and we need to increase our knowledge about the motivational processes which can enhance physical activity behaviour (Paper III). Further, there are also studies which indicate that physical activity may impact perceived physical and mental health as well as quality of life for adults with a disability (Roe et al., 2008), and change in physical activity is indirectly associated with improved health-related quality of life in individuals with a disability. We wanted to investigate if such effects could be obtained during a relatively short rehabilitation program with an emphasis on adapted physical activity and autonomy support, and explore possible mechanisms underlying such a process (Paper IV).

Aim of the thesis

Based on the present introduction and background, the aim of this dissertation was to;

- understand and explain the physical activity behaviour of young adults with a physical disability, and to learn which factors are most strongly associated with this behaviour
- try to influence central factors in the motivational process in an intervention and explore mechanisms which can increase motivation for physical activity and the actual behaviour
- register how perceived health is affected through such an intervention

Based on this aim, the following research questions were outlined:

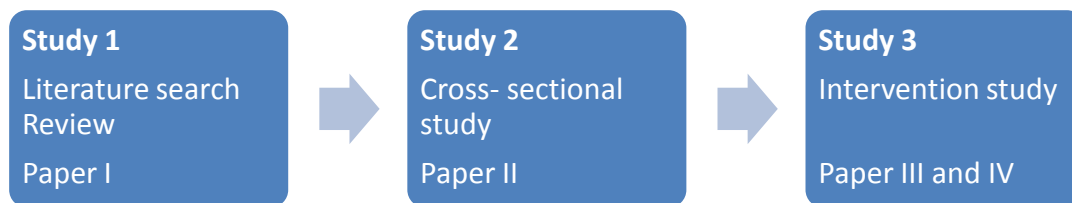
1. What is the knowledge-base in the literature that examines correlates and associations of physical activity among adults with a disability (Paper I)?
2. What is the level of physical activity among young adults with a physical disability who are members of an interest organisation (Paper II)?
3. What is the relative importance of functioning and disability, environmental, and personal factors for total physical activity among young adults with a disability who are members of an interest organisation (Paper II)?
4. What is the impact of an autonomy supportive intervention on motivational variables and total physical activity in a sample of young adults with a disability? (Paper III)?
5. How does an autonomy supportive intervention affect changes in perceived health in a sample of young adults with a disability, and what is the role of psychological need satisfaction in these changes (Paper IV)?

METHODS

Overall purpose and project design

In 2007, Beitostølen Healthsports Centre and Stiftelsen Sophies Minde started financing a project over three years to examine physical activity and motivation among young adults (age 18-35) with a physical disability. The literature review (paper I) confirmed that adults with a physical disability, were, on average less physically active than their non-disabled peers. In addition, significant correlates of physical activity were identified in relation to type of disability and functioning, environmental- and personal factors. Designing a cross-sectional survey (study 2), based on a questionnaire, we focused on barriers and facilitators for physical activity among young adults with a disability. The cross sectional study was conducted during spring 2008. Based on the results from the cross-sectional survey, we designed an intervention study to deal with the challenges revealed during the cross sectional study. The intervention study was carried out spring 2009, and the follow-up period ended spring 2010.

Figure 1. Overall project design



Design

Design study 1. The purpose of this article was to examine the international literature on correlates and associations of physical activity among adults (age 16-65 years) with physical disabilities. Electronic searches were conducted to identify research articles published from 1980 through 2009. Specific inclusion criteria were identified. PubMed, PsycINFO and SPORTdiscus were systematically searched for relevant articles. These databases were chosen because together they are generally acknowledged to provide a complete overview of studies and articles covering disability and physical activity/exercise, in relation to sport, psychology and rehabilitation. This is in line with previously conducted similar literature reviews (van der Ploeg et al., 2004). We specifically looked for studies describing the relationship between physical activity and disability.

Design study 2. The second study (paper II) was designed as a cross-sectional survey, and data were collected through a questionnaire (see Appendix 4). The questionnaires were sent to the participants through five interest organisations for people with generic disabilities. A reminder was sent out after three weeks. An electronic version was offered to the visually impaired and for those who so preferred. Participants were informed about the electronic questionnaire through the information letter enclosed in the questionnaire. The study was approved by the Regional Medical Committee for Research Ethics in Norway.

Design study 3. The third study had a longitudinal design, based on an autonomy-supportive physical activity intervention at a rehabilitation centre. Data was collected through an internet-based electronic questionnaire (see Appendix 5). Two persons with visual impairment were interviewed by the researcher because they could not complete the questionnaire by themselves. The participants filled in the questionnaire five times; respectively at arrival to the rehabilitation centre (Time 1 = baseline), after one week of the rehabilitation stay (Time 2), at departure from the centre (Time 3), twelve weeks after departure (Time 4) and twelve months after the end of the rehabilitation stay (Time 5). The study was approved by the Regional Medical Committee for Research Ethics in Norway.

Discussion of designs

The main purpose of the research design is to give the best and most comprehensive answers to the research questions. Research designs differ with regard to the causal inferences they allow (Bauman et al., 2002), or there may be threats to internal validity (Bartholomew, Parcel, Kok, Gottlieb, & N., 2001). Cross-sectional designs are among the weakest as they provide no evidence of causality (Bauman et al., 2002), and present some limitations for the results from study 2 (paper II). The results in study 2 may as well present the impact of physical activity on personal variables (i.e. motivation), as the opposite. It may also be bidirectional. However, the congruence with the results in study 3 (paper III) supports the results, emphasising the connection between autonomous motivation and physical activity.

Experimental designs using randomized control groups provide the strongest evidence for a cause-effect (Bartholomew et al., 2001) Randomized control groups will ensure that there are no systematic differences between the control group and the intervention group which could affect some of the outcome variables. However, control group and randomization is not always an option, as was the situation in study 3 (paper III and IV), since all the persons

who applied for a stay at the rehabilitation centre had the right to treatment over a limited time period. In rehabilitation research and research among people with a disability there are often used quasi-experimental designs (Dzewaltowski, Estabrooks, Klesges, Bull, & Glasgow, 2004). In a study, Rimmer, Chen, McCubbin, Drum and Peterson (2010) identified research articles published from 1986 to 2006, and of the 80 physical activity/exercise interventions identified in the literature, only 32 were randomized controlled trials. Quasi-experimental designs, as in study 3, have a lower internal validity than randomized experiments (Bauman et al., 2002).

Samples and procedures

Procedures study 1. English language peer-reviewed primary literature that examined physical activity (or exercise) and disability among adults with disabilities was included in the review. The search included articles about persons with a physical disability aged 18-65 years (excluding children and older adults), for the period from 1980 to 2009. Further, we excluded articles concerning physical activity in school and education, athletes with a disability, lower back pain, and fibromyalgia. Due to the scope and complexity of the present review, studies testing theoretical models and constructs were also excluded. In short; the search terms were: Exercise OR physical activity AND disability (disabled persons). Search limitations were journal articles in English language with English abstract. Keywords for the link between physical activity and persons with a disability were; determinants, associations, correlates, predictors, barriers, facilitators, and mediators.

Article citations were excluded at the abstract level if they met the following exclusion criteria: not disability-related, not physical activity- or exercise-related, sample based on athletes with a disability, descriptive articles or program descriptions, non-English language, published before 1980, all study participants younger than 18 years or older than 65 years, physical education/school and non-peer-reviewed publications (i.e., dissertations, chapters, non-peer-reviewed articles, and conference presentations). In conclusion, studies that met the following criteria were included: (1) cross sectional studies, prospective studies; qualitative studies (2) health outcomes (physical activity or disability) as dependent variables or discussion point; and, most importantly, (3) describing correlates, determinants, associations or mediators in relation to physical activity.

Sample and procedures study 2. The population in study 2 were young adults (age 18-30) with a disability who were members of interest organisations for persons with

disabilities (N = 998). The population included members of organisations for people with cerebral palsy (n=399/40.0%), spina bifida and hydrocephalus (n=116/11.6%), spinal cord injuries (n=66/6.6%), muscle diseases (n=127/12.7%) and visually impaired (n=290/29.0%). The questionnaires were sent to the participants through the interest-organisations. A reminder was sent out after three weeks. An electronic version was offered to the visually impaired and for those who so preferred. Participants were informed about the electronic questionnaire through the information letter with the questionnaire, together with an informed consent form. This resulted in a sample that is not a representative sample as such, but rather a convenience sample based on disability groups that are accessible through the interest organisations. Together with a low response rate (34.6%), it is necessary to discuss a selection bias that may have an influence on both internal and external validity of the study.

Sample and procedures study 3. Young adults with a disability (aged 18-35 years) were during the winter 2009 invited to apply for one of four similar three-week rehabilitation stays with up to 14 persons in each group. Sixty-two persons applied for a stay. Of those, 9 persons got another rehabilitation offer because they were seriously cognitively challenged. Fifty-three persons were accepted by the admission team, and 48 persons (28 women) accepted the terms for the stay and were included in the study. Four of them dropped out during the follow-up period, and did not answer the last questionnaire. Thus, 44 persons (27 women) completed the study.

Participants were divided into four groups, based on their preferences. Some of the participants were either employed, students, and/or were dependent on assistance and had to decide the best possible time for the three-week rehabilitation stay. Estimates for power were made. For acceptable power in the statistical analysis we needed about 35 participants for a longitudinal study.

The rehabilitation hospital where the intervention was carried out offers secondary rehabilitation to persons with impairments and disabilities. The rehabilitation program is based on the vision of Adapted Physical Activity (Hutzler & Sherrill, 2007), by means of physical activities adapted to the specific needs of each individual with a disability. The rehabilitation includes social and cultural activities and extensive use of outdoor natural facilities on a year-round basis. A wide range of services is offered, including adaptation of the environmental factors, a variety of technical aids and individual instruction. Such services may be essential in order to participate in the activities, or recommended in order to obtain the optimal effect of the activity program. The program is intensive, with 3 - 5 hours of physical

activity a day, 6 days a week. Variation in activities is emphasised. Fulfilment of the basic psychological needs like autonomy, relatedness and competence were emphasised during the stay.

Before the intervention period, the professional staff at the rehabilitation centre was offered four lectures in Self Determination Theory, where the facilitation for autonomy-support, possibilities for demonstrating competence, and facilitation for relatedness were especially emphasised. The intervention was based on patient autonomy by providing opportunities for choice and self-initiation during goal-setting, priority of activities, and support and surveillance during the rehabilitation stay. Further, extended instruction in the activities was given priority in order to enhance efficacy in activities, and finally, relatedness support in the group of 11-14 participants was emphasised. Most of the physical activities were arranged in groups. The group setting is considered important (cfr. relatedness), with peer work and exchange of activity experiences between the participants. The range of activities offered by the rehabilitation centre (e.g., swimming, cross-country skiing, horseback riding) and, compared with other rehabilitation programs, often less traditional activities (e.g., aerobics, alpine skiing, kayaking), provide the opportunity to determine activities suited to the individual, and to facilitate the experience of autonomy, competence and relatedness.

Discussion of the samples

The number of persons with disabilities in Norway is based on estimates, but represents a relatively large group. The estimates vary, based on what criteria one assumes. Recent figures suggest around 80 - 100 people have traumatic spinal cord injuries per year, 200 people suffered traumatic head injuries and almost 15,000 people have strokes each year. Moreover, there are estimated to be approximately 600 people with spina bifida, 5-8,000 people with cerebral palsy, and about 5,000 with multiple sclerosis. 120,000 people are believed to have mental retardation. Approximately 200,000 people have a visual impairment and 80,000 a hearing disability (Conradi & Rand-Henriksen, 2004). In large population studies, up to 20% answered that they have problems in life with vision, hearing, carrying capacity, movement ability or employability. This corresponds to 7-800,000 people (Conradi & Rand-Henriksen, 2004).

In general, probability sampling would have strengthened the external validity, but that sampling method is not relevant in this case, because there are no records or lists of persons with disabilities available for such purposes. Based on the known literature probability sampling is not used in research on persons with disabilities in Norway. Far more

common is the selection based on the discretionary selection, where research is done on the sample that is available, often based on available information about groups or diagnoses, i.e., a non-probability sampling method.

When applying for access to informants for a study it is relatively common to ask for permission to contact informants with disabilities through a few different channels like membership organisations, registers / records at hospitals, or public records (for example, NAV-registers). Based on accessible information, contact with the participants through membership organisations was preferred. Some studies have gained access through the organisations, but there are several aspects to be aware of as a researcher:

- Address lists may be inadequate to date.
- Not all organisations distinguish between the types of membership (e.g. ordinary member or family-member) (Grue, 1998).
- The organisations have limited information about their members. We know that up to 30% of the members of the CP-organisation have a cognitive disability which may make it difficult for them to answer a questionnaire (Jahnsen, 2004).

We have do not know if this is a selected group. For example, we have limited information if this is a particularly resourceful group of people with disabilities who have the energy to engage in union work, or whether the organisations represent people who have a strong need for the organisation's assistance and support. In general, only the major diagnostic groups with resourceful interest organisations have the resources to help in any study.

The sample in study 2 was not representative of the whole population of persons with a disability, but it may be argued that to some extent it was representative of a sample with sensory or mobility impairment. Furthermore, it would have been a strength for the survey in study 2 if we could ensure the representation of participants with different levels of functioning, reflecting the variations in the groups. The procedure can be described as a quota selection (Lund et al., 2002). However, there is reason to be aware that subgroups which represent rare disabilities can easily become too small to be able to successfully perform statistical analyses properly.

For clinical exercise interventions (as in study 3), it may be necessary to conduct multicenter studies in order to obtain adequate statistical power and to generalize the findings of certain disability groups and, ideally, to certain subgroups within a specific disability (i.e.,

subjects with greater or lesser health and function). Because most experimental research is conducted with volunteers, it is difficult to generalize the findings of the study to the entire subgroup. People who volunteer for exercise-related research may generally be more motivated for physical activity or have a higher functional level or both. This is a common problem in experimental research but may be an even greater issue among people with disabilities because sample selection is limited to a small subset of the population (Rimmer, Chen, McCubbin, Drum, & Peterson, 2010).

The lack of a control group and randomization in study 3 also affects the external validity and, subsequently, the generalization of results. Results from studies where the sample has been purposely selected may not be generalized to other populations, since they may systematically differ from the population they were selected from and are representing. This situation is the case for the sample in both study 2 and 3.

In study 3, there are two more concerns about the sample which must be mentioned. The first is the sample size, which is not large enough to detect small changes, or to use several independent variables. The second issue is selection bias, and the fact that the participant in some way volunteered (they applied for a stay and were judged to be in need of rehabilitation by the admission-team at the rehabilitation centre) to take part in both study 2 and 3. It is reasonable to suggest that they differed from those who refused to participate. Following, some groups may then be underrepresented, and research results may not apply to them.

Low response rate may also result in some of the same methodological challenges, due to selection bias. The response rate in study 2 was 34.7%, and it is likely that those who responded were more interested in physical activity than those who refused to participate. Consequently, the generalizability is reduced. In study 3, average baseline level for physical activity was quite high, and one should keep this in mind when interpreting the results.

Given the complexity in identifying and recruiting individuals with disabilities for cross-sectional studies or exercise-intervention research, classifying subjects by function rather than disability may be an alternative approach to increase recruitment size and identify key health outcomes among disability groups. The use of the International Classification of Functioning, Disability and Health (ICF) would allow researchers to identify specific eligibility criteria by impairment (e.g., lower-limb paralysis) and/or activity limitation like the inability to walk (Rimmer et al., 2010)

Measurements

In this section, the measures that were used in study 2 and 3 are presented by the variable they measured.

Physical Activity. In study 2 and 3, physical activity was assessed using an adapted version of the self-administered short form of the International Physical Activity Questionnaire (IPAQ). This measure assesses total vigorous intensity physical activity, total moderate intensity physical activity, total time walking and time spent sitting during the last seven days. Time spent sitting was excluded in this study because asking wheelchair-users to report their time spent sitting during the last seven days is meaningless. IPAQ short form has been developed and tested for use with adults with an age range of 15-69 years and has shown acceptable reliability and validity (Craig et al., 2003). IPAQ had been translated into Norwegian previously, and has been used by the Survey of Living conditions (Wilhelmsen, 2009).

The examples of vigorous and moderate intensity activities used were not relevant for our sample. The IPAQ protocol allows the use of culturally applicable examples (IPAQ Research Committee, 2005). According to this, “fast wheeling/pushing in wheelchair” (vigorous-intensity), ”wheeling/pushing the wheelchair with moderate speed” (moderate-intensity), and ”wheeling/pushing the wheel-chair” as an alternative to walking was included. IPAQ provides a continuous variable (metabolic equivalent – minutes pr. week = MET-minutes pr. week) which was used as the dependent variable. There is no report on this measure being used on populations with disabilities. In order to check the construct validity, an alternative measure was used as a comparison. This was a description of leisure time activity with four possible answers, frequently used by the National Institute of Public Health (Graff-Iversen, Anderssen, Holme, Jenum, & Raastad, 2008). Albeit there is a difference between total physical activity (IPAQ) and leisure time physical activity, it will give an indication of activity level. With that difference in mind, a reasonable correlation with results from the IPAQ Short Questionnaire ($r_s = .632, p < .001$) was demonstrated. For psychometric properties, see paper II. For additional information, the participants reported which type of activity they participated in through an open question.

Functioning and disability. In study 2, the type of disability was inferred by which interest-organisation the participants belonged to (e.g., visually impaired). Mobility function was measured on a three-level scale ranging from: 1. “I can walk indoors and outdoors

without any aids”; to 3. “I am completely dependent on using a wheelchair”. For visual function, the scale ranged from: 1. “Can walk around outdoors without a guide or guide dog”; to 3. “Need guiding (or guide dog) when I am outdoors”. Participants also responded to the question about whether their disability was congenital or acquired. Need for personal mobility aids was measured by answering “Yes” or “No” to the question: “Are you in need of mobility aids to move around indoors or outdoors”? Finally, need for personal care was measured by one item asking how much time they spent on daily care procedures, indicating on a four level scale ranging from: “Less than one hour”; to “More than three hours”.

Environmental factors. Measures have been developed to assess environmental factors in the US (i.e., Rimmer, 2006), but the instrument was not suitable for this study, due to cultural differences. For the identification of specific environmental variables some of that research and the advice of an expert group at a rehabilitation centre using physical activity as the means of rehabilitation (Beitostølen Healthsports Centre), as well as interviews with patients, were used. Three activities in the local community were rated on a scale from one “*Not at all true*” to three “*Very true*” on easy access to facilities, good opportunities for transportation, low costs, available assistance, adapted activities, adapted facilities and a feeling of being welcome at the actual site (e.g., “The activity is well adapted to fit my ability”). As an expression for general environmental availability a mean score was generated from all seven ratings.

Functionality of personal activity equipment was assessed by a mean score derived from how well three statements about the equipment described their situation (e.g., “My personal activity equipment is functional and improves my ability”). The scale ranged from: 1. “*Not at all true*”; to 5. “*Very true*”. The participants also reported available time for activity (e.g., “I have the time to engage in leisure time physical activity”), availability of information about activities (e.g., “Information about appropriate activities is easily available”), the subjective feeling of having sufficient energy (e.g., “I have the energy to engage in physical activity in my leisure time”) and available activities in the local community (e.g., “There are opportunities for me to be physically active in my local environment”). The scales for the last four statements ranged from: 1. “*Not at all true*”; to 5. “*Very true*”. The present items were used in study 2.

Motivation regulation. Motivation-regulation for physical activity was measured by the Exercise Self-Regulation Questionnaire (SRQ-E), and was used in both study 2 and 3

(Ryan & Connell, 1989). The SRQ-E was translated into Norwegian by a bilingual researcher. Back-translation into English by a second bilingual translator was performed to ensure conceptual accuracy. Sample items are: “I try to be physically active on a regular basis because I feel like it's the best way to help myself” (identified regulation); and “I try to be physically active on a regular basis because I enjoy exercising” (intrinsic regulation). The responses were given on a seven-point Likert-type scale ranging from “*Very true*” (7) to “*Not at all true*” (1). In study 2, the subscales were analyzed separately. In study 2, the subscale for intrinsic motivation was used because it provided the clearest expression of the autonomous part of the continuum. In study 3, autonomous motivation scores were used in the statistical analysis. Autonomous motivation was estimated by averaging the sum of intrinsic and identified regulation items. The SRQ-E also included items for controlled motivation (i.e., introjected and external regulations) which in most cases are found to be unrelated to long-term adherence (Deci & Ryan, 2000). This was also the case in study 3, and controlled motivation was therefore not included in further analyses. Psychometric properties for the scale are described in paper II and III.

Exercise self-schema. Exercise self-schema in study 2 was measured as described by Kendzierski (1988). The scales consist of three items describing (on a scale from one to eleven) the person as an exerciser, and whether he/she considers this an important aspect of his/her self-image. The scoring criterion used to determine the “exerciser schematics” group required that a minimum of two items on both scales were scored at eight or higher. The participants who did not meet this standard were classified as “non-exerciser schematics”. Psychometric properties for the scale are described in paper II.

Perceived physical and mental health. Physical and mental health in study 2 and 3 were measured by the Medical Outcomes Study 12-item Short Form Health survey (SF-12). SF-12 consists of 12 items measuring the Physical Component Summary (PCS) and Mental Component Summary (MCS) variables, which are intended to reflect perceived physical and mental health respectively. The physical health summary contains the following four subscales: (i) Role physical (ii) Physical functioning (iii) Bodily pain (iv) General health. The four subscales for the mental health summary are: (i) Vitality (ii) Social functioning (iii) Role emotional (iv) Mental health. The SF-12 is widely used and has been validated for use in nine countries, including Norway (Gandek et al., 1998). As outlined by Ryan and Deci (2002), there is no specific measure to assess well-being or mental health in relation to self-

determination theory, and in line with their guidelines a generic measure (SF-12) was used to assess physical and mental health. Psychometric properties are presented in paper IV.

Autonomy support. The Health-Care Climate Questionnaire (HCCQ) concerns support for healthy behaviours (Williams et al., 1996). The original HCCQ is a 15-item measure which assesses participants' perceptions of the degree to which they experience their health-care providers during the intervention to be autonomy-supportive versus controlling in providing the treatment. The short form of the HCCQ that includes six of the 15 items was used (Williams et al., 1998). A sample item is: "I feel that the staff provided me choices and options". Items were responded to on a 7-point scale ranging from "*Strongly disagree*" (1) to "*Strongly agree*" (7). Scores were calculated by averaging the individual item scores. Autonomy support was measured after one week of the rehabilitation stay (baseline + 1 week). The scale was used in study 3. Psychometric properties for the scale are presented in paper II and III.

Need satisfaction. Psychological need satisfaction in study 3 was assessed by the Basic Psychological Needs in Exercise Scale (BPNES: Vlachopoulos & Michailidou, 2006). The BPNES was preferred because it was accessible in a translated version (from the English version to Norwegian, and back-translated to English), and because it has been developed in Europe, and according to Wilson and Bengoechea (2011), the BPNES is suitable for structured exercise settings and should apply well to the present study. This 12-item scale assesses perceptions of the extent to which the innate needs for autonomy, competence, and relatedness (Deci & Ryan, 2000) are satisfied in the domain of exercise. Sample items are: "The exercise program I follow is highly compatible with my choices and interests" (autonomy); "I feel I have been making huge progress with respect to the end result I pursue" (competence); and "I feel extremely comfortable when together with the other exercise participants" (relatedness). Each item was responded to on a 7-point scale ranging from "*Strongly disagree*" (1) to "*Strongly agree*" (7). Participants completed the scale at the end of the rehabilitation stay (Time 2). Separate scores for autonomy, competence and relatedness were made by averaging the sum of each of the four items. A score for total needs satisfaction was also calculated by averaging the sum of the 12 items. Psychometric properties for the scale are described in paper II and III.

Exercise self-efficacy. Exercise Self-Efficacy was measured by the ESES - Exercise Self-Efficacy Scale. The measure includes ten items made up on a ten-point Likert scale. A sample item is: "I am confident that I can overcome barriers and challenges with regard to physical activity and exercise if I try hard enough". Responses were given on a ten-point Likert scale ranging from "*Not at all true*" (1) to "*Always true*" (10). The scale has been tested for validity in a sample with 368 individuals with spinal cord injury. Preliminary findings indicate that the ESES is a reliable instrument with high internal consistency and scale integrity. Content validity both in terms of face and construct validity was satisfactory (Kroll et al., 2007). The scale was used in study 3. For further psychometric properties, see paper III.

Discussion of measurements

Assessing physical activity among persons with a disability. Most often, survey questions about physical activity are used to determine the relationship between physical activity and health in a population (Caspersen, Kriska, & Dearwater, 1994). Surveys are convenient methods to collect such information, since they are relatively inexpensive, cause minimal stress to the respondent, are modifiable for a special populations, and provide a acceptable level of validity and reliability (Caspersen, Powell, & Christenson, 1985).

Physical activity is a complex behaviour and the term may have been understood differently by the researcher and the participant. Consequently, it is important to clearly define the behaviour of interest (Sallis & Saelens, 2000). We assume that participant and researcher have a common understanding of the term "physical activity", "vigorous physical activity", "moderate physical activity" or "leisure activity". For people with little experience of activity, this could be a challenge. However, the physical activity questionnaire in the present study included descriptions of intensity, frequency and duration. Nevertheless, it may have been complicated for a person with a severe mobility limitation to decide level of intensity. This may affect both validity and reliability.

Most self-report instruments are developed for able-bodied, with few exceptions (Washburn et al., 2002), and walking is often the preferred modality. There is a need for additional research to develop more accurate methods for measuring physical activity in this heterogeneous population, with special focus on groups with mobility impairments (Cervantes & Porretta, 2010).

Most questionnaires about physical activity are primarily about leisure time physical activities which require energy expenditure at or above the energy costs of tasks of daily

living. These leisure time activities often include leisure walking, gardening, household maintenance activities, sports, recreation, and conditioning exercises. Physical activity questionnaires seldom include questions about activities of daily living (ADL). This has to be considered when developing the method and the questionnaire.

Measuring functioning and disability. One of the research challenges in this field is that we do not have knowledge about the impact of the disability on participation in physical activity. Disability in itself cannot be used as an independent variable, but it is appropriate to formulate indicators of functioning to see if they are associated with physical activity. The challenge is to make generic indicators for the impairment (Rimmer et al., 2010). There has been a call for more diagnosis-related studies, due to the fact that different diagnoses or impairments may have different impacts on the activity level. Researchers have more control over the variables in a homogeneous sample, and can easily argue for the methodological approach. In addition, there are a considerable number of instruments which are diagnosis specific and can be used as functional targets. Examples of this are the GMFCS (Gross Motor Function Classification System) used as gross motor classification in relation to people with cerebral palsy (Jahnsen, Villien, Stanghelle, & Holm, 2003). They documented that adults with mild levels of CP (GMFCS 1-2) were more physically active and had little physical therapy, while those with moderate to severe (GMFCS 3-5) were less physically active and had more need for physiotherapy. They also revealed an association between disability and participation in physical activity. GMFCS seems to be a suitable measure for functioning in CP, but so far, we have not found any generic measure of physical functioning.

Other areas may also serve as indicators of functioning. Examples of such indicators can be e.g., need for technical aids, need for assistance/services and employment. The International Classification of Functioning, Disability and Health (ICF) may also be used for classifying participants by function rather than disability. The ICF and subjects under the component "activities and participation" have been used as a basis for developing indicators of impairment (WHO, 2001). Rimmer (2006) points especially at the areas of learning and knowledge application (d1), communication (d3), mobility (d4) and self-care (d5) as important areas for participation in physical activity. Results show that symptoms of disability may have a mediating effect on the level of activity (Stewart, 2003).

Others have used generic measures (not diagnosis specific) of health-related quality of life to indicate functional health among persons with a disability. Examples of this are the SF 36 and SF 12 (Short Form 36 and 12). Both of these measures generate subscales for physical

and mental functioning (Ware, Kosinski, Turner-Bowker, & Gandek, 2002). However, it is important to emphasise that this is perceived physical and mental health, and in that respect, a personal factor.

Statistical analysis

In the review paper (paper I), only frequency data were presented.

Paper II: For descriptive analyses, frequency distribution and mean scores were used where appropriate. Comparisons of total physical activity between disability groups and between acquired/congenital disabilities were performed by one-way ANOVA with Bonferroni post-hoc test, or t-test. In order to study association between total physical activity (MET-minutes pr. week) and the independent variables, bivariate Spearman correlation analyses were performed. For identifying the relative importance of the factors in explaining the variance of total physical activity, stepwise linear regression analysis for the continuous dependent variables were performed.

Paper III: Pearson correlations were performed to detect bivariate associations between the variables. Regression analysis was used to create change scores (standardized residuals) for variables. Residual change scores were used to obtain gain scores that are uncorrelated with the pre-test scores, and measure if a person's post-test score is larger or smaller than a predicted value for that person (Waltz, Strickland, & Lenz, 2010). To test the process model and indirect relations, we used bootstrapping. Bootstrapping is a nonparametric resampling procedure, advocated for testing mediation which does not impose the assumption of normality of the sampling distribution. Compared to multiple regression, bootstrapping was used because it is more suitable and recommended for small sample sizes. Guidelines for final reporting were used, recommending 5,000 bootstrap samples (Preacher & Hayes, 2008). Repeated measures ANOVA were performed to analyse increases or decreases in mean scores of variables from Time 1 (baseline), over Time 3 (end of rehabilitation stay), to Time 4 (12 weeks after the end of the stay).

Paper IV: See analyses described for paper III. In addition to repeated measures ANOVA, paired samples t-tests were performed as post-hoc tests to analyse increases or decreases in mean scores of variables from Time 1 (baseline), over Time 3 (end of rehabilitation stay), to Time 4 and 5 (three and twelve months after the end of the stay,

respectively). For correlations and differences between means where the direction was expected, one-tailed significance tests were used. All analyses were performed with the Statistical Package for the Social Sciences (SPSS - versions 15.0 and 18.0).

Ethical aspects

The Regional Committee of Medical ethics and the Norwegian Social science Data Service approved the project in two parts, in February and September 2008, respectively (see Appendix 2). Data were analyzed after anonymisation in both studies. In the first study there was no explicit written informed consent. Information about the research project was given in a letter accompanying the questionnaire, and the return of the questionnaire was taken as consent to include the responders in the database and to use the data in the study. Phone number and contact information were provided in the information letter. In the second study written informed consent was sent to the potential participants, and those who wanted to participate returned their consent to sender (see Appendix 1). The ethical aspect may be that persons with a disability may have many unsatisfied needs, therefore effort was made in the information letter not to create any expectations of automatic follow-up of the participants. However, with help from the interest organisation, all those who responded in the first study got an information letter with a letter informing about the intervention stay, so those who were interested could apply for a rehabilitation stay at the Beitostølen Health Sport Centre. Further, those who applied for a stay were, due to the intake-policy, treated as other patients. It means that there was no randomization. of participants.

As discussed, the methods presented have several challenges which have to be considered when interpreting the results. These are; the study design, in particular the recruitment of the samples in both study 2 and 3, lack of randomization and control group in the intervention study (study 3), sample size in study 3, and the disadvantages of self-report. In the following chapter, the results from the studies are presented in summary as they appear in the four papers.

SUMMARY OF RESULTS

Paper I

Physical disability and physical activity: A review of the literature on correlates and associations

Saebu, M.

The search produced 4,189 articles; however, only 57 met all specified criteria. They were representing seven different disability groups, including one crossover category with two or more disabilities. The International Classification of Functioning, Disability and Health developed by the World Health Organisation was used as a structural framework for presenting the results. Results revealed a substantial core of research on a few disability groups, among them spinal cord injury (SCI) and multiple sclerosis (MS).

Several studies revealed that adult persons with a disability are less physically active than their able-bodied peers. Further, significant correlates were identified in relation to type of disability and functioning. In summary, increasing body mass index, low levels of health status, low mobility level, and low physical function seems to be correlated with reduced activity level. Increasing severity of MS, and severe degree of SCI or CP (cerebral palsy) also demonstrate high correlation with reduced activity level.

Regarding environmental factors, the trend in the literature revealed that costs, physical access, equipment, assistance and social support were the strongest environmental correlates to physical activity for persons with a disability.

Finally, several personal factors seem to interplay with physical activity. Increasing age, unemployment and depression is correlated with reduced physical activity, while high intrinsic motivation, coping skills and exercise efficacy are correlates of increasing physical activity.

Paper II

Factors associated with physical activity among young adults with a disability

Saebu, M. and Sørensen, M.

A total of 327 participants between 18 and 30 years with physical disabilities were finally included in the study. The adjusted response rate was 34.6%. The sample reported a mean score of total physical activity of 1,520 and 1,685 MET-minutes pr. week, women and

men respectively. Within the sample, the group with acquired disabilities reported significantly more physical activity ($M = 2,464$, $SD = 2,550$) than the group with congenital disabilities ($M = 1,396$, $SD = 1,778$), $t(73.9) = 3.1$, $p < .01$). The most frequently reported activities were dance, swimming, horseback riding and boccia. Some took part in activities in a gym or a fitness-centre (17.6% women and 10.6% men).

Of the variables representing functioning and disability, the question “no need for personal aids” demonstrated the strongest correlation with total physical activity (see Table 2 – paper II). Among the environmental factors, “available local activities” demonstrated the highest correlation with physical activity. The strongest positive correlation among the personal factors occurred between physical activity and having a self-schema as a physically active person (exerciser schematics), while perceived physical health (PCS) and high intrinsic motivation demonstrated relatively high associations with physical activity.

Based on these correlations, separate linear regression analyses for the different components in the ICF were performed. In the analyses, all factors with significant correlations ($p < .05$) from the correlation analyses were included. The model included MET-minutes pr. week as the dependent variable, and fourteen independent variables. In the next step, the variables that contributed significantly to the regression in a hierarchical stepwise regression were included.

Seven variables contributed significantly to the equation (see Table 5 - paper II). Together, they explained 31% of the variation in physical activity. Being an “exerciser-schematic” represented the strongest contribution, with high intrinsic motivation, low need for personal activity equipment, available local activities and being employed as significant contributors. Having an acquired disability and high perceived physical health (PCS) also played a role

Paper III

Motivation for physical activity in young adults with a physical disability during a rehabilitation stay: A longitudinal test of Self-Determination Theory.

Saebu, M., Sørensen, M., and Halvari, H.

We tested a Self-Determination Theory process model (Deci & Ryan, 2000) during a 3-week physical activity rehabilitation stay among young adults with a physical disability ($N = 44$, $Mage = 24.7$, $SD = 5.1$). Due to the small sample size, we reduced the number of variables in the analyses by testing two process models separately: (1) a model including

autonomy support, needs satisfaction, and changes in autonomous motivation, efficacy and physical activity from the start of the rehabilitation stay and until departure; and (2) an alternative model including autonomy support, needs satisfaction and total physical activity at Time 3.

As hypothesized, perceived autonomy support positively predicted needs satisfaction at the end of the stay ($r = .38, p < .01$). Further, needs satisfaction was positively linked to changes in autonomous motivation for physical activity ($r = .47, p < .01$). Both changes in autonomous motivation and self-efficacy were associated with physical activity increases over the stay ($r = .57, p < .01$ and $r = .47, p < .01$, respectively).

The results supported significantly the indirect relations between autonomy support and change in autonomous motivation through needs satisfaction, and between needs satisfaction and change in physical activity through change in autonomous motivation. We also noticed support for the positive indirect link between autonomy support and total physical activity 12 weeks after the intervention through needs satisfaction. The correlations between autonomy support and the three single needs for autonomy, competence and relatedness, respectively, were all weaker than the correlation between autonomy support and total needs satisfaction. Partly due to this, no single need did significantly mediate the links between autonomy support and change in motivational variables. In sum, bootstrapping results supported the SDT process-model, indicating a support for a development towards more self-determined motivation in rehabilitation.

Further, repeated measures ANOVA revealed that total physical activity increased significantly from the start of the rehabilitation stay at T1 and until the follow up (T3) twelve weeks after the intervention, $F(1.26, 54.12) = 12.05, p < .001$. (Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity). Further, efficacy increased significantly from T1 to T3, $F(2, 79) = 3.95, p = .023$. Finally, mean for autonomous motivation increased, but not significantly, from T1 to the end of the rehabilitation stay, and remained relatively high after twelve weeks.

Paper IV

Autonomy support and perceived health after in-patient physical activity rehabilitation in young adults with a disability: The mediating role of needs satisfaction

Saebu, M., Halvari, H., and Sørensen, M.

Among physically disabled young adults ($N = 44$, M age = 24.7, $SD = 5.1$), we tested the hypotheses that: (1) an autonomy-supportive intervention based on adapted physical activity would lead to increases in both physical and mental health at the three- and twelve-month follow-ups, relative to the baseline results; and (2) that perceived autonomy support measured early in the intervention would positively predict needs satisfaction at the end of the intervention stay, which in turn would positively predict changes in mental and physical health.

The results demonstrated a longitudinal effect on the physical health summary, including the role physical subscale, while the effect on the mental health summary and mental subscales decreased after the end of the intervention period. An exception was scores for vitality which were significantly higher at three months and twelve months than at baseline.

According to the predicted links in the SDT process model described, autonomy support significantly predicted needs satisfaction, which in turn predicted changes in the subscales of vitality, mental health, role emotional, as well as in the mental health summary. Further, needs satisfaction also predicted change in physical role from baseline until the follow-up after three months, and positive change in mental health summary during the intervention period predicted reduced negative change in general health from the end of the rehabilitation stay and until three months after the stay.

The statistics for the change in mental health summary indicated that total need satisfaction mediated the relationship between autonomy support and the change in mental health summary (see paper IV, Table 5, row 1). Further, both role emotional and vitality were mediated by total needs satisfaction, representing the strongest contribution to the mental health summary. Among the physical subscales, needs satisfaction mediated the link between autonomy support and change in role physical from baseline and up to three months. Finally, need satisfaction also had an indirect effect on change in general health from the end of the intervention (T3) and up to three months (T4), since the confidence interval included two negatively-valued coefficients (see paper IV, Table 5, row 6). In addition, we also mention that the autonomy need was the only single need that mediated the link between autonomy support and the three subscales; role emotional, vitality and mental health.

In summary, autonomy supportive physical activity intervention over three weeks at a rehabilitation centre lead to change in perceived physical health (SF-12) over 12 months. Further, a Self-Determination Theory process model was tested and autonomy support positively predicted psychological needs satisfaction at the end of the stay which was

positively linked to changes in mental health during the stay and positively linked to changes in role physical three months after departure.

DISCUSSION OF RESEARCH QUESTIONS

Research question 1

What is the knowledge-base in the literature that examines correlates and associations of physical activity among adults with a disability (Paper I)?

In the past thirty years we have seen a development in research on physical activity and disability. During the eighties researchers were concerned about the health benefits of physical activity on persons with a disability, and called for training guidelines for this population (eg., Compton, Eisenman, & Henderson, 1989). The public health perspective was still strong during the nineties (eg., Heath & Fentem, 1997), but an emerging interest for correlates, determinants and associations between physical activity and disability could be discerned (Kinne, Patrick, & Maher, 1999). Today, there exists more knowledge about this population and also about various disability groups. There is also an increasing amount of research connected to activity level and methods for measuring physical activity and exercise in this population (Cervantes & Porretta, 2010; Washburn et al., 2002). The results from this study revealed a substantial body of research on a few disability groups, among them spinal cord injury and multiple sclerosis. Number of incidences, scientific environment, and the choice of topics, as well as economical issues and grants may be a part of the priority in this field.

Through the examination of relevant studies, significant correlates were identified in relation to type of disability and functioning, but also among environmental factors (e.g. costs, accessibility, built environment, information and social support) and personal factors (e.g. age, exercise self efficacy, depression, mental health). The results revealed a need to establish a stronger evidence base to increase our knowledge of correlates and associations in relation to physical activity and disability. The results also revealed a need for common measurement methods to assess physical activity among disabled. This is in line with previous research (Cervantes & Porretta, 2010). Most self report questionnaires are based on activities and examples for able-bodied, with walking as the preferred modality. This makes it difficult e.g. for people in a wheel-chair to recognize activity, and for researchers to compare results. More objective measurement methods like accelerometers should be developed to be used e.g. in a population with wheelchair users.

A need for research on correlates and associations in relation to physical activity and disability among specific diagnosis, especially among low-incidence groups, was also

revealed. The results indicated that there are differences between different disability groups, probably depending of characteristics and severity of the disability. There seemed to be a lack of knowledge about the effect of functioning in relation to body mass index. Among the environmental factors, we emphasise the need for research on informational routines and how to reach the targeted populations. The impact of gender among people with a disability seems to be an understudied issue in physical activity and disability research. Some studies have indicated small or no differences in the activity levels of male and female participants (Boslaugh & Andresen, 2006), contrary to research among able-bodied where male gender are associated with higher activity level. Further, we must increase our knowledge about self-regulation and motivational processes. With the exception of a few attempts (Kosma, Cardinal, & Rintala, 2002; Martin, 2006), the knowledge about disability, physical activity and motivation is scarce. Finally, we call for more theory-based research in order to identify different aspects of physical activity behaviour.

Research question 2

What is the level of physical activity among young adults with a physical disability who are members of an interest organisation (Paper II)?

The young adults with a disability in study 2 reported less physical activity than a comparable able-bodied national sample of the same age, measured by MET-minutes pr. week (Anderssen & Andersen, 2004). In that study able-bodied females (n=167) and males (n=144) aged 18-30 years were about three times more active than those in the present study. About one out of three met the recommendations of being physically active in a moderate pace for about half an hour a day (Anderssen & Strømme, 2001; Haskell et al., 2007). There are few studies on young adults, but looking at the studies including adults with a disability, several studies support these results (Boslaugh & Andresen, 2006; Ellis, Kosma, Cardinal, Bauer, & McCubbin, 2007; McGuire, Strine, Okoro, Ahluwalia, & Ford, 2007; Rimmer et al., 1999; Santiago & Coyle, 2004).

The amount of physical activity among the young adults with a disability demonstrated some differences between types and degrees of functioning and disability which could be expected, and similar results have been revealed among persons with severe CP (Jahnsen et al., 2003; van der Slot et al., 2007), increasing MS (Becker & Stuifbergen, 2004; Motl, Snook, McAuley, Scott, & Hinkle, 2007; Motl, Snook, McAuley, Scott, & Gliottoni, 2007) and in persons with a high level spinal cord injury (Tasiemski, Kennedy,

Gardner, & Blaikley, 2004; van den Berg-Emons et al., 2008). Those with an acquired disability often have experience in sport or physical activity prior to acquiring their disability (Sherrill & Williams, 1996). For those with congenital disabilities, it may be a question of overprotection by parents (Grue, 1998). Both may explain the higher physical activity level among persons with acquired disabilities.

The sample reported a mean score of total physical activity of 1,520 and 1,685 MET-minutes pr. week, women and men respectively, which approximately corresponds to 400 minutes pr. week with moderate physical activity, or about an hour a day. However, this includes all kind of activities which “take moderate physical effort and make you breathe somewhat harder than normal”, and it includes a lot of different activities persons do at work, as part of house and yard work, to get from place to place, and in spare time for recreation, exercise or sport (IPAQ Research Committee, 2005).

In addition, 27,3 % ($N=327$) of the sample, took part in one or more organized physical activities (Males 24,5% and females 29,7%). Most frequently reported were dance, swimming, horseback riding and boccia. A few took part in activities in a gym or fitness-centre (17.6% women and 10.6% men). Participation in organized physical activity corresponded reasonably well with data from “Survey of living conditions 2007” (Vaage, 2009), but Vaage (2009) found that among people (age 16-44 years) who had problems with participation in leisure time activity, 23 % reported that they had visited a fitness centre during the last twelve months. For able-bodied the count was 42%.

Based on the chi-square analyses, we performed logistic regression analysis for the different components in the ICF structure. In the initial analysis we included eight factors with significant correlations ($p < .05$). The final model included the three variables that contributed significantly to the initial logistic regression (intrinsic motivation, physical component sumscore and low functional personal activity equipment). The results are given in OR (odds ratio), which are approximations of the likelihood to be active if the value of the predictor variables is increased by one unit. The results from the logistic regression are shown in Table 3. Analyzed together the three variables still contributed significantly to the equation. High intrinsic motivation increased the odds ratio for participation in organized physical activity by 1.6, and low functioning personal activity equipment reduced the odds ratio for participation by 0.6. The physical component sum score (PCS) demonstrated significance, but not meaningfully (odds around one).

About one third of the sample took part in some kind of organized physical activity, and in this respect there were no significant gender differences. Compared to another national

able-bodied sample, this is more similar to the population without a disability (Vaage, 2009). However, it should be taken into consideration that the data are not based on exactly the same question.

Table 3. Odds ratio (OR) of participation in organized physical activity (logistic regression) of young adults with a physical disability

Variable	OR	95 % CI.for OR	
		Lower	Upper
High intrinsic motivation	1.6 **	1.3	1.9
Physical Component Summary (PCS)	1.0 *	1.0	1.0
Low functionality personal activity equipment	0.6 **	0.4	0.8

CI = confidence interval. * $p < .05$, ** $p < .01$.

These results are supported by other research findings. People with disabilities seem to use gyms and fitness centres less than the general population. In 2006, six out of ten of the general population (Vaage, 2009) used such facilities regularly compared to one out of seven persons with a disability. Various barriers are reflected in the differences in activity level between the types of disabilities. The absence of individuals with a disability at health clubs and fitness centres has also been reported from the US (Rimmer, Riley, Wang, & Rauworth, 2005). In his study, Rimmer focused on disability-unfriendly physical activity environments; inaccessible buildings, lack of equipment, information, staff training, policies and procedures. Our data indicate that most of the respondents had physical access to one or more physical activities in their local community. On the one hand, there may be some cultural differences at play to explain such differences between the US and Europe, but on the other hand we may need to look for other explanations.

The conclusion was that a majority of the sample in this study did not meet the national recommendations for physical activity (Helsedirektoratet, 2005), and the average activity level was low, compared to the able-bodied population.

Research question 3

What is the relative importance of functioning and disability, environmental, and personal factors for total physical activity among young adults with a disability who are members of an interest organisation (Paper II)?

On average, women were about as active as men. This finding is supported in American studies (Boslaugh & Andresen, 2006; Longmuir & Bar-Or, 2000). Among able-bodied, female gender is often associated with a lower level of physical activity, but this is not the situation in the present study. Can impairment and reduced mobility be a more disabling condition for men than for women? Alternatively, can disability overrule gender? We may speculate on different reasons for this, but nevertheless, further investigation is needed to study this issue.

Personal factors explain more of the variance in total physical activity than do environmental factors and factors related to functioning and disability (see paper II). The personal factors were: identity as a physically active person (being an exerciser schematic), and intrinsic motivation. This means that personal ideas about the self, and experiences with physical activity, seemed to be important factors for involvement in physical activity for those with a disability. The strongest association was demonstrated by having a self-schema as an exerciser. This is congruent with research findings in the general population (Kendzierski, 1988; Yin & Boyd, 2000), and corresponds well with the finding that athletic identity was associated with a likelihood of continued sports participation among individuals with a disability (Martin, Smith, & Adamsmushett, 1995).

The other personal factor strongly associated with higher physical activity level was intrinsic motivation. This is in line with previous research among able bodied (Wilson & Rodgers, 2004; Wilson, Rodgers, Fraser, & Murray, 2004). According to self-determination theory (Ryan & Deci, 2000b), it is a question of whether physical activity satisfies the need for autonomy, competence and relatedness. Self-determination research in exercise implies that psychological need fulfilment is associated with more self-determined exercise motives, i.e. intrinsic motivation-regulation (McDonough & Crocker, 2007; Wilson, Mack, Muon, & LeBlanc, 2007). This is interesting, in relation to the strong focus of the media and health-authorities on the health imperatives of being physically active. However, that represents an controlled motivation regulation, which according to the theory is less likely to maintain the behaviour in question (Ryan & Deci, 2000b). It may well be that an overemphasis on the health consequences of the population with disabilities may partially explain the lower physical activity levels.

Results from the present study supports previous studies in relation to motivation and identity (Martin, 2006; Scelza, Kalpakjian, Zemper, & Tate, 2005; Tasiemski et al., 2004). Several studies have emphasised the importance of personal variables and few studies

have investigated motivational issues, but some do exist (Kinne et al., 1999; Kosma et al., 2002). However, there is still a lack of knowledge in this field.

The participants in this study reported perceived physical and mental health, and this represents the participants' experience of their functioning and disability. As has been demonstrated before, there was a clear association between physical disability and perceived physical health (Roe et al., 2008). Further, a perception of positive physical health demonstrated a significant positive correlation with activity level. This supports the findings discussed earlier about the fact that the severity of mobility limitation may affect the activity level. Thus, perceived low physical health may be a practical barrier for physical activity.

One environmental factor seemed to be important. Existing activity possibilities in the local community contributed significantly to the total physical activity equation, also indicating that transportation and time are central factors. Transportation has been emphasised in several studies as an important environmental factor (Rimmer et al., 2008; Rimmer, Rubin, & Braddock, 2000) It makes sense that available local activities make it easier to be physically active, for example by reducing the need for transportation and time. Several other environmental variables demonstrated meaningful correlations, emphasising the importance of functional personal activity equipment (Stuifbergen & Becker, 1994), and strengthens our assumption that there is a need to improve the distribution of, and access to, such equipment. Few studies are dealing with questions about technical aids. In our country, financial support is given via our social security for technical aids for sport and exercise, up until a person is 26 years old. However, as the mean age in this study was just over 24 years, many in this sample may not have experienced the challenges connected to expensive technical aids. It should also be taken into consideration that these findings are from a small country which has reasonably good resources to spend on facilitating participation in sport for individuals with a disability. These results support results from a study among people with MS, where participants were more likely to engage in a health-promoting lifestyle if they required less mechanical assistance (Stuifbergen & Becker, 1994), if we interpret that less mechanical assistance also indicates high physical functioning.

Only a few of the indicators of functioning and disability emerged as important correlates of total physical activity in this study. Employment was positively associated with physical activity, and supports previous research in a study among persons with MS (Motl et al., 2007). Higher education was significantly correlated with physical activity even though it did not contribute significantly to the regression model. The relationship with education is consistent with the data from the general population (Vaage, 2009), and in the present study it

may indicate higher functional capability. The same could be said in relation to employment, even though it may be argued that those who are employed may have less time to engage in physical activity.

Persons with cerebral palsy were significantly less active than persons with visual impairment, indicating that there is a difference between different diagnoses, similar to previous research (Longmuir & Bar-Or, 2000). Nevertheless, the results support a call for more intensive research on more homogenous groups, to increase our knowledge about the different challenges in relation to different disabilities, or the similarities (Rimmer et al., 2010).

Research question 4

What is the impact of an autonomy supportive intervention on motivational variables and total physical activity in a sample of young adults with a disability (Paper III)?

The intervention study was carried out at a rehabilitation centre, based on adapted physical activity as the primary means of rehabilitation. Patient autonomy was emphasised by providing opportunities for choice and self-initiation during goal-setting, priority of activities and support and supervision during the rehabilitation stay.

There are different approaches to motivation, and while enjoyment (Kosma et al., 2002; Martin, 2006; Sandstrom et al., 2009) is representing autonomous motivation, awareness of the health-benefits of physical activity (Stroud, Minahan, & Sabapathy, 2009) may represent a controlled motivation-regulation. Health professionals may assume that persons with a disability are motivated by the health imperatives, but additional research is needed to increase our knowledge about these issues.

As predicted, autonomous motivation was associated with increased total physical activity. In rehabilitation, the focus has often been on the health imperatives for physical activity (Shifflett et al., 1994), but this study indicates that autonomy support and autonomous motivation plays an important role in predicting physical activity for people with a disability. It further supports the self-determination theory by confirming the relation between autonomy support, satisfaction of psychological needs, autonomous motivation and healthy behaviour (Ryan & Deci, 2000b; Wilson et al., 2006).

In the present study, autonomous motivation was a mediator of the relationship between changes in needs satisfaction and change in physical activity level. This mediation supported previous research among able-bodied (Chatzisarantis & Hagger, 2009; Fortier et

al., 2007). Thus, there is a need for additional research to examine other possible mediators between the autonomy supportive intervention and change in physical activity for people with a disability.

Furthermore, we also recognize the indirect link between autonomy support and autonomous motivation, through need satisfaction. The results revealed a high level of need satisfaction (see Table 2, paper III), indicating that autonomy, relatedness and competence together played a role for the direct link to autonomous motivation. This is not surprising, as many of the participants highlighted the autonomy-supportive staff, facilitation for optimal challenges in activity and the social benefits of being with other people with disabilities during the rehabilitation stay. The link between need satisfaction and more autonomous physical activity motives has also been demonstrated in previous research (Hagger, Chatzisarantis, & Harris, 2006; Vlachopoulos & Michailidou, 2006; Wilson et al., 2006).

Among the needs, relatedness seems to be the most important one in this study, as it seems to interplay with autonomous motivation during and after the rehabilitation stay, and is indirectly linked to efficacy through autonomous motivation (see paper III, Table 3). This may be explained by the participant's unique opportunity during the rehabilitation stay to share experiences with other persons with disabilities in adapted activities, and to be valued by experienced disabled peers who acknowledge the effort made. For many of the participants this is quite unusual in their local environment, due to a limited amount of persons with disabilities being physically active in small communities. However, the results are not in line with previous research among able-bodied, demonstrating that perceived relatedness was linked with controlling regulations for exercise (Peddle, Plotnikoff, Wild, Au, & Courneya, 2008; Wilson et al., 2007).

Participants may have felt connected to the staff and the other participants during the stay. Consequently, this may contribute to the changes in autonomous motivation during the stay, and following, indirectly making the participants more vulnerable after the stay, caused by the loss of contact with the rest of the group. We may also speculate that they gained autonomy and competence during the stay, which is something they internalize, and thus are less vulnerable. The results also indicated that the lack of relatedness after the stay overran the effects of satisfaction of autonomy and competence, and consequently there were zero correlations between total need satisfaction and the motivational variables (autonomous motivation and efficacy) from the end of the rehabilitation stay and until twelve weeks. The different impact of the needs may also contribute to the lack of predictive variables for the change in physical activity from T2 to T3, with an exception for autonomy support.

The results connected to relatedness may imply that there is a need to make the participants less vulnerable after the stay while they are acutely missing the support of their physical activity peers and the staff. Key strategies may be links to local support groups after a rehabilitation stay, or continued contact with the staff and other participants via e-mail or a website.

According to Williams et al. (2004), patients are more likely to feel able to control important health outcomes when they are initiating the behaviour themselves. Results from the present study correspond well with Williams et al. (2004), who emphasised the importance of clinicians to support patients' self-initiated attempts to master a new technique or skill, and to encourage them to make informed decisions about healthy behaviour. Over time, the patients will internalize the regulation of the behaviour, and become more autonomous and competent in making healthy behaviour changes and then sustaining the changes over time. This should also apply to people with a physical disability in a rehabilitation setting. Different studies have shown that autonomous motivation has strong connections with positive emotions, interest, and enjoyment of physical activities (Reeve & Deci, 1996; Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). In the present study, the strength of correlation between autonomous motivation and total physical activity indicates that this type of motivation is also important for persons with a disability.

Research question 5

How does an autonomy supportive intervention affect changes in perceived health in a sample of young adults with a disability, and what is the role of psychological need satisfaction in these changes (Paper IV)?

Few studies have examined the relationship between disability, physical activity and well-being, but we are aware of one study where the authors revealed that individuals who use wheelchairs perceived a number of psychological, social, and health benefits associated with physical activity involvement (Giacobbi jr., Stancil, Hardin, & Bryant, 2008). Further, Wilson and colleagues examined the relationship between perceived psychological need satisfaction and well-being in exercise among able-bodied in a study based on self-determination theory. Correlation analyses indicated that perceived need satisfaction was differentially associated with positive and negative affect. These results suggest that perceived psychological need satisfaction in exercise contributes to global and contextual well-being (Wilson et al., 2006).

According to the results presented in paper IV, the described intervention increased the participants' perceived physical health. These results provided partial support for the first hypothesis, and supported previous results in rehabilitation research (Motl & McAuley, 2009; Roe et al., 2008; Stuifbergen et al., 2006). Further, it also supported research among able-bodied in relation to self-determination theory, where perceived psychological need satisfaction contributed to both physical and mental health and well-being (Miquelon & Vallerand, 2008; Wilson et al., 2006). The results represent knowledge that should be helpful in order to reach the national goals for rehabilitation, where increased activity and participation in the society are among the most important and general objectives. As outlined in previous research, people with physical disabilities report reduced mental and physical functioning compared to able-bodied (Roe et al., 2008), and rehabilitation strategies which can contribute to reducing such a gap are important. Increased perceived physical health may also be important for managing daily life activities (Kemp & Thompson, 2002), and having sufficient capacity for participating in leisure time activities.

Among the physical subscales, we noticed a significantly increased role physical score, and similar results have been demonstrated in other studies (Fletcher, 1995; Roe et al., 2008). This indicates that the participants felt they accomplished more in their daily lives, and were less limited in their activities. Among the four physical subscales, we noticed that the physical function was not affected, indicating that this subscale mainly reflects the participants' physical disability which in itself did not change. This is in line with previous research (Roe et al., 2008; Saebu & Sorensen, 2010).

We also observed that mental health summary increased significantly during the intervention, but was reduced after the next three months. This supports the finding by Roe et al. (2008), which addressed whether the improved mental health was a kind of a "holiday-effect" during the rehabilitation stay. We have no further results to support this interpretation, but find it interesting that the physical health summary seemed to be better maintained after the intervention than the mental health in the present study. A possible explanation may be that the social support or group identity effect experienced during the stay had faded away in the home situation.

According to Table 2 – paper IV, the change in mental health summary during the stay had an indirect effect on general health, indicating that those who had the most extensive increase on the mental health summary had less reduction in the general health subscale the three months after the rehabilitation period than those with small increases in the mental health summary. There is no obvious explanation for this result, but those who had the highest

increase in mental health summary during the stay may have been so satisfied with their improvement and their general well-being after the intervention period, that this may have had an impact on the level of reduction in perceived general health after the stay. However, the link between mental health and self-rated general health should be further investigated longitudinally as part of interventions.

The subscale for vitality is based on a question about perceived energy, and the result indicates that this subscale represented the strongest contribution to the mental health summary. Scelza, Kalpakjian, Zemper and Tate (2005) reported that lack of motivation, lack of energy, and lack of interest were the most frequently cited barriers to exercise among individuals with a disability. An increase in vitality may therefore be important for maintaining an increased activity level after a rehabilitation stay; having sufficient energy in order to be physically active.

In the process model, we noticed the strong association between autonomy support, need satisfaction, and mental health summary, with vitality and role emotional as the strongest contributors among the mental variables. The bootstrap results also demonstrated an indirect effect of autonomy support upon mental health summary, including both vitality and role emotional subscales, indicating that autonomous functioning is important also for the experience of having accomplished activities without any emotional limitations. Further, we emphasise the link between autonomy support, need satisfaction and role physical after three months, indicating that autonomy support and psychological need satisfaction can predict physical health variables. This supports previous research (Miquelon & Vallerand, 2008). Among the individual psychological needs, the autonomy need demonstrated the strongest correlation. This supports the point that autonomy support may be especially important for need satisfaction among people with a physical disability, because autonomous functioning may be a particular challenge for this group. Many have experienced need for assistance throughout their lives, and the need of being self-determined may be challenged.

Further, the intensive treatment led to significant changes in health-related variables during the rehabilitation stay, but we cannot conclude that perceptions of need satisfaction led to changes in the mental health variables, since the need satisfaction was measured at the same time as the improvements in the mental outcome variables. The relations could have been bidirectional, or the improvement in mental health variables might have affected the level of perceived need satisfaction.

In sum we recognized that both mental and physical health summary scores improved during the intervention period. Of them, only physical health summary scores remained

significantly higher twelve months after the rehabilitation stay. The autonomy supportive physical activity intervention with emphasis on psychological needs seemed to enhance role physical outcomes among the physical subscales, and vitality among the mental subscales. Based on our findings, physical health variables seem to be better maintained than the mental health variables in the present study after the intervention period. The present study supported the self-determination theory model, where the subscales for vitality and role emotional were the strongest outcome contributors during the rehabilitation stay. We have not previously seen the SDT health process model applied in a setting among people with a disability, with physical and mental health as the main outcomes. There is a need for additional research to develop and test self-determination and autonomy supportive interventions which include ways to improve health care practitioner autonomy supportiveness (Williams et al., 2004).

GENERAL DISCUSSION

The introduction to this dissertation raised a question about similarities and differences between persons with a disability and able-bodied persons, as related to physical activity. The results of this dissertation may indicate some answers to these complex questions. As outlined in the “Summary of results” section, there are several issues regarding functioning and disability, environmental and personal factors that may differ.

The results of this dissertation confirm previous findings in that this sample of individuals with a physical disability demonstrate lower levels of physical activity than comparable populations of able-bodied persons. Looking at the similarities of the correlates of physical activity comparing persons with a disability and able-bodied, we can include most of the personal factors. Factors such as autonomous motivation, exercise schema and perceived positive health are general correlates that are present and important issues among persons with a disability as well as among able-bodied. Consequently, this should be a central focus for future research as well as a central focus in rehabilitation.

Nevertheless, there are differences when it comes to environmental factors and barriers for physical activity. Environmental barriers such as lack of access to technical aids or equipment are not barriers for able-bodied in the same way as for a person with a mobility impairment or a sensory impairment. The review in paper I also reported other restricting factors like need for assistance and access to built environment that also seems to be quite unique for persons with disabilities. Finally, the disability in itself seems to be a unique associated factor that will impact physical activity level. Severity of mobility limitation and type of disability will make a difference.

These factors may to some extent explain the lower activity level among people with a disability than among able-bodied. In addition, as for able-bodied, low activity level will also be explained by low autonomous motivation, low exercise schemata and perceived poor health. The findings indicate that personal factors are important, and probably more important than we have been aware of previously. In general, professionals have been concerned about intervening at the environmental level and at the disability level, and unconsciously taken for granted that the health benefits, (i.e., controlled motivation) are sufficient motivation for the development of healthy behaviour. However, this approach seems to be too limited, and there is a need to carry out interventions that investigate the impact of personal factors (e.g., autonomous motivation) on physical activity. Pleasure, fun, mastery and achieving new goals are important elements in this approach, and should give directions for foci in facilitating

physical activity for persons with a disability. The awareness about this kind of knowledge seems to be higher for able-bodied individuals, but appears to be overlooked in rehabilitation due to our focus on the disability.

It may also be convenient to blame sources in the environment for a low activity level. It is easier to focus on environmental factors than the personal ones. In addition, some of the challenges in the environment may be easier to grasp, and probably easier to solve with concrete proposals or solutions. I must emphasise that there is still a need to keep the focus on the environmental challenges, in combination with disability and functioning. According to the results in the present studies they play an important role, and the personal factor approach comes in addition to those previously mentioned here.

The need for focus on the personal factors, including enhanced motivation, leads us to strategies to increase autonomous motivation. Following the self-determination theory, satisfaction of the basic psychological needs for autonomy, competence, and relatedness are crucial in enhancing autonomous motivation. As earlier outlined, autonomy may represent a particular challenge for people with a disability, especially those in need of assistance and help during their daily activities and leisure time activities. Even though autonomy is more than independence (Ryan & Deci, 2002), from my point of view the need for assistance will to some extent affect their experience of being the perceived origin of their own behaviour. Following, autonomy supportive behaviour from professionals and volunteers who facilitate physical activity may be an important contribution to encourage persons to act according to their own interest and integrated values.

The strategy must also include ways to increase exercise-efficacy and perceived competence. Perceived competence refers to a felt sense of confidence and effectance in a social context (Ryan & Deci, 2002). I will emphasise the social frame for this concept; exercising alone in an individual activity may not necessarily increase your perceived competence. The need for competence leads us to seek optimal challenges, and as a professional at a rehabilitation facility, or as a volunteer in a sports organisation, we have the opportunity to facilitate optimal challenges for the targeted group.

Relatedness is connected to competence because of the need to demonstrate competence in a social context. Feeling connected to others, to caring and being cared for by those others, to have a sense of belongingness with other individuals and with one's community (Ryan et al., 1995) increases your feeling of relatedness, and increases your chances for the experience of perceived competence, too. For people with a disability, being in a social setting where the others know how to value your skill is an important source of

both perceived relatedness and competence. We must facilitate settings where persons with a disability can meet others who know how to appreciate their skill or performance.

According to the theory, autonomy support and need satisfaction will lead to increased autonomous motivation, and subsequently to increased levels of activity. The combination of need satisfaction and increased activity levels may also impact one's sense of well-being and mental health. In summation, the findings support an approach to physical activity and disability where the person is more important than the disability and the environment.

Strengths and limitations.

The present investigation adds to previous research in several ways. The main strengths of the studies are the focus on a subgroup that has been paid little attention in physical activity research (Rimmer et al., 2010), and the use of theory as a base. There is a lack of studies in physical activity and disability research that are soundly based in theory (Kosma, Cardinal, & McCubbin, 2003), and the present studies will help that situation. Further, as motivation is an understudied issue in disability- and rehabilitation research (Kosma et al., 2002), the present study represents a much needed contribution.

However, several methodological limitations discussed under "Methods" must be taken into consideration when interpreting the results of the present research. These include study designs, selection bias, and generalization as well as questionnaire data. Further, we must realize that these results are based on quite limited numbers of participants, so there are reasons to be careful and not too rigid in our conclusions and the possibility for generalisations of them. To some extent, the theoretical approach also limits our findings. Using a theoretical approach provides the possibility to identify and explain factors that may interplay with physical activity, but also includes selection of some variables in line with the theory, and excluding variables that might have played a role. Further we must emphasise the complexity of the field with a heterogeneous sample. Some of the limitations are discussed in the individual papers, but here we may emphasise the general limitation in relation to a self-report questionnaire, and especially the limitations implied when measuring physical activity among persons with a disability.

Questionnaire data and self-report limitations. Self-report is the most commonly used method for measuring physical activity (Baranowski, 1988; Sallis & Saelens, 2000). However, self-reported questionnaires have several limitations which may reduce the validity and reliability of the results (Sallis & Saelens, 2000). *Reliability* refers to the consistency with

which an instrument assesses an object of measurement (Sallis & Owen, 1999). Reliable instruments are relatively free from unsystematic errors and will therefore produce similar results across time and across items. Reliability is necessary, but not sufficient for a measurement to also be valid (Sutton & French, 2004). Validity is the degree to which an instrument measures what it is intended to measure (Baranowski, 1988). Valid measurements are relatively free from systematic errors. There are also other important sources which may impact validity and reliability of questionnaire data, like recall bias, social desirability bias and the definition of the target behaviour (Baranowski, 1988; Sallis & Saelens, 2000).

Studies have reported that recall of physical activity is difficult (Baranowski & DeMor, 2000), and some types of physical activity seem more difficult to recall than others. Sallis and Saelens (2000) reported higher validity and reliability when recalling vigorous physical activity than moderate, low and occupational physical activity. Recall of information about physical activity in the last seven days (or longer periods) is also a significant cognitive challenge, and all knowledge suggests that this provides a relatively large margin of error. The instruments can vary based on how complex a form is to fill out (Baranowski, 1988). This is one of the main challenges when using self-report in relation to persons with a disability with a limited cognitive function.

Social desirability bias increases the chance of over-reporting physical activity, and along with the expectations of healthy behaviour of persons with a disability, this may have affected the results in the present studies. Studies suggest that both young and older participants report more activity than they actually carry out, and this applies particularly to "vigorous physical activity". Studies have shown over-estimation of up to 100% in this category. In the category of "moderately strenuous activity" the trend is more consistent with the facts. We do not know if these conditions are different for people with disabilities than for non-disabled. However, we see that over-reporting is linked to expectations that we all should be physically active - physical activity is a form of status, and it indicates that people take care of their body and health. It follows that the risk of over-reporting is also correspondingly high.

Electronic surveys must be characterised as self-report, and include many of the same weaknesses and benefits as a self-report postal questionnaire. One benefit is that all steps in the form have been programmed in advance, so the informant will not have to scroll past the questions that are not relevant. The method is also easy to administer, and data can be downloaded directly to the program for statistical treatment. It is important that researchers have access to the correct e-mail addresses of informants. Error in e-mail addresses, e-mail

invitations that go into the spam filter as well as the fact that it is easy to delete such e-mail, or forget it, can lead to a low response rate when the data collection form used.

Finally, the length of the questionnaire can affect the participants willingness to complete it (Sutton & French, 2004). This may have impacted the participants in study 2, and contributed to the low response rate. Also many of these participants are targets for several research projects, and they have therefore filled out many questionnaires, increasing the chance for not being motivated or interested enough to fill out another one, or it may have affected their accuracy.

Comparison with recent Nordic research

In the introduction to this dissertation, the Nordic research in this field from 1980 and until the project started was presented. At the end of the dissertation it is time to present research which has emerged during the project period, from 2007 until 2010 (see Table 2). A total of six studies are cited here, half of them with a qualitative methodological approach. Even if the methodological approach differs a lot from my study they have been cited since there are few studies in total, and the topics of the qualitative studies have much in common with the approach for this dissertation. The results of this project fit in quite well with the results from the recent Nordic studies. I will emphasise the prerequisites for engagement in physical activity and physiotherapy as outlined by Sandstrom et. al (2009) (i.e. enjoyable activities and supportive health care professionals), and the coaching approach by Sjöquist et al. (2010). Both studies concern intervention at a personal level. Further, Standal and Jespersen (2008) emphasised the role of peers with a disability as a resource in learning skills such as the use of a wheelchair in physical activity. This can be seen as a strategy to facilitate social support and relatedness. Finally, also mentioning the association between physical activity and mental and physical health, demonstrated in two of the studies (Lannem et al., 2009; Roe et al., 2008). The studies mentioned here represent the Nordic contribution to this field. The number of studies is limited, and there is a need for more extensive research to increase our knowledge about physical activity and persons with a disability in the Nordic countries. The need for a regional approach appears primarily in relation to the climate, which may be a particular challenge in this region.

Implications for practice

The findings should have some implications for efforts to motivate people with disabilities to engage in physical activity, and how rehabilitation is implemented. To motivate

individuals with a disability, increasing perceptions of autonomy and autonomous motivation regulation are the strategies that have the potential to have the greatest impact.

Further, we support previous calls for studies to include ways to improve health-care practitioner autonomy supportiveness (Williams et al., 2004). According to the results there is also a need for studies focusing on how patients can take more responsibility for their health outcomes, and the development of efficient techniques and instruments to improve perceived autonomy support. Traditionally, rehabilitation for people with a physical disability has been directed by the physicians, i.e. a controlled motivation regulation, with emphasis on the health benefits. However, during the last 10-15 years there has been a development towards more self-determination in rehabilitation (Shakespeare, 2006). The results of the present study support this priority.

Having a disability, either a physical or sensory disability, will to some extent limit your activity level, compared to able-bodied persons (e.g., Boslaugh & Andresen, 2006; Jahnsen et al., 2003; Motl et al., 2007). The activity limitation will vary in relation to type and severity of the disability. Among the environmental variables in paper II, having existing activity possibilities in the local community contributed significantly to the total physical activity equation. It makes sense that available local activities make it easier to be physically active, for example by reducing the need for transportation and time. Being dependent on adapted transportation, many struggle with gaining access to activities. This may indicate that short distance to activity facilities, eliminating the need for transportation, may be important for the activity level. Strategies towards strengthening the activity programs offered in the local environment may be one way to go, including support to inclusion strategies. In many small communities it is often difficult to recruit a sufficient number of participants to establish activity programs only for people with a disability. Too few are interested in physical activity. Another solution may be the Norwegian model, where the National Governing Body for Sport ten years ago took over the responsibility for including activities for persons with a disability in their ordinary activities among able-bodied (Sorensen & Kahrs, 2006). We are aware that this model also represents some challenges, but it represents something new, and is an approach that probably will change our attitudes towards persons with a disability in sports in the future.

Local activities can also solve some of the challenges in relation to information, which is also a bidirectional issue; there is a lack of information about relevant activity offers, on the other hand, those who are organising the activity have limited information about the

targeted population and to whom to send relevant information. Well targeted information about local activity seems more accessible than general information spread over a wide area.

In addition, there is a need for political engagement for Universal Design to make training centres and training facilities more accessible for persons with a disability. This includes e.g. parking-grounds and paved pathways, but also stairs, doors, toilets, wardrobes and lifts. Several studies have indicated low accessibility of training facilities for persons with disabilities (e.g., Rimmer, 2005) especially persons in a wheel-chair (Arbour & Martin Ginis, 2007).

Low need for personal activity equipment was one of the significant environmental correlates in the cross-sectional study (paper II). Most commercial training equipment requires progress using the muscles in both lower extremities (i.e., treadmills, stationary bikes and steppers), thus limiting the use among people with lower extremity disabilities (e.g., paralysis, limb loss).

Further, people with visual disabilities may have problems using different types of fitness equipment. Display panels are often difficult to read or understand and the equipment presents a risk of falling, and the machines are often difficult to run or lift (e.g. weights are too heavy) for persons with reduced muscle strength (Rimmer, 2005). Increased access to the standard training of persons with disabilities will be beneficial for people with physical and sensory limitations. Fitness centres must be encouraged to adapt their equipment to these groups, and to offer supervision if they are in need of competence. As a consequence of limited access to fitness centres, persons with a disability also have a need for supervision the first time they attend a training-centre. Being met in an inclusive way may be one of the key actions.

The majority of the general population is able to walk, an activity which does not involve any costs or skill, and can be done at convenient times during the day (e.g., to and from work). But for people with disabilities and chronic health problems who have lower-limb paralysis or weakness or other disabling conditions, this recommendation is not a realistic option. Alternative forms of physical activity, such as performing various types of chair-exercise regimes that can be done at home or outdoors with upper-body exercise equipment such as an arm-ergometer, or access to a pool at a local public gym should be recommended, so that persons with disabilities have alternative activities.

In paper II, the personal factors demonstrated more power in explaining the variance in physical activity than disability and functioning and environmental factors. Intrinsic motivation was among the strongest correlates, indicating that people with a disability, like

able-bodied people, are in need of intrinsic motives like enjoyment, fun, the challenge in accomplishment of goals and experience of one's own improvement. As for able-bodied (McDonough & Crocker, 2007; Wilson et al., 2007), results in paper III demonstrate that need fulfilment is associated with more self-determined exercise motives. The preset study also demonstrated the importance of relatedness, which has been a more secondary need in self-determination research (Deci & Ryan, 2000). As a consequence of these results, a common strategy may be to work with autonomy support among both professionals in rehabilitation centres, and coaches and trainers in voluntary sport. Further, we emphasise the need for optimal challenges in activities that lead to increased efficacy in activity. At last, relatedness seems to be more important in this population than in comparable able-bodied samples. Additionally, being in a group with people you feel related to may be an issue. A consequence such a focus is the need for activities facilitated and adapted for people with disabilities, and the possibility for performing together in a group.

The results in paper IV indicate that we can enhance perceived physical health through adapted physical activity. This supports previous research (Roe et al., 2008), and indicates that adapted physical activity is an important approach for increased functional health through rehabilitation.

CONCLUSIONS

The aim of the thesis was to;

- understand and explain the physical activity behaviour of young adults with a physical disability, and to learn which factors are most strongly associated with this behaviour
- try to influence central factors in the motivational process in an intervention and explore mechanisms which can increase motivation for physical activity and the actual behaviour
- register how perceived health is affected through such an intervention

The existing knowledge and understanding of the physical activity behaviour and motivation in young adults with a physical disability has been extended by:

1. The literature study revealed a need for research on correlates and associations in relation to physical activity and disability, regarding specific diagnoses.
2. Comparison with other studies supported that young adults in this study were less physically active than their able-bodied peers, demonstrating that it may be more difficult to be physically active with a disability than without.
3. However, the personal factors (high intrinsic motivation and having identity as a physically active person) explained more behavioural variance in physical activity than the other factors of the ICF. Functioning and disability and environmental factors also played a role, albeit a more minor one in our study.
4. The attempt to influence central factors in the motivational process through an adapted physical activity intervention resulted in the following: The results supported the SDT process-model, indicating a support for a development towards more self-determined motivation in rehabilitation. As hypothesized, perceived autonomy support positively predicted needs satisfaction at the end of the intervention. Further, needs satisfaction was positively linked to changes in autonomous motivation for physical activity. Both changes in autonomous motivation and exercise self-efficacy were associated with physical activity increases over the stay.

5. The registration of how perceived health was affected through an autonomy-supportive physical activity intervention resulted in the following: The intervention led to change in perceived physical health over twelve months. In addition, psychological needs satisfaction was positively linked to changes in perceived mental health during the stay and positively linked to changes in role physical three months after the stay.

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PAPER I

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PHYSICAL DISABILITY AND PHYSICAL ACTIVITY: A REVIEW OF THE LITERATURE ON CORRELATES AND ASSOCIATIONS

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The purpose of this article was to examine the literature on correlates and associations of physical activity among adults (age 16-65 years) with physical disabilities. Electronic searches were conducted to identify research articles published from 1980 to 2009. Specific inclusion criteria were identified. The search produced 4,189 articles; however, only 57 met all specified criteria. They represented seven different disability groups, including one cross-over category with two or more disabilities. The International Classification of Functioning, Disability and Health developed by the World Health Organization was used as a structural framework for organising the results. The results revealed a substantial core of research concerning a few disability groups, among them spinal cord injury and multiple sclerosis. Significant correlates were identified in relation to type of disability and functioning, but also among environmental factors (e.g. costs, accessibility, built environment, information and social support) and personal factors (e.g. age, exercise self efficacy, depression, and mental health). Findings are discussed relative to conducting future physical activity research on persons with disabilities.

KEYWORDS: physical activity, exercise, disability, correlates, determinants

INTRODUCTION

Despite the huge amount of research that has been published in the field of exercise science over the past three decades, relatively little attention has been paid to physical activity behaviour among people with a disability (Rimmer, Braddock, & Pitetti, 1996). The health benefits and the impact on well-being (Heath & Fentem, 1997; Physical Activity Guidelines Advisory Committee, 2008) are well documented, and it has even been claimed that for the health and well-being of people with a disability a physically active lifestyle is more important than for the general population (van der Ploeg, van der Beek, van der Woude, & van Mechelen, 2004). In the past thirty years we have seen developments in research on physical activity and disability. During the eighties researchers were concerned about the health benefits of physical activity in persons with a disability and there was a call for training guidelines for

this population (e.g., Compton, Eisenman, & Henderson, 1989). The public health perspective was still strong during the nineties (e.g., Heath & Fentem, 1997), but an emerging interest for correlates, determinants and associations between physical activity and disability could be discerned (e.g., Kinne, Patrick, & Maher, 1999).

In 1995, a study on physical activity and public health (Pate et al., 1995) sponsored by the Centers for Disease Control and Prevention (CDC) and The American College of Sports Medicine (ACSM), barely mentioned persons with physical disabilities. They were grouped along with older adults, the socioeconomically disadvantaged, and the less educated. The part of the report which cited data about the proportion of adults who did not engage in leisure time physical activity, categorized by gender, race, annual income, and education, did not include

persons with disabilities (Rimmer et al., 1996).

However, 15 years later, there exists more knowledge about this population and also about various disability groups. In 2005, CDC reported that twice as many adults with a disability (25,6%) were physically inactive during the preceding week, compared to adults without a disability (12,8%) (Centers for Disease Control and Prevention, 2007). This was consistent with other studies from the U.S. (Boslaugh & Andresen, 2006; Ellis, Kosma, Cardinal, Bauer, & McCubbin, 2007; McGuire, Strine, Okoro, Ahluwalia, & Ford, 2007; Rimmer, Rubin, & Braddock, 2000). There is also an increasing amount of research connected to activity level and methods for measuring physical activity and exercise in this population (Cervantes & Porretta, 2010; Washburn, Zhu, McAuley, Frogley, & Figoni, 2002). Therefore, the aim of this review was to get an overview of the existing knowledge-base about correlates and associations of physical activity and disability.

Selection of variables within the ICF factors

Within the factor *functioning and disability*, there has been a call for research on potential differences in activity patterns between groups of people with different disabilities (Rimmer et al., 1996). Research indicates that the severity of the disability is negatively correlated with physical activity (Jahnsen, Villien, Aamodt, Stanghelle, & Holm, 2003). Consequently, information about the type and the severity of the disability seems important to include. Furthermore, *environmental barriers* seem to limit participation in physical activity for people with disabilities (Rimmer, 2005; Rimmer, Wang, & Smith, 2008). Consequently, information about environmental factors should be included to fully understand the correlates of physical activity. Environmental factors include physical environment factors, social and cultural correlates. In addition, Scelza, Kalpakjian, Zemper and Tate (2005) reported that lack of motivation, lack of energy, and lack of interest were the most frequently cited

barriers to exercise among individuals with SCI, emphasising that psychosocial aspects are important, too. Consequently, *personal factors* should be included, in a similar way as in research on able-bodied (Bauman, Sallis, Dzewaltowski, & Owen, 2002). Personal factors include demographic-, biological-, psychological-, cognitive-, and emotional correlates. The correlates of environmental and personal factors were chosen based on similar research among able-bodied (Bauman et al., 2002; Trost, Owen, Bauman, Sallis, & Brown, 2002).

In summary, the purpose of this paper is to provide a comprehensive review of the literature which examines (1) physical activity level and (2) correlates and associations of physical activity among adults with a disability, in relation to (a) functioning (b) environmental factors and (c) personal factors. Finally, (3) we will also examine the studies in relation to disability type.

METHOD

General

Scoping reviews are particularly important as an overview when a research area (such as disability and physical activity) does not have uniformity in study design and measurement (Hempel, Norman, Golder, Aguiar-Ibanez, & Eastwood, 2008; Rimmer, Chen, McCubbin, Drum, & Peterson, 2010). This type of review use specific protocols to increase focus in study identification, appraisal, and synthesis, thereby reducing bias (Petticrew & Roberts, 2006). On this basis, the methodological approach of a scoping review was preferable.

Literature search

PubMed, PsycINFO and SPORTdiscus were systematically searched for relevant articles. These databases were chosen because together they are generally acknowledged to provide a complete overview of studies and articles covering disability and physical activity/exercise, in relation to sport, psychology and rehabilitation. This is in line with previously conducted similar literature reviews (van der

Ploeg et al., 2004). We specifically looked for studies describing the relationship between physical activity and disability. The keywords used in the Medline search were “exercise” (Medical Subject Headings term – MeSH - including both “physical activity” and exercise) and disabled persons (MeSH term including disabled, disability, physically disabled, physically challenged, physically handicapped). PsycINFO was searched using “physical activity” or “exercise” and “disab*” to include disability, disabled and people with a disability. SPORTdiscus was searched using the terms “physical activity”, “exercise”, “motivation” and “disab*” to include disability, disabled and people with a disability.

Selection criteria

English language peer-reviewed primary literature that examined physical activity (or exercise) and disability among adults with disabilities was included in the review. Physical disability was defined as

someone with a mobility or sensory impairment. Although important, cognitive, mental health and developmental disabilities were not included in this review. The search included articles about persons with a physical disability aged 18-65 years (excluding children and older adults), for the period from 1980-2009. The research before 1980 was limited and mostly described the health benefits of activity, and early experiences with physical activity and disability. Further, we excluded articles concerning physical activity in school and education, athletes with a disability, low back pain, and fibromyalgia. Due to the scope and complexity of the present review, studies testing theoretical models and constructs were also excluded. Keywords for the link between physical activity and persons with a disability were; determinants, associations, correlates, predictors, barriers, facilitators, and mediators. Search results are presented in Table 1.

Table 1. Search terms, publication year and results

Database	Search terms	Publ. year	No. Citations
PubMed	Disabled persons AND exercise	1980 - 1989	27
		1990 - 1999	162
		2000 - 2009	405
SPORTDiscus	Disability AND physical activity Disability AND exercise	1980 - 1989	479
		1990 - 1999	752
		2000 - 2009	1560
PsycINFO	Disability AND physical activity Disability AND exercise	1980 - 1989	17
		1990 - 1999	135
		2000 - 2009	652
All databases		Total	4189

Article citations were excluded at the abstract level if they met the following exclusion criteria: not disability related, not physical activity or exercise related, sample based on athletes with a disability, descriptive articles or program descriptions, non-English language, published before 1980, all study participants younger than 18 years or older than 65 years, physical education/school and non-peer-reviewed publications (i.e., dissertations, chapters, non-peer-reviewed

articles, and conference presentations). Reviews of the literature on outcomes of exercise interventions for persons with physical and cognitive disabilities have been conducted previously (Rimmer et al., 2010; Taylor, Baranowski, & Young, 1998). The focus of most interventions have been on physical and mental health gains of physical activity in clinical or community practice, and less with correlates of existing physical activity. Rimmer et al. (2010) were for

instance focusing on health outcomes (i.e., functional health, cardiorespiratory health, musculoskeletal health, metabolic health including healthy weight and mental health) of clinical exercise interventions. Therefore, intervention studies were excluded in the present paper.

The reason for excluding studies involving participants aged 65 years and older was to control for aging related factors that may attenuate the potential impact of the exercise interventions on younger individuals with disabilities. In conclusion, studies that met the following criteria were included: (1) cross sectional studies, prospective studies; qualitative studies (2) health outcomes (physical activity or disability) as dependent variables or discussion point; and, most importantly, (3) describing correlates, determinants, associations or mediators in relation to physical activity. 57 studies were included in the final analysis (see Table 2.)

Data extraction and synthesis

For studies that met the inclusion criteria, we extracted the data for each individual study by type of disability, research design, data collection method, type of independent variables (environmental, personal and function-related) and dependent variable. *Type of disability* was classified according to the participants' main diagnosis (1) Stroke; (2) Multiple Sclerosis; (3) Spinal cord injury; (4) Cerebral palsy; (5) Parkinson's disease; (6) Combined diagnosis or disability groups. *The research design* was classified into one of the following categories: (1) Cross-sectional studies and (2) Qualitative studies. *Data collection method* as listed under the following headings: (1) Postal questionnaire; (2) Telephone-interview questionnaire; (3); Internet-questionnaire; (4) In-depth interview (5) Focus-groups and (6) Combined (e.g., pedometer/accelerometer/questionnaire). Types of exercise was also extracted, but yielded only limited information. Ninety percent of the activities described were cross-over activities (more than one activity).

Table 2. Percent and number of physical activity studies by disability, research design, data collection method, and publication year

Characteristic	N	%
Disability		
Stroke	1	1,8
MS	9	15,8
SCI	12	21,0
CP	5	8,8
Parkinson	1	1,8
Heterogeneous	29	50,8
Sum	57	100,0
Research design		
Cross sectional	42	73,7
Qualitative	15	26,3
Sum	57	100,0
Data collection method		
Postal questionnaire	30	52,6
Telephone-interview questionnaire	5	8,8
Internet-questionnaire	1	1,8
In-depth interview	13	22,8
Focus-group	2	3,5
Combined (e.g. pedom./accelerom./quest.)	6	10,5
Sum	57	100,0
Publication year		
2000 - 2009	44	77,1
1990 - 1999	12	21,1
1980 - 1989	1	1,8
Sum	57	100,0

RESULTS

Initial search results

Table 1 provides an overview of the review process. After completing the literature search, 4,189 articles were identified. The first-level review involved 460 articles related to physical activity and exercise. A second-level review was conducted in order to identify studies that were strictly physical activity/exercise and disability related. Among the 460 citations, 262 additional studies were excluded because they focused on specific rehabilitation interventions (e.g., gait training, functional

electrical stimulation, constraint-induced movement training), athletes, elderly, lower back pain or fibromyalgia, and 131 studies were excluded because they were; testing a theoretical model or construct, describing the research field, literature reviews or commentaries. Another 10 studies were excluded because they did not primarily focus on physical activity. As a result, a total of 57 studies met the inclusion criteria and were included in the final analysis.

Physical activity studies sorted by disability, research design and publication year

Table 2 provides the characteristics of the 57 studies by disability, research design, data collection method, and publication year. Please note the high number of studies including people with spinal cord injury (SCI). We also noticed a significant number of studies including multiple sclerosis (MS). However, most of the studies included several diagnostic groups ($n = 29$, 50.8%). Of the articles included, there was only one study from the eighties, and a small amount of studies from the nineties ($n = 12$, 21.1%). Forty-two of the studies were cross-sectional and 15 were qualitative studies/case studies. About half of the studies in the present review used postal questionnaires as the main data collection method (see Table 2).

How active are adults with a physical disability?

In this review, studies that are measuring both total physical activity and leisure time physical activity are included. Several studies have reported activity levels, but only a few of them are accurate when it comes to description of the activity level. Among the diagnostic cross-over studies, Ellis et al. (2007) reported that among 223 adults ($M_{age} = 45.4$ years, $SD = 10.8$) who completed a web-based survey, the average total physical activity score was 20.5 metabolic equivalent (METS)-hours/day ($SD = 16.8$). This corresponds approximately to five hours a week with extensive walking or fast wheeling (IPAQ Research Committee, 2005).

Further, Santaigo & Coyle (2004) reported leisure time physical activity participation to be 2.9 times (± 5.12) per week in 170 women with physical disabilities, with 39.4% reporting no participation at all. In a study among Afro-American woman with physical disabilities ($N = 50$) Rimmer, Rubin, Braddock, & Hedman (1999) revealed low levels of leisure time physical activity. Only 8.2% of the sample participated in leisure-time physical activity, and only 10% engaged in some kind of aerobic exercise three or more days per week for at least 15 min. Unstructured physical activity (e.g., work-related activity, housework, gardening, shopping) was nearly absent.

In a study among 4,038 adults with disability, Boslaugh and Andresen (2006) concluded that the majority of adults with disability did not meet basic recommendations for physical activity. The recommendation of the CDC and ACSM for moderate physical activity was used: moderate exercise for at least 30 minutes on 5 or more days per week in segments of at least 10 minutes each was considered to be sufficiently active. Participants were classified dichotomously as meeting this recommendation or not.

Among the studies on cerebral palsy (CP), van der Slot et al. (2007) concluded that the levels of everyday physical activity and community participation, measured by an activity monitor in adults with CP, were comparable to levels in able-bodied. Other studies including persons with CP have reported quite low levels of activity. Jahnsen et al. (2003) reported that among 403 adults with CP, 46% were regularly physically active, defined as a minimum of 1 hour a week. In their qualitative study among 22 individuals aged 35-68 years, Sandstrom, Samuelsson and Oberg (2009) demonstrated a low activity level among the interviewed participants.

Several studies included persons with SCI. In a group of 985 persons with SCI, just over half (52.1 %, $n = 501$) of participants engaged in no sports activities each week (Tasiemski, Kennedy, Gardner, & Blaikley,

2004). They had no measure for total physical activity. Van den Berg-Emons et al. (2008) reported low activity level compared to able-bodied in a group ($N = 16$) of persons with SCI, one year after in-patient rehabilitation. The activity level was measured by activity-monitor. They calculated that the duration of

average dynamic activities was 49 minutes per day in the SCI-group. This was significantly lower than the mean duration of dynamic activities among able-bodied (143 min. per day).

Table 3. Correlates of physical activity in adults with disabilities

Determinant or correlate	Associations with overall physical activity
Functioning and disability	
Increasing MS	--
High degree of CP	--
High level of SCI	--
High Body mass index	-
Fatigue	--
Environmental factors	
High costs	--
Lack of transportation	-
Lack of assistance	-
Lack of equipment	-
Low accessibility	--
Lack of information	--
Strong social support	++
Personal factors	
Increasing age	--
Gender	0
Unemployment	-
Depression	--
High intrinsic motivation	+
Self efficacy	++

Note:

++ = repeatedly documented positive association with physical activity, + = weak or mixed evidence of positive association with physical activity, 0 = weak or mixed evidence of no association with physical activity, - = weak or mixed evidence of negative association with physical activity, -- = repeatedly documented negative association with physical activity. "Support" is defined as a code of -, --, + and ++. Demographic and biological variables are not included in this summary. Adapted from Bauman, Sallis, Dziewaltowski and Owen (2002).

Does the disability and the level of functioning count?

Table 3 provides an overview of correlates of physical activity and disability. Several studies have outlined functioning and disability as an important correlate when discussing physical activity and disability. In

the following we have reported some of these studies, starting with the cross-over studies without any specific diagnosis.

Longmuir and Bar-Or (2000) observed significant differences in habitual physical activity between disability types, specific diagnostic categories, and age in a study

among 957 youths with a disability. They also found significant differences in perceived participation limitations among disability types. Youths with CP, muscular dystrophy, and visual impairment had the most sedentary lifestyles. Gender, however, did not influence the results. Among a number of variables, Santiago & Coyle (2004) emphasized that deconditioning was inversely related to the ability of 170 moderately mobility-impaired women to participate in leisure time physical activity. Shifflett, Cator, & Megginson (1994) also reported that functional health barriers in 62 persons with a disability had a negative impact on their adherence to an active lifestyle.

Twenty percent of the survey respondents in a study ($N = 2298$) by Finch, Owen, & Price (2001) posted current injury or disability as a reason for not being more active. There was a significant trend toward more frequently mentioning current injury or disability as a barrier for participation in activities with increased age. High body mass index and current low physical activity levels were significantly related to the injury or disability barriers. This was supported by Warms et al (2007) and Ellis et al. (2007). Further, adults with disabilities ($N = 117$) were more likely to engage in a health-promoting lifestyle if less mechanical assistance was required (Stuifbergen & Becker, 1994), assuming that less mechanical assistance also indicates higher physical functioning. In a study by Bodde, Seo and Frey (2009), a national US-sample of 46,883 adults with disabilities was examined. They reported that physical activity participation was significantly associated with self-rated health status.

When looking at the diagnose-specific studies, Manns & Chad (1999) found that among 38 participants with SCI, physical activity was negatively correlated with reduced physical functioning in quadriplegic and paraplegic persons. Hence, higher scores for physical independence, mobility, and occupation were positively correlated with physical activity in quadriplegic persons. They also concluded that physical activity

may play an important role in perceived physical function for persons with SCI, and particularly for persons with quadriplegic injuries.

Furthermore, studies conducted in the domain of multiple sclerosis (MS) also give support to level of functioning as an important correlate. Becker and Stuifbergen (2004) reported that fatigue and grade of impairment were significantly associated with decreased activity level in a study in 2,710 persons with MS. This observation was supported by several studies which found that increased MS and decreased function reduced the activity level (Crocker, 1993; Kasser, 2009; Motl, Snook, McAuley, Scott, & Gliottoni, 2007; Stroud, Minahan, & Sabapathy, 2009).

Finally, CP represents a heterogeneous disability group. Not surprisingly, studies have revealed associations between physical activity and type of disability and functional level. According to Jahnsen et al.(2003), the degree of CP seems to play a main role for the activity level. This was supported by van Eck et al. (2008), who found low activity levels in persons with more severe CP (Gross Motor Function Classification System - GMFCS III/IV) than persons with GMFCS I/II.

In summary, increasing body mass index, low levels of health status, low mobility level, and low physical function seems to be correlated with reduced activity level. Further, increasing severity of MS, and severe degree of SCI or CP also demonstrate high correlation with reduced activity level.

Environmental factors

Focus on environmental barriers and facilitators have increased in this field over the last decade. These factors are many and quite heterogeneous, because we are discussing different kind of environments (e.g., social, natural, technical, equipment, built environment, facilities, transportation etc). Among the general studies, Lockwood (1997) explored views and behaviours of 493 people with and without disabilities in relation to their levels of participation in physical activity in settings ranging from segregated to fully inclusive. The findings

identified that there is considerable room for improvement in areas such as training, flexible programming, support services for inclusive settings and transport to sporting facilities.

The four major environmental barriers reported by Rimmer et al. (2000) among fifty African American women with physical disabilities were cost of the exercise program (84.2%), transportation (60.5%), and not knowing where to exercise (57.9%). Financial resources were also representing important barriers to physical activity in the studies by Becker and Stuifbergen (2004) and Scelza et al. (2005). The latter study also emphasized the importance of knowledge of where to exercise and access to a place to exercise among 72 individuals with SCI. Ellis et al. (2007) revealed that factors obstructing physical activity were disability itself and associated symptoms, and a lack of access to adequate facilities, equipment, or programs. The factors that facilitate physical activity were access to adequate facilities, equipment, or programs, and support or assistance.

Rimmer et al. (2008) administered a survey to a group of 83 adults with unilateral stroke (*M age* = 54.2 years) to explore their perceived barriers to exercise. The five most common barriers ranked in order were (1) cost of the program (61%), (2) lack of awareness of a fitness centre in the area (57%), (3) no means of transportation to a fitness centre (57%), (4) no knowledge of how to exercise (46%), and (5) no knowledge of where to exercise (44%). As revealed, the financial cost has repeatedly been emphasized in several studies as a barriers to participate in physical activity (Becker & Stuifbergen, 2004; Scelza, Kalpakjian, Zemper, & Tate, 2005; Rimmer et al., 2008; Rimmer et al., 2000)

Shifflett, Cator and Megginson (1994) also pointed out access to activities and facilities as correlates of leisure time physical activity level in their study, while findings among 206 persons with SCI suggested a role of the physical environment in predicting physical activity; particularly moderate intensity leisure time wheeling (Arbour &

Martin Ginis, 2007). In a qualitative interview-study with 32 participants, Vissers et al. (2008) discussed the most important barriers to and facilitators of the level of everyday physical activity in thirty-two persons with a SCI. The major environmental barriers were accessibility of stores and buildings. The most frequently mentioned facilitators were preparation in the rehabilitation centre with respect to daily activities and social activities and stimulation to be physically active.

When caregivers perceived greater benefits of exercise, adults with CP (*N* = 83) were likely to exercise more frequently (Heller, Ying, Rimmer, & Marks, 2002). This is supported by Sandstrom, Samuelsson and Oberg, who committed an interview with 22 community-living adults (35 - 68 years) with CP. They identified five different themes, and among the environmental factors we mention "being integrated in daily life", and "supportive healthcare with competent professionals" from that study. Social support was also underlined as important mediator on the pathway between physical activity and quality of life in a sample of persons with MS (Motl & McAuley, 2009).

Among wheelchair users, Warms et al. (2007), demonstrated that subjectively measured activity correlated significantly with healthcare providers discussing exercise, and social support for exercise. These results also adhere to the results of Standal and Jespersen (2008) who investigated the learning that took place when people with disabilities interacted in a rehabilitation context. The results indicated that peer learning extends beyond skills and techniques, and includes ways for the participants to make sense of their situations as wheelchair users.

Rolfe, Yoshida, Renwick and Bailey (2009) explored how material and social structures and functions, existing and operating within 15 disabled women's communities at community-based exercise facilities, affected their participation. They concluded that the first and most important step in encouraging and facilitating women's

exercise participation was to engage women living with disabilities in dialogue about their needs and preferences, and to include them in the planning and development of accessible exercise programs and community services. When support (instrumental, emotional, informational) was provided to participants, each of these had a positive influence on physical activity participation in a qualitative study among seven participants with Parkinson's disease (Ravenek & Schneider, 2009).

The trend in the literature revealed that costs, physical access, equipment, assistance and social support were the strongest environmental correlates to physical activity for persons with a disability.

Personal factors

Among the personal factors, increasing age seemed to be associated with reduced activity level (Boslaugh & Andresen, 2006; Finch, Owen, & Price, 2001; Motl, Snook, McAuley, Scott, & Hinkle, 2007; Warm, Belza, & Whitney, 2007). However, increasing age may also indicate reduced level of physical function. Female gender was associated with a lower level of physical activity, but this does not correspond with Boslaugh and Andresen (2006) who found no correlation between gender and activity level. In the same study, African Americans were significantly less active and annual income of \$50,000 or higher were significantly related to higher physical activity level.

Santiago and Coyle (2004) found that secondary conditions of isolation were significantly and inversely related to leisure time physical activity participation, while Mitra, Wilber, Allen and Walker (2005) found that depression was negatively correlated with physical exercise. Consequently, reduced mental health and depression seems to interfere with physical activity among adults with a disability. In a qualitative interview-study by Goodwin and Staples (2005), nine youth campers with physical, sensory, or behavioural disabilities experienced increased self-reliance, independence, and new understandings of

their physical potential after participating in activities at a summer camp.

Among the diagnose specific studies, Becker and Stuijbergen (2004) reported that intrapersonal factors contributed significantly to the prediction of barriers to healthy behaviour in persons with MS ($N = 2710$), and Jahnsen et al. (2003) found that having learnt to take responsibility for personal health during childhood was the strongest correlate for being physically active as an adult with CP ($N = 406$) of persons with CP.

The aim of the study by Wahman, Biguet and Levi (2006) was to identify factors that may promote participation in physical activity among people with SCI. In qualitative multiple case studies, sixteen participants with SCI were interviewed. The main themes they identified were: using cognitive and behavioural strategies; exploring motivation post injury; and capturing new frames of reference. Further, in another study, the most frequently cited concerns about barriers among individuals with SCI were lack of motivation, lack of energy and lack of interest (Scelza et al., 2005). Tasiemski et al. (2004) detected that persons with SCI ($N = 678$) had lower levels of athletic identity than able-bodied adults and adolescents with physical disabilities. Finally, Lannem, Sorensen, Frosli and Hjeltne (2009) concluded that participants ($N = 69$) in a study with incomplete SCI who exercised regularly experienced a significantly higher life satisfaction and perceived exercise fitness, but lower perceived exercise mastery than their inactive peers.

Motl and McAuley (2009) and Motl, McAuley, Snook and Gliottoni (2009) observed a pattern of relationships that supported the possibility that physical activity is indirectly associated with improved quality of life through pathways that include fatigue, pain, social support, and self-efficacy in individuals with MS. Their results were supported in a study among 786 persons with MS. The effects of severity of illness on quality of life were mediated partially by health-promoting behaviours, resources,

barriers, self-efficacy and acceptance (Stuifbergen, Seraphine, & Roberts, 2000).

Self-efficacy correlated significantly with vigour for the fifty wheelchair tennis participants in a study by Greenwood & Dziewaltowski (1990). Furthermore, wheelchair-mobility self-efficacy correlated significantly with mood factors except depression for the wheelchair non-tennis participants. It was concluded that wheelchair mobile individuals participating in tennis may be more confident about performing tennis skills and general wheelchair mobility tasks than are wheelchair mobile nonparticipants. Several studies have revealed that a high score on self-efficacy for exercise is a significant correlate of physical activity (Kasser, 2009; Kinne et al., 1999; Motl, McAuley, Snook, & Gliottoni, 2009; Motl & McAuley, 2009; Plow, Resnik, & Allen, 2009; Stroud et al., 2009; Stuifbergen & Becker, 1994), but it is also interesting to notice that five of these six studies have been conducted in a sample of persons with MS.

In conclusion, several personal factors seem to interplay with physical activity. Increasing age, unemployment and depression is correlated with reduced physical activity, while high intrinsic motivation, coping skills and exercise efficacy are correlates of increasing physical activity.

DISCUSSION

Traditionally, personal factors as correlates of physical activity among people with a disability have received little attention, but there are an increasing number of studies that addresses this issue. The results demonstrate no strong evidence for gender as a strong correlate. This is not in line with research among able-bodied, where male gender is positively correlated with higher amount of intensity and total physical activity (Anderssen & Strømme, 2001).

Very few studies have investigated motivational issues (Kinne et al., 1999; Scelza et al., 2005). However, there are different approaches to motivation, and while enjoyment (Sandstrom, Samuelsson, & Oberg, 2009) is representing intrinsic

motivation, awareness of the health-benefits of physical activity (Stroud et al., 2009) is representing a controlled motivation-regulation. Health professionals often assume that persons with a disability are motivated by the health imperatives because of their disability, but additional research is needed to increase our knowledge about these issues. What energises physical activity behaviour seems to be a central question, for persons with a disability, as well as for able-bodied.

Clearly, mental health and depression seems to interplay with physical activity (Mitra, Wilber, Allen, & Walker, 2005; Santiago & Coyle, 2004). This corresponds with earlier results (Stewart et al., 1994). The incidence of depression is higher among people with a disability (Roe, Dalen, Lein, & Bautz-Holter, 2008) than in the able-bodied population, and may to some extent explain a part of the reduced activity level in a population with a disability.

Among the frequently represented environmental factors we detected that the costs of the activity played a major role. The financial resources in this population may be limited, and results in reduced activity level (Becker & Stuifbergen, 2004; Scelza et al., 2005; Rimmer et al., 2008; Rimmer et al., 2000). Many individuals with a disability are living on social security, and additionally, their participation most often requires adapted facilities, equipment and personal support for being physically active. It is likely that limited income and need for additional paid services to be physically active results in an even more challenging situation, which might lead to reduced physical activity as compared to an able-bodied population.

Further, there seems to be a connection between transportation to facilities, access to facilities, adapted equipment and physical activity. Not surprisingly, the strongest evidence for these limitations are found in studies representing persons with severe mobility impairments like SCI (Scelza et al., 2005; Vissers et al., 2008) and MS (Plow et al., 2009). Hence, an inaccessible environment seem to be negatively correlated with physical activity in

populations with SCI (Arbour & Martin Ginis, 2007). As an example, lack of paved pathways is an obstacle for wheelchair access.

Focus on support and assistance is needed in some populations (eg. Lockwood, 1997), but were not among the strongest correlates in the studies reviewed. More emphasized was the need for information on where to exercise (Buffart, Westendorp, van den Berg-Emons, Stam, & Roebroek, 2009; Ravenek & Schneider, 2009), indicating that there is a need for more research on how to reach the targeted population with information about adapted facilities, equipment and activity.

Social support for being physically active represents some of the strongest correlates, and are represented across diagnosis and age (Ellis et al., 2007; Motl et al., 2009; Plow et al., 2009; Standal & Jespersen, 2008; Stuijbergen et al., 2000; Wahman, Biguet, & Levi, 2006; Warms et al., 2007), including support from health professionals (Ellis et al., 2007). The solid documentation on this issue emphasizes the need for additional research on how to change attitudes among family, friends and peers. Activity planners should plan programs that place emphasis on modifying the social environment and removing attitudinal barriers.

The level of physical activity among adults with a disability demonstrated some differences between types and degrees of functioning and disability that could be expected, and indicated a positive correlation between reduced functioning and reduced physical activity. This seems to be most clear in the populations with severe activity limitations like MS (Becker & Stuijbergen, 2004; Crocker, 1992; Motl et al., 2007; Stroud et al., 2009) CP (Jahnsen et al., 2003) and SCI (Manns & Chad, 1999). These groups also struggle with fatigue and exertion, which seems to be negatively correlated with physical activity in this population (Becker & Stuijbergen, 2004; Fernandez, Pitetti, & Betzen, 1990), and especially in MS (Motl et al., 2009; Motl & McAuley, 2009). Daily activities require additional energy for those

who are severely impaired (Kemp & Thompson, 2002), and may have an influence on the activity level. However, the results also give some support to statements that there is a connection between general, heterogeneous groups with disability and increasing inactivity (Boslaugh & Andresen, 2006), and that having a disability, regardless of type, reduces the average activity level. Research on the effect of body mass index on activity in this population is needed.

We can conclude that people with a disability are on average less active than the general population, but we must be aware of the great differences in defining physical activity and ways of measuring the activity (Cervantes & Porretta, 2010). This makes it further difficult to compare results from various studies. However, using the acknowledged definition by Caspersen, Powell, & Christenson (1985) is quite usual, and probably also correct, because many persons with a disability use much energy to finish daily activities. In a public health perspective, daily tasks and activities that require calorie expenditure are also important to measure. Low levels of physical activity are defined as less than half an hour, five days a week (2 ½ hours per week) with moderate physical activity (Haskell et al., 2007).

Most of the studies are across diagnoses, probably because of the limited number of people within the different categories or diagnosis. It is challenging to get access to a representative sample, especially for low-incidence disability groups (Rimmer et al., 2010). However, it need to be addressed that SCI also represents a low-incidence disability group, but is frequently represented here. Unfortunately, there is a lack of research including persons with hearing disabilities and persons with visual impairment, which represent high-incidence disability groups. Accordingly, the number of incidents does not explain the whole picture, so there is a need for other ways to explain the different representation of disability groups. Another possible explanation may be connected to the fact that the studies presented here in this review on MS and SCI

represent a few but active research environments. This may indicate that scientific environment and the choice of topics, as well as economical issues and grants may play a role of the priority in this field.

Persons with stroke are only represented in one study in this review. This reflects the age criterion set for ages 16-65 years. The incidence of stroke is much higher after 65 years, and can probably explain why only one study is present here. The same explanation may be given for Parkinson's disease, which is quite often represented in studies on persons with disabilities, but the incidence of Parkinson's is low under 65 years.

Study limitations

The search terms we used may not have captured all the relevant studies, or the number and scope of search-engines could be too limited. There is also a possibility that the exclusion criteria selected were too many, or too narrow. In addition, the review was limited to papers published in English with abstract and only peer-reviewed journals. As such, unpublished papers from proceedings and abstracts were excluded due to convenience. Studies involving adults older than 65 years were not reported, which limits the findings of age-related conditions like Parkinson's disease and stroke. We also excluded research from education, but are aware of the extensive research and the significant contribution coming from this research field.

Future research

The 57 studies identified in this review were spread across seven different disability groups (including one category that combined two or more types of disabilities) although heterogeneous populations make it easier to recruit subjects (e.g., including individuals with paraplegia and quadriplegia in the same study) and obtain higher levels of statistical power, it limits the generalizability of the results. Whenever possible, studies should be designed with more homogeneous samples in

terms of age, health status, and functional level. Consequently, we emphasize the need for researchers that address specific disability groups, but are also aware of the heterogeneity between and within disability groups. The low incidence of many disabilities make it extremely difficult to obtain adequate sample sizes when recruiting subjects from one setting (Rimmer et al., 2010).

It is difficult to make comparisons between studies when instruments are not the same or not explained well enough to make critical comparisons between them. Cervantes and Porretta (2010) suggest the use of a combination of measurement methods (i.e., multiple measures of physical activity), and we agree that this appears to offer the best solution for assessing the level of physical activity. However, until then, we may suggest the development and consensus in the future to use of one survey to measure physical activity among persons with a disability.

Most research material is conducted with volunteers, and it is difficult to generalize the findings of the study to the entire subgroup. In general, those who are responding are also those most interested in physical activity. The people who volunteer for exercise-related research may also have a higher functional level. Given the complexity of identifying and recruiting individuals with disabilities for exercise research, classifying subjects by function (ICF) rather than disability may be an alternative approach to increase recruitment size and identify key health outcomes that generalize across disability groups (Rimmer et al., 2010).

Perspective

There is a need to establish a stronger evidence base to increase our knowledge of correlates, determinants and associations in relation to physical activity and disability. The results revealed a need for common measurement methods to assess physical activity among persons with a disability. This is in line with previous research (Cervantes & Porretta, 2010). Further, there is a need for research on determinants and associations in relation to physical activity and disability

among specific diagnosis, and specifically among low incidence groups. Among the environmental factors, we emphasize the need for research on informational routines and how to reach the targeted populations. The impact of gender among people with a disability seems to be an understudied issue in physical activity and disability research. Finally, in order to understand engagement and participation in physical activity among people with a disability, we must increase our knowledge about motivational processes, self-regulation models and coping strategies, emphasizing the need for additional research with a broader theoretical approach to identify different aspects of physical activity behaviour.

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PAPER II

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Factors associated with physical activity among young adults with a disability

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The purpose of this study was to examine: (1) total physical activity and (2) the relative importance of functioning and disability, environmental and personal factors for total physical activity among young adults with a disability. The International Classification of Functioning, Disability and Health developed by the World Health Organization was used as a structural framework for a cross-sectional survey, based on a questionnaire. The population studied was 327 young adults (age 18–30) with a disability who were members of interest organizations for persons with disabilities. Using an adapted version of the self-administered short form of International Physical Activity Questionnaire

(IPAQ), the sample reported some differences in physical activity related to the type and the onset of disability. Linear regression analyses revealed that personal factors demonstrated more power in explaining the variance in physical activity than both the environmental factors and factors related to functioning and disability. As for the able-bodied, intrinsic motivation and identity as an active person were the factors most strongly associated with physical activity behavior. This should have important consequences for how professionals try to motivate people with disabilities for physical activity, and how they plan and implement rehabilitation.

Regular physical activity for persons with chronic diseases and disabilities have considerable health benefits with the prevention of secondary conditions (Heath & Fentem, 1997; Physical Activity Guidelines Advisory Committee, 2008). Consequently, it has been assumed that people with disabilities are motivated for physical activity for the health benefits (Vaage, 2009) while other studies emphasize the social benefits (Sherrill & Williams, 1996; Groff & Kleiber, 2001). However, there is little knowledge about the determinants of actual physical activity in this population. This is important because studies indicate that young adults (age 18–30) with a disability are less physically active than their able-bodied peers (Grue, 1998; Hanssen et al., 2003). Given the relatively long traditions of sport and physical activity for people with disabilities in Scandinavia, there are surprisingly few studies examining the reasons for this difference. Therefore, more knowledge about the determinants of physical activity for young adults with a disability is needed.

Health conditions as well as personal and environmental barriers may reduce a person's ability to engage in physical activity/rehabilitation (Rimmer, 2006). Based on his own research, Rimmer (2006) recommended to use the International Classification

of Functioning, Disability and Health (ICF) as a framework for identifying factors that may impact physical activity among people with disabilities (WHO, 2001). The ICF is a comprehensive classification system designed to capture functioning, and not only medical descriptions of limitations. ICF has two parts, each with two components. Part 1 is about *functioning and disability* related to: (a) body functions and structures; and (b) activities and participation. Part 2 consists of *contextual factors*, including both: (c) environmental factors; and (d) personal factors. With this structure, this classification system may help select the more important factors among the multitude of factors that are related to physical activity for this population. There is also a need for establishing the relative importance of the various ICF factors in the physical activity context.

Selection of variables within the ICF factors

Within the factor functioning and disability, research indicates that the severity of the disability is negatively correlated with physical activity (Jahnsen et al., 2003; Becker & Stuijbergen, 2004). In addition, there has been a call for research on potential differences in

activity patterns between persons with congenital versus acquired disabilities, and between groups of people with different disabilities (Rimmer et al., 1996). Consequently, including information about the type and the severity of the disability appears important.

Evidence exists that shows that environmental barriers to physical activity limit participation in community activities for people with disabilities (Rimmer, 2005; Rimmer et al., 2008). It would appear that information about environmental barriers should be included to fully understand the determinants of physical activity.

Personal factors have also been cited as important (Martin, 2006). One of the most important personal factors for physical activity is motivation. Motivation for physical activity is widely studied among the able-bodied, both in sport (e.g., Roberts et al., 2007) organized exercise (e.g., McAuley et al., 2001), physical education (e.g., Biddle, 2001), and physical activity in general (e.g., Trost et al., 2002). For people with disabilities, the extant research is scarce, but some studies do exist. Martin (2006) found that enjoyment was a critical personal factor in the commitment to disability sport. Martin et al. (1995) reported that adolescent swimmers with a disability reported a strong personal athletic identity. Scelza et al. (2005) reported that lack of motivation, lack of energy, and lack of interest were the most frequently cited barriers to exercise among individuals with a disability. These findings indicate that factors other than health benefits are important for the motivation for physical activity for persons with disabilities. Therefore, there is a need to investigate how motivational variables and exercise identity interact with physical activity.

Because autonomous functioning and social interaction may be a particular challenge for people with disabilities, self-determination theory (SDT) was used as a motivational approach for this study. The theory assumes that the basic needs for autonomy, competence and relatedness are sought to be satisfied. According to Ryan and Deci (2000), these basic needs apply to all people regardless of gender, group or culture, and presumably disability. SDT differentiates motivation in terms of the degree to which it has been internalized, suggesting that the more fully it is internalized, the more it will be the basis for autonomously regulated behavior. There are five different degrees of motivational regulation: external regulation, introjected regulation, identified regulation, integrated regulation and intrinsically regulated motivation, from the least to the most fully internalized form of regulated motivation respectively. Recently, research based on SDT has demonstrated the importance of intrinsic and self-determined motivation for adherence to physical activity and ex-

ercise for populations without disabilities (Thogersen-Ntoumani & Ntoumanis, 2006; Chatzisarantis & Hagger, 2008).

One's identity as a physically active person (an exercise self-schema) is another personal factor that has demonstrated the importance of physical activity for individuals with disabilities (Sørensen, 2006). Self-schemas are cognitive structures that affect how people process information, motivational processes and regulate behavior (Kendzierski, 1988). People tend to try to maintain consistency in their self-schemas, meaning that exercise-schematic individuals will increase their focus on and process more information of physical activity and demonstrate active participation. Studies have demonstrated that exercise schematics were more likely to start and continue with physical activities than non-exercise schematics (Kendzierski, 1988).

Studies indicate that physical activity may impact perceived physical and mental health as well as the quality of life for adults with a disability (Roe et al., 2008; Lannem et al., 2009). We wished to confirm that increased perceived physical and mental health may also be associated with physical activity for people with a disability.

Thus, the purpose for this study was to examine: (1) total physical activity and (2) the relative importance of functioning and disability, environmental and personal factors for total physical activity among young adults with a disability. Based on previous research (Jahnsen et al., 2003; Rimmer, 2005; Scelza et al., 2005; Martin, 2006; Rimmer et al., 2008), associations between both functioning and disability, environmental factors, personal factors, and total physical activity were expected.

Materials and methods

Study population

The population studied were young adults (age 18–30) with a disability who were members of interest organizations for persons with disabilities ($N = 998$). The population included members of organizations for people with cerebral palsy ($n = 399/40.0\%$), spina bifida, and hydrocephalus ($n = 116/11.6\%$), spinal cord injuries ($n = 66/6.6\%$), muscle diseases ($n = 127/12.7\%$), and visually impaired ($n = 290/29.0\%$).

Design and data collection

The study was designed as a cross-sectional survey, and data were collected with questionnaires. The questionnaires were sent to the participants through the interest organizations. A reminder was sent out after 3 weeks. An electronic version was offered to the visually impaired and for those who so preferred. Participants were informed about the electronic questionnaire through the information letter with the questionnaire, together with an informed consent form. The study was approved by the Regional Medical Committee for Research Ethics in Norway.

Measures

Physical Activity

Physical activity was assessed using an adapted version of the self-administered short form of the International Physical Activity Questionnaire (IPAQ). This measure assesses the total vigorous intensity physical activity, total moderate intensity physical activity, total time walking, and the time spent sitting during the last 7 days. Time spent sitting was excluded in this study because it has no meaning to ask wheelchair users to report their time spent sitting during the last 7 days. IPAQ short form has been developed and tested for use with adults with an age range of 15–69 years and has shown acceptable reliability and validity (Craig et al., 2003). IPAQ had been translated into Norwegian previously and has been used by the Survey of Living conditions (Wilhelmsen, 2009).

The examples of vigorous and moderate intensity activities used were not relevant for our sample. The IPAQ protocol allows the use of culturally applicable examples (IPAQ Research Committee, 2005). According to this, “fast wheeling/pushing in wheelchair” (vigorous intensity), “wheeling/pushing the wheelchair with moderate speed” (moderate intensity), and “wheeling/pushing the wheelchair” as an alternative to walking was included. IPAQ provides a continuous variable (metabolic equivalent – minutes pr. week = MET-minutes per week) that was used as the dependent variable. There is no report on this measure being used on populations with disabilities. In order to check the construct validity, an alternative measure was used as a comparison. This was a description of leisure time activity with four answering alternatives, frequently used by the National Institute of Public Health (Graff-Iversen et al., 2008). Albeit, there is a difference between total physical activity (IPAQ) and leisure time physical activity; it will provide an indication of the activity level. With this difference in mind, a reasonable correlation with results from the IPAQ Short Questionnaire ($r_s = 0.632$, $P < 0.001$) was demonstrated. For additional information, the participants reported what type of activity they participated in through an open question.

Functioning and disability

The type of disability was inferred by which interest organization the participants belonged to (e.g., visually impaired). Mobility function was measured on a three-level scale ranging from: 1. “I can walk indoors and outdoors without any aids”; to 3. “I am completely dependent on using a wheelchair”. For visual function, the scale ranged from: 1. “Can walk around outdoors without a guide or guide dog”; to 3. “Need guiding (or guide dog) when I am outdoors”. Participants also responded to the question about whether their disability was congenital or acquired.

The need for personal mobility aids was measured by answering “Yes” or “No” to the question: “Are you in need of mobility aids to move around indoor or outdoor”? Finally, the need for personal care was measured by one item asking how much time they spent on daily care procedures, indicating on a four-level scale ranging from: “Less than 1 h”; to “More than 3 h”.

Environmental factors

Rimmer et al. (2000) developed a measure of barriers to exercise, which contained some environmental factors for individuals with a disability in the United States. The instrument was not suitable for this study due to cultural differences. For the identification of specific environmental variables, both

some of that research (Rimmer, 2006), the advice of an expert group at a rehabilitation center using physical activity as the means of rehabilitation (Beitostølen Healthsports Centre), as well as interviews with parents and patients were used. Three activities in the local community were rated on a scale from 1 (not at all true) to 3 (very true) on easy access to facilities, good opportunities for transportation, low costs, available assistance, adapted activities, adapted facilities and a feeling of being welcome to the actual site (e.g., “The activity is well adapted to fit my ability”). As an expression for general environmental availability, a mean score was generated from all seven ratings.

The functionality of personal activity equipment was assessed by a mean score derived from how well the three statements about the equipment described their situation (e.g., “My personal activity equipment is functional and improves my ability”). The scale ranged from: 1 “Not at all true”; to 5 “Very true”. The participants also reported available time for activity (e.g., “I have the time to engage in leisure-time physical activity”), availability of information about activities (e.g., “Information about appropriate activities is easily available”), the subjective feeling of having sufficient energy (e.g., “I have energy to do physical activity in my leisure time”) and available activities in the local community (e.g., “There are opportunities for me to be physically active in my local environment”). The scales for the last four statements ranged from: 1 “Not at all true”; to 5 “Very true”.

Personal factors

Motivation for physical activity was measured by the Exercise Self-Regulation Questionnaire (SRQ-E) (Ryan & Connell, 1989) that assesses domain-specific types of motivation regulation (external, introjected, identified, and intrinsic). The responses were given on a 7-point Likert-type scale ranging from “very true” to “not at all true”. The Relative Autonomy Index (RAI) and average scores were calculated for each subscale, and the subscale for intrinsic motivation was used because it provided the most clear expression of the autonomous part of the continuum. The SRQ-E was translated into Norwegian by a bilingual researcher. Back translation into English by a second bilingual translator was performed to ensure conceptual accuracy. Psychometric properties of the SRQ-E were established with a sample from the United States (Rockafellow et al., 2006).

Exercise self-schema was measured as described by Kendzierski (1988). The scales consist of three items describing (on a scale from 1 to 11) the person as an exerciser, and whether he/she consider this as an important aspect of their self-image. The scoring criterion to determine the “exerciser schematics” group was when a minimum of two items on both scales were scored eight or higher. The participants who did not meet this standard were classified as “non-exerciser schematics”. The internal consistency and convergent validity of the scale have been demonstrated when compared with exercise behavior measures (Kendzierski, 1988). Principal Component Analysis based on the present data extracted only one factor, accounting for 70.4% of the variance with an acceptable internal consistency ($\alpha = 0.91$).

Perceived physical and mental health was measured by the Medical Outcome Study Short Form 12 (SF-12). SF-12 consists of 12 items, and the responses were given on a Likert scale with scoring levels from 2 to 6 for the various questions. The physical and mental component summary norm-based scores (PCS and MCS) for SF-12 were calculated after reversing the scores of questions 1, 8, 9, and 10. The SF-12 is widely used and has been validated for use in nine countries (Gandek et al., 1998).

Analyses

All data were entered into SPSS15.0.1 and checked for accuracy by another person. For descriptive analyses, frequency distribution and mean scores were used where appropriate. Comparisons of total physical activity between disability groups and between acquired/congenital disabilities were performed by one-way ANOVA with Bonferroni post-hoc test, or *t*-test. In order to study the association between total physical activity (MET-minutes per week) and the independent variables, bivariate Spearman's correlation analyses were performed. For identifying the relative importance of the factors in explaining the variance of total physical activity, linear regressions for the continuous dependent variables were performed. All models were checked for violations of assumptions. The significance level was set to $P < 0.05$.

Results

Participants

A total number of 875 postal questionnaires and 123 e-mailed questionnaires were sent out. Of those, 28 were returned due to wrong or non-functional addresses. The questionnaires were completed and returned to their organizations by 262 young adults, and 75 completed the electronic version. Three participants unable to use either version answered a telephone survey. Two individuals were excluded because they were identified as multivariate outliers. Five participants were too young (under 18 years), and two addressees had died. Ten individuals (or their assistant/relatives) reported as being cognitively challenged and unable to answer the questionnaire. Five persons received the questionnaire twice due to double membership, but returned only one. Six questionnaires were returned incomplete and had to be removed from the analyses. A total of 327 participants between 18 and 30 years with physical disabilities were finally included in the study. The adjusted response rate was 34.6%. Further details are in Table 1.

The distribution of participants across interest organizations was as follows: members from organizations for cerebral palsy ($n = 139$, 42.5%); spina bifida, and/or hydrocephalus ($n = 36$, 11.08%); spinal cord injury ($n = 23$, 7.0%); muscular disease ($n = 48$, 14.7%); and visual impairment ($n = 78$, 23.9%). Others ($n = 3$, 0.9%) were members of an interest organization that did not represent their primary disability. These percentages correspond reasonably well with the percentages in the total population. Among those who did not answer the questionnaire ($n = 619$), the mean age was 23.8 years, ($SD = 3.7$), and there were 316 (51.1%) females, which is quite similar to the sample (cf. Table 1).

Descriptive statistics

The information about impairments given in the questionnaire by each participant was congruent with his/her membership status in the organizations.

Table 1. Descriptive data of the sample and variables within the ICF factors ($N = 327$)

Variables	<i>n</i>	%	<i>M</i>	<i>SD</i>
Physical activity				
MET-minutes per week			1595	1985
Functioning and disability factor				
Impairments				
Mobility impairment	246	75.2		
Visual impairment	78	23.9		
Others	3	0.9		
Need for personal mobility aids	184	56.3		
Need for personal activity equipment	157	48.0		
Personal care (more than 3 h/day)	47	14.4		
Employed	73	22.3		
Education (university)	73	22.3		
Environmental factor				
Access to facilities			2.38	.54
Assistance			2.24	.57
Adapted facilities			2.17	.66
Functionality personal activity equipment			2.40	.90
Information about activity			2.47	1.40
Costs			2.53	.56
Available local activities			3.32	1.43
Personal factor				
Gender				
Female	178	54.4		
Male	149	45.6		
Exercise schematics	104	31.8		
Age			24.15	3.88
SRQ-Exercise Intrinsic motivation			4.78	1.59
Physical component summary (PCS)			40.94	10.70
Mental component summary (MCS)			50.27	10.93
Time for activity			4.16	1.11

ICF, International Classification of Functioning, Disability and Health; SRQ, Self-Regulation Questionnaire.

Further, this is similar to the distribution in the population (Conradi & Rand-Henriksen, 2004). The sample reported a mean score of total physical activity of 1520 and 1685 MET-minutes per week, women and men respectively. Within the sample, the group with acquired disabilities reported significantly more physical activity ($M = 2464$, $SD = 2550$) than the group with congenital disabilities ($M = 1396$, $SD = 1778$), $t(73.9) = 3.1$, $P < 0.01$). One-way ANOVA analysis demonstrated an overall significant difference between types of disability $F(4, 327) = 2.97$, $P = 0.02$, but Bonferroni post hoc analyses were only significant between cerebral palsy and visual impairment groups ($SE = 266.8$, $P = 0.039$). The most frequently reported activities were dance, swimming, horse-riding, and boccia. Some took part in activities in a gym or fitness center (17.6% women and 10.6% men).

Associations between physical activity and the ICF factors

Of the variables representing functioning and disability, the question "no need for personal aids" demonstrated the strongest correlation with total

physical activity (cf. Table 2). “No need for personal activity equipment”, “being employed in some form of work,” and “educational level” revealed a relatively high association with physical activity, while “need for more than 3 h daily for personal care” was significantly associated with a lower level of activity.

Among the environmental factors, “available local activities” demonstrated the highest correlation with physical activity, but also “functional personal activity equipment”, “adapted facilities at the site” and “high level of information about activities” were positively correlated with physical activity (cf. Table 3).

The strongest positive correlation among the personal factors occurred between physical activity and having a self-schema as a physically active person (exerciser schematics), while PCS and high intrinsic motivation demonstrated relatively high associations with physical activity. There appeared to be no association between activity level and age or gender (cf. Table 4), but it should be taken into consideration that the sample is a selected age group.

Variables explaining the variation in total physical activity

Based on these correlations, separate linear regression analyses for the different components in the ICF were performed. In the analyses, all factors with significant correlations ($P < 0.05$) from the correlation analyses were included. The model included MET-minutes per week as the dependent variable and 14 independent variables. In the next step, the variables that contributed significantly to the regression in a hierarchical stepwise regression were included.

It can be assumed that functioning and disability represents basic factors that may impact personal factors such as motivation, self-schema, and perceived physical health. It also may be assumed that environmental factors can affect motivation. Based on these assumptions, the factors representing functioning and disability were entered in the first step of the equation, environmental variables were included in the second step, and finally personal factors were included in the last step of the regression procedure. Attempts to

change the order for the entrance of the factors into the equation did not change the main picture.

Seven variables contributed significantly to the equation (cf. Table 5). Together, they explained 31% of the variation in physical activity. Being an “exerciser-schematic” represented the strongest contribution, with high intrinsic motivation, low need for personal activity equipment and being used also as significant contributors. Having an acquired disability and high perceived physical health (PCS) also played a role.

Discussion

The amount of physical activity among the young adults with a disability demonstrated some differences between types and degrees of functioning and disability that could be expected (Jahnsen et al., 2003; Becker & Stuifbergen, 2004; Lannem et al., 2009). Those with an acquired disability often have experience in sport or physical activity before acquiring their disability (Sherrill & Williams, 1996). For those with congenital disabilities, it may be a question of overprotection by parents (Grue, 1998). Both may explain the higher physical activity level among persons with acquired disabilities.

The differences in physical activity between the five different disability groups were small. However, those with cerebral palsy were significantly less active than those with visual impairments. In this sample, those with cerebral palsy reported more severe mobility limitations, and this may affect their activity level. The findings are consistent with previous research (Jahnsen et al., 2003; Becker & Stuifbergen, 2004; Lannem et al., 2009).

The young adults with a disability in this study reported less physical activity than a comparable able-bodied national sample of the same age, measured by MET-minutes per week (Anderssen & Andersen, 2004). In that study of able-bodied females ($n = 167$) and males ($n = 144$) aged 18–30 years, they were about three times more active than those in the present study.

Table 2. Bivariate Spearman's correlation analysis between physical activity (MET, minutes per week) and variables within the functioning and disability factor

	1	2	3	4	5	6	7	8
1. Total MET-minutes per week	–							
2. High mobility limitation	–.30**	–						
3. High visual impairment	–.23*	.46**	–					
4. Low need for personal aids	.36**	–.59**	–.45**	–				
5. Low need for personal activity equipment	.22**	–.37**	–.30**	.56**	–			
6. High time for personal care	–.24**	.38**	.57**	–.31**	–.17**	–		
7. Employed	.21**	–.18**	–.18	.22**	.13*	–.12*	–	
8. High education	.21**	–.03	–.22*	.15**	.10	–.08	.33**	–

* $P < .05$; ** $P < .01$.

Table 3. Bivariate Spearman's correlation analysis between physical activity (MET, minutes per week) and variables within the environmental factor

	1	2	3	4	5	6	7
1. Total MET-minutes per week	–						
2. High access to facilities	.02	–					
3. High assistance	.05	.19**	–				
4. High adaption of facility	.15**	.29**	.33**	–			
5. Low functionality personal activity equipment	–.12*	–.03	–.13*	–.24**	–		
6. High information about activities	.16**	.19**	.17**	.26**	–.11*	–	
7. High available local activities	.36**	.17**	.19**	.32**	–.17**	.49**	–

P* < .05; *P* < .01.

Table 4. Bivariate Spearman' correlation analysis between physical activity (MET, minutes per week) and variables within the personal factor

	1	2	3	4	5	6	7	8
1. Total MET-minutes per week	–							
2. Age	.04	–						
3. Sex	–.01	–.01	–					
4. High intrinsic motivation	.34**	–.01	.01	–				
5. Exerciser schematics	.43**	–.03	–.05	.52**	–			
6. High physical components summary (PCS)	.35**	–.06	.07	.13*	.20**	–		
7. High mental components summary (MCS)	–.01	–.01	.10	.09	.18**	.03	–	
8. High time for activity	.00	–.01	.09	.28**	.26**	.04	.14*	–

P* < .05; *P* < .01.

The number of people in the present study using gyms and fitness centers were comparable with the results from a survey of living conditions (Vaage, 2009). People with disabilities appear to use gyms and fitness centers less than the general population. Vaage indicated that there is an expectation that people with disabilities should use the gym more for health benefits. This would imply that people with disabilities are more motivated for physical activity for the health benefits than other people, an expectation our data does not appear to support. The absence of individuals with a disability in health clubs and fitness centers also has been reported in the United States (Rimmer, 2005). In his study, Rimmer focused on disability unfriendly physical activity environments; inaccessible buildings, lack of equipment, information, staff training, policies, and procedures. Our data indicate that most of the respondents had physical access to one or more physical activities in their local community. On the one hand, there may be some cultural differences at play to explain such differences between the United States and Europe, but on the other hand we may need to look for other explanations.

Explaining the variance in total physical activity

Examining the factors measured by the ICF in the regression analyses, the personal factors demonstrated more power in explaining the variance in total physical

activity than either the environmental factors or the factors related to functioning and disability. The personal factors were identity as a physically active person (being an exerciser schematic), and intrinsic motivation. This means that personal ideas about the self and experiences with physical activity appeared to be important factors for involvement in physical activity for those with a disability. The strongest association was demonstrated by having a self-schema as an exerciser. This is congruent with research findings in the general population (Kendzierski, 1988). The finding that athletic identity was associated with a likelihood of continued sports participation among individuals with a disability provides further evidence that this is an important variable (Martin, Smith, & Adamsmushett, 1995).

The other personal factor strongly associated with higher physical activity level was intrinsic motivation. According to the SDF (Ryan & Deci, 2000), it is a question of whether physical activity satisfies the need for autonomy, competence and relatedness. This is interesting in relation to the strong focus of the media and health authorities on the health imperatives of being physically active. However, this represents an externally regulated motivation, which according to the theory is less likely to maintain the behavior in question (Ryan & Deci, 2000). Research on individuals with cerebral palsy has demonstrated that too much physical treatment and training with a health focus early in life may be

Table 5. Summary of hierarchical regression analysis for the variables associated with total physical activity ($N = 327$)

Variable	<i>B</i>	<i>SE B</i>	β
Step 1 [†]			
Acquired disability	1062.8	267.4	0.21**
Low need for personal activity equipment	738.5	208.4	0.19**
Employed	995.9	251.8	0.21**
Step 2 [‡]			
Acquired disability	942.8	260.8	0.19**
Low need for personal activity equipment	595.8	204.6	0.15**
Employed	832.8	246.9	0.18**
Available local activities	323.5	71.2	0.24**
Step 3 [§]			
Acquired disability	619.4	243.8	0.12*
Low need for personal activity equipment	577.8	195.8	0.15**
Employed	746.3	228.1	0.16**
Available local activities	154.5	69.0	0.11*
High physical component summary (PCS)	22.5	9.5	0.12*
Exerciser schematics	1116.2	232.8	0.27**
High intrinsic motivation	173.2	67.2	0.14**

Dependent variable: Total MET-minutes per week. $R^2 = 0.12$ for step 1, 0.05 for step 2 and 0.14 for step 3. Adjusted R^2 0.31.

* $P < .05$; ** $P < .01$.

[†]Functioning and disability.

[‡]Environmental factors.

[§]Personal factors.

detrimental to motivation for physical activity later in life (Jahnsen et al., 2003). It may well be that an overemphasis on the health consequences of the population with disabilities may partially explain the lower physical activity levels.

The participants in this study reported perceived physical and mental health, and this represents the participants' experience of their functioning and disability. As demonstrated before, there was a clear association between physical disability and perceived physical health (PCS) (Roe et al., 2008). Further, perceived physical health demonstrated a significant positive correlation with the activity level. This supports the findings discussed earlier about the severity of mobility limitations that may affect the activity level. Perceived physical health may be a practical barrier for physical activity, but it is not necessarily a motivational issue.

In summary, personal factors (exercise self-schema, intrinsic motivation and perceived physical health) appeared to explain more of the variance in total physical activity than environmental factors and factors related to functioning and disability. The importance of personal factors support the findings by Scelza et al. (2005).

However, one environmental factor was important. Existing activity possibilities in the local community contributed significantly to the total physical

activity equation. Several other environmental variables demonstrated meaningful correlations, emphasizing the importance of functional personal activity equipment, and strengthens our assumption that there is a need to improve the distribution of, and access to, such equipment. It makes sense that available local activities make it easier to be physically active, for example by reducing the need for transportation and time. The National Governing Body for Sport over the past 10 years has the experience that environmental factors are central in accommodating athletes with various disabilities (Sorensen & Kahrs, 2006). However, it should be taken into consideration that these findings are from a small country that has reasonable resources to spend on facilitating participation in sport for individuals with a disability.

Only a few of the indicators of functioning and disability emerged as important correlates of total physical activity in this study. Employment was positively associated with physical activity, and higher education was significantly correlated with physical activity, even though it did not contribute significantly to the regression model. The relationship with education is consistent with the data from the general population (Vaage, 2009), and in the present study, it may indicate higher functional capability. The same could be argued in relation to employment, even though it may be argued that those who are used may have less time to engage in physical activity.

Limitations of the study

The adjusted response rate was relatively low, which limits the generalizability of the findings. It is likely that those within the population who are the most interested in physical activity are overrepresented. Other studies have had similar problems, both among able-bodied (Anderssen & Andersen, 2004) and in populations with disabilities (Washburn et al., 2002) Measurement of physical activity by self-report is in itself a challenge, and in particular among people with disabilities (Washburn et al., 2002). Another limitation is the cross-sectional nature of the study because causal relationships cannot be determined. The participants were recruited through their interest organizations, but there is no information about individuals with a disability who are not members of organizations. It may be debated whether members of organizations are more or less resourceful than individuals who choose not to be a member (Grue, 1998).

Perspectives

The findings of this study indicated differences in activity levels among young adults with acquired and

congenital disabilities, and between persons with cerebral palsy and visual impairment, which is an important reminder of the heterogeneity of the population of individuals with a disability. Comparison with other studies indicated that young adults in this study were less physically active than their able-bodied peers, demonstrating that it may be more difficult to be physically active with a disability than without. However, the personal factors explained more behavioral variance in physical activity than the other factors of the ICF. As with the able-bodied, identity as an active person and intrinsic motivation were the most important factors for explaining the variance in total physical activity behavior (Kendzierski, 1988; Thogersen-Ntoumani & Ntoumanis,

2006). The same has been demonstrated among people with psychiatric illness (Sørensen, 2006). These findings have important implications for efforts to motivate people with disabilities to engage in physical activity, and how rehabilitation is implemented. To motivate individuals with a disability, forging an identity as an exerciser and increasing perceptions of autonomy and intrinsic self-regulation are the strategies that have the potential to have the greatest impact. Functioning and disability and environmental factors also played a role, albeit a more minor one in this study.

Key words: physical activity, intrinsic motivation, self-determination, self-schema, environmental factors.

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PAPER III

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Running head: MOTIVATION, PHYSICAL ACTIVITY AND DISABILITY

Motivation for physical activity in young adults with a physical disability during a
rehabilitation stay: A longitudinal test of Self-Determination Theory.

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Abstract

We tested a Self-Determination Theory process model (SDT; Deci & Ryan, 2000) during a 3-week physical activity rehabilitation stay among young adults with a physical disability ($N = 44$, $M_{\text{age}} = 24.7$, $SD = 5.1$). As hypothesized, perceived autonomy support positively predicted needs satisfaction at the end of the stay ($r = .38$, $p < .01$). Further, needs satisfaction was positively linked to changes in autonomous motivation for physical activity ($r = .47$, $p < .01$). Both changes in autonomous motivation and self-efficacy were associated with physical activity increases over the stay ($r = .57$, $p < .01$ and $r = .47$, $p < .01$, respectively). Bootstrapping results supported the SDT process-model, indicating a support for a development towards more self-determined motivation in rehabilitation.

Key words: physical activity, self-determination, rehabilitation

The present study tested the Self-Determination Theory process model (SDT; Deci & Ryan, 2000) in the domain of physical activity in a group of young adults with a physical disability (age 18-35) admitted to a rehab centre for rehabilitation.

Despite the numerous health benefits of physical activity (Heath & Fentem, 1997; Physical Activity Guidelines Advisory Committee, 2008), several studies indicate that people with a physical disability are less likely to engage in regular physical activity than non-disabled (US Department of Health and Human Services, 2000; Rimmer, Rubin, Braddock, & Hedman, 1999). This was supported by recent research among young Norwegian adults (age 18-30) that indicated that those with a disability were less physically active than their able-bodied peers (Saebu & Sorensen, 2010). Using the concepts from the ICF - International Classification of Functioning, Disability and Health (WHO, 2001), personal factors explained more of the variance in physical activity than both the environmental factors and factors related to functioning and disability. Similar to research among able-bodied, identity as an active person and intrinsic motivation were powerful factors for explaining variance in physical activity behaviour (Bauman, Sallis, Dzewaltowski, & Owen, 2002). However, results in this domain are not consistent, and studies have reported that other self-determined extrinsic motives like introjected regulation (e.g., Thogersen-Ntoumani & Ntoumanis, 2006) and in particular identified regulation (e.g., Wilson, Rodgers, Fraser, & Murray, 2004) may be as important as intrinsic regulation for explaining the variance in physical activity participation. In addition, Burton, Lydon, D'Alessandro and Koestner (2006) has demonstrated that controlling motives also can underpin persistence behavior, but acting for this reason may lead to reduced psychological health and well-being for the individual.

Research on motivation for physical activity among people with a disability is scarce and we need to increase our knowledge about the processes that can enhance healthy behaviour, i.e. physical activity. However, some studies exist. Martin (2006) found that enjoyment was a critical personal factor in commitment to disability sport. Another study indicated that health status and lack of money, and the unsuitability of local sports facilities rather than lack of motivation were cited as the main barriers to explain the low participation in sport by young disabled people (Finch, Lawton, Williams, & Sloper, 2001). Scelza, Kalpakjian, Zemper and Tate (2005) reported that lack of motivation, lack of energy, and lack of interest were the most frequently cited barriers to exercise among individuals with spinal cord injury, while another study reported that lack of interest was one of the least frequently perceived barriers to exercise among people with a stroke (Rimmer, Wang, & Smith, 2008).

Similar results were observed in a study among American African women with disabilities (Rimmer, Rubin, & Braddock, 2000). In sum, the findings thus seem to be contradictory.

In rehabilitation, it has proved to be a challenge to maintain the level of physical activity in everyday life as during rehabilitation (van der Ploeg et al., 2007). This was supported by a study reporting that the increase in the activity level during in-patient rehabilitation did not continue after discharge among people with spinal cord injury (van den Berg-Emons et al., 2008). Therefore a stronger focus on motivational aspects in rehabilitation research has been emphasized (Roe, Dalen, Lein, & Bautz-Holter, 2008). Maclean, Pound, Wolfe and Rudd (2000) found that highly motivated patients were more likely to take responsibility for their own rehabilitation and health outcomes, and that motivation for rehabilitation seem to be influenced by the environment in which the patient is rehabilitated. These findings indicate that factors other than health benefits are important for the motivation for physical activity for persons with disabilities. More knowledge about how motivation for physical activity in everyday life can be improved during rehabilitation is needed.

Theoretical Framework

Self-determination theory (SDT) has been strongly recommended as a suitable framework for understanding motivated physical activity behaviour (Biddle & Nigg, 2000; Landry & Solmon, 2002). Moreover, SDT has been recently used in physical activity research (Chatzisarantis & Hagger, 2009; Fortier, Sweet, O'Sullivan, & Williams, 2007; Wilson et al., 2004), and over the past 15 years a growing body of work has also applied SDT in studies of health-related behaviour change (Patrick & Williams, 2008; Ryan & Deci, 2007; Williams, Freedman, & Deci, 1998). Further, autonomous functioning and self-determination may be a particular challenge for people with a disability, since many of them are dependent of help and assistance both in physical activity and daily activities. Limited work has been done in adapted physical activity using SDT, but we are aware of one study examining the contribution of two different models of psychological need satisfaction to well-being in a sample of sport athletes with a disability (Lighthouse, Wilson, & Oster, 2010). In our opinion, there is a need for additional research using self-determination theory as a framework in a rehabilitation setting among non-athlete participants. The SDT theory was therefore used as a theoretical framework for identifying and understanding the motivation mediators of physical activity in this study.

Motivation and Psychological Needs Satisfaction

According to SDT, maintenance of behaviours over time requires that patients are autonomously motivated for that behaviour (Deci & Ryan, 2000). Autonomous motivation

includes intrinsic, integrated and/or identified forms of behaviour regulation. The theory further argues that if health-care settings maximize patient's satisfaction of the needs for autonomy, competence, and relatedness, their regulation of health-related behaviours are more likely to be autonomously motivated, and behaviour change will be better maintained (Williams, Deci, & Ryan, 1998). Need for autonomy can be satisfied by experiences of choice and volition (e.g., DeCharms, 1968); satisfaction of the need for competence can be a result of behaviour that lead to intended outcomes (e.g., White, 1959); and perceptions of being attached to and understood by others can lead to satisfaction of the need for relatedness (e.g., Baumeister & Leary, 1995). These basic needs, according to Ryan and Deci (2000), apply to all people, regardless of gender, group or culture, and presumably disability.

Although autonomy and competence have been found to be the most powerful influences on autonomous types of motivation and its maintenance, theory and research suggest that relatedness also plays a role, albeit a more distal one (Deci & Ryan, 2000). The practitioner-patient relationship has been emphasized as an important social context for change. Because patients are vulnerable and often insecure about their own capability, individuals are expecting guidance from professionals, and this is especially important in health care. In this process, a sense of being respected and understood is essential to form the experiences of relatedness that nurture internalization (Ryan, Patrick, Deci, & Williams, 2008). At the rehabilitation centre in the present study the group setting is considered important, with peer work and exchange of activity experiences among the patients. The patients' feeling of relatedness to the rest of the group may also be important for the outcome of the rehabilitation stay.

In sum, to increase autonomous motivation, the satisfaction of basic psychological needs for autonomy, competence and relatedness are supposed to be important. The theory argues that all three needs are essential and that if any is thwarted there will be distinct functional costs. Thus satisfaction of all three needs were included in this study of participants with a disability, because optimal functioning seems to be important for their engagement in physical activity (Jahnsen, Villien, Aamodt, Stanghelle, & Holm, 2003).

Autonomy Support, Autonomous Motivation and Perceived Competence.

SDT differentiates motivation in terms of the degree to which it has been internalized, suggesting that the more fully it is internalized, the more it will be the basis for autonomously regulated behaviour. There are three different autonomous types of regulation; identified (for personally held values such as learning new skills; internally referenced contingency), integrated (behaviours that are fully incorporated into the repertoire of behaviours that satisfy

psychological needs), and intrinsic (for enjoyment, pleasure and fun, without reward or reinforcement). These three types of regulation comprise *autonomous motivation* in research (Williams, Freedman, & Deci, 1998). Patients who are regularly physically active would be autonomous if they freely chose to exercise because they enjoy being physically active, or are personally committed to improving their health. Practitioners may facilitate autonomous motivation and perceived competence for change by supporting patients as they explore resistances and barriers to change, and helping them identify congruent pathways to health (Ryan et al., 2008). In Self-Determination Theory, such environments are termed autonomy-supportive contexts and defined as: “ones in which significant others offer choice, provide a meaningful rationale, minimize pressure, and acknowledge the target individual’s feelings and perspectives” (Williams, Grow, Freedman, Ryan, & Deci, 1996, p. 117). Effective behaviour change requires people to be both autonomously motivated and to perceive themselves as competent in doing it (Deci & Ryan, 2000). Competence refers to a felt sense of confidence and effectance in a social context, and it is not an attained skill or capability. The need for competence leads us to seek optimal challenges (Ryan & Deci, 2002). People perceive themselves to be competent when they feel capable of attaining important health outcomes in a social setting, such as meeting a physical activity goal. Autonomy-supportive patient care has been found to enhance autonomous motivation and perceptions of competence, which improved health outcomes (Williams et al., 1998; Williams, McGregor, Zeldman, Freedman, & Deci, 2004).

Along with a sense of autonomy, internalization requires that a person experience the confidence and competence to change. In SDT, support for competence is integrated in the concept of autonomy support defined above and afforded when practitioners provide effectance, relevant inputs and feedback. This means that the patient is afforded the skills and tools for change, encouraged to choose among them, and is supported when competence or control-related barriers emerge. Patients are not over-challenged, but rather helped to experience mastery in terms of the health behaviour change that needs to be engaged (Ryan et al., 2008). Fortier, Sweet, O'Sullivan and Williams (2007) outlined that the construct of perceived competence is very similar to the self-efficacy concept (Bandura, 1997). It may be discussed if general self-efficacy is more related to issues of social cognition central to Bandura’s (1997) model of human agency rather than Deci and Ryan’s (2002) formulation that is based on different theoretical orientations concerned with volitional action. In the present study, items measuring efficacy refer to perceived confidence related to overcoming barriers and challenges in physical activity in general. Thus, the present measure of efficacy

may be very similar to measures of perceived competence in SDT (Williams et al., 1996). Efficacy has been found to be one of the strongest predictors of physical activity in adults (Troost, Owen, Bauman, Sallis, & Brown, 2002). Similar results have also been revealed in populations with a disability (Bean, Bailey, Kiely, & Leveille, 2007; Kroll, Kehn, Ho, & Groah, 2007). The term efficacy has been used in this study.

Recent research has revealed that autonomous motivation and perceived competence for making change were important for involvement in physical activity among able-bodied (Bagoien & Halvari, 2005; Chatzisarantis & Hagger, 2009; Chatzisarantis, Hagger, Biddle, & Karageorghis, 2002; Hagger, Chatzisarantis, Barkoukis, Wang, & Baranowski, 2005; Hagger, Chatzisarantis, Culverhouse, & Biddle, 2003). Due to a lack of self-determination theory research on persons with a disability in rehabilitation settings, we examined some studies of other health related behaviours as a basis for our hypotheses.

Autonomous motivation and perceived competence were found to be important for better self-management of diabetes behaviours and better glucose control for patients with diabetes (Williams et al., 2004; Williams et al., 1998), active participation in an alcohol treatment program (Ryan, Plant, & Omalley, 1995), adherence to exercise programs and long term weight management in overweight and obese middle-aged women (Palmeira et al., 2007; Teixeira et al., 2006), and in morbidly obese patients (Williams et al., 1996), smoking cessation (Williams, Gagne, Ryan, & Deci, 2002), and long-term medication adherence (Williams, Rodin, Ryan, Grolnick, & Deci, 1998). In sum, it seems as if autonomous motivation and perceived competence may be important for participation in and adherence to various health related behaviours.

The Self-Determination Theory Process Model of Change

Autonomy-supportive practitioners will facilitate the patients' satisfaction of psychological needs. This is expected to enhance autonomous motivation and perceived competence, which both are expected to yield maintained healthy functioning (Williams et al., 2004). Research has emphasized the importance of autonomy support in several health care related studies (Halvari & Halvari, 2006; Teixeira et al., 2006; e.g. Williams et al., 2006). However, the process model has to our knowledge never been applied in the domain of physical activity among young adults with a physical disability. Thus, we tested a Self-Determination Theory process model in which perceived autonomy support during a 3-week physical activity rehabilitation stay was hypothesized to positively predict psychological needs satisfaction at the end of the stay. This was expected to increase autonomous motivation and self-efficacy for physical activity (motivation variables), which both were

expected to be linked to physical activity increases over the stay. We also examined whether autonomy support would be indirectly linked to change in motivation variables through needs satisfaction; and that needs satisfaction would be indirectly associated with changes in physical activity through motivation variables.

According to SDT, satisfaction of basic psychological needs represents essential nutriment for individuals' healthy functioning (Deci & Ryan, 2000), and previous research has demonstrated that satisfaction of the three basic psychological needs are important (Hagger, Chatzisarantis, & Harris, 2006; Wilson, Longley, Muon, Rodgers, & Murray, 2006). Further, previous studies have observed direct effects of perceived autonomy support upon self-reported physical activity, when experiences related to need satisfaction were not taken into consideration (Chatzisarantis & Hagger, 2009; Hagger et al., 2005; Hagger et al., 2003). Based on this, we tested an alternative Basic Need Theory Model and predicted that perceived autonomy support will be positively correlated with satisfaction of basic psychological needs as in the SDT process model outlined above, and that needs satisfaction would be directly positively associated with physical activity (see Figure 1, model 2).

Method

Participants

Young adults with a disability (aged 18-35 years) were during the winter 2009 invited to one of four similar three-week rehabilitation stays with up to 14 persons in each group. Sixty-two persons applied for a stay. Of those, nine persons got another rehabilitation offer because they were seriously cognitively challenged. Fifty-three persons were accepted by the admission team, and 48 persons (28 women) accepted the terms for the stay, and were included in the study. Four of them dropped out during the follow-up period, and did not answer the last questionnaire. Thus, 44 persons (27 women) completed the study. Mean age was 24.7 years ($SD = 5.1$; women: $M = 25.3$, $SD = 5.7$; men: $M = 23.9$, $SD = 4.3$). For additional descriptive information, see Table 1.

All the persons who applied for a stay at the national rehabilitation centre had the right to treatment over a limited time period. Participants were divided into four groups, based on their preferences. Some of the participants were either employed, studying, and/or were dependent on assistance and had to decide the best possible time for the three week rehabilitation stay. The study was approved by the Regional Medical Committee for Research Ethics in Norway.

Design

This was a longitudinal study, based on repeated measures. Data was collected through an internet-based questionnaire. Two persons with visual impairment were interviewed by the researcher because they could not complete the questionnaire themselves. The participants filled out the questionnaire three times; respectively at arrival of the rehabilitation centre (Time 1 = baseline), at departure from the centre (Time 2), and twelve weeks after departure (Time 3). According to Rogasa (1995), three or more observations are preferred to detect individual change, and for the estimation of individual growth curves. The period for the intervention was given by the terms of condition for a stay at the rehabilitation centre. A third measure and a follow-up period of 12 weeks was considered as important because it provided opportunities for the participants to implement a more healthy behaviour and physical activity routines in daily life.

Intervention at the rehabilitation centre

The rehabilitation programme at the rehabilitation centre is based on the vision of Adapted Physical Activity (APA; Hutzler & Sherrill, 2007), by means of physical activities adapted to the specific needs of each individual with a disability. The rehabilitation includes social and cultural activities and extensive use of outdoor natural facilities, on a year-round basis. A wide range of services is offered, including adaptation of the environmental factors, technical aids and individual instruction. The programme is intensive, with 3 - 5 hours of physical activity a day, six days a week.

Before the intervention period, the professional staff at the rehabilitation centre was given four lectures on Self-Determination Theory, where the facilitation of autonomy-support, possibilities for demonstrating competence, and facilitation for relatedness were especially emphasized. The intervention was based on patient autonomy by providing opportunities for choice and self-initiation during goal-setting, priority of activities, and support and surveillance during the rehabilitation stay. Further, extended instruction in the activities was given priority in order to enhance efficacy in activities, and finally, relatedness support in the group of 11-14 participants was emphasized.

Most of the activities were arranged in groups. The group setting is considered important (cfr. relatedness), facilitating for the participants to work together, giving feedback to each other and exchange of activity experiences. During the stay, individual's schedules are constantly assessed and adjusted when necessary. The range of activities (e.g., traditional ones such as swimming, cross-country skiing and riding, and less traditional activities such as aerobics, alpine skiing and kayaking) offered by the rehabilitation centre provide opportunity to determine activities best suited to the individual.

Measures

Autonomy support. The Health-Care Climate Questionnaire (HCCQ) concerns support for healthy behaving (Williams et al., 1996). The original HCCQ is a 15-item measure that assesses participants' perceptions of the degree to which they experience their health-care providers during the intervention to be autonomy supportive versus controlling in providing the treatment. The short form of the HCCQ that includes six of the 15 items was used. Psychometric properties were established in a sample of 1183 patients in various studies where the measure yielded a one factor solution with all factor loadings above .74. In another study on persons with diabetes (a sample which has some challenges in common with the sample in the present study), the short version represented good internal consistency ($\alpha = .80$), and correlated .91 with the full version (Williams et al., 1998). A sample item is: "I feel that the staff provided me choices and options". Items were responded to on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). Scores were calculated by averaging the individual item scores. Autonomy support was measured after one week of the rehabilitation stay (baseline + 1 week = Time 1b).

Basic Psychological Needs. Basic psychological needs were assessed by the Basic Psychological Needs in Exercise Scale (BPNES: Vlachopoulos & Michailidou, 2006). The BPNES was preferred because it was accessible in a translated version (from the English version to Norwegian, and back-translated to English), it has been developed in Europe, and other researchers have called for more research using this new BPNES (Wilson, Mack, & Grattan, 2008). According to Wilson and Bengoechea (2011), the BPNES are suitable for structured exercise settings and should apply well for the present study. This 12-item scale assesses perceptions of the extent to which the innate needs for autonomy, competence, and relatedness (Deci & Ryan, 2000) are satisfied in the domain of exercise. Sample items are: "The exercise program I follow is highly compatible with my choices and interests" (autonomy); "I feel I have been making huge progress with respect to the end result I pursue" (competence); and "I feel extremely comfortable when together with the other exercise participants" (relatedness). Each item was responded to on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). Participants completed the scale at the end of the rehabilitation stay (Time 2). Separate scores for autonomy, competence and relatedness were made by averaging the sum of each four items. A score for total needs satisfaction was also calculated by averaging the sum of the 12 items.

Psychometric properties of the BPNES have been established in a sample of 1012 persons employed from fitness centres. The results demonstrated an adequate factor structure,

internal consistency, generalizability of the factor dimensionality across the calibration and the validation samples, discriminant validity and predictive validity. In addition, acceptable stability of the BPNES scores over four weeks was also presented. The scores of the scale were found to be largely unaffected by socially desirable responding and the tendency to impress management (Vlachopoulos & Michailidou, 2006).

Motivation Regulation. Autonomous motivation for physical activity was measured by the Exercise Self-Regulation Questionnaire (SRQ-E) (Ryan & Connell, 1989). The SRQ-E was translated into Norwegian by a bilingual researcher. Back translation into English by a second bilingual translator was performed to ensure conceptual accuracy. The SRQ-E has demonstrated acceptable validity and reliability in Norway, reflecting the motivational regulations among adolescents and young adults (Ommundsen & Kvalo, 2007). Sample items are: “I try to be physically active on a regular basis because I feel like it's the best way to help myself” (identified regulation); and “I try to be physically active on a regular basis because I enjoy exercising” (intrinsic regulation). The responses were given on a seven-point Likert-type scale ranging from *very true* (7) to *not at all true* (1). Autonomous motivation scores were estimated by averaging the sum of intrinsic and identified regulation items. The SRQ-E also included items for controlled motivation (i.e., introjected and external regulations) which in most cases are found to be unrelated to long-term adherence (Deci & Ryan, 2000). This was also the case in the present study, and controlled motivation is therefore not included in further analyses. The scale were used in a Norwegian study among young adults with a disability ($N = 327$), and demonstrated good reliability on intrinsic and identified regulations, $\alpha = .80$ and $.85$, respectively. Factor analysis revealed two factors representing intrinsic and identified regulation. All factor loadings above $.60$ (Saebu & Sorensen, 2010).

Efficacy. Exercise Self-Efficacy was measured by the ESES - Exercise Self-Efficacy Scale. A sample item is: “I am confident that I can overcome barriers and challenges with regard to physical activity and exercise if I try hard enough”. Responses were given on a ten point Likert scale ranging from *not at all true* (1) to *always true* (10). The scale has been tested for validity in a sample with 368 individuals with spinal cord injury. Preliminary findings indicate that the ESES is a reliable instrument with high internal consistency and scale integrity. Content validity both in terms of face and construct validity was satisfactory (Kroll et al., 2007). In the present study, Principal Component Analysis extracted only one factor, accounting for 62.3% of the variance, with a good internal consistency ($\alpha = .86$).

Physical Activity. Physical activity was assessed using an adapted version of the self-administered short form of the International Physical Activity Questionnaire (IPAQ). This

measure assesses total time (minutes) in vigorous intensity physical activity, total time (minutes) in moderate intensity physical activity, and total time (minutes) in walking and time spent sitting during the last seven days. Time spent sitting was excluded in this study because there is no value in asking wheelchair-users to report their time spent sitting during the last seven days. IPAQ short form has been developed and tested for use with adults with an age range of 15-69 years and has shown acceptable reliability (Spearman's clustered ρ around 0.8) and criterion validity ($\rho = .30$) (Craig et al., 2003). IPAQ had been translated into Norwegian previously and has been used by the Survey of Living conditions (Wilhelmsen, 2009).

The examples of vigorous and moderate intensity activities used were not relevant for our sample. The IPAQ protocol allows the use of culturally applicable examples (IPAQ Research Committee, 2005). According to this, "time in fast wheeling/pushing in wheelchair" (vigorous-intensity), "time in wheeling/pushing the wheelchair with moderate speed" (moderate-intensity), and "time in wheeling/pushing the wheelchair" as an alternative to walking was included (Saebu & Sorensen, 2010). IPAQ provides a continuous variable (metabolic equivalent – minutes pr. week = MET-minutes pr. week) that was used as the dependent variable.

Analyses

All data were analysed using SPSS, version 15.0.1. Pearson correlations were performed to detect bivariate associations between the variables. Regression analysis was used to create change scores (standardized residuals) for variables. Residual change scores were used to obtain gain scores that are uncorrelated with the pre-test scores, and measures if a person's post-test score is larger or smaller than a predicted value for that person (Waltz, Strickland, & Lenz, 2010). To test the process model and indirect relations, we used bootstrapping. Bootstrapping is a nonparametric resampling procedure, advocated for testing mediation that does not impose the assumption of normality of the sampling distribution. Compared to multiple regression, bootstrapping was used because it is more suitable and recommended for small sample sizes (Preacher & Hayes, 2008). Guidelines for final reporting were used, recommending 5000 bootstrap samples (Preacher & Hayes, 2008). Repeated measures ANOVA were performed to analyse increases or decreases in mean scores of variables from Time 1 (baseline), over Time 2 (end of rehabilitation stay), to Time 3 (12 weeks after the end of the stay).

Results

Descriptive Statistics and Reliability

Table 2 shows the means, standard deviations, and reliabilities for all variables. The scores for all motivation-related variables are distributed around a high mean (1 *SD* above scale midpoint) at all three times of measurement. The scores for total physical activity are distributed around a high mean, which is comparable to about four hours of walking or three hours of moderate physical activity daily. Relatively high levels of *SD* emerged in relation to mean scores since there are some participants who are not physically active at all at time 1 and time 3.

Correlations for SDT-related Variables and Physical Activity

Bivariate correlations between all measures emerge in Table 2. According to the predicted links in the SDT process model described, autonomy support was significantly positively associated with needs satisfaction, which was significantly linked to both autonomous motivation and efficacy at Time 2. In turn, both autonomous motivation and efficacy at Time 2 predicted positively physical activity at Time 3, but only efficacy is significantly linked to physical activity at Time 2. All predicted associations were significant in the expected direction, except the correlation between autonomous motivation at Time 2 and physical activity at Time 2.

Change scores (standardized residuals) from baseline to the end of the rehabilitation stay of autonomous motivation, efficacy, and physical activity were created by regression of T 2 measures onto T 1 measures for each variable. The same procedure was applied when creating change scores for motivation and physical activity variables from the end of the rehabilitation stay (T 2) to 12 weeks after (T 3). The correlations among autonomy support, total needs satisfaction, the three needs for autonomy, competence, relatedness and changes in autonomous motivation, efficacy, and physical activity are presented in Table 3. The correlation between autonomy support and needs satisfaction is the same as presented in Table 2. Further, needs satisfaction was significantly positively associated with change in autonomous motivation (T1-T2) but not with change in efficacy (T1-T2). In turn, change in both these motivation variables (T1-T2) was significantly positively linked to change in physical activity (T1-T2), and to total physical activity at Time 3 (12 weeks after T2). However, changes in motivation variables are not significantly related to change in physical activity from T2 to T3.

Hypotheses Testing of Relations in the SDT Process Model

The overall SDT process model suggests that autonomy support would predict needs satisfaction, which would enhance people's efficacy and autonomous motivation, which, in turn, would predict increases in total volume of physical activity. Table 3 shows that autonomy support was positively related to needs satisfaction ($r = .38, p < .01$); that needs satisfaction was linked to positive change in autonomous motivation (T1-T2: $r = .47, p < .01$) and non-significantly related to change in efficacy (T1-T2: $r = .21, p > .05$); and that changes in both autonomous motivation (T1-T2: $r = .57, p < .01$) and efficacy (T1-T2: $r = .47, p < .01$) were related to increased physical activity (T1-T2).

Looking at the single needs (see Table 3), relatedness seems to contribute to a change in autonomous motivation from T1 to T2 ($r = .52, p < .01$), which in turn is correlated with the reduction in autonomous motivation from T2 to T3. ($r = -.48, p < .01$). Some of the reduction in autonomous motivation from T2 to T3 can also be explained by relatedness ($r = -.28, p < .05$). This is not the situation for autonomy and competence. Further, changes in autonomous motivation and efficacy is correlated ($r = .46, p < .01$), indicating that relatedness contributes indirectly to the increase in efficacy (T1-T2) through the change in autonomous motivation (T1-T2). This indirect link between the relatedness need and change in efficacy through change in autonomous motivation was significant, path a X path b = .20, $SE = .09$, bias corrected 95% CI [.06, .45]. Probably because the relatedness need contribute most to the increase in autonomous motivation from T1 to T2, the decrease in the latter variable from T2 to T3 is negatively linked to the same need (relatedness need – change in autonomous motivation from T2 to T3: $r = -.28, p < .05$). We also notice that the autonomy need is positively correlated with changes in the autonomous motivation from T2 to T3 ($r = .26, p < .05$) and the change in efficacy at the same time ($r = .28, p < .05$). The competence need is also positively correlated with changes in autonomous motivation and efficacy, but not significantly.

We tested the SDT process models of physical activity that appears in Figure 1 by bootstrapping. Bootstrapping was applied because it is suitable and recommended for small samples (Preacher & Hayes, 2008). Due to the small sample size, we reduced the number of variables in the analyses by testing two process models separately: (1) a model including autonomy support, needs satisfaction, and changes in autonomous motivation, efficacy and physical activity from Times 1 to 2; and (2) an alternative model including autonomy support, needs satisfaction and total physical activity at Time 3.

Model 1: Autonomy support → needs satisfaction → autonomous motivation and efficacy → physical activity. First, we analysed the paths between autonomy support at Time 1b (Independent Variable = IV), needs satisfaction at Time 2 (Mediator = M), and autonomous motivation at Time 2 (Dependent Variable = DV), using autonomous motivation at Time 1 as a Control Variable (CV) (see Figure 1, model 1). The path between autonomy support and needs satisfaction was significant (Point Estimate, PE, for path a = .39, $p < .01$), as was the path between needs satisfaction and autonomous motivation at Time 2 (PE for path b = .24, $p < .01$), controlling for autonomous motivation at Time 1 (partial PE of CV on DV = .83, $p < .001$). The indirect link between autonomy support and change in autonomous motivation through needs satisfaction was significant because the bias-corrected confidence intervals (for the bands of products of coefficients after n re-samplings) did not include zero or negatively valued coefficients, path a X path b = .10, $SE = .04$, bias corrected 95% CI [.01, .19]. See Table 4, row 1.

Second, we analysed the paths between autonomy support at Time 1b (IV), needs satisfaction at Time 2 (M), and efficacy at Time 2 (DV), controlling for efficacy at Time 1 (CV). The path between autonomy support and needs satisfaction was significant (PE for path a = .28, $p < .05$), whereas the path between needs satisfaction and efficacy at Time 2 was non-significant (PE for path b = .31, $p > .10$), controlling for efficacy at Time 1 (partial PE of CV on DV = .77, $p < .001$). The indirect link between autonomy support and change in efficacy through needs satisfaction was non-significant, path a X path b = .09, $SE = .08$, bias corrected 95% CI [-.03, .29]. See Table 4, row 2.

Third, we analysed the paths between needs satisfaction at Time 2 (IV), change in autonomous motivation and efficacy from T1 to T2 (M), and physical activity at T2 (DV), controlling for physical activity at Time 1 (CV). The path between needs satisfaction and change in autonomous motivation was significant (PE for path $a^1 = .61$, $p < .001$), but the path between needs satisfaction and change in efficacy was not significant (PE for path $a^2 = .22$, $p > .05$). Analyzing the b paths, we revealed that the b^1 path between change in autonomous motivation and change in physical activity was significant (PE for path $b^1 = 843$, $p < .01$), and the b^2 path between change in efficacy and change in physical activity was marginally significant (PE for path $b^2 = 491$, $p = .06$), controlling for physical activity at Time 1 (partial PE of CV on DV = .93, $p < .001$). The indirect link between needs satisfaction and change in physical activity through change in autonomous motivation was significant, path a X path b = 516.41, $SE = 206.67$, bias corrected 95% CI [191.68, 1062.24]. See Table 4, row 3. In addition, the indirect link between needs satisfaction and change in physical activity through

change in efficacy was not significant, path a X path b = 110.31, $SE = 145.08$, bias corrected 95% CI [-5.56, 537.05], because it included a negatively valued coefficient. See Table 4, row 4, and the path coefficients illustrated in Figure 1, Model 1.

The correlations between autonomy support and the three needs for autonomy, competence and relatedness, respectively, were all weaker than the correlation between autonomy support and total needs satisfaction (see Table 3). Partly due to this, no single need did significantly mediate the links between autonomy support and change in motivational variables. Thus, as shown above, total needs satisfaction including all three needs is the important construct mediating the link between autonomy support and change in autonomous motivation.

Further, the correlation between total needs satisfaction and change in autonomous motivation was relatively strong ($r = .47, p < .001$). Regarding single needs, it is only the relatedness need that could match this correlation strength in relation to autonomous motivation ($r = .52, p < .001$), whereas this correlation was much lower for the autonomy need ($r = .30, p < .05$) and the competence need ($r = .27, p < .05$). Consequently, for single needs, only the Relatedness Need (RN) was significantly indirectly linked to change in Physical Activity (PA) through change in Autonomous Motivation (AM), a-path: RN --> AM (.42, $p < .001$); b-path: AM --> PA (939.24, $p < .001$); c-path: RN --> PA (485.13, $p < .05$); c'-path, RN --> PA controlling for the AM mediator: 87.45, $p = .68$. Because the RN --> PA path became non-significant after controlling for the mediator, a full mediation is supported. This is also indicated by the indirect link, point estimate = 397.68, $SE = 167.34$, bias corrected 95% CI [144.93, 804.99]. Regarding the indirect links between single needs and change in physical activity through change in efficacy, none of them were significant. Further, using a similar model, we changed physical activity measured at Time 2 with physical activity measured at Time 3 (twelve weeks after the intervention) as the dependent variable, but the model did not demonstrate any strong support to the change model.

An alternative Model 2: Autonomy support at time 1b → needs satisfaction at time 2 → total physical activity at Time 3. Because autonomy support and needs satisfaction yielded the strongest correlations observed ($r = .33, p < .05$) with total physical activity at Time 3 (12 weeks after the end of the rehabilitation stay), we tested an alternative model with these three variables. We analysed the paths between autonomy support at Time 1b (IV), needs satisfaction at Time 2 (M), and physical activity at Time 3 (DV). The path between autonomy support and needs satisfaction was significant (PE for path a = .39, $p <$

.01), and the path between needs satisfaction and physical activity was marginally significant (PE for path b = 1558.85, $p < .10$). The indirect link between autonomy support at Time 1b and physical activity at Time 3 through needs satisfaction at Time 2 was significant, path a X path b = 608.81, $SE = 437.02$, bias corrected 95% CI [36.91, 1811.08]. See Table 4, row 5, and the path coefficients illustrated in Figure 1, Model 2.

In sum, the results supported significantly the indirect relations between autonomy support and change in autonomous motivation through needs satisfaction, and between needs satisfaction and change in physical activity through change in autonomous motivation. We also noticed support for the positive indirect link between autonomy support and total physical activity 12 weeks after the intervention through needs satisfaction.

Increases and Decreases in Mean Scores for Motivation and Physical Activity Variables

Repeated measures ANOVA revealed that physical activity (see Table 2) increased significantly from the start of the rehabilitation stay at T1 and until the follow up (T3) twelve weeks after the intervention, $F(1.26, 54.12) = 12.05$, $p < .001$. (Degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity). Further, efficacy increased significantly from T1 to T3, $F(2, 79) = 3.95$, $p = .023$. Finally, mean for autonomous motivation increased, but not significant, from T1 to T2, and remained relatively high at T3 (see Table 2).

Discussion

The purpose of the present study was to test the Self-Determination Theory process model in the domain of physical activity in a group of young adults with a physical disability (age 18-35) admitted to a rehabilitation centre. The results supported the model and should have some practical implications for how we plan and implement rehabilitation. We have not previously seen the SDT health process model applied in a setting with people with a disability. As predicted, autonomous motivation was associated with increased total physical activity. This provides additional evidence for findings in previous studies among able-bodied persons (Bagoien & Halvari, 2005; Chatzisarantis & Hagger, 2009; Chatzisarantis et al., 2002; Fortier et al., 2007; Hagger et al., 2005; Hagger et al., 2003). It also corresponds with other research on people with disabilities (Saebu & Sorensen, 2010). In rehabilitation, the focus has often been on the health imperatives of physical activity, but this study indicates that autonomy support and autonomous motivation plays an important role in predicting physical activity for people with a disability. It further supports the self-determination theory, by confirming the relation between autonomy support, basic psychological needs, autonomous motivation and healthy behaviour (Ryan & Deci, 2000; Wilson et al., 2006).

According to Williams et al. (2004), patients are more likely to feel able to control important health outcomes when they are initiating the behaviour themselves. Results from the present study correspond well with Williams et al. (2004) who emphasized the importance of clinicians to support patients' self-initiated attempts to master a new technique or skill, and to encourage them to make informed decisions about healthy behaviour. Over time, the patients will internalize the regulation of the behaviour, and become more autonomous and competent in making healthy behaviour changes and then sustaining the changes over time. This should also apply to people with a physical disability in a rehabilitation setting. Different studies have shown that autonomous motivation has strong connections with positive emotions, interest, and enjoyment of physical activities (Reeve & Deci, 1996; Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). In the present study, the strength of correlation between autonomous motivation and total physical activity indicates that this type of motivation is very important for persons with a disability too.

Further, perceived efficacy for physical activity was positively associated with total physical activity. It corresponds well with results among able-bodied, where efficacy and perceived competence are important correlates of physical activity (Troost et al., 2002) and recent research in populations with a disability (Bean et al., 2007; Kroll et al., 2007). We noticed that there was no significant positive relation between autonomy support and efficacy, or between need satisfaction and efficacy, indicating that autonomy support alone is not enough to impact efficacy for physical activity among persons with a disability in the present study. Similar results have been demonstrated among able-bodied by Fortier et al (2007), which did not reveal any differences in perceived competence in physical activity after an autonomy-supportive intervention. However, this is contrary to other research (Williams et al., 2006), and there is a need for future research may in the domain of physical activity and the SDT process-model. Results in the present study regarding efficacy may also be explained due to the ceiling effect on the efficacy scale, since the mean scores were high already at Time 1 (see Table 2). According to Fortier et al , (2007), the time frame for assessment is important, because it takes time to build feelings of competence. This may explain why the efficacy level also increased from the end of the intervention and up to the follow-up after twelve weeks (see Table 2).

The study revealed three significant indirect effects or mediators. A mediator is on the causal pathway between exposure to the intervention and program effects or outcomes. There may be a single mediator between the intervention and the outcome, or several mediators that intervene and are causally related in sequence, between the program and outcome (Baron &

Kenny, 1986). In the present study, autonomous motivation was a mediator of the relation between changes in basic psychological needs and change in physical activity level. This mediation supported previous research among able-bodied (Chatzisarantis & Hagger, 2009; Fortier et al., 2007). Thus, there is a need for additional research to examine other possible mediators between the autonomy supportive intervention and change in physical activity for people with a disability.

Further, we also recognize the indirect link between autonomy support and autonomous motivation, through need satisfaction. The results revealed a high level of need satisfaction (see Table 2), indicating that autonomy, relatedness and competence together played a role for the direct link to autonomous motivation. This is not surprising, as many of the participants highlighted the autonomy-supportive staff, facilitation for optimal challenges in activity and the social benefits of being with other people with disabilities during the rehabilitation stay. The link between need satisfaction and more autonomous physical activity motives has also been demonstrated in previous research (Hagger et al., 2006; Vlachopoulos & Michailidou, 2006; Wilson et al., 2006).

Among the needs, relatedness seems to be the most important one in this study, as it seems to interplay with autonomous motivation through and after the rehabilitation stay, and is indirectly linked to efficacy through autonomous motivation (see Table 3 and the bootstrapping results in the text above). This may be explained by the participant's unique possibility during the rehabilitation stay for sharing experiences with other persons with disabilities in adapted activities, and to be valued by disabled peers that have the experience to acknowledge the effort made. For many of the participants this is quite unusual in their local environment, due to a limited amount of persons with disabilities being physically active in small communities. However, the results are not in line with previous research among able-bodied, demonstrating that perceived relatedness was linked with controlling regulations for exercise (Peddle, Plotnikoff, Wild, Au, & Courneya, 2008; Wilson, Mack, Muon, & LeBlanc, 2007)

Participants may have felt connected to the staff and the other participants during the stay. Consequently, this may contribute to the changes in autonomous motivation during the stay, and following, indirectly making the participants more vulnerable after the stay, caused by the loss of contact with the rest of the group. We may also speculate in that they gained autonomy and competence during the stay, which is something they internalize, and thus are less vulnerable to. The results also indicated that the lack of relatedness after the stay overran the effects of satisfaction of autonomy and competence, and consequently there were zero

correlations between total need satisfaction and the motivational variables (autonomous motivation and efficacy) from the end of the rehabilitation stay and until twelve weeks. The different impact of the needs may also contribute to the lack of predictive variables for the change in physical activity from T2 to T3, with an exception for autonomy support.

The results connected to relatedness may have the implication that there is a need for making the participants in a rehabilitation stay less vulnerable for the lack of their physical activity peers and the staff after the stay. Key words for such strategies may be local-support groups after a rehabilitation stay, or continued contact with the staff and other participants via e-mail or a web-site.

Although basic psychological needs were included in this study, the study did not have an experimental design, and consequently no causal relations could be drawn. However, the effects of need satisfaction on behaviour may be both directly reflecting automatic processes of influence and indirectly reflecting influences due to deliberative processes.

We also examined an alternative longitudinal model of autonomy support at Time 1, needs satisfaction at Time 2, and physical activity at Time 3 (see Figure 1, model 2). Previous studies have observed direct effects of perceived autonomy support upon self-reported physical activity, when experiences related to need satisfaction were not taken into consideration (Chatzisarantis & Hagger, 2009; Hagger et al., 2005; Hagger et al., 2003). In the present study, need satisfaction was included in the model, and perceptions of autonomy support demonstrated a direct effect upon self-reported physical activity after twelve weeks, indicating a long term effect for the autonomy supportive intervention.

The present study demonstrated effects of a longitudinal intervention programme on physical activity behaviour, but it is not without limitations. Recruitment of participants among young adults with a disability in rehabilitation is difficult. Thus, the number of participants is limited and our sample size small. According to this, the results of the present study may not apply to other people with disabilities with different physical abilities. Future studies might consider replicating results of the present study by conducting a larger scale intervention, if possible. Further, the intensive treatment led to significant change in physical activity during the rehabilitation stay, but we cannot conclude that changes in perceptions of autonomy and efficacy led to the change in physical activity, because changes in the motivation variables were occurring at the same time as the improvements in physical activity. In other words, improvement in physical activity could have produced the change in motivation or efficacy, or the relations could have been bidirectional. Finally, the study did not examine perceptions of structure and involvement that have been forwarded as important

components of perceived interpersonal style (Taylor & Ntoumanis, 2007) that could represent effects in this context. Future studies should include perceptions of structure and involvement in rehabilitation settings, and examine if these constructs are divergent valid from satisfied competence and relatedness needs, respectively.

The present study leads to several conclusions. First, the self-determination model for health behaviour with autonomy support, needs satisfaction, and changes in autonomous motivation and physical activity was supported. The paths with efficacy included were rejected. Second, the results supported significantly the indirect relations between autonomy support and change in autonomous motivation through needs satisfaction, and between needs satisfaction and change in physical activity through change in autonomous motivation. Finally, an alternative model indicated that autonomy support and needs satisfaction during the rehabilitation stay positively predicted total physical activity scores 12 weeks after the stay.

There is a need for additional research to develop and test self-determination interventions that would enhance patients' autonomous motivation and efficacy for physical activity. We therefore support previous calls for studies to include ways to improve health care practitioner autonomy supportiveness (Williams et al., 2004). According to the results there is also a need for studies that focus on how patients can take more responsibility for their health outcomes, and development of efficient techniques and instruments to improve perceived autonomy support. Traditionally, rehabilitation for people with a physical disability has been directed by the medical expertise, i.e. an externally controlled motivation, with emphasis on the health benefits. However, the last 10-15 years there has been a development towards more self-determination in rehabilitation (Shakespeare, 2006). The results of the present study support this priority.

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Table 1. Descriptive data of the sample (N=44)

Variables	n	%
Engagement		
Student	15	34.1
Employed	14	31.8
Social security	11	25.0
Work related rehabilitation	12	27.3
Voluntary work	8	18.3
Living		
Living alone	19	43.2
Married/cohabitants	5	11.4
Living with parents	17	38.6
Living with own children	5	11.4
Activities of daily living		
Personal assistant	5	11.4
Leisure time assistant	6	13.6
Support services	11	25.0
Impairment		
Congenital	28	63.6
Acquired	16	36.4
Mobility limitation	37	84.1
Wheelchair user	24	54.5
Uses crutches/walker	2	4.5
Walk without aids	11	25.0
Visual impairment	6	13.6
Blind	5	11.4

Table 2. Mean, SD and bivariate correlation (Pearson's) among independent and dependent variables.

Measure	M	SD	α	1	2	3	4	5	6	7	8	9	10
1 Autonomy support T1	6.31	.76	.95										
2 Basic Psych. Needs T2	6.22	.78	.88	.38 **									
3 Autonomous motivation T1	5.82	.94	.80	-.01	.31 *								
4 Efficacy T1	7.50	1.68	.86	.25 *	.50 **	.43 **							
5 Physical activity T1	4672	4581		.18	.17	.05	.30 *						
6 Autonomous motivation T2	5.91	.94	.82	.15	.49 **	.90 **	.39 **	.06					
7 Efficacy T2	7.85	1.74	.89	.31 *	.53 **	.45 **	.83 **	.40 **	.52 **				
8 Physical activity T2	7251	4704		.21	.22	.19	.18	.93 **	.12	.38 **			
9 Autonomous motivation T3	5.89	.97	.84	.08	.41 **	.87 **	.52 **	.06	.82 **	.51 **	.01		
10 Efficacy T3	7.88	1.60	.86	.27 *	.44 **	.58 **	.87 **	.26 *	.51 **	.78 **	.17	.64 **	
11 Physical activity T3	5562	5080		.33 *	.33 *	.17	.19	.61 **	.27 *	.32 *	.66 **	.11	.25

* $p < .05$, ** $p < .01$.

Table 3. Bivariate correlations (Pearson's) among independent and dependent variables (residual change score)

Measure	1	2	3	4	5	6	7	8	9	10	11
1 Aut support T1											
2 Basic Psych need T2	.38 **										
3 Autonomy need T2	.34 **	.84 **									
4 Competence need T2	.36 **	.84 **	.82 **								
5 Relatedness need T2	.25 **	.76 **	.35 **	.37 **							
6 Change aut motivation (T1-T2)	.35 **	.47 **	.30 *	.27 *	.52 **						
7 Change efficacy (T1-T2)	.17	.22	.17	.11	.22	.46 **					
8 Change physical activity (T1-T2)	.12	.19	.00	.03	.34 *	.57 **	.47 **				
9 Change aut motivation (T2-T3)	-.08	.00	.26 *	.15	-.28 *	-.48 **	-.26 *	-.49 **			
10 Change efficacy (T2-T3)	.05	.03	.28 *	.22	-.28 *	-.36 **	-.51 **	-.36 **	.43 **		
11 Change physical activity (T2-T3)	.26 *	.24 .	.17	.25	.18	.13	.03	.01	-.11	.17	
12 Physical activity (T3)	.33 *	.33 *	.24	.36 **	.23	.25 *	.30 *	.25	-.19	.01	.75 **

* p < .05, ** p < .01.

Table 4. Test of indirect links emerging in Figure1

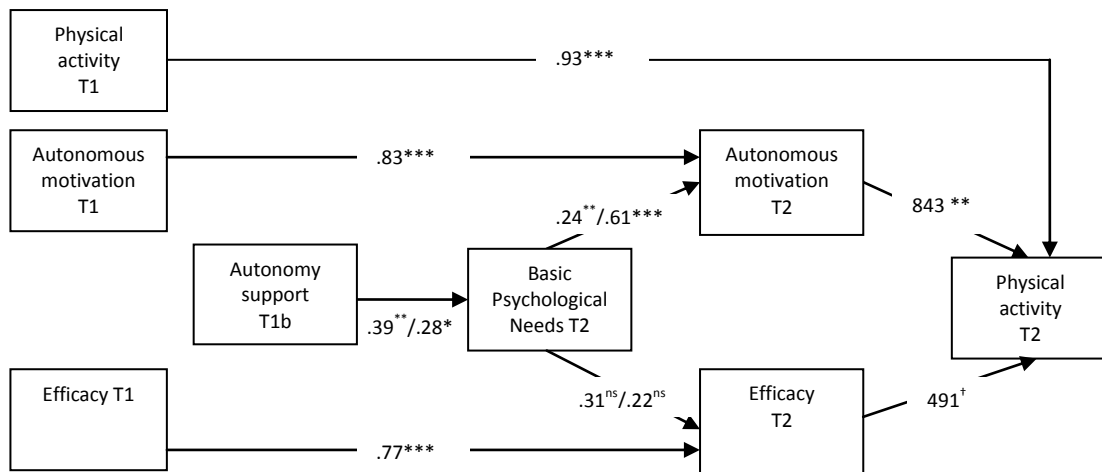
Independent variable (IV)	Mediator (M)	Dependent Variable (DV)	Point estimate	SE	Bootstrapping BC 95% CI
1. Autonomy support	Need Satisfaction	Autonomous motivation	.10	.04	[.01, .19]
2. Autonomy support	Need Satisfaction	Efficacy	.09	.08	[-.03, .29]
3. Need Satisfaction	Autonomous motivation	Physical activity T2	516.41	206.67	[191.68, 1062.24]
4. Need Satisfaction	Efficacy	Physical activity T2	110.31	145.08	[-45.56, 537.05]
5. Autonomy support	Need Satisfaction	Physical activity T3	608.81	437.02	[36.91, 1811.08]

BC - bias corrected; 5000 bootstrap samples, *a-path* IV → M, *b-path* M → DV

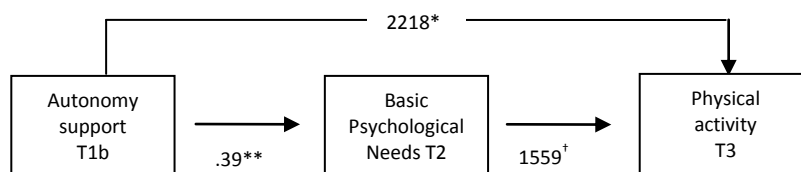
Figure 1. The change model – two different approaches. Bootstrapping models. See text for further information. Note: T1 = Baseline, T1b = Baseline + one week, T2 = after three weeks intervention, T3 = Twelve weeks after intervention.

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Model 1)



Model 2)



PAPER IV

Saebu, M., Halvari, H., & Sorensen, M. (2011). Autonomy support and perceived health after in-patient physical activity rehabilitation in young adults with a disability: The mediating role of needs satisfaction. *Adapted Physical Activity Quarterly*, (in review).

Running head: PHYSICAL AND MENTAL HEALTH IN REHABILITATION

Autonomy support and perceived health after in-patient physical activity rehabilitation
in young adults with a disability: The mediating role of needs satisfaction

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Abstract

Among young adults with a physical disability ($N = 44$, M age = 24.7, $SD = 5.1$), an autonomy supportive physical activity intervention over three weeks at a rehabilitation center lead to change in perceived physical health (SF-12) over 12 months, $F(3, 126)=2.65$, $p<.05$. Mental health improved significantly during the intervention, but decreased after departure. Further, a Self-Determination Theory process model was tested in which autonomy support positively predicted psychological needs satisfaction at the end of the stay which was positively linked to changes in mental health during the stay and positively linked to changes in role physical three months after departure. Further, the higher the positive changes in mental health during the stay, the lower was the reduction in self-rated general health measured three months after departure.

Key words: health, rehabilitation, self-regulation & self-determination, physical disabilities

Previous research indicates that people with physical disabilities report reduced mental and physical functioning compared to able-bodied (Roe, Dalen, Lein, & Bautz-Holter, 2008), as well as reduced health-related quality of life and well-being. Living with impairments is associated with various challenges that may influence mental and physical health (de Ridder & Schreurs, 2001), and many individuals with impairments struggle with reduced physical functioning, which limits physical activity and participation in general (Jahnsen, Villien, Aamodt, Stanghelle, & Holm, 2003). Over time, physical inactivity may add to the initial impairment and increase the functional consequences of the impairments. Another implication of reduced physical capacity is that the activities of daily life may require most of, or more than, the functional capacity of the individual (Kemp & Thompson, 2002). Further, reduced physical activity seems to be associated with psychological functioning, in particular reduced mental health and depression (Stewart et al., 1994).

In a recent study among young adults with cerebral palsy (Young et al., 2010), the observed health and quality of life scores were characterized as low, and Lannem, Sorensen, Frosli and Hjeltnes (2009) found that individuals with spinal cord injury seemed to demonstrate less satisfaction with life when compared with the general population. However, they also reported that persons with spinal cord injuries who were exercising regularly scored significantly higher on a life satisfaction measure than non-exercisers. There are also studies indicating that physical activity is associated with improved perceived physical and mental health in individuals with a disability (Motl & McAuley, 2009; Roe et al., 2008; Stuifbergen, Blozis, Harrison, & Becker, 2006).

In order to investigate if such effects could be obtained during a relatively short rehabilitation program, the purpose of this study was to investigate change in perceived mental and physical health in a group of young adults with a disability (age 18-35) admitted to a rehabilitation centre for rehabilitation by means of adapted physical activity. In this article, mental and physical health is defined as measured by SF-12, where terms as mental health and well-being is emphasized (Ware, Kosinski, Turner-Bowker, & Gandek, 2002). The SF-12 measure has been used in a similar study among persons with disabilities (Roe et al., 2008). According to Gandek et al. (1998), the variable physical health summary includes the four subscales of physical functioning, role physical, bodily pain and general health, whereas the mental health summary includes the four subscales of vitality, social functioning, role emotional and mental health.

Over the past years a growing body of work has also applied SDT in studies of health-related behavior change (Patrick & Williams, 2008; Ryan & Deci, 2007; Williams, Freedman, & Deci, 1998). Because of their impairment, many persons with a disability are dependent of assistance and support. Due to this, autonomous functioning and self-determination may be a particular challenge. The self-determination theory was therefore used as a theoretical framework to explore, understand and explain possible mechanisms underlying the processes behind the expected changes in the health-related outcome variables.

Theoretical Framework

Over the past 15 years a growing body of work has applied self-determination theory (SDT) in studies of health-related behavior change (Patrick & Williams, 2008; Ryan & Deci, 2007; Williams, Freedman, & Deci, 1998). The theory assumes that basic needs for autonomy, competence and relatedness are sought to be satisfied. Ryan and Deci (2000) described a physiological or a psychological need as an “energizing state” (p.74) that if satisfied will nurture health and well-being, but if thwarted will contribute to reduced mental health and well-being. *Autonomy* refers to the experience of behaving in accord with one’s own interests or values (e.g., DeCharms, 1968); and it is supported by non-controlling, supportive relationships providing choice and self-initiation. *Competence* is a propensity toward mastery and effectance in one’s environment, and is facilitated by conditions that provide optimal challenges and positive feedback (e.g., White, 1959). Finally, *relatedness* refers to a propensity toward connectedness or belongingness with others (e.g., Baumeister & Leary, 1995). According to Ryan and Deci (2000), these basic needs should apply to all people, regardless of gender, group or culture, and presumably disability.

Autonomy Support, Psychological Needs Satisfaction and Mental Health

In self-determination theory, well-being is not simply a subjective experience of happiness. Deci and Ryan (2000) emphasize that it is an organismic function, from which the person detects the presence of vitality and a sense of wellness (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). Because of this, in the present study mental health has been used as an expression for well-being, which is in line with previous research (Stewart et al., 1989).

SDT specifically suggests that autonomy is an essential basis for psychological growth and mental health (Ryan & Deci, 2000), and previous research has emphasized the importance of autonomy support in several health-care related studies (e.g., Halvari & Halvari, 2006; Teixeira et al., 2006; Williams et al., 2006). According to self-determination theory, autonomy-supportive contexts can be described as a situation where “significant others offer choice, provide a meaningful rationale, minimize pressure, and acknowledge the individual's

feelings and perspective” (Williams, Grow, Freedman, Ryan, & Deci, 1996, p. 117). More specifically, autonomy-supportive practitioners are hypothesized to facilitate the patients’ satisfaction of psychological needs, which in turn are expected to nurture healthy functioning (Kasser & Ryan, 1999).

Further, studies have examined the relation between need satisfaction and measures of well-being and mental health in different domains. Ilardi, Leone, Kasser, & Ryan (1993) found that employees’ reports of satisfaction of their needs for autonomy, competence, and relatedness in the workplace were related to self-esteem and general health, while a study by Wilson and colleagues (Wilson, Longley, Muon, Rodgers, & Murray, 2006) suggested that perceived psychological need satisfaction in exercise contributed to global and contextual well-being. In health care, a study conducted in a nursing home by Kasser and Ryan (1999), extending earlier work by Vallerand and O’Connor (1989), revealed that satisfaction of the needs for autonomy and relatedness in their daily lives were positively related to perceived health among the nursing home residents. However, to our knowledge, no study has been conducted on perceived need satisfaction in the domain of rehabilitation among persons with a disability.

Wilson et al (2006) emphasized the importance of need satisfaction for well-being in exercise, indicating that there were several sources for need satisfaction in an exercise setting among able-bodied. We wished to examine whether changes in perceived physical and mental health can be associated with the satisfaction of basic psychological needs in a rehabilitation setting based on adapted physical activity.

Thus, we tested the hypotheses that: (1) an autonomy supportive intervention based on adapted physical activity would lead to increases in both physical and mental health at the three and twelve month’s follow-up, relative to the baseline results; and (2) that perceived autonomy support measured early in the intervention would positively predict needs satisfaction at the end of the intervention stay, which in turn would positively predict changes in mental and physical health.

Method

Participants

Young adults with a disability (aged 18-35 years) were invited to one of four similar three-week rehabilitation stays with up to 14 persons in each group. Sixty-two persons applied for a stay. Of those, 9 persons were offered another rehabilitation option because they were seriously cognitively challenged. Fifty-three persons were accepted by the admission-team,

and 48 (28 women) accepted the terms for the stay, and were included in the study. Four of them dropped out during the follow-up period (two women and two men), and did not answer the last questionnaire. They reported lack of time for filling out the questionnaire and lack of interest for the study as reasons for dropping out. Thus, 44 persons (27 women) completed the study. Mean age was 24.7 years ($SD = 5.1$; women: $M = 25.3$, $SD = 5.7$; men: $M = 23.9$, $SD = 4.3$). For additional descriptive information, see Table 1.

All persons applying for a stay at a national rehabilitation centre have the right to treatment within a limited time period. Due to this, randomization was not an option in this study. Participants were divided into four groups, based on their preferences. Written informed consent was obtained from the participants, and the study was approved by the Regional Medical Committee for Research Ethics in Norway.

Design

The study was designed as a longitudinal study, based on repeated measures. Data was collected through an internet-based questionnaire. Two persons with visual impairment were interviewed by the researcher because they could not complete the questionnaire by themselves. Data was collected at five stages; on arrival at the rehabilitation centre (Time 1 = baseline), one week after arrival of the rehabilitation centre (Time 2), at the departure from the centre 3 weeks after arrival (Time 3), three months after departure (Time 4), and twelve months after the end of the rehabilitation stay (Time 5).

Intervention at the Rehabilitation Centre

The rehabilitation programme at the rehabilitation centre is based on the vision of Adapted Physical Activity (APA; Hutzler & Sherrill, 2007), by means of physical activities adapted to the specific needs of each individual with a disability. The program includes social and cultural activities and extensive use of outdoor natural facilities on a year-round basis. A wide range of services is offered including adaptation of the environmental factors, technical aids, and individual instruction. Such services may be essential in order to participate in the activities, or recommended in order to obtain the optimal effect of the activity program. The program is intensive, with 3 - 5 hours of physical activity a day, 6 days a week.

Before the intervention period, the professional staff at the rehabilitation centre was offered four lectures on Self-Determination Theory, where the facilitation of autonomy-support, possibilities for demonstrating competence, and facilitation for relatedness were emphasized. The training was delivered by a researcher, and was based on a dialogue on how health care professionals can be autonomy supportive (Williams et al., 1998). The intervention encouraged patient autonomy by providing opportunities for choice and self-

initiated goal-setting for the rehabilitation stay, prioritization of activities, and support and supervision during the rehabilitation stay. Further, extended instruction in the activities was given priority in order to enhance their activity-efficacy. Most of the physical activities were arranged in groups of 10-14 participants. The group setting is considered important (cfr. relatedness), with peer support and exchange of activity experiences. The range of activities (e.g., swimming, cross-country skiing, riding, aerobics, alpine skiing and kayaking) offered by the rehabilitation centre provided the opportunity to determine activities best suited to the individual.

Measures

Perceived physical and mental health. Physical and mental health was measured by the Medical Outcomes Study 12-item Short Form Health Survey (SF-12) at T1, T3, T4 and T5. SF-12 consists of 12 items measuring the Physical Component Summary and Mental Component Summary variables, which are intended to reflect perceived physical and mental health respectively. The physical health summary contains the following four subscales: (i) Role physical with this sample item: “During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health”; e.g., “Accomplished less than you would like?”, responded to on a five point scale ranging from (1) “All of the time” to (5) “None of the time”; (ii) Physical functioning with this sample item: “Does your health now limit you in these activities?” e.g., “Climbing several flights of stairs. If so, how much?”, responded to on a three point scale ranging from (1) “Yes, limited a lot” to (3) “No, not limited at all”; (iii) Bodily pain with this sample item: “During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework?)”, responded to on a five point scale ranging from (1) “Not at all” to (5) “Extremely”; (iv) General health with this sample item: “In general, would you say your health is: ...”, responded to on a five point scale ranging from (1) “Excellent” to (5) “Poor”. Items 3 and 4 were reversely coded in order to indicate good physical health. The four subscales for the mental health summary are: (i) Vitality with the sample item: “How much of the time during the past 4 weeks did you... have a lot of energy?”; (ii) Social functioning with this sample item: “During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities.” e.g., “like visiting friends, relatives, etc. ?”; (iii) Role emotional with the sample item: “During the past 4 weeks, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems.” e.g., “such as feeling depressed or anxious”; and (iv) Mental health with the

sample item: “How much of the time during the past 4 weeks have you felt downhearted and depressed?”. The items for the mental health summary were responded to on a five point scale ranging from (1) “All of the time” to (5) “None of the time”. Item 1 was reversely coded in order to indicate good mental health. The SF-12 is widely used and has been validated for use in nine countries, among them Norway (Gandek et al., 1998). The test-retest reliability of the PCS-12 summary measures was 0.89 in the United States and 0.86 in the United Kingdom. Alpha coefficients of 0.76 and 0.77 were observed for the MCS-12 in the United States and the United Kingdom, respectively (Ware, Kosinski, & Keller, 1996). In the present study the Cronbach’s alpha coefficients were .81 for physical health summary and .83 for mental health summary.

Autonomy support. The Health-Care Climate Questionnaire (HCCQ) concerns autonomy support for healthy behaving (Williams et al., 1996). The original HCCQ is a 15-item measure that assesses participants' perceptions of the degree to which they experience their health-care providers to be autonomy supportive versus controlling in providing the activities. The short form of the HCCQ that includes 6 of the 15 original items was used (Williams et al., 1998). A sample item is: “I feel that the staff has provided me choices and options”. Items were responded to on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). Scores were calculated by averaging the individual item scores. Autonomy support was measured after one week of the rehabilitation stay (T2). In the present study the Chronbach’s alpha coefficient was .95.

Basic Psychological Needs. Basic psychological needs were assessed at time 3 by the Basic Psychological Needs in Exercise Scale (BPNES: Vlachopoulos & Michailidou, 2006). This 12-item scale assesses perceptions of the extent to which the needs for autonomy, competence, and relatedness are satisfied in the domain of exercise. Sample items are: “The exercise program I follow is highly compatible with my choices and interests” (autonomy); “I feel I have been making huge progress with respect to the end result I pursue” (competence); and “I feel extremely comfortable when together with the other exercise participants” (relatedness). Each item was responded to on a 7-point scale ranging from *strongly disagree* (1) to *strongly agree* (7). Participants completed the scale at the end of the rehabilitation stay (Time 3). Separate scores for autonomy, competence and relatedness were made by averaging the sum of each four items. A score for total needs satisfaction was also calculated by averaging the sum of the 12 item. In the present study the Cronbach’s alpha coefficients were .88 for total need satisfaction, .88 for autonomy, .71 for competence, and .90 for relatedness.

Psychometric properties of the BPNES have been established in a sample of 1,012 persons recruited from fitness centres. The results demonstrated an adequate factor structure, internal consistency, generalizability of the factor dimensionality across the calibration and the validation samples, discriminant validity and predictive validity, and acceptable stability of the BPNES scores over four weeks (Vlachopoulos & Michailidou, 2006).

Functioning and disability. Information about functioning and disability were found in the participants' medical journals, and they also rated their own visual impairment or mobility level on a scale. Mobility limitation was measured on a five level scale ranging from (1) "I can walk indoors and outdoors without any aids" to (5) "I am completely dependent on the use of an electric wheelchair". For visually impaired the scale ranged from (1) "Can walk around outdoors without a guide or guide dog" to (3) "Need guiding (or guiding dog) when I am outdoors". Participants also responded to the question if their disability were congenital or acquired.

Analyses

Pearson correlations were performed to detect bivariate associations between the variables. Regression analysis was used to create change scores (standardized residuals) for variables. Residual change scores were used to obtain gain scores that are uncorrelated with the pre-test scores, and measures if a person's post-test score is larger or smaller than a predicted value for that person (Waltz, Strickland, & Lenz, 2010). To test the process model and indirect relations, we used bootstrapping. Bootstrapping is a nonparametric resampling procedure, advocated for testing mediation that does not impose the assumption of normality of the sampling distribution. Compared to multiple regression, bootstrapping was used because it is more suitable and recommended for small sample sizes (Preacher & Hayes, 2008). Guidelines for final reporting were used, recommending 5000 bootstrap samples (Preacher & Hayes, 2008). Repeated measures ANOVA with paired samples t-test as post-hoc tests were performed to analyse increases or decreases in mean scores of variables from Time 1 (baseline), over Time 3 (end of rehabilitation stay), to Time 4 and 5 (three and twelve months after the end of the stay, respectively). A significance level of .05 was chosen. For correlations and differences between means in where the direction was expected, one-tailed significance tests were used. All data were analysed using SPSS, version 18.

Results

Long-Term Changes in Physical and Mental Health Variables

Descriptive results for the measures are presented in Table 2. In testing the first hypothesis, we performed repeated measures ANOVA analysis based on the measures at the

start of the intervention (T1), at the end of the intervention (T3), three months after the intervention (T4) and twelve months after the intervention (T5). The longitudinal results are presented in Table 3. The repeated measures ANOVA analysis revealed that physical activity intervention over three weeks lead to change in physical health summary over twelve months, $F(3, 126)=2.65, p<.05$, representing the most important finding (see Table 3). Post hoc analysis with paired-samples t-tests revealed that physical health summary were significantly higher twelve months after the intervention ($M = 42.44, SE = 1.39$) than at start of the intervention ($M = 40.00, SE = 1.42$), $t(1, 43) = -2.15, p = .037$. However, the physical health summary was only marginally higher at three months after the intervention ($M = 41.43, SE = 1.53$), $t(1,43) = -1.38, p = .087$ (one tailed), than at baseline (see Table 2). Among the physical subscales, role physical represented the strongest contribution, increasing significantly from T1 ($M=42.83, SE=1.70$) to T3 ($M=49.64, SE=1.25$), $t(1,43) = -5.10, p < .01$, and remained relatively high after three months ($M=46.18, SE=1.45$) and twelve months ($M=46.36, SE=1.37$). Role physical were significantly higher twelve months after the rehabilitation period than at baseline, $t(1,43) = -2.68, p = .010$. The superscript in Table 2 indicate means that differ significantly from each other ($p <.05$; paired samples t-test).

Further, the repeated measures ANOVA for mental health summary also indicate a significant change, see table 3. The paired-samples t-tests revealed a significant increase in mental health summary from T1 ($M=50.18, SE=1.85$) to T3 ($M=56.39, SE=1.30$), $t(1,43) = -4.54, p < .01$, but it then decreases after the intervention period, and was not significantly different from baseline at the follow-up three and twelve months after the rehabilitation stay. Among the mental subscales, vitality increased significantly from baseline ($M = 44.78, SE = 1.81$) and to the end of the rehabilitation stay, ($M = 52.09, SE = 1.48, t(1,43) = -5.37, p < .01$). There was also a significant increase in vitality scores between baseline and the three months follow-up ($M = 49.58, SE = 1.89, t(1,43) = -2.62, p = .006$ (one tailed), and they remained significantly higher after 12 months ($M = 47.52, SE = 1.78$), $t(1,43) = -1.80, p = .040$ (one-tailed). The role emotional subscale increased significantly from baseline ($M = 45.02, SE = 1.87$) to end of the intervention ($M = 51.50, SE = 1.25$), but then decreased and yielded only small differences in the means at three months and twelve months. In sum, we demonstrated a longitudinal effect on the physical health summary, including the role physical subscale, while the effect on the mental health summary and mental subscales decreased after the end of the intervention period. An exception was scores for vitality which were significantly higher at three months and twelve months than at baseline.

The Self-Determination Theory Process Model

In order to test the second hypothesis, we examined the change in physical and mental health based on the Self-Determination Theory process model, in which perceived autonomy support was hypothesized to positively predict needs satisfaction, which in turn would positively predict changes in mental and physical health. Change scores (standardized residuals) were created for the physical and mental health variables by using separate regression analyses to remove T1 values for a variable from the T3, T4 and T5 values, respectively, for that variable. After this, bivariate correlations indicated that needs satisfaction did not predict any changes from baseline to the 3 or 12 months follow-up in physical or mental health variables, with an exception for the subscale of role physical. Due to this, changes from baseline to the end of the intervention (Time 3) in physical and mental health variables that revealed a significant correlation with total need satisfaction in Table 4 were included in the test of the SDT-process model, and changes in role physical from T1 to T4. Because of the significant negative correlation between change in mental health summary and change in the physical subscale of general health from T3-T4, this variable was also included in the process-model.

Table 4 presents the correlations among the residual change scores from T1-T3, autonomy-support assessed at T2, and need satisfaction assessed at the end of the intervention (T3). Residual change scores for role physical from T1-T4 and general health from T3-T4 are also included. According to the predicted links in the SDT process model described, autonomy support significantly predicted needs satisfaction, which in turn predicted changes in the sub-scales of vitality, mental health, role emotional, as well as in the mental health summary. Further, needs satisfaction also predicted change in physical role from baseline until the follow-up after three months, and change in mental health summary predicted negatively change in general health from the end of the rehabilitation stay and until three months after the stay.

The correlations between autonomy support and the three needs for autonomy, competence and relatedness, respectively, were all weaker than the correlation between autonomy support and total needs satisfaction (see Table 4). Thus, as shown above, total needs satisfaction including all three needs is an important construct supposed to mediate the link between autonomy support and change in the mental health variables. Further, the correlation between total needs satisfaction at the end of the intervention and change in the mental health summary score during the stay was relatively strong ($r = .45, p < .01$). Regarding single needs, none of them could match this correlation, but among them, the relatedness need

demonstrated the strongest correlation with the mental health summary variable ($r = .39$, $p < .01$), whereas this correlation was lower for the autonomy need ($r = .35$, $p < .05$) and the competence need ($r = .34$, $p < .05$), see Table 4.

Hypotheses Testing of Relations in the SDT Process Model. As shown above, bivariate correlations yielded that autonomy support predicted needs satisfaction. In turn, needs satisfaction predicted changes in vitality, mental health, role emotional, and in the mental health summary score from Time 1-3, and in role physical from Time 1-4. Thus, these variables were used in the test of hypothesis 2. To test the SDT process model shown in Figure 1, direct and indirect associations between all variables in the model were examined. These analyses were performed by bootstrapping. Results from the tests of the indirect paths are presented in Table 5.

The statistics for the change in mental health summary represents the most important result, indicating that total need satisfaction mediated the relation between autonomy support and the change in mental health summary (see Table 5, row 1). This is because the path between autonomy support and needs satisfaction was significant (Point Estimate, PE for path $a = .39$, $p < .05$), and the path between needs satisfaction and the change in mental health summary from Time 1-3 (PE for path $b = .60$, $p < .01$). The indirect link between autonomy support and change in the mental health summary through needs satisfaction was significant, path $a \times$ path $b = .24$, $SE = .11$, bias corrected 95% CI [.06, .52]. This indirect link was significant because the bias-corrected 95% confidence intervals (for the bands of products of coefficients after n re-samplings) did not include zero or negatively valued coefficients (see Table 5, row 1).

Looking at the subscales (which all are a part of the mental health summary) in table 5, we notice that the role emotional (Table 5, row 2) and vitality (Table 5, row 3) were mediated by total needs satisfaction, representing the strongest contribution to the mental health summary. Total need satisfaction did not significantly mediate the relation between autonomy support and the subscale measure of mental health (see Table 5, row 4), since the confidence interval included a negatively valued coefficient.

According to Figure 1, the path between autonomy support and needs satisfaction was significant (PE for path $a = .39$, $p < .05$), and the path between needs satisfaction and change in role physical from Time 1-4 (PE for path $b = .39$, $p < .05$). The indirect link between autonomy support and change in role physical through needs satisfaction was significant (see Table 5, row 5). Further, change in mental health summary during the rehabilitation stay had an indirect effect on change in general health from the end of the intervention (T3) and up to

three months (T4), since the confidence interval included two negatively valued coefficients (see Table 5, row 6).

Among the single needs, the autonomy need revealed the strongest indirect impact on the relation between autonomy support and the mental health summary score. The path between autonomy support and the autonomy need was significant (point estimate for path $a = .39, p < .05$), and the same was the path between autonomy need and the change in mental health summary at Time 1-3 (point estimate for path $b = .39, p < .05$). The indirect link between autonomy support and change in the mental health summary through autonomy need was significant, path $a \times \text{path } b = .15, SE = .11$, bias corrected CI 95% [.00, .51]. In addition, we also mention that the autonomy need was the only single need that mediated the link between autonomy support and the three subscales; role emotional, vitality and mental health.

Discussion

According to the results, the described intervention increased the participants' perceived physical health. These results provided partial support for the first hypothesis, and supported previous results in rehabilitation research (Motl & McAuley, 2009; Roe et al., 2008; Stuifbergen et al., 2006). Further, it also supported research among able-bodied in relation to self-determination theory, where perceived psychological need satisfaction contributed to both physical and mental health and well-being (Miquelon & Vallerand, 2008; Wilson et al., 2006). The results represent knowledge that should be helpful in order to reach the national goals for rehabilitation, where increased activity and participation in the society are among the most important and general objectives. As outlined in previous research, people with physical disabilities report reduced mental and physical functioning compared to able-bodied (Roe et al., 2008), and rehabilitation strategies that can contribute to reduce such a gap are important. Increased perceived physical health may also be important for managing the daily life activities (Kemp & Thompson, 2002), and having sufficient capacity for participating in leisure time activities.

Among the physical subscales, we noticed a significantly increased role physical score, and similar results have been demonstrated in other studies (Fletcher, 1995; Roe et al., 2008). This indicates that the participants felt that they accomplished more in their daily lives, and were less limited in their activities. Among the four physical subscales, we noticed that the physical function was not affected, indicating that this subscale mainly reflect the participants' physical disability which in itself did not change. This is in line with previous research (Saebu & Sorensen, 2010; Roe et al., 2008). A likely explanation is that the main group of the participants was born with a disability, and had a clarified relationship to their

disability. Accordingly, they have long experience with their physical health, and do not have high expectations for the rehabilitation stay to change this aspect of their health.

We also observed that mental health summary increased significantly during the intervention, but was reduced after the next three months. This supports the finding by Roe et al. (2008), which addressed whether the improved mental health was a kind of a “holiday-effect” after the rehabilitation stay. We have no further results to support this interpretation, but find it interesting that the physical health summary seem to be better maintained after the intervention than the mental health in the present study. A possible explanation may be that the social support or group identity effect experienced during the stay had faded away in the home situation. According to Table 2, the change in mental health summary during the stay had an indirect effect on general health, indicating that those who had the most extensive increase on the mental health summary had less reduction in the general health subscale the three months after the rehabilitation period than those with small increases in the mental health summary. There is no obvious explanation for this result, but those who had the highest increase in mental health summary during the stay may have been so satisfied with their stay and their general well-being after the intervention period, that this may have had an impact on the level of reduction in perceived general health after the stay. However, the link between mental health and self-rated general health should be further investigated longitudinally as part of interventions.

The subscale for vitality is based on a question about perceived energy, and the result indicates that this subscale represented the strongest contribution to the mental health summary. Scelza, Kalpakjian, Zemper and Tate (2005) reported that lack of motivation, lack of energy, and lack of interest were the most frequently cited barriers to exercise among individuals with a disability. An increase in vitality may therefore be important for maintaining an increased activity level after a rehabilitation stay, having sufficient energy in order to be physically active.

In the process model (hypothesis 2), we noticed the strong association between autonomy support, need satisfaction, and mental health summary, with vitality and role emotional as the strongest contributors among the mental variables. The bootstrap results also demonstrated an indirect effect of autonomy support upon mental health summary, including both vitality and role emotional subscales, indicating that autonomous functioning is important also for the experience of having accomplished activities without any emotional limitations. Further, we emphasize the link between autonomy support, need satisfaction and role physical after three months, indicating that autonomy support and psychological need

satisfaction can predict physical health variables. This supports previous research (Miquelon & Vallerand, 2008).

Among the individual psychological needs, the autonomy need demonstrated the strongest correlation. This supports the point that autonomy support may be especially important for need satisfaction among people with a physical disability, because autonomous functioning may be a particular challenge for this group. Many have experienced need for assistance throughout their lives, and the need of being self-determined may be challenged.

Traditionally, rehabilitation for people with a physical disability has been directed by the medical expertise, but according to Williams et al. (2004), patients are more likely to feel able to control important health outcomes when they are initiating the behaviour themselves. Results from the present study correspond well with Williams et. al. (2004) who emphasized the importance of clinicians to support patients' self-initiated attempts to master a new technique or skill, and to encourage them to make informed decisions about healthy behaviour. This should also apply to people with a physical disability in a rehabilitation setting. It further supports the self-determination theory (Ryan & Deci, 2000), by confirming the relation between autonomy support, need satisfaction and well-being. This finding represents an interesting contribution to the rehabilitation research, indicating that physical activity, autonomy support and need satisfaction should be important elements in rehabilitation interventions for the future.

The number of participants is limited and our sample size small, and the lack of a control group is also an obvious limitation. Because of this, the results of the present study may not be generalized to other people with disabilities. Future studies might consider replicating results of the present study by conducting a larger scale intervention. Further, the intensive treatment led to significant changes in health-related variables during the rehabilitation stay, but we cannot conclude that perceptions of need satisfaction led to changes in the mental health variables, since the need satisfaction was measured at the same time as the improvements in the mental outcome variables. The relations could have been bidirectional, or the improvement in mental health variables might have affected the level of perceived need satisfaction.

In sum we recognized that both mental and physical health summary scores improved during the intervention period. Of them, only physical health summary scores remained significantly higher twelve months after the rehabilitation stay. The autonomy supportive physical activity intervention with emphasis on psychological needs seemed to enhance role physical outcomes among the physical subscales, and vitality among the mental subscales.

Based on our findings, physical health variables seem to be better maintained than the mental health variables in the present study after the intervention period. The present study supported the self-determination theory model, where the subscales for vitality and role emotional were the strongest outcome contributors during the rehabilitation stay. We have not previously seen the SDT health process model applied in a setting among people with a disability, with physical and mental health as the main outcomes. There is a need for additional research to develop and test self-determination and autonomy supportive interventions that include ways to improve health care practitioner autonomy supportiveness (Williams, McGregor, Zeldman, Freedman, & Deci, 2004).

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Table 1. Descriptive data of the sample (N=44)

Variables	n	%
Engagement		
Student	15	34.1
Employed	14	31.8
Social security	11	25.0
Work related rehabilitation	12	27.3
Voluntary work	8	18.3
Living		
Living alone	19	43.2
Married/cohabitants	5	11.4
Living with parents	17	38.6
Living with own children	5	11.4
Activities of daily living		
Personal assistant	5	11.4
Leisure time assistant	6	13.6
Support services	11	25.0
Impairment		
Congenital	28	63.6
Acquired	16	36.4
Mobility limitation	37	84.1
Wheelchair user	24	54.5
Uses crutches/walker	2	4.5
Walk without aids	11	25.0
Visual impairment	6	13.6
Blind	5	11.4

Table 2. Means and standard deviations for each study variable (N = 44)

Variable	Start intervention (T1)		End intervention (T3)		3 months (T4)		12 months(T5)	
	Total M	SD	Total M	SD	Total M	SD	Total M	SD
Physical functioning	37.92 ^a	10.30	39.29 ^a	10.96	38.70 ^a	11.63	40.49 ^a	11.02
Role physical	42.83 ^a	11.29	49.64 ^b	8.32	46.18 ^c	9.64	46.36 ^c	8.98
Bodily pain	44.94 ^a	12.41	46.09 ^a	11.04	43.55 ^a	12.83	43.22 ^a	11.37
General health	44.25 ^a	10.54	49.44 ^b	9.29	45.82 ^a	12.54	45.89 ^a	10.97
Vitality	44.78 ^a	12.00	52.09 ^b	9.80	49.58 ^c	12.52	47.52 ^c	11.51
Role emotional	45.02 ^a	12.39	51.50 ^b	8.29	46.68 ^a	11.17	45.55 ^a	14.40
Mental health	50.69 ^a	11.93	53.73 ^b	9.28	49.99 ^a	11.77	47.80 ^a	10.83
Social functioning	46.24 ^a	12.22	51.98 ^b	8.83	46.93 ^a	11.72	47.17 ^a	11.74
Physical health sum	40.00 ^a	9.25	42.88 ^b	8.69	41.43 ^{ab1)}	10.18	42.44 ^b	9.49
Mental health sum	50.18 ^a	12.25	56.39 ^b	8.59	51.39 ^a	9.77	49.99 ^a	11.89

Note: Autonomy support was measured at T2, M = 6.31, SD = .76, and total needs satisfaction at T3, M = 6.22, SD = .78. For each variable, means not sharing a common superscript differ significantly from each other ($p < .05$; paired samples t -test).

ab1: Marginally significant different ($p = .087$, one-tailed) than T1.

Table 3. ANOVA of study variables (repeated measures) from start intervention until 12 months follow-up

Variable	(df)	F	η^2	1- β	p
Physical functioning	3	1.51	.04	.39	.214
Role physical	3	9.48	.18	.99	.001
Bodily pain	3	1.18	.04	.45	.156
General health	3	5.12	.11	.92	.002
Vitality	3	7.19	.15	.98	.000
Role emotional	2.33*	4.85	.10	.83	.007
Mental health	3	3.64	.08	.79	.015
Social functioning	3	4.28	.09	.85	.007
Physical health sumscore	3	2.65	.06	.70	.048
Mental health sumscore	3	7.34	.15	.98	.000

*) Degrees of freedom corrected using Greenhouse-Geisser estimates

Table 4. Correlations (Pearson *r*'s) among autonomy support, needs satisfaction, and change in health-related variables (residual change scores)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Autonomy support T2																
2. Total needs satisfaction T3	.38 *															
3. Autonomy need T3	.34 *	.84 **														
4. Competence need T3	.36 *	.84 **	.82 **													
5. Relatedness need T3	.25	.78 **	.35 *	.37 *												
6. Physical function T1 - T3	.24	-.22	-.12	-.09	-.28											
7. Role physical T1 - T3	.04	.26	.31 *	.24	.12	.01										
8. Bodily pain T1 - T3	.25	.08	.08	.09	.03	.18	.13									
9. General health T1 - T3	.23	.14	.21	.32 *	-.08	.15	.06	.06								
10. Vitality T1 -T3	.21	.37 *	.34 *	.30 *	.27	-.01	.02	-.11	.09							
11. Mental health T1 -T3	.20	.31 *	.24	.30 *	.22	-.35 *	-.10	-.01	.10	.10						
12. Role emotional T1 -T3	.03	.41 **	.42 **	.32 *	.27	.33 *	.44 **	.16	.06	.12	.19					
13. Social function T1 - T3	.17	.10	.07	.12	.07	.10	.31	.30	-.19	.00	.30 *	.37 *				
14. Physical health sum score T1 - T3	.21	-.12	-.02	-.02	-.24	.77 **	.40 **	.49 **	.34 *	-.08	-.46 **	-.21	.07			
15. Mental health sum score T1 -T3	.11	.45 **	.35 *	.34 *	.39 **	.51 **	.10	-.03	-.07	.39 **	.70 **	.67 **	.54 **	.58 **		
16. Role physical T1 -T4	.14	.32 *	.40 **	.34 *	.10	.02	.32 *	.27 *	-.07	.22	-.24	.36 **	-.10	.21	.02	
17. General health T3-T4	-.02	.23	.09	.14	.07	.18	.08	.08	-.33 *	.05	-.42 **	-.19	-.05	.22	-.31 *	.25

Note: Change scores (standardized residuals) were created by regression of T3 measures onto T1 measures. For change scores other than those from T1 to T3 only changes in General Health from the end of the intervention to 3 months after, and changes in Role Physical from baseline (T1) to 3 months after the end of the intervention are presented. All other changes were nonsignificant for the model tested in Figure 1. All correlations are available for readers upon request to the first author.

* $p < .05$, ** $p < .01$.

Table 5. Tests of indirect paths for links illustrated in Figure 1.

Independent variable (IV)	Mediator (M)	Dependent Variable (DV)	Point estimate	SE	Bootstrapping BC 95% CI	R ²
1. Autonomy support T2	Need Satisfaction T3	Mental health summary T1-T3	.24	.11	[.06, .52]	.20
2. Autonomy support T2	Need Satisfaction T3	Role emotional T1-T3	.23	.10	[.06, .48]	.18
3. Autonomy support T2	Need Satisfaction T3	Vitality T1-T3	.17	.09	[.04, .39]	.14
4. Autonomy support T2	Need Satisfaction T3	Mental health T1-T3	.13	.09	[-.02, .33]	.10
5. Autonomy support T2	Need Satisfaction T3	Role physical T1-T4	.15	.12	[.01, .48]	.10
6. Need Satisfaction T3	Mental Health Summary T1-T3	General health T3-T4	-.26	.11	[-.52, -.08]	.18

BC: bias corrected; 5000 bootstrap samples, *a-path* IV → M, *b-path* M → DV

Figure 1. The change model illustrated by bootstrapping results. See text for further information. Note: T1=Baseline, T2 = Baseline + one week, T3 = after three weeks intervention, T4 = three months after intervention
 ** p<.01, *p<.05, † p<.10

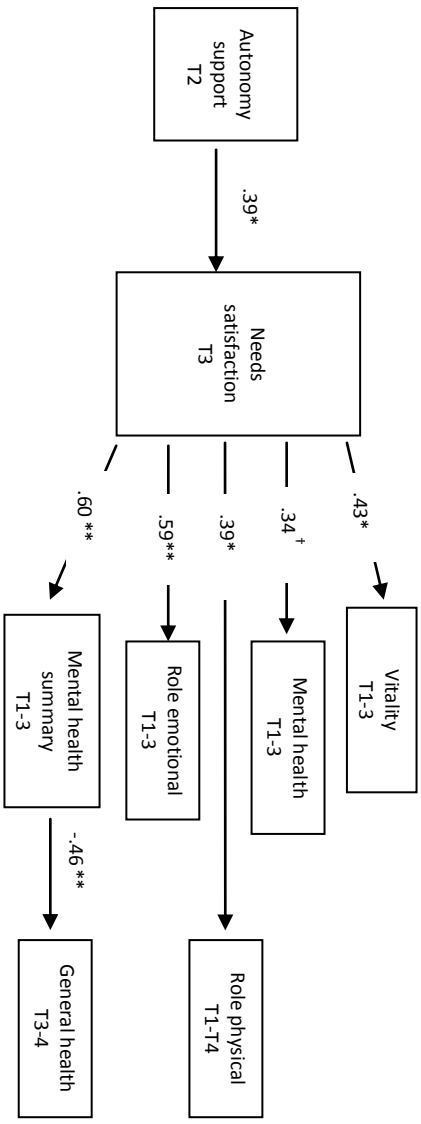


Figure 1.

APPENDICES

Appendix 1

Informed consent

Forskningsprosjekt: Unge voksne med funksjonshemming og fysisk aktivitet

Vi kontakter deg fordi vi ønsker å gjennomføre et forskningsprosjekt om fysisk aktivitet og funksjonshemming, og inviterer deg til å delta i denne undersøkelsen. Vi understreker at det er frivillig å besvare dette spørreskjemaet.

Undersøkelsen er et samarbeid mellom Beitostølen Helseportsenter, Norges Idrettshøgskole og Stiftelsen Sophies Minde. Prosjektleder er Martin Sæbu. Undersøkelsen støttes av Cerebral Pareseforeningen, Norges Blindforbund, Foreningen for Muskelsyke, Ryggmargsbrokk- og Hydrocephalusforeningen og Landsforeningen for Ryggmargsskadde.

Vedlagt finner du et spørreskjema der vi ber deg svare på noen spørsmål vedrørende aktivitet, og hva som hemmer og fremmer deltakelse i fysisk aktivitet for deg. Opplysningene vil bli analysert av prosjektleder, og inngår i hans doktorgradsarbeid ved Norges Idrettshøgskole. Resultatene vil bli benyttet til øke vår kunnskap om hvilke faktorer som hemmer og fremmer deltakelse i fysisk aktivitet, for senere å kunne utarbeide anbefalinger og styrke tilbudet med tanke på tilrettelegging av fysisk aktivitet for unge voksne med funksjonshemming. Opplysningene du gir er viktige, selv om du ikke deltar i fysisk aktivitet i dag.

Alle opplysningene du gir behandles konfidensielt. Opplysningene er aidentifisert, og alle koblinger til navn og adresse vil bli slettet etter at datainnsamlingen er avsluttet 31.12. 2008. Øvrige data lagres til prosjektets avslutning ved utgangen av 2010. Deltakere kan fritt trekke sine opplysninger frem til 31.12.2008. Prosjektleder og øvrige deltakere i prosjektet er pålagt taushetsplikt. Prosjektleder har ikke tilgang til navn og øvrige personopplysninger. Brukerorganisasjonene sender ut undersøkelsen og tar imot besvarelsene.

Det er viktig at du selv besvarer spørsmålene, og at det er dine oppfatninger og meninger som kommer frem i din besvarelse. Utfylt skjema legges i vedlagte frankerte svarkonvolutt og puttes i postkassen.

De som ønsker å besvare spørreskjemaet elektronisk, kan gå inn på www.questback.com/nih/skjema

Blant dere som besvarer skjema trekkes det ut en person som mottar en I-pod Nano 8 Gb medieavspiller. Den som har vunnet vil bli tilskrevet innen 1. juli 2008. Dersom noen har spørsmål kan Martin Sæbu kontaktes på e-post eller telefon.

Prosjektet er godkjent av Regional komité for medisinsk forskningsetikk Sør-Øst B og Personvernombudet for forskning.

Med vennlig hilsen



Martin Sæbu
Stipendiat, Beitostølen Helseportsenter
martin.sebu@online.no
tlf. 952 08 137

Marit Sørensen
Professor, Norges Idrettshøgskole

Forespørsel om deltakelse i forskningsprosjektet

I forbindelse med ditt opphold ved Beitostølen Helsesportsenter inviteres du herved til å delta i studien

”Unge voksne med funksjonshemming, fysisk aktivitet og motivasjon”

Bakgrunn og hensikt

Dette er et spørsmål til deg om å delta i en forskningsstudie der vi undersøker hvordan motivasjon for fysisk aktivitet kan endres gjennom deltakelse i et rehabiliteringsopphold. Vi ønsker også å utarbeide anbefalinger med tanke på tilrettelegging av fysisk aktivitet for unge voksne med funksjonshemming.

Hva innebærer studien?

Deltakelse i studien innebærer at dere skal delta i et intervju under oppholdet på Beitostølen Helsesportsenter, samt svar på et spørreskjema på fire forskjellige tidspunkter. Det vil si en måned før oppholdet starter, ved ankomst ved BHSS, ved avreise og tre måneder etter at oppholdet er avsluttet. Alle som deltar på Ung 2009-oppholdene ved Helsesportsenteret forespørres om å delta i studien.

Mulige fordeler og ulemper

Vi kan ikke se at det er noen ulemper ved å delta i studien, men noen kan jo oppleve det som en ulempe å besvare spørreskjema. Det vil ta ca. 20-30 min. å besvare spørreskjema. Det er heller ingen kjente fordeler ut over det faktum at du bidrar med viktig informasjon for at vi skal kunne tilrettelegge aktivitetstilbudet på en best mulig måte.

Hva skjer med informasjonen om deg?

Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjenkende opplysninger. En kode knytter deg til dine opplysninger og prøver gjennom en navneliste.

Det er kun autorisert personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg. All informasjon som samles inn slettes ved prosjektets avslutning 31.12.2010. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse

Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser for din videre behandling. Dersom du ønsker å delta, undertegner du samtykkeerklæringen på siste side. Om du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at det påvirker ditt rehabiliteringstilbud ved Beitostølen Helsesportsenter. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Martin Sæbu, tlf. 95208137, eller e-post: martin@bhss.no

Med vennlig hilsen



Martin Sæbu, prosjektleder
Beitostølen Helsesportsenter/Norges Idrettshøgskole

Ytterligere informasjon om studien finnes i kapittel A – utdypende forklaring av hva studien innebærer.
Ytterligere informasjon om personvern og forsikring finnes i kapittel B – Personvern, økonomi og forsikring.
Samtykkeerklæring følger etter kapittel B.

Kapittel A- utdypende forklaring av hva studien innebærer

Bakgrunnsinformasjon om studien

Resultatene fra en kartleggings-studie i 2008 viste at det er relativt lav andel blant unge voksne med funksjonshemming som er fysisk aktive. Tar vi utgangspunkt i de norske anbefalingene for fysisk aktivitet blant voksne, tilsvarer disse om lag 30 minutter moderat fysisk aktivitet pr. dag. Resultatene fra kartleggings-studien viser at 65,6% av kvinnene og 66,7% av mennene i undersøkelsen ikke oppfyller disse anbefalingene. Til sammenlikning viser data fra liknende studier blant "ikke-funksjonshemmede" at 63% kvinner og 44% menn ikke tilfredsstillende anbefalingene om en ½ time fysisk aktivitet daglig.

Årsakene til dette synes ikke å være entydige, men det er i stor grad samsvar mellom høy grad av indre motivasjon og det å være fysisk aktiv. Med bakgrunn i dette vil vi nå gjennomføre en studie under et opphold på Beitostølen Helse- og sportsenter der vi legger til rette for en styrking av deltakernes motivasjon, for å undersøke om dette kan endres.

Kriterier for deltakelse

Alle personer med fysisk funksjonshemming i alder 18-35 år som er inne til rehabiliteringsopphold ved Beitostølen Helse- og sportsenter i 2009 forespørres om å delta i studien.

Alternative prosedyrer eller behandling pasienten får dersom personen velger å ikke delta i studien

De som ikke ønsker å delta i studien får samme rehabiliteringstilbud som de som deltar i studien.

Undersøkelser og annet den inkluderte må gjennom

Undersøkelsen består i å fylle ut et spørreskjema på fire ulike tidspunkter. Dette skjer fire uker før opphold, ved oppholdets start, ved avreise fra Beitostølen Helse- og sportsenter samt tre måneder etter avsluttet opphold.

Pasientens/studiedeltakerens ansvar

Det pålegges ikke noe ansvar på den enkelte deltaker ut over det å fylle ut og returnere fire spørreskjema.

Mulige beslutninger/situasjoner som gjør at deres deltagelse i studien kan bli avsluttet tidligere enn planlagt

Dersom det skulle oppstå uforutsette situasjoner som medfører at studien vil bli avsluttet tidligere enn planlagt, vil deltakerne bli tilskrevet og informert.

Deltakere vil bli orientert så raskt som mulig dersom ny informasjon blir tilgjengelig som kan påvirke deltakerens ønske om å delta i studien.

Eventuell kompensasjon til og dekning av utgifter for deltakere]

Deltakelse i studien medfører ingen økonomiske utlegg for deltakerne. Alle utgifter knyttet til rehabiliteringsoppholdet på Beitostølen er dekket. Dette er uavhengig av denne studien.

Kapittel B - Personvern, økonomi og forsikring

Personvern

Opplysninger som registreres om deg:

- Opplysninger om fysisk aktivitetsnivå og deltakelse, samt motivasjon for fysisk aktivitet innhentes gjennom spørreskjema.
- Bakgrunnsinformasjon om alder, kjønn, funksjonshemming, bosted og utdanning innhentes gjennom intervju/medisinsk undersøkelse.

Beitostølen Helseportsenter ved administrerende direktør er databehandlingsansvarlig.

Rett til innsyn og sletting av opplysninger om deg

Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Økonomi

Studien er finansiert gjennom forskningsmidler fra Beitostølen Helseportsenter og Stiftelsen Sophies Minde.

Forsikring

Det er ingen potensiell risiko forbundet med å delta i studien, og det gjelder derfor ingen spesielle forsikringsordninger for studien. Under oppholdet på Beitostølen Helseportsenter er deltakere forsikret gjennom Norsk Pasientskadeerstatning, som alle andre brukere ved Helseportsenteret.

Informasjon om utfallet av studien

Deltakerne har rett til å få informasjon om utfallet/resultatet av studien. Resultatene fra undersøkelsen vil bli publisert i 1-2 artikler i internasjonale tidsskrifter. Resultatene vil også inngå som en del av doktorgradsavhandlingen til Martin Sæbu.



Martin Sæbu
Beitostølen Helseportsenter

Professor Marit Sørensen (sign.)
Ansvarlig prosjektleder
Norges Idrettshøgskole

Samtykke til deltakelse i studien

”Unge voksne med funksjonshemming, fysisk aktivitet og motivasjon”

Jeg er villig til å delta i studien

(Signert av deltaker, dato)

Jeg bekrefter å ha gitt informasjon om studien

Martin Sabu

, prosjektleder, 1. oktober 2008.

(Signert, rolle i studien, dato)

Appendix 2

Approval letters from the Regional Committees for Medical Research Ethics



Professor PhD Marit Sørensen
Norges idrettshøgskole
Pb. 4014 Ullevål Stadion
0806 Oslo

**Regional komité for medisinsk og helsefaglig
forskningsetikk Sør-Øst B (REK Sør-Øst B)**
Postboks 1130 Blindern
NO-0318 Oslo

Telefon: 22 85 06 70

Telefaks: 22 85 05 90

E-post: jorunn.lindholt@medisin.uio.no

Nettadresse: www.etikkom.no

Dato: 11.02.08

Deres ref.:

Vår ref.: S-08031b

S-08031b Unge voksne med funksjonshemming, fysisk aktivitet og motivasjon [1.2007.2810]

Søknad mottatt 02.01.08 med følgende vedlegg: Prosjektbeskrivelse; protokoll; informasjonsskriv med samtykkeerklæring; spørreskjema.

Komiteen behandlet søknaden i sitt møte den 31. januar 2008. Prosjektet er vurdert etter lov om behandling av etikk og redelighet i forskning av 30. juni 2006, jfr. Kunnskapsdepartementets forskrift av 8. juni 2007 og retningslinjer av 27. juni 2007 for de regionale komiteer for medisinsk og helsefaglig forskningsetikk.

Forskningsetisk vurdering

Studien som søkes godkjent her har som mål å få økt kunnskap om determinanter, motiver og deltakelse i fysisk aktivitet for unge voksne med funksjonshemming ved at ca. 900 personer skal besvare et spørreskjema. Komiteen kan ikke se at prosjektet reiser noen spesielle etiske problemstillinger utover at vi stiller ved spørsmål hvorfor materialet som samles inn ikke er anonymisert. Vi kan ikke se at det her skulle være behov for å samle inn personopplysninger med mindre det er for at informantene skal kunne kontaktes. Komiteen er av den oppfatning at eventuelle hensyn til purring på informanter eller lignende, ikke er tilstrekkelig begrunnelse for ikke å anonymisere data.

Informasjonsskriv/Samtykkeerklæring

1. Det foreligger ingen egen samtykkeerklæring. Samtykke er tenkt gitt gjennom å besvare skjemaet.
2. Frivillighet bør nevnes tidlig i informasjonsskrivet.
3. Det skal informeres om at prosjektet er godkjent av Regional komité for medisinsk forskningsetikk Sør-Øst B.
4. Informasjonsskrivet slik det foreligger nå har en noe ladet form (...håper vi at du har anledning til å delta... Vi understreker at opplysningene du gir er viktige.... Vi håper at du har anledning til å besvare skjemaet.... Vi understreker at det er viktig at du selv besvarer spørsmålene... Vi henvender oss til medlemmer av de seks brukerorganisasjonene som ønsket at deres medlemmer skulle delta i undersøkelsen). Dette må modereres.

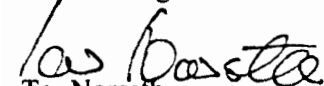
Vedtak

Prosjektet godkjennes under forutsetning av at de merknadene som er anført ovenfor blir innarbeidet før prosjektet settes i gang. Revidert informasjonsskriv og samtykkeerklæring må sendes komiteen til orientering.

Komiteens avgjørelse var enstemmig.

Komiteens vedtak kan påklages (jfr. Forvaltningslovens § 28) til Den nasjonale forskningsetiske komité for medisin og helsefag. Klagen skal sendes til REK Sør-Øst B (jfr. Forvaltningslovens § 32). Klagefristen er tre uker fra den dagen du mottar dette brevet (jfr. Forvaltningslovens § 29). Det bes presisert hvilke vedtak/vilkår som påklages og den eller de endringer som ønskes. Se informasjon om klageadgang og partsinnsynsrett på <http://www.etikkom.no/REK/klage>

Med vennlig hilsen


Tor Norseth
Leder


Jorunn Lindholt
Sekretær



UNIVERSITETET I OSLO

DET MEDISINSKE FAKULTET

Professor Marit Sørensen
Norges Idrettshøgskole
Postboks 1414 Ullevål Stadion
0806 Oslo

**Regional komité for medisinsk og helsefaglig
forskningsetikk Sør-Øst B (REK Sør-Øst B)**

Postboks 1130 Blindern
NO-0318 Oslo

Telefon: 22 85 06 70

Telefaks: 22 85 05 90

E-post: juliannk@medisin.uio.no

Nettadresse: www.etikkom.no

Dato: 05.09.2008

Deres ref.:

Vår ref.: S-08570b 2008/14040

S-08570b Unge voksne med funksjonshemming, fysisk aktivitet og motivasjon (del II) (6.2008.1749)

Komiteen behandlet søknaden i sitt møte den 28. august 2008. Prosjektet er vurdert etter lov om behandling av etikk og redelighet i forskning av 30. juni 2006, jfr. Kunnskapsdepartementets forskrift av 8. juni 2007 og retningslinjer av 27. juni 2007 for de regionale komiteer for medisinsk og helsefaglig forskningsetikk.

Saksframstilling

Prosjektet er beskrevet som andre del av et dr.gradsprosjekt på Norges Idrettshøgskole som omfatter funksjonshemmede unge voksne i alder 18-35 år. Gjennom intervju og spørreskjema ønsker man å øke kunnskap om hvordan motivasjon for fysisk aktivitet kan endres gjennom deltakelse i et teoribasert og målrettet rehabiliteringssopphold på Beitostølen Helseportsenter.

Forskningsetisk vurdering

Komiteen ser ingen forskningsetiske betenkeligheter ved prosjektet.

Informasjonsskriv/Samtykkeerklæring

1. Komiteen ber om at informasjonsskrivet påføres logo fra Norges Idrettshøgskole.
2. Avsnittet "Mulige fordeler og ulemper" gjentas to ganger med samme skrivefeil.
3. Det bør fremgå av informasjonsskrivet hvem som er ansvarlig prosjektleder.

Vedtak

Prosjektet godkjennes.

Komiteens avgjørelse var enstemmig.

Med vennlig hilsen

Tor Norseth
Leder

Julianne Krohn-Hansen
Komitésekretær

Kopi: Prosjektmedarbeider/stipendiat Martin Sæbu, e-post: martin.sebu@online.no

Appendix 3

Approval letters from the Norwegian Social Science Data Services



Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Martin Sæbu
Beitostølen Helseportsenter
2953 BEITOSTØLEN

Vår dato: 10.03.2008

Vår ref: 17665 / 2 / KH

Deres dato:

Deres ref:

TILRÅDING AV BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 19.10.2007. All nødvendig informasjon om prosjektet forelå i sin helhet 03.03.2008. Meldingen gjelder prosjektet:

17665	<i>Unge voksne med funksjonshemming, fysisk aktivitet og motivasjon</i>
Behandlingsansvarlig	<i>Norges idretts høyskole, ved institusjonens øverste leder</i>
Daglig ansvarlig	<i>Martin Sæbu</i>

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

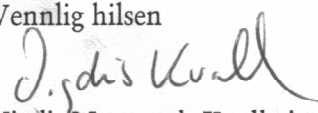
Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, eventuelle kommentarer samt personopplysningsloven/-helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/forsk_stud/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://www.nsd.uib.no/personvern/prosjektoversikt.jsp>.

Personvernombudet vil ved prosjektets avslutning, 31.12.2010, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen


Vigdis Namtvedt Kvalheim


Kjersti Håvardstun

Kontaktperson: Kjersti Håvardstun tlf: 55 58 29 53
Vedlegg: Prosjektvurdering



Harald Hårfagres gate 29
N-5007 Bergen
Norway
Tel: +47-55 58 21 17
Fax: +47-55 58 96 50
nsd@nsd.uib.no
www.nsd.uib.no
Org.nr. 985 321 884

Martin Sæbu
Beitostølen Helseportsenter
2953 BEITOSTØLEN

Vår dato: 01.09.2008

Vår ref: 19665 / 2 / PB

Deres dato:

Deres ref:

TILRÅDING AV BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 05.08.2008. Meldingen gjelder prosjektet:

19665	<i>Unge voksne med funksjonshemming, fysisk aktivitet og motivasjon (del 2)</i>
Behandlingsansvarlig	<i>Norges idretts høyskole, ved institusjonens øverste leder</i>
Daglig ansvarlig	<i>Martin Sæbu</i>

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

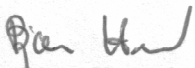
Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, eventuelle kommentarer samt personopplysningsloven/-helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/forsk_stud/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, <http://www.nsd.uib.no/personvern/prosjektoversikt.jsp>.

Personvernombudet vil ved prosjektets avslutning, 31.12.2010, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen


Bjørn Henrichsen


Pernilla Bollman

Kontaktperson: Pernilla Bollman tlf: 55 58 24 10
Vedlegg: Prosjektvurdering

Appendix 4

Questionnaire, study 2



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ID-nr:

Unge voksne med funksjonshemming og fysisk aktivitet

Vi vet i dag for lite om folks aktivitets- og mosjonsvaner, og om hva som gjør at noen er fysisk aktive og andre ikke. Ved å besvare dette spørreskjemaet bidrar du til å få frem nyttig kunnskap uansett om du er fysisk aktiv eller ikke. Vi benytter anledningen til å prøve ut forskjellige måter å måle fysisk aktivitet på. Noen av spørsmålene kan derfor overlappes hverandre.

Spørreskjemaet ser omfattende ut, men de fleste spørsmålene besvares raskt. Det er ingen svar som er riktige eller feil. Skjemaet leses av en maskin, så bruk sort eller blå kulepenn ved utfyllingen. Slik: Ikke slik:

Bruk blokkbokstaver der du skal skrive tekst, og skriv så tydelig du kan i tall- og tekstboksene. Slik:

Vær vennlig å fylle ut skjema, legg det i vedlagte frankerte svarkonvolutt og returner det, helst innen 1 uke. På forhånd takk.

OM FYSISK AKTIVITET

1.1. Angi bevegelse og kroppslig anstrengelse på din fritid. Hvis aktiviteten varierer mye mellom f.eks sommer og vinter, så ta et gjennomsnitt. Spørsmålet gjelder bare det siste året. (Sett kryss i den ruta som passer best)

Leser, ser på fjernsyn eller annen stillessittende beskjeftigelse 1

Går, sykler eller beveger deg på annen måte minst 4 timer 2

Luka? (her skal du også regne med gange, rulle med rullestol eller sykling til arbeidsstedet, søndagstur m.m.) 3

Driver mosjonsidrett, lyngre hagearbeid eller lignende? (Værk at aktiviteten skal vare minst 4 timer i uka) 4

Trener hardt eller driver konkurranseidrett regelmessig, og flere ganger i uka

1.2. Får du behandling hos fysioterapeut?

Nei, gå til spm. 2.1a Ja Hvis ja, hvor mye av dette er:

Aktiv trening i timer og minutter pr. uke

Timer

Minutter

Passiv behandling i timer og minutter pr. uke

Timer

Minutter

Meget anstrengende er fysisk aktivitet som får deg til å puste mye mer enn vanlig

Middels anstrengende er fysisk aktivitet som får deg til å puste litt mer enn vanlig

2.1a. Hvor mange dager i løpet av de siste 7 dager har du drevet med meget anstrengende fysiske aktiviteter som tunge løft, gravearbeid, aerobics, sykle fort eller rullet fort med rullestol? Tenk bare på de aktiviteter som varer minst 10 minutter i strekk.

Dager pr. uke Ingen. Gå til spørsmål 2.2a

Timer Minutter

2.1b. På en vanlig dag hvor du utførte meget anstrengende fysiske aktiviteter, hvor lang tid brukte du da på dette (skriv i boksene)?

Dager pr. uke Ingen. Gå til spørsmål 2.3a

2.2a. Det er kun aktiviteter som varer minst 10 minutter i strekk som skal rapporteres. Hvor mange dager i løpet av de siste 7 dager har du drevet med middels anstrengende fysiske aktiviteter som å bære lette ting, sykle i moderat tempo, spilt golf eller rullet rullestol i moderat fart? Ikke ta med gange.

2.2b. På en vanlig dag hvor du utførte middels anstrengende fysiske aktiviteter, hvor lang tid brukte du da på dette?

Timer Minutter



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2.3a. Hvor mange dager i løpet av de siste 7 dager, gikk eller rullet du minst 10 minutter i strekk for å komme deg fra et sted til et annet? Dette inkluderer gange/rulle på jobb og hjemme, gange/rulle til buss, eller gange/rulle som du gjør på tur eller som trening i fritiden.

Dager pr. uke Ingen. Gå til spørsmål 2.4

2.3b. På en vanlig dag hvor du gikk eller rullet for å komme deg fra et sted til et annet, hvor lang tid brukte du da totalt på å gå/rulle?

Timer Minutter

Dette spørsmålet omfatter all tid du tilbringer i ro (*sittende*) på jobb, hjemme, på kurs og på fritiden. Det kan være tiden du sitter ved et arbeidsbord, hos venner, mens du leser eller sitter eller ligger for å se på TV.

2.4. I løpet av de siste 7 dager, hvor lang tid brukte du vanligvis totalt på å sitte på en vanlig hverdag?

Timer Minutter

FYSISK AKTIVITET OG ANDRE FRITIDSAKTIVITETER

3.1. Deltar du i organisert fysisk aktivitet (f.eks. i idrettslag, helseportlag, handikapidrettslag og lignende)

Nei, ingen Ja, en aktivitet Ja, flere enn en aktivitet Deltatt før, men har sluttet

Bruk blokkbokstaver. Bruk ett tomt mellomrom dersom flere aktiviteter. Skriv bare type aktivitet (RIDNING SYKLING ALPINT SVØMMING STYRKE TRENING etc)

Hvis ja, hvilke(n)?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Hvis nei, har du ønske om å delta i organisert fysisk aktivitet (f.eks. i idrettslag, helseportlag, handikapidrettslag)

Nei Ja Hvis ja, hvilken?

3.2. Trener eller driver du fysisk aktivitet på egen hånd?

Nei, ingen Ja, en aktivitet Ja, flere enn en aktivitet Har gjort det før, men har sluttet

Hvis ja, hvilke(n)?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Hvis nei, har du ønske om å drive trening/fysisk aktivitet på egen hånd?

Nei Ja Hvis ja, hvilken?

3.3. Deltar du i annen organisert fritidsaktivitet enn idrett (f.eks i kor, korps eller annen forening)

Nei, ingen Ja, flere enn en aktivitet Deltatt før, men har sluttet

Hvis ja, hvilke(n)?

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Hvis nei, har du ønske om å drive annen organisert fritidsaktivitet enn idrett (f.eks i kor, korps eller annen forening)?

Nei Ja Hvis ja, hvilken?



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OM FYSISK AKTIVITET, TILGJENGELIGHET OG TILRETTELEGGING

4.1. Kan du nevne de tre viktigste treningstilbudene som finnes i ditt nærmiljø, uavhengig om du deltar eller ikke (Rekkekfølge har ingen betydning. Hvis du ikke kjenner til tre, skriv det (t) du kjenner til)

Aktivitet 1:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Aktivitet 2:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Aktivitet 3:	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

4.2. Vurder disse tre aktivitetstilbudene (jfr. pkt 4.1) i forhold til påstandene under.

Sett ett kryss på hver aktivitet for hvert spørsmål.	Ikke akutt for meg	Stemmer ikke	Stemmer delvis	Stemmer helt
Det er god fysisk tilgjengelighet til anlegget for meg (tilgang til heis, bredde på dører/porter, merking av dører og utstyr)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Jeg får ordnet transport til og fra aktiviteitsområdet når jeg har behov for det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Det er for høye kostnader (pris) for meg å delta i aktivitet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Jeg får nødvendig bistand/ledsaging i aktivitet når jeg har behov for det (assistent, leesejer, støttekontakt)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Aktiviteten er godt tilrettelagt for meg (tilpasset mitt funksjonsnivå)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Treningsutstyret er godt tilrettelagt for meg (tilpasset mitt funksjonsnivå)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Jeg føler meg velkommen til å delta	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 1	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 2	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitet 3	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.3. Kan du være snill å ta stilling til disse påstandene?	Stemmer ikke	Stemmer delvis	Stemmer helt
Jeg har tid til å drive fysisk aktivitet på fritida	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg har overskudd til å drive fysisk aktivitet på fritida	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Informasjon om passende aktivitetstilbud er lett tilgjengelig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Det finnes muligheter for meg å være fysisk aktiv i mitt nærmiljø	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.4. Har du behov for hjelpemidler til forflytning inne og utendørs? (f.eks. rullator, rullestol, førerhund, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Ja	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nei	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Hvis ja, kan du være snill å ta stilling til disse påstandene?	Stemmer ikke	Stemmer delvis	Stemmer helt
Hjelpemidlene er funksjonelle og bedrer min funksjonsevne	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hjelpemidlene jeg har fungerer dårlig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg har ikke de hjelpemidlene jeg trenger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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4.5. Har du behov for hjelpemidler til fysisk aktivitet/trening (f.eks. spesiell rullestol, piggekjelke, sit-ski, tandemsykkle, etc.)

Hvis ja, kan du være snill å ta stilling til disse påstandene?

	Stemmer ikke	Stemmer delvis	Stemmer helt
Aktivitetshjelpemidlene mine er funksjonelle og bedrer min funksjonsevne	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aktivitetshjelpemidlene jeg har fungerer dårlig og hindrer meg i å delta i aktivitet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg har ikke de aktivitetshjelpemidlene jeg trenger for å være fysisk aktiv	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Prisen på aktivitetshjelpemidler hindrer meg i å anskaffe utstyr jeg har behov for	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4.6. Hva opplever du er viktige forhold for at du skal kunne være fysisk aktiv? Nevn de to viktigste.

1:

2:

OM STØTTE TIL Å VÆRE FYSISK AKTIV

5.1. I hvilken grad opplever du at du har sosial støtte for å være fysisk aktiv fra:

	Svært lite	Lite	Noe	Mye	Svært mye
Familie (eller medlemmer i husstanden)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fra venner/bekjente	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

MENINGER OM FYSISK AKTIVITET

5.2. Det er mange ulike grunner til at folk driver med regelmessig fysisk aktivitet. Vær vennlig å indikere hvordan utsagnene under stemmer med dine tanker om å være fysisk aktiv. (Det er viktig at du besvarer denne selv om du ikke er fysisk aktiv).

	Ikke sant i det hele tatt	Delvis sant	Svært sant
Fordi jeg ville føle negativt om meg selv hvis jeg ikke gjorde det.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Det er ikke så tydelig for meg lengre; jeg tror ikke fysisk aktivitet er tingen for meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi andre ville bli sinte på meg om jeg ikke gjorde det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg liker å trene	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg ville føle meg mislykket hvis jeg ikke gjorde det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg føler det er den beste måten å hjelpe meg selv på	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg pleide å ha gode grunner for å være fysisk aktiv, men nå spør jeg meg selv om jeg skal fortsette med det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi folk ville tenke at jeg er en svak person om jeg ikke gjorde det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg føler at jeg ikke har noe valg i forhold til å trene, andre får meg til å gjøre det	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi det er en utfordring å nå mine mål	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg tror trening får meg til å føle meg bedre.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi det er moro	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg bekymrer meg for å få problemer med andre om jeg ikke gjorde det.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi det føles viktig for meg personlig å nå det målet	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg føler meg skyldig om jeg ikke trener regelmessig	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Jeg er ikke sikker på hvorfor jeg fortsatt trener, det ser ikke ut som om jeg kommer noen vei med det.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi jeg ønsker at andre skal se at jeg gjør det jeg er blitt bedt om å gjøre	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi det er interessant å se min egen framgang	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fordi det å føle meg sunnere er en viktig verdi for meg	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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6.12. løpet av de siste 4 ukene, hvor mye av tiden har din fysiske helse eller følelsesmessige problemer påvirket din sosiale omgang (som det å besøke venner, slektninger osv.)?

Hele tiden Nesten hele tiden En del av tiden Litt av tiden Ikke i det hele tatt

6.13. Hvor lang tid bruker du på daglig stell/nutimer? Mindre enn 1 time 1-2 timer 2-3 timer Mer enn 3 timer (vask, påkledning, skift etc.)

6.14. Tid som går med til daglig husarbeid? Mindre enn 1 time 1-2 timer 2-3 timer Mer enn 3 timer

BAKGRUNN

7.1. Fødselsår 19

7.2. Kjønn Kvinne Mann

7.3. Utdanning. Jeg har gjennomført:

Grunnskole

Videregående skole

Universitet/høgskole

Antall år

7.4. Bosted By Tettsted Land

7.5. Jeg bor i

hus/rekkehus leilighet

servicebolig institusjon

bokollektiv annen bolig

7.6. Jeg bor (du kan sette flere kryss)

alene

sammen med barn Hvor mange?

foreldre/foresatte

sammen med ektefelle/samboer/partner

sammen med annen person

7.7. Har du servicetilbud?

Ja Nei, gå til spm. 7.9

7.8. Hva slag servicetilbud har du? (Du kan sette flere kryss)

Personlig assistent Hjemmehjelp

Hjemmesykepleie Personai i bokollektiv

Leidsager/teneste Støttekontakt

Avlastning

7.8b. Jeg har servicetilbud under 2 t. pr. uke

mellom 2 og 20 timer pr. uke

mellom 20 og 60 t. pr. uke

mer enn 60 t. pr. uke

7.9. Jeg (du kan sette flere kryss)

studerer/er under utdanning er arbeidssøkende

er hjemmeværende er under attføring

er uføretygd ulønnet frivillig arbeid/aktivitetstilbud

er syk/meldt annet

er i lønnet arbeid Annet, skriv her:

<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
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Hjertelig takk for at du deltok!

Appendix 5

Questionnaire, study 3 (copy of internet-based electronic questionnaire).



Ung 2009: Fysisk aktivitet og motivasjon - del B

Under finner du en spørreundersøkelse om fysisk aktivitet, helse og motivasjon. Svar så ærlig og godt som du kan. Det finnes ingen riktige eller gale svar.

Hvis du opplever problemer med besvarelsen kan du bare ringe meg.

Med vennlig hilsen
Martin Sæbu
tlf. 95208137
Prosjektleder

1) Opplever du at din motivasjon for å være fysisk aktiv har endret seg under oppholdet ved Helseportsenteret?

- Ja Nei

2) Har din motivasjon for å være fysisk aktiv økt eller minsket under oppholdet ved Helseportsenteret?

- Økt Minsket

3) Hvor mye har din motivasjon for å være fysisk aktiv endret seg under oppholdet ved Helseportsenteret?

- 1 Svært lite
 2
 3
 4
 5
 6
 7
 8
 9
 10 Svært mye

4) I hvilken grad ble dine målsetninger for oppholdet ved Helseportsenteret innfridd?

- | | I | svært liten grad | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | I | svært høy grad |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Målsetning 1 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Målsetning 2 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

5) Kan du skrive ned de to viktigste målsetningene for oppfølging etter oppholdet ved BHSS? 7) Målsetning 1:

6) Målsetning 2:



7) Hvor sikker er du på at du når disse målsetningene?

1. Ikke sikker i det hele tatt
 2
 3
 4
 5
 6
 7
 8
 9
 10 Svært sikker



8) Hva tror du at økt aktivitetsnivå vil bety for

- | | Ingen betydning | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Stor betydning |
|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| - din generelle helse/tilstand | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| - din psykiske helse | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| - din fysiske helse | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Denne delen av spørreskjemaet handler om hvordan du ser på din egen helse. Disse opplysningene vil hjelpe oss til å få vite hvordan du har det og hvordan du er i stand til å utføre dine daglige gjøremål.

For hvert av de følgende spørsmålene vennligst merk av det svaralternativet som best beskriver ditt svar.

9) Stort sett, vil du si at din helse er:

- Utmerket
 Meget god
 God
 Nokså god
 Dårlig

De neste spørsmålene handler om aktiviteter som du kanskje utfører i løpet av en vanlig dag. Er din helse slik at den begrenser deg i utførelsen av disse aktivitetene nå? Hvis ja, hvor mye?

	Ja, begrenser meg mye	Ja, begrenser meg litt	Nei, begrenser meg ikke tatt
Moderate aktiviteter som å flytte et bord, støvsuge, gå en tur eller drive med hagearbeid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gå opp trappen flere etasjer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I løpet av løpet av de siste 4 ukene, hvor ofte har du hatt noen av de følgende problemer i ditt arbeid eller i andre av dine daglige gjøremål på grunn av din fysiske helse?

	Hele tiden	Mye av tiden	En del av tiden	Litt av tiden	Ikke i det hele tatt
Du har utrettet mindre enn du hadde ønsket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Du har vært hindret i å utføre visse typer arbeid eller gjøremål	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I løpet av de siste 4 ukene, hvor ofte har du hatt noen av de følgende problemer i ditt arbeid eller i andre av dine daglige gjøremål på grunn av følelsesmessige problemer (som f.eks. å være depriment eller engstelig)?

	Hele tiden	Mye del av tiden	En del av tiden	Litt i det hele tatt	Ikke i det hele tatt
Du har utrettet mindre enn du hadde ønsket	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Du har utført arbeidet eller andre gjøremål mindre grundig enn vanlig	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I løpet av de siste 4 ukene, hvor mye har smerter påvirket ditt vanlige arbeid (gjelder både arbeid utenfor hjemmet og huserarbeid)?

<input type="radio"/>	Ikke i det hele tatt
<input type="radio"/>	Litt
<input type="radio"/>	En del
<input type="radio"/>	Mye
<input type="radio"/>	Svært mye

Disse spørsmålene handler om hvordan du har følt deg og hvordan du har hatt det de siste 4 ukene. For hvert spørsmål, vennligst velg det svaralternativet som best beskriver hvordan du har hatt det. Hvor ofte i løpet av de siste 4 ukene har du...

<input type="radio"/>	Hele tiden	Mye av tiden	En del av tiden	Litt i det hele tatt	Ikke i det hele tatt
Følt deg rolig og harmonisk?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hatt mye overskudd?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Følt deg nedfor og depriment?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I løpet av de siste 4 ukene, hvor ofte har din fysiske helse eller følelsesmessige problemer påvirket din sosiale omgang (som det å besøke venner, slektninger osv.)?

<input type="radio"/>	Hele tiden
<input type="radio"/>	Mye av tiden
<input type="radio"/>	En del av tiden
<input type="radio"/>	Litt av tiden
<input type="radio"/>	Ikke i det hele tatt

OM OPPHOLDET PÅ BEITOSTØLEN HELSESPORTSENTER
10) Vær så snill å se nøye på hver av påstandene, og tenk på hvordan dette passer for deg i aktivitetene her på Helseportsenteret. Indiker på skalaen hvor sant disse utsagnene er for deg.

	Ikke sant i det hele tatt							Noe sant							Veldig sant						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Treningen er i stor grad forenlig med mine valg og interesser	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler jeg har stor fremgang i forhold til målet mitt med treningen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler meg veldig bekvem sammen med de andre deltakerne	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler sterkt at treningen passer måten jeg vil trene på	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler jeg utfører aktivitetene/øvelsene i treningsprogrammet mitt veldig effektivt	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler jeg kan omgås de andre deltakerne på en vennlig måte	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Måten jeg trener på er helt klart et uttrykk for hvordan jeg ønsker at trening skal være	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler denne treningen er noe jeg får til bra	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler jeg har god og åpen kommunikasjon med de andre deltakerne	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler sterkt at jeg har mulighet til å gjøre valg i forhold til min aktivitet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler jeg kan klare de oppgavene programmet legger opp til	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jeg føler meg veldig fortlølig med de andre treningsdeltakerne	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Dette skjemaet inneholder utsagn som er relatert til din erfaring med personellet ved Beistøtølen Helseisrportsenter under oppholdet.

1.1) Vi vil gjerne vite hvordan ditt inntrykk av personalet er. Ditt svar er konfidensielt kan ikke relateres til deg. Vær så snill å være ærlig og oppriktig i din vurdering.

Sterkt uenig 1 2 3 4 5 6 7 Sterkt enig

Jeg følger at personalet ved BHSS gir meg muligheter og valg

Jeg følger at personalet ved BHSS forstår meg

Personalet ved BHSS gjør meg trygg på at jeg klarer å gjøre det bra på trening

Personalet ved BHSS oppmuntrer meg til å stille spørsmål

Personalet ved BHSS hører på hvordan jeg vil gjøre ting

Personalet ved BHSS prøver å forstå hvordan jeg ser ting, før han eller hun foreslår en ny måte å gjøre ting på

Jeg har stor tillit til personalet ved BHSS

Jeg følger at personalet ved BHSS bryr seg om meg

OM FYSISK AKTIVITET

De neste spørsmålene gjelder tiden du har vært fysisk aktiv eller i bevegelse de siste 7 dagene. Vi begynner med å spørre om aktiviteter som er meget fysisk anstrengende, dernest om aktiviteter som er moderat anstrengende og til slutt om vanlig gange/rullestol. Det gjelder både på jobben, og hjemme, og når du beveger deg fra sted til sted eller i aktiviteter på fritiden. Vi ønsker svar på hvert spørsmål, selv om du mener du ikke er en aktiv person.

Tenk på aktiviteter som er **meget anstrengende** og som gjør at du **puster mye tyngre** enn vanlig. Det kan være å løfte eller bære tungt, aerobics, rask jogging/sykling eller rullet/pigget fort med rullestol.

1.2) **Hvor mange av de siste 7 dagene holdt du på med slike meget anstrengende aktiviteter sammenhengende i 10 minutter eller mer?**

Ingen_____ (Gå til neste side. Klikk Neste>> nederst på siden)

1 dag

2 dager

3 dager

4 dager

5 dager

6 dager

7 dager

Hvor lenge holdt du på med slike meget anstrengende aktiviteter i gjennomsnitt per dag på de dagene (den dagen) du har nevnt? 10) Time(r)

Velg et alternativ

Minutt(er)

Velg et alternativ



Tenk på **moderat anstrengende aktiviteter**. Dette er aktiviteter som gjør at du **puster litt tyngre** enn vanlig, for eksempel lette løft, svømming, sykling eller rask gange, rulle/pigge rullestol i moderat fart, mv.. Regn ikke med vanlig gange eller turgåing (eller rulle rolig med rullestol).

Hvor mange av de 7 siste dagene holdt du på med slike moderat anstrengende aktiviteter i 10 minutter eller mer sammenhengende?

Ingen_____ (Gå til neste side. Klikk Neste>> nederst på siden)

1 dag

2 dager

3 dager

4 dager

5 dager

6 dager

7 dager

Hvor lenge holdt du på med slike moderat anstrengende aktiviteter i gjennomsnitt per dag på de dagene (den dagen) du har nevnt? 14) Time(r)

Velg et alternativ

Minutt(er)

Velg et alternativ



Tenk på tiden du har gått eller rullet rullestol hjemme, på jobb eller på fritiden de siste 7 dagene. Regn med all gange/rulling uansett fart og anstrengelse, men regn bare med de gangene du gikk/rulla 10 minutter eller mer sammenhengende.

På hvor mange av de siste 7 dagene har du gått (eller rullet rullestol) i minst 10 minutter sammenhengende?

Ingen_____ (Gå til neste side. Klikk Neste>> nederst på siden)

1 dag

2 dager

3 dager

4 dager

5 dager

6 dager

7 dager

