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Master in Public Health

Motivational change towards physical activity participation from physiological testing in cancer survivors attending rehabilitation

Motivasjonsendring for fysisk aktivitet som følge av fysisk testing, for kreftoverlevere under rehabilitering

1 MFV 202 Master tesis

2016

Acknowledgement

Working my way towards submission of this master thesis, experienced as a mental marathon, I feel privileged to have gotten the opportunity to complete this race. I would never have reached the marathon finish line without all the support and positivism from the people around me. Therefore, I would like to thank my fellow students and teachers at Hedmark University College for two years of important learning and personal development that has really broadened my horizons. Especially tanks to my skillful supervisor Giovanna Calogiuri, for contributing with knowledge, constructive criticism and inspiration: Thank you so much for always being available for discussions and feedback, and for keeping a contagious positive attitude through all parts of my learning process, that finally resulted in this master thesis.

Thanks also to my workplace Åsnes municipality and Våler municipality for supporting my educations, and also to my former workplace, LHL- clinics Røros, for giving access to participants, and to all the cancer survivors who participated in the study. The cancer rehabilitation team and in particular Øystein Kojedal, has assisted in practical planning and organizing as well as secure data storage. Thanks also to chief scientist in the LHL- clinics Line Oldervoll and last, but not least, my former colleague and mentor Jon Arne Sandmæl for challenging me to expand my comfort zone.

Along a personal line I also would like to thank my close friends and my family, particularly my parents, for practical support during the master race. Finally, especially thanks to my fantastic husband Henning, for taking care of me, horses, dogs, cats and even dust-bunnies throughout this process. My studies would never have been completed without your care and optimism!

Ingvild Arnesen,

October 2016

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Abstract

Aim: Stimulating physical activity (PA) participation is particularly important to cancer survivors, to reduce late effects from cancer and medical treatment and promote health. Physiological tests are procedures that aim to assess the individuals' level of cardio-pulmonary fitness or performance, and are commonly integrated in rehabilitation programs, to specify exercise programs and motivate to PA participation. Still there is limited research to the field motivational changes from undergoing physiological tests. The purpose of this study was to investigate possible motivational change towards future participation in physical activity in cancer survivors undergoing a physiological test, the Modified Shuttle Walk Test (MSWT), during rehabilitation. Especially there was major interest towards change in future intention to exercise and affective responses during test, as well as the influence of previous level of physical activity and cancer related fatigue (CRF).

Method: Cancer survivors attending rehabilitation in a clinic underwent the MSWT as part of the rehabilitation program. The design was within- subject experiment, with questionnaires being filled out before and after the test, to capture information of motivational change, particularly intention to exercise and affective responses. Levels of PA and CRF were registered at baseline and after three months follow- up.

Results: 45 cancer survivors participated at baseline and pre- and post-test, while 36 completed the follow-up. There was a statistically significant increase in intention to future exercise from baseline to post test, especially among those who reported lower levels of physical activity at baseline. There was also a significant increase in positive affect from pre-test to post-test. Most cancer survivors experienced a positive perceived motivational change (PMC), and comments from participants indicate that the PMC was mainly due to mastery experience and subjective norm. There was no significant correlation between change in affect and change in intention to exercise and PMC. The participants reported increased PA levels and decreased CRF from baseline to follow-up.

Conclusion: Most cancer survivors who underwent the MSWT during rehabilitation experienced a positive motivational change towards future PA participation, especially those who were less active at baseline. Feedbacks from the participants suggest that such motivational change was especially due to mastery experiences and subjective norm. Future studies with randomized control design are needed to better understand the importance as well as the cost-effectiveness of including the MSWT as a motivational strategy during rehabilitation in cancer survivors.

Implications: The findings provide new information about the impact of undergoing physiological tests on the motivation to engage in regular PA in cancer survivors. This may influence whether or not institutions chose to include physiological testing in rehabilitation programs in cancer survivors, for more reasons than specifying individual exercise programs.

Sammendrag

Formål: Å stimulere til økt fysisk aktivitetsnivå er særlig viktig blant kreftoverlevere, for å redusere seneffekter etter sykdom og behandling og fremme helse. Fysiologiste tester har til hensikt å finne kondisjonsnivå, og benyttes i stor grad i rehabiliteringsprogram, for å spesifisere treningsprogram og motivere til fysisk aktivitet. Likevel er det lite bevis for at slik testing virker motiverende. Formålet med denne studien var å undersøke mulig motivasjonsendring for framtidig fysisk aktivitet blant kreftoverlevere som gjennomfører en fysiologisk test, Modified Shuttle Walk Test (MSWT) under rehabilitering. Fokus var særlig på endring i intensjon for framtidig trening og følelsesresponser i tilknytning til testen, i tillegg til mulig innvirkning av aktivitetsnivå og kreftrelatert fatigue.

Metode: Kreftoverlevere som var på et rehabiliteringssenter gjennomførte MSWT som en del av rehabiliteringsprogrammet. Dette var en eksperimentell studie, der spørreskjema ble besvart før og etter testen, for å finne informasjon om motivasjonsendring, spesielt intensjon for fremtidig trening og følelsesresponser. Fysisk aktivitetsnivå og fatigue ble registrert før oppstart av rehabilitering, samt ved oppfølging tre måneder etter rehabilitering.

Resultater: 45 kreftoverlevere deltok ved oppstart og før og etter test, mens 36 fullførte oppfølging. Det var en statistisk signifikant økning i intensjon for framtidig trening fra oppstart til etter test, særlig blant dem som hadde lavere aktivitetsnivå ved oppstart. Det var også signifikant økning i positive følelser fra før til etter test. De fleste kreftoverleverne rapporterte positive endring i opplevd motivasjon, og kommentarer fra deltakerne indikerer at endringen var relatert til mestringsopplevelser og subjektiv norm. Det ble ikke funnet signifikante korrelasjoner mellom følelser og verken endring av intensjon eller opplevd motivasjonsendring. Deltakerne rapporterte økt aktivitetsnivå og redusert nivå av fatigue fra oppstart av rehabilitering til oppfølging.

Konklusjon: De fleste kreftoverleverne som gjennomførte MSWT under rehabilitering opplevde positiv motivasjonsendring for fremtidig fysisk aktivitet, spesielt de som hadde lavere aktivitetsnivå ved oppstart. Tilbakemelding fra deltakerne indikerer at denne motivasjonsendringen skyldes mestringsopplevelser og subjektiv norm. Fremtidige studier med randomisert kontrollert design er nødvendig for å skape en bedre forståelse for MSWT som motivasjonsstrategi for fremtidig fysisk aktivitet blant kreftoverlevere.

Implikasjoner: Denne studien tilfører ny informasjon om hvorvidt fysiologiske tester innvirker på motivasjon til fremtidig fysisk aktivitet blant kreftoverlevere. Dette kan påvirke hvorvidt rehabiliteringssentre og andre tilbydere av rehabilitering etter kreftsykdom inkluderer fysiologiste tester som del av rehabiliteringen, av flere grunner enn spesifisering av individuelle treningsprogram.

1. Introduction

1.1 Background

In Public Health Act, public health is described as the health in a population, including how the health is distributed in the population (Ministry of Health and Care Services, 2012). In Norway and most other western countries the population health in general is mainly good, as the health status is getting better and the life expectancy is increasing. In 2012 the life expectancy in Norway was 79.0 years for men and 83.4 years for women, and this represents an increase of 30 years since 1900 (Norwegian Institute of Public Health, 2015). This positive trend suggests that many health problems have been successfully tackled, still we have to be prepared for upcoming challenges. Globally, most prominent in western countries, we are facing a trend of health problems and diseases related to living habits. The risk of developing severe cancer diagnoses, cardiovascular diseases, diabetes mellitus and chronic lung diseases increase significantly from unhealthy living habits as bad nutrition, physical inactivity, smoking and unhealthy alcohol consume. Better health service, with early diagnosis and better treatment give more people the chance to survive life-threatening diseases and to live longer with chronic diseases (Norwegian Ministry of Health and Care Services, 2012). Regaining and enhancing health status to people who have survived life-threatening diseases have become important to promote health among these growing populations.

In 2013 more than 30 400 Norwegians were diagnosed with cancer, which is about 50 percent increase over the last 50 years. In Norway this development is strongly related to

increased life expectancy, as about 75 percent of persons diagnosed with cancer are over 60 years old. Thanks to early diagnosis and more specific treatment an increasing number of cancer patients are surviving, either they are fully cured or live with cancer. This group is often referred to as cancer survivors. At the end of 2013 there were more than 232 000 Norwegian cancer survivors, and this is an increase of 74 000 people in the last 10 years (Norwegian Institute of Population- Based Cancer Research, 2015).

Sedentary behavior and physical inactivity are independent risk factors for disease development and early death. Physical activity (PA) is no longer a natural part of everyday life of most Norwegians, as only about 22 percent of grown women and 18 percent of grown men meet the previous national recommendations of 30 minutes daily activities of moderate intention (The Norwegian Directorate of Health [NDH], 2014). The health related effects of physical activity are well documented, and enhancing physical activity in the population is a public health priority worldwide (World Health Organisation [WHO], 2004). Many countries have developed strategies to promote physical activity in the population. In 2014 the Norwegian Government published a new report about recommendations concerning physical activity in the population. At least 150 minutes of moderate intensity activities or 75 minutes of high intensity activities per week, exemplifying moderate as fast walks and high as running, is recommended for adults (NDH, 2014.)

Promoting high levels of PA is an important goal, and at the same times a challenge, especially among cancer patients. In recent years there is growing evidence for the beneficial effects of physical exercise in cancer patients, in improving physical fitness and quality of life and reducing cancer related fatigue (CRF), which is the most common late effect from cancer treatment (Mishra et al., 2012). Side effects from cancer treatment often result in

sedentary behavior, which is here referred to as not meeting the recommendations of physical activity (NDH, 2014), and therefore motivation to physical activity is very important in particular to this group (Blaney, Lowe-Strong, Rankin-Watt, Campbell, & Gracey, 2013). The knowledge of exact physical activity participation among cancer survivors is unclear. Studies show both increase (Thorsen, 2003) and decrease (Gjerset, et.al.,2010; Midtgaard, et.al, 2009) in PA levels in populations with different cancer diagnoses compared to level before diagnosis, and compared to general population. A review published in 2015 provided evidence based basis for exercise as medicine in treat of chronic diseases, advising cancer patients to exercise according to generally physical activity recommendations, and suggests that cancer patients benefit from a mixture of moderate and high intensity aerobic exercise training combined with resistance training (Pedersen & Saltin, 2015). Physical exercise programs during and after cancer treatment are becoming more common (Bisschop et al., 2012), and there are clear recommendations matching the individual fitness level to achieve optimal training effect (Van den Berg et al., 2011).

Physiological testing, meaning procedures that aim to assess the individuals' level of cardio-pulmonary fitness or performance, is feasible and safe for cancer patients prior to exercise programs (Bisschop et al., 2012). The golden standard for measuring a person's cardiopulmonary fitness level consist in making a person undergoing a physical test, most often on a treadmill or ergometer bike, in which the intensity increases progressively until exhaustion, and during which the oxygen uptake is continuously measured using a metabolimeter (Jones, 2008). This method measuring peak value of the oxygen uptake (also known as VO_{2peak}) is however resource intensive, as both expensive equipment and trained staff is needed. Therefore other tests are a more accessible alternative in practice. Field tests are protocols designed to obtain indirect measurements of an individual's cardiopulmonary

fitness. Typically, field tests don't require expensive equipment to be performed. One of these field tests, The Modified Shuttle Walk Test (MSWT), has been validated to patients with sarcoidosis (DeBoer, Kolbe & Wilsher, 2014), and measurement properties are now to be tested in cancer survivors attending rehabilitation, headed by the cancer rehabilitation team in the Norwegian Association of Heart and Lung disease (LHL) clinics in Røros, located in the middle part of Norway.

Often, physiological testing is administered with the purpose of strengthening a person's motivation to exercise in the future. There are several reasons for undertaking physiological tests, as matching exercise programs to fitness level, measure individual progress, and also *a possible* motivational change on further exercise behavior (Winter, Jones, Davidson, Bromley, & Mercer, 2007). However, based on my knowledge there is no clear evidence supporting the assumption that individuals can be motivated to exercise by undergoing a physiological test A large, ongoing study in Denmark intend to measure possible motivational change of fitness testing in preventive health checks of the 30- 49 year old general Danish population, as critical appraisal of the value of fitness testing as part of preventive health checks (Høj, et.al, 2014). It has been argued that any possible motivational change induced by exercise tests is more likely to occur in people who already have an intrinsic motivation for exercise (Mahoney, 2007), meaning people that exercise regularly are more likely to have positive motivational change from test participation. Moreover, it is important to consider the emotional responses experienced by a person during such type of tests. The subjective experience during an exercise is in fact an important determinant of participation in future PA (Bryan, Hutchison, Seals, & Allen, 2007). Mastery experience and affective responses, such as enhanced mood and enjoyment experienced during exercise, implicate future intentions to exercise and might serve as determinants of participation in

regular PA and implicate future behavior (Focht, 2009; Kwan & Bryan, 2010a; Kwan & Bryan, 2010b). For example, if a person has a positive experience during a test he may have a better attitude towards the idea of exercising in the future as well as a stronger self-efficacy, meaning a stronger belief about the ability to engage and maintain regular exercise routines. On the other hand, if the experience leads to discomfort and fatigue, his or her attitudes and self-efficacy in relation to exercise might be worsened. Negative emotions can influence negatively on physical activity intentions, and the predictor is stronger for people who are less physically active than for those who exercise more (Wang, 2011). Patients with higher levels of fatigue at baseline might find the test more challenging and tiring, which potentially lead to negative experiences of mastering. The assumptions are therefore that future experiences of PA among the cancer survivors, and the level of CRF, are specific factors that can have influence their total experience of participating in the test.

When evaluating possible motivational change from physiological testing, it is also important to consider characteristics of different protocols that might influence the participants` emotional responses. Intensity above ventilator threshold may reduce pleasure, but when the intensity is self-selected rather than imposed, the tolerance to higher intensity levels is greater (Ekkekakis, Parfitt & Petruzzello, 2011). Participants may perceive to have a greater control of the pace during a field test than during a treadmill test because even if the tests indicate a given pace, they must generate intensity voluntarily.

1.2 Rationale, aims, research question and hypothesis

Participating in tests is assumed to have a positive effect in the patient's motivation to exercise (Winter, et.al., 2007), but to the best of my knowledge there is very thin evidence

base supporting such assumption, and no evidence in cancer survivors. Physiological tests are commonly integrated in rehabilitation programs, both in cancer survivors and other populations. Based on reviewed literature there is limited research to the field motivational changes from undergoing physiological tests, and no study particularly about cancer survivors participating in field tests. Stimulating physical activity participation is particularly important to cancer survivors, to promote and reduce CRF, limit weight gain and reduce risk of secondary cancer (Blaney, 2010). The purpose of this study was to investigate possible motivational change in cancer survivors undergoing the MSWT, in particular affective responses and future intention to exercise, and if a potential change is related to previous level of PA and CRF. The new learning may be beneficial as it intend to provide new information about whether field testing leads to a change in motivation and intention to future exercise, and this may influence the importance of physiological testing being included in rehabilitation programs in cancer survivors, for more reasons than specifying individual exercise programs.

The main research question of this master project is:

RQ 1: Will undergoing the Modified shuttle walk test enhance motivation for future physical activity participation among cancer survivors attending rehabilitation?

More specifically, this study will investigate whether there is a change in motivation towards future physical activity, focusing on psychological dimensions that may influence the motivation. Furthermore, there will be a major focus on the following sub-questions:

RQ 2: What are the psychological factors that are associated with change in motivation by undergoing the Modified Shuttle Walk Test?

RQ 3: Will previous level of physical activity and level of cancer related fatigue influence the motivational change to future exercise participation among cancer survivors undergoing Modified Shuttle Walk Test?

Three research hypotheses are developed on the basis of the theoretical framework and the literature review, as presented in the theory chapter. More specifically, the test is expected to motivate those who had more positive affective responses, as increased positive affect and tranquility, and less negative responses, as lower fatigue and negative affect. Higher levels of CRF at baseline might potentially have a negative impact on motivation, but participants with higher PA level might be able to address the test-related fatigue in a better way. The research hypotheses are therefore outlined as follow:

H 1: Cancer survivors will experience motivational change to future physical activity participation by undergoing the Modified shuttle walk test during rehabilitation.

H 2: The motivational change will be associated with the patients' affective responses to the modified shuttle walk test.

H 3: The motivational change will be associated with previous level of physical activity and level of cancer related fatigue.

1.3 Description of underlined concepts:

- Motivational change: Motivation is described by Bandura (1997) as activation to action, and the level of motivation is reflected in choice of courses of action, and in the intensity and persistence of effort. Self-beliefs of efficacy play a key role in the self-regulation of motivation. Motivation is often described as an umbrella term for

factors that initiate and control the behavior of humans and animals. Factors that initiate behavior are often referred to as the energy components, meaning what drives us and determines the effort and perseverance. The control factors are referred to as the direction, meaning our goals and choices. Motivation in this context is the driving force behind an action.

- Intention to future exercise (Intention): Intention is considered to be the antecedent of a behavior (Ajzen, 1991). Intention to future exercise may in this respect be the indication of a person's readiness to participate in future exercise, in the present referred to as meeting the national recommendations of weekly 150 minutes of moderate intensity or 75 minutes at high intensity (NDH, 2014). Cancer survivors should aim to exercise according to generally recommended levels of PA, and preferably the training should be individually tailored and supervised (Pedersen & Saltin, 2015).

- Affective response: Affect is often referred to as the most basic component of all valence responses, both positive and negative, in a broader concept than emotions and moods (Ekkekakis & Petruzzello, 2000). The circumplex model of affect (Russel, 1980) describes affective experiences to lie on a continuum from positive to negative, and affective states on a continuum from high to low, forming four quadrants of activation- deactivation and pleasure-displeasure. An “affective response” is intended here in terms of change in self-reported affect.

- Physical activity (PA) and exercise: These concepts may often be used underchangebely, still PA is often referred to as any bodily movement initiated by the

skeletal muscle resulting in a substantial increase in energy consumption beyond the resting level. Exercise has a more structured goal component, involving PA that is planned, structured and repetitive, aiming increased or maintained functioning (NDH, 2009).

- Rating of perceived exertion: The perceived exertion (RPE) is a person`s subjective perception of exertion, reported by scaling how exhausting an activity was experienced (Borg, 1982).

- Level of Physical Activity (PA): The level of PA in this study is referred to as participation in PA during a normal week, and the participants self- report their frequency of exercise participation of at least 30 minutes variety included intensity grading (Godin & Shepard, 1985).

Cancer related fatigue (CRF): Fatigue is the most commonly reported late effect among cancer patients. There are several definitions and explanations to CRF. Patarca- Montero (2004) wrote that:

> *"Cancer- related fatigue is a complex syndrome, with physical, mental and emotional components and diverse causes, characterized by a chronic and abnormal whole- body experience of tiredness, decreased capacity for physical and mental work, or persistent exhaustion that is disproportional or unrelated to exertion and not revealed by rest"* (Patarca- Montero, 2004, p.3).

1.4 The structure of the dissertation

The dissertation is structured according with recommendations by Creswell (2010) for most quantitative approaches. Chapter one contains an introduction to the study including research questions and research hypothesis, followed by the theory section presented in chapter two, including the theoretical framework and a review of relevant literature. The methodology and the research process are described in chapter three, and chapter four contains presentation and analyzes of the collected data. The fifth chapter contains discussion and conclusion. In the appendix the ethical approval from Regional Ethic Committee, REK, the informed consent form, questionnaires used for collecting data and the complete results correlation matrix are listed.

2. Litterature review

2.1 Theoretical framework

2.1.1 Health behaviour

Promoting health behaviours like participating regularly in PA is particularly important to the growing population of cancer survivors, to reduce CRF and increase quality of life (Mishra, et.al, 2012). Behaviour is understood as a function of people`s perception of reality, rather than conditioned responses to environmental stimuli (Earl, 2007). Health behaviour often reflects a person's health cognition, referred to as thoughts and feelings that individuals associate with a particular health related action or outcome, and includes all activity with purpose of preventing or detecting disease or improving health. Further, the health psychology aims to promote health and prevent illness (Abraham, et.al, 2008). Health promotion focuses on achieving equity in health, and aims to reduce differences in current health status. In the Ottawa charter from 1986 health promotion is referred to as the process of enabling individuals to increase control over and to improve their health (WHO, 2015).

The determinants of health are strongly related to socioeconomic factors as education and income, and this social gradient in health is considered to be the most prominent contemporary public health challenge in most western countries (Norwegian Institute of Public Health, 2015). Health behaviour is one of the determinants of health outcome, and to better understand underlying factors that influence health behaviour, theories and cognitive models may be helpful (Abraham et.al, 2008).

2.1.2 Behavioural theories that inform the study

Severe models describe causalities and aim to provide the basis for effective interventions that may improve health of a person or group of people by influencing and changing psychological processes. According to Earle (2007) theories are organized sets of knowledge applicable in a variety of circumstances that may help us to analyse, predict or explain a particulate phenomenon and the way in which change take place in individuals, communities, organizations and societies. Models and theories that use a number of cognitive variables to understand or predict human behaviour, including health behaviour, are called social cognitive models (Abraham, 2008). Social cognitive models provide a clear theoretical background to any research and are considered essential in order to predict or determine health behaviour. The theoretical framework that inform this study is underpinned by three elements: The circumplex model of affect (Russel, 1980), The Theory of Planned Behaviour (Ajzen, 1991) and The Social- cognitive theory (Bandura, 1986).

Circumplex model of affect

The circumplex model of affect (figure 1) was developed by Russel (1980) to better understand the concepts of emotion, affect and mood. Twenty-eight distinct affective states could be represented along the perimeter of a circle, with two axes reflecting pleasure-displeasure and arousal- sleepiness. Affective experiences lie on a continuum from positive to negative, and high or low action on a continuum regardless of the positive- negative affect states.

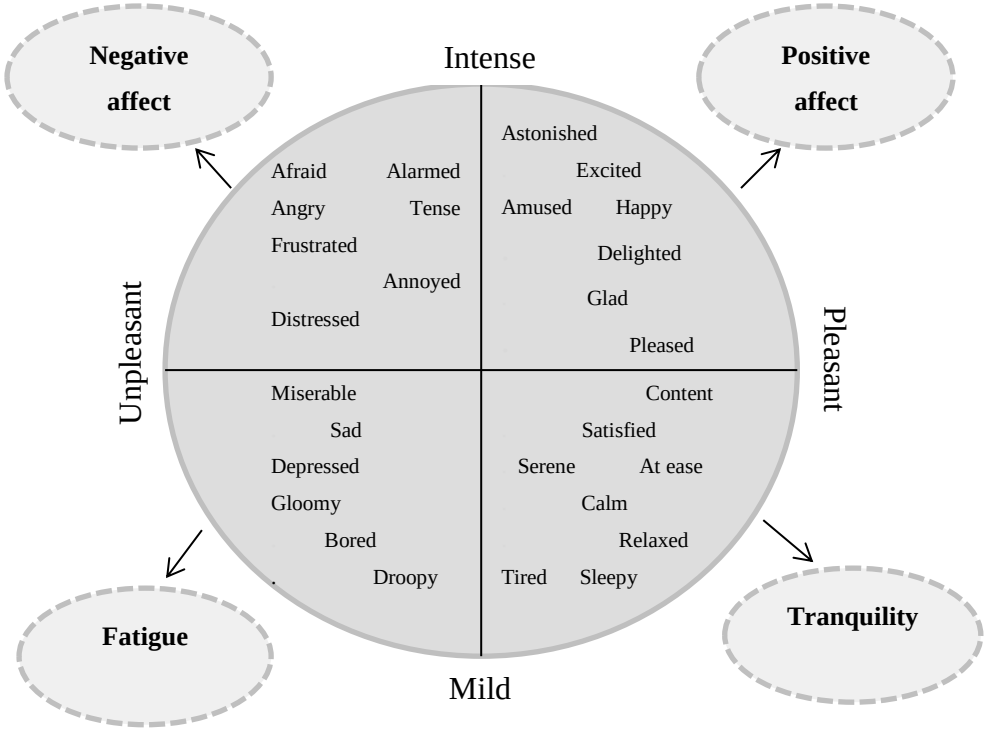

Figure 1. Russel`s circumplex model of affect (Source: Russel, 1980). The four items representing The Physical Activity Affect Scale (PAAS; Lox, et.al, 2000) added to the model, marked with dotted lines.

A series of studies reported by Russel (1980) provided support that affective states could be located along the circumplex according to pleasant or unpleasant tone and intensity properties. As exemplified by Lox, Jackson, Tuholski, Wasley, & Treasure (2000) excitement would fall within the quadrant of *positive-high activation*, relaxed would be in the quadrant *positive-low activation state*, frustration would represent the quadrant *negative-high activation affect*, whereas depression would be in the quadrant *negative-low activation state.* The Physical activity affect scale (PAAS; Lox, et.al, 2000) is based on this model, grouping three of the 12 items in each quadrant, relating the positive affect to positive high

activation, negative affect to negative high activation, tranquility to positive low activation and fatigue to negative low activation (Lox et.al, 2000).

Theory of planned behavior

The theory of planned behaviour (TPB, figure 2), was develop by social psychologists and specifies the factors that determine a person`s decision to perform a specific behaviour (Ajzen, 1991). According with TPB, behaviours are mainly determined by a person's intention to perform the behaviour, and the perceived control over that behaviour. Perceived behaviour control (PBC) describes the person`s expectancy to perform the behaviour (Abraham, 2008). In TPB the human behaviour is guided by three kinds of considerations; attitudes, subjective norms and PBC. Attitudes are the overall evaluation of behaviour by the individual as positive or negative, and are referred to as beliefs about the perceived consequences of the behaviour. Subjective norms describe beliefs about the normative expectations of others, meaning whether the person believes that significant others think he or she should perform the behaviour. PBC includes beliefs about the presence of factors that may facilitate or complicate performance of the behaviour, and is assumed to influence behaviour intention because believing that we can succeed normally increase effort, and the opposite we are not likely to attempt doing something if we believe we will fail (Abraham, 2008).

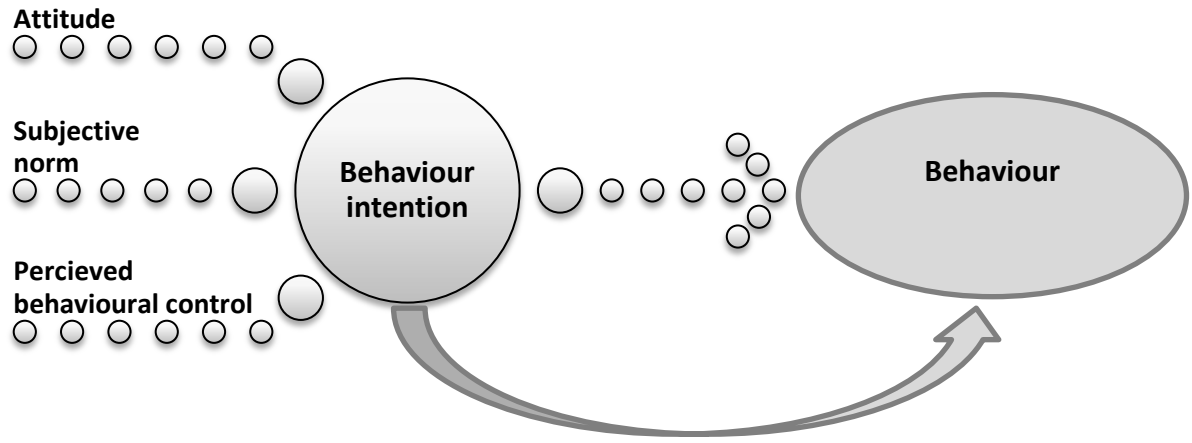

Figure 2. Ajzen`s Theory of planned behaviour (TPB; Source: Abraham, 2008)

The TPB predicts intention for a given behaviour, still there is an intention- behaviour gap noticed by researchers that can be explained by severe factors. Negative emotions in relationship with PA may cause a person not to exercise. The gap may also include implicit attitudes, meaning people may have a positive attitude towards exercising, but be negatively disposed in a subconscious level. Low self-efficacy or perceived barriers to exercise may also influence on the actual behaviour (Abraham, 2008).

Social cognitive theory

The Social Cognitive Theory (SCT, Bandura, 1986, figure 3) explain human behaviour through socio- structural factors, describing that a person learn from observing other people`s attitudes, behaviour and outcome of the behaviour. Bandura defines SCT by giving greater accent to three factors; goals, outcome expectancy and self-efficacy. Also, Bandura

added socio- structural factors to his theory, which include living conditions, health systems, and political, economic or environmental systems. Goals are referred to as plans to act understood as intention to perform a specific behaviour.

A person`s self-efficacy is referred to as his or her expectation of whether he or she is capable of a behaviour that leads to achieving a specific goal (Lerdal & Fagermoen, 2011). According to Banduras SCT (figure 3), a person`s self-efficacy strongly influence the person`s behaviour. An individual`s self-efficacy influence both the outcome expectations, the socio- structural factors and his or her goals, as well as a direct influence on the actual behaviour. Self-efficacy is essential because it will influence the choices we make, as well as how much effort we keep in achieving a specific goal. According to Bandura (1997) there are severe factors influencing a person`s self-efficacy, as knowledge and specific skills, future experiences from similar situations, desire for results, the effect of the measure, as well as how much effort is taken to reach the goal. Still, a general self-efficacy to most everyday challenges is not always enough when it comes to new and unknown challenges, as for example being struck by a serious disease (Lerdal & Fagermoen, 2011).

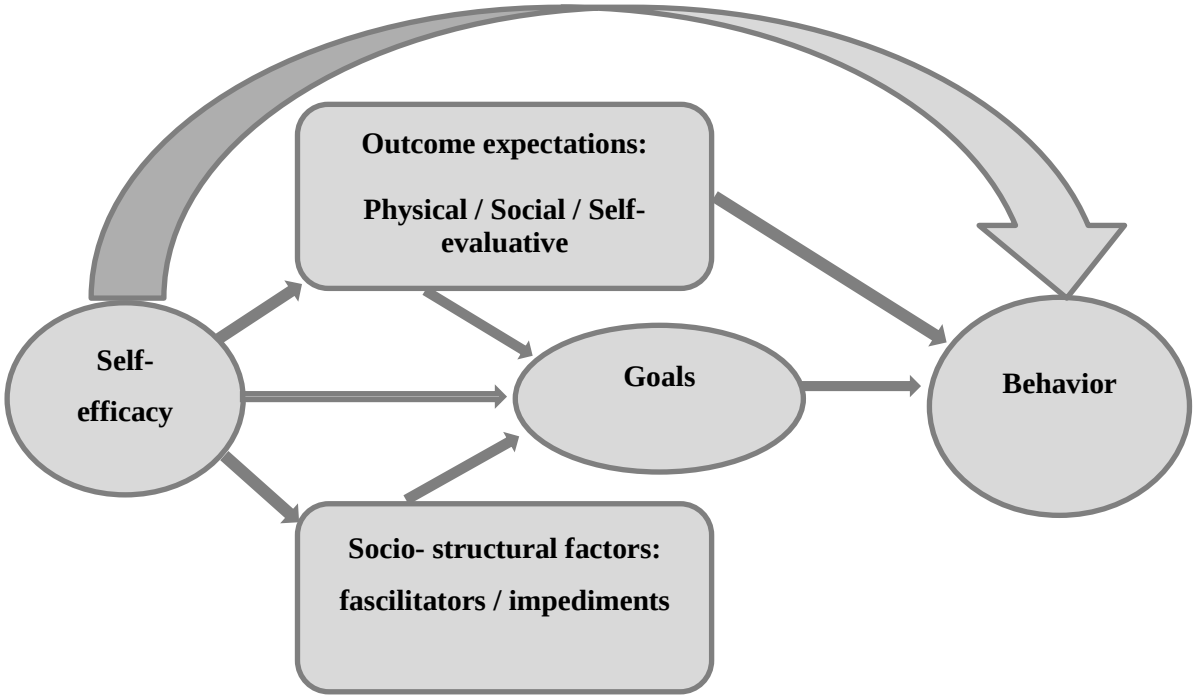

Figure 3. Bandura`s Social Cognitive Theory (SCT; Source: Lerdal & Fagermoen, 2011)

2.1.3 Affective responses and exercise behavior

The public health issue related to physical inactivity is well known, still in most industrialized countries, the majority of the population is physically inactive or inadequately active. Most theoretical models of exercise behaviour assume that the decision to be physically active is based on cognitive factors. Another possibility is that these decisions are influenced by affective variables, such as whether previous exercise experiences were associated with pleasure or displeasure (Ekkekakis et.al, 2011). A systematic review by Ekkekakis et.al, (2012) examines 33 articles published from 1999 to 2009 on the relationship between exercise intensity and affective responses. The studies provide evidence of a relation between the intensity of exercise and affective response, in a dose- response relation

between exercise intensity and affect. Intensity above ventilator threshold may reduce pleasure, but when the intensity is self-selected, rather than imposed, the tolerance to higher intensity levels is greater.

An important part of studying exercise behaviour is the identification of physiological and psychological characteristics that explain the participation. Consideration of psychological, behavioural, genetic and physiological determinants is essential in predicting exercise behaviour (Marcus et al., 2006). Personal experience of PA is a determinant to future exercise behaviour, as a positive affective response is associated with increased participation in physical exercise (Bryan et al., 2007). In other words, participation in exercise is more likely to increase for individuals who experience positive emotions as result of exercise.

Intention represents an individual's overall motivation to perform behaviour, and there is a strong relationship between intentions and behaviour (Bryan et al., 2007). Individuals who experience more positive affective responses to exercise are more likely to translate intentions to actual behaviour. The individuals with positive affective response to exercise, meaning greater positive affect, increased tranquillity, less negative affect and fatigue have more favourable attitudes, self-efficacy and intentions to exercise at follow- up, as underpinned by TPB by Ajzen (1991). A positive affective response to exercise is associated with more temporally stable intentions, and that straightened the relationship between past behaviour and future behaviour, leading to more stable motivation (Bryan et al., 2007).

A study by Kwan, & Bryan (2010b) tested whether affective response to exercise leads to greater motivation based on terms of attitudes, subjective norms, self-efficacy and intention to exercise, as based on the concepts from TPB (Ajzen, 1991). The affective response is related to exercise behaviour, as positive affective response to exercise can aid in building

and sustaining motivation over time. Individuals who experience greater improvements in positive affect, negative affect and less fatigue during exercise also reported more positive attitudes, exercise self-efficacy and intentions to exercise three months later. Results from the study indicate that when people feel good as a result of exercise, they are more likely to be physical active regularly and over time (Kwan & Bryan, 2010a; Kwan & Bryan, 2010b). In 2010 Kwan & Bryan studied the in-task affective response to exercise in purpose of translating exercise into behaviour. Results showed that affective response to exercise influence in voluntarily participation in exercise. Participants who experienced an increase in affective responses and decrease in fatigue during exercise tended to exercise more frequently three months later, than participants who had no change or negative affective responses. Greater feeling of tranquillity and less fatigue at 15 min post-exercise was associated with exercising more at follow-up, and with a stronger intention- behaviour relationship. They also repeated the test 30 minutes post exercise, showing the same results as 15 minutes post exercise. Importantly, intentions were poor predictors of behaviour when there was negative affect or increase in fatigue during exercise (Kwan & Bryan, 2010a; Kwan & Bryan, 2010b). Another study comparing effect of brief walks in outdoor and laboratory environments on affective responses, enjoyment, and intention to walk for exercise (Focht, 2009), showed improvements in affective responses during exercise, and participants reported greater pleasant affective states, enjoyment and intention for future participation with outdoor walking. Findings suggest that the environment influence the affective responses, and showed that affective states experienced during walking are related to determinants of PA.

In summary, affective responses during exercise are often determinants of exercise initiation and maintenance (Bryan et al., 2007; Kwan & Bryan, 2010a; Kwan & Bryan 2010b; Focht,

2009). A positive affective response to exercise would influence intentions to exercise behaviour positively, while a negative affective response will have negative influence (Annesi, 2005). For individuals who experience affective improvements, the likelihood of future PA will increase, meaning exercise could be self-reinforcing (Williams et al., 2008). In this context one must be aware of that affect does not always occur in a conscious level. Baumeister, Vohs, DeWall & Zhang (2007) claim that human behaviour is shaped through feedback, anticipation and reflection, rather than direct awareness of the emotion.

2.1.4 Factors that influence the affective responses and future intention to exercise

Past PA is often an individual characteristic that is associated with positive or negative affective experiences during exercise (Magnan, Kwan, & Bryan, 2013; Wang, 2011). Participants in a study about effects of current PA on affective response to exercise attended to participate in a 30- minute bout of moderate-intensity exercise, reporting current level of PA, exercise self-efficacy and affect during the exercise. More active individuals experienced higher levels of positive affect and tranquillity and lower levels of negative affect and fatigue during exercise, than less active individuals. Results from this study indicate that affect experienced during PA is related to current activity level (Magnan et al., 2013).

Exercising more could lead individuals to feel better during PA (Bryan et al., 2007). Hoffmann & Hoffmann (2008) compared acute mood changes before and after aerobic activity across ultramarathon runners, regular moderate exercisers and non-exercisers. They found evidence of improved mood in all groups, and the exercise groups had greater

improvement, unlike Rose & Parfitt (2012) who found no overall difference in active and inactive groups. Weiss & Ferrer- Cajas' (2002) study comparing students with different exercise competence, concluding students with high physical competence were more likely to enjoy and continue participation in physical activities than those with low perceived competence.

The exercise intensity is another important factor that can influence people's affective responses to exercise as well as future exercise behaviour. The evidence of exercise intensity and the affective responses to exercise on long term motivation and drop- out avoidance are so well established that they led to a change in the American college sports medicine guidelines to include the consideration of the affective response to exercise in addition to the exercise intensity when developing exercise programmes (Pescatello, Arena, Riebe & Thompson, 2014). The Norwegian PA guidelines also appear to this knowledge, fronting national campaigns as "Yours 30" to face the health effect of 30 minutes physical activity a day, with the slogan "Each movement counts" to specify that type of activity and intensity is less relevant (Health Norway, 2016).

As mentioned earlier, affective response to exercise seems to be more positive when people are allowed to self- select the mode and intensity of exercise (Miller, Bartholomew & Springer, 2005). Parfitt, Markland & Holmes (1994) found that high-active individuals reported more positive affect after four minutes of intense PA (90%) than low-active individuals, but found no difference between the groups after low intensity activity (60%). In 2014 Jung, Bourne & Little compared affective responses between high-intensity interval training (HIT), continuous vigorous-intensity exercise (CVI) and continuous moderate-intensity exercise (CMI). Participants reported greater enjoyment to HIT than to CVI, but

HIT was less pleasurable than CMI. They also found that affective responses during HIT exercise are not as negative as those seen in CVI. 20 minutes post HIT there was a positive rebound effect that was not seen in CVI. The study indicates that CVI can lead to negative psychological responses, while HIT allows series of breaks from the negative affective responses. An important note is that the in-task affect significantly decreased over time. Findings suggest that HIT may be a viable alternative to continuous moderate-intensity exercise for inactive individuals. HIT leads to less displeasure compared to CVI, and less pleasure compared to CMI in a sample of inactive adults (Jung et al., 2014).

Another study of physiological and affective responses in older active adults from 60- 74 years during a maximal graded exercise test and self-selected exercise shows relative stable and positive affect during incremental exercise up to and across the ventilator threshold (Smith, Eston, Tempest, Norton & Parfitt, 2014). When older adults are given the freedom to self-select the exercise intensity, they will choose to exercise at or around the point of aerobic-anaerobic transition while maintaining a positive affective response. It is purposed that variability in affective responses can be explained by the individual's personal preference for and tolerance of the intensity of exercise (Smith, et al., 2014).

2.1.5 Physiological testing and psychological issues

To the best of my knowledge, the evidence base of motivational change of physiological testing is limited, and participating in tests has been previously associated with intrinsic motivation: people who score higher than expected would tend to become more motivated and committed to exercise, while individuals who score lower than expected can become less motivated (Mahoney, 2007). The feedback a person receive as a result of the test can help to establish appropriate intrinsic motivation to achieve goal outcomes, and lead to training,

improvement and personal commitment in a personal development plan for health and fitness benefits (Mahoney, 2007). Another way to look at this phenomenon relates to reinforcements and mastery experiences. According to Banduras SCT (1986) feedback can reinforce or strengthen behaviour. The feedback can be external or internal and can be positive or negative. Positive feedback will have positive influence of a person`s sense of achievement and his or her self-efficacy, while negative feedback may have the opposite effect. The most effective way of creating a strong sense of self-efficacy is by mastery experiences. Successes build a solid belief in a human`s self-efficacy. Failure leads to the opposite, and especially if failures occur before a sense of efficacy is established (Bandura, 1997). People who have concerns about the purpose and outcome of the exercise testing may worry and get anxious before tests, and fatigue caused cognitive stress might result in muscle tiredness and often lead to spiral of negative thinking that may trig feelings of pain, fatigue, hopelessness and defeat (Mahoney, 2007). A low sense of self-efficacy to exercise control produces depression as well as anxiety. A solid base of efficacy is required to remain focused in the face of pressing situations. When people are faced to handle difficult situations, those who have most self-doubts about their efficacy become more and more unsecure, lower their aspirations and the quality of their performance reduces. In contrast, those who maintain a solid sense of efficacy set themselves challenging goals, which pay off in performance accomplishments (Bandura 1997). Thus, as Mahoney (2007) claims, exercise testing itself unlikely will result in motivation to exercise, especially to beginners, who are highly susceptible to positive feedback and vulnerable to negative outcomes. New exercise participants can often display low self-efficacy and are likely to find limited motivation from the experience of exercise testing. But when they have established some skills associated with exercise, results from testing may be a useful to aid motivation to outcome.

2.2 Physical activity promotion in cancer survivors

2.2.1 The rehabilitation process

A Cochrane review from 2013 about rehabilitation programmes for adult cancer survivors suggest that cancer survivors may experience a range of physical and emotional symptoms that can influence their daily living and quality of life (Scott, et al., 2013). The most common physical symptoms are fatigue, reduced muscle strength and weight gain, while common psychological symptoms are anxiety and depression. Several rehabilitation programmes have been developed to help cancer survivors to deal with these problems and increase their quality of life (Scott, et al., 2013).

The Heart and lung disease- clinics (LHL- clinics) in Røros was established in February 2003, offering multidisciplinary rehabilitation programs for patients suffering from heart and lung disease. The rehabilitation programs were extended to persons suffering from morbid obesity, vocational rehabilitation and in 2009 to cancer survivors. Today there are five multidisciplinary rehabilitation teams in the clinic, specified in each discipline. The rehabilitation program for cancer survivors consist of three weeks primary rehabilitation, and one week of follow- up 12 weeks after. The aim of the rehabilitation at the LHL- clinics program for cancer survivors has both physical and emotional components, leaded by the multidisciplinary cancer rehabilitation team (LHL, 2015).

2.2.2 Physical activity in cancer survivors

Regular PA is important to promote a healthy lifestyle in cancer survivors, but despite the evidence of exercise as effective strategy to prevent and treat late effects, especially in

cancer related fatigue, many in the general cancer population are sedentary (Ness, Wall, Oskes, Robertson & Gurney, 2006). Still, the evidence seems to be divergent. A cross-sectional Norwegian study including 975 cancer survivors assessing level of PA before and after treatment suggests that less than half of cancer survivors were physically active. About one fourth of the patients changed their level for physical activity after cancer treatment, and most of these became less active (Gjerset, Fosså, Courneya, Skovlund & Thorsen, 2011). Another Norwegian study from 2003 on a large cohort of testicular cancer survivors, comparing observations from 1276 TCS with age similar group from general population, showed a slightly higher level of self- reported PA level 12 months after treatment (Thorsen, et al., 2003).

It is well known that health behavior in general, and also participating in PA, is related to sociodemographic factors (Norwegian Directory of Health, 2016). This also seems to be the case for cancer survivors. A newly published randomized study conducted in The Netherlands by Kampshoff, et.al, (2016) found associations between several demographic and psychosocial factors and participation in exercise among cancer survivors. A high compliance rate to participating in exercise program was related to higher education, lower psychological distress and higher outcome expectations, and especially for high intensity activities they found self-efficacy to be significantly associated to high session attendance.

2.2.3 Possible barriers to physical activity in cancer survivors

Cancer related fatigue (CRF) is one of the most prevalent and debilitating sequel of cancer treatment. CRF is a common problem for people with cancer, as about 80 % of people with cancer report experience with cancer- related fatigue. Many of these continue to experience

fatigue for months or years after successful treatment (Stone, Hardy, Huddart, A'Hern, & Richards, 2000).

Fatigue is associated with physical deconditioning, social isolation, and difficulties making exercise a routine. This often leads to reduced quality of life for cancer patients (Blaney, Lowe-Strong, Rankin-Watt, Campbell & Gracey, 2010). A systematic review from 2014 about exercise as treatment for CRF, including eleven studies and 1530 patients with all types of cancer diagnoses, concluding supervised PA interventions reduce CRF. The suggestions are that exercise should be included as a part of all rehabilitation programs for people who have been diagnosed with cancer (Meneses- Echavez, Gonzales- Jimenez & Robinson, 2014).

Exercise can be both prophylactic and therapeutic in different clinical populations (Kwan & Bryan, 2010b). Despite the evidence of exercise as effective strategy for patients with CRF, many in the general cancer population are sedentary. Blaney et al. (2010) conducted focus group interviews with 26 participants about exercise barriers, exercise facilitators, motivators of exercise. Among the barriers discussed, fatigue was a central issue, reported as a treatment side-effect. Moreover, fatigue often lead to additional barriers such as physical deconditioning, social isolation, and difficulties of regularly exercise routines. On the other hand, among the motivational factors, gradual progression and realistic goal setting were considered important factors to encouraging exercise (Blaney, et al., 2010). Many of the patients discussed the positive impact of previous exercise had on their physical and mental well- being and looked at fatigue associated to exercise as normal or natural, compared to CRF (Blaney et al., 2010). Klika, Callahan & Golik (2008) measured physiological responses to clinical exercise testing among a group of cancer survivors, compared to a

healthy age-matched control group. Compared to healthy group, cancer survivors had significantly lower cardiopulmonary capacity and also lower maximal power. A Danish study from 2009 including 245 patients from 18- 65 years about self- reported PA behavior, suggest that the Danish adult cancer patients receiving chemotherapy have a significant decline in PA behavior. There seem to be a general interest in PA among cancer patients, but the study suggests there is much untapped potential (Midtgaard, et al., 2009).

2.2.4 Cardiopulmunary testing in cancer survivors

Based on the growing evidence for the beneficial effects of physical exercise in cancer patients in improving physical fitness and quality of life and reducing CRF (Mishra et al., 2012), physical exercise programs during and after cancer treatment are becoming more common (Bisschop et al., 2012). The Dutch Guideline Cancer rehabilitation recommends exercise programs matching the individual fitness level to achieve optimal training effect (Van den Berg et al., 2011). The individual exercise capacity can be assessed by measuring peak oxygen uptake (VO_{2peak}), as the VO_{2peak} reflects the ability of the cardiopulmonary system to deliver oxygen to skeletal muscles, and muscles ability to utilize the oxygen. Cardiopulmonary exercise testing with gas exchange analysis during incremental exercise is the only test that measures VO_{2peak} directly, and is therefore often described as the golden standard in measuring maximal exercise capacity (Jones et.al, 2008). Results from a review analyzing 28 articles, including 1158 patients, suggest that cardiopulmonary exercise testing is feasible and safe for cancer patients prior to exercise programs (Bisschop et al., 2012). Measuring peak oxygen is quite demanding in terms of resources as it requires well trained test managers in addition to advanced technical equipment. Therefore other less resource intensive tests are more common in the field work in different patient groups. Field tests, not

performed in laboratories, that require minimal equipment and technical support, become therefor an important instrument that can be more easily integrated in rehabilitation programs.

Based on the reviewed literature there are only a few field tests validated in measuring exercise capacity among cancer patients. Garanger, McDonald, Parry, Oliveira & Denehy (2013) systematically reviewed 31 articles to document the measurement properties of instruments used to assess functional capacity, PA and muscle strength in participants with non-small cell lung cancer (NSCLC). Functional capacity was mainly assessed using the six- and twelve-minute walk tests, incremental shuttle walk tests, and the stair-climbing test, concluding there is a gap in the literature regarding the measurement properties of commonly used outcome measures in NSCLC participants. Further research needs to determine the most suitable outcome measures in trials involving NSCLC participants (Garanger et al., 2013).

The incremental shuttle walk test (ISWT) was developed more than 20 years ago by Singh, Morgan, & Scott (1992) and is widely used clinically as a field exercise test of functional capacity in a variety of chronic diseases (Parreira et al., 2014). The ISWT requires participants to walk up and down a 10 meter course, increasing the speed of walking every minute, to the maximum of 12 minutes, not allowing participants to run (Singh et al., 1992). It has previously been suggested that the performance at the ISWT strongly relates to the VO_{2max} obtained from the traditional treadmill test in patients with chronic airflow limitations (Singh et al., 1992). The validity and reliability of the test have been documented in different populations, such as Bradley, Howard, Wallace, & Elborn (1999), Bradley, Howard, Wallace, & Elborn (2000), Campo, Chilingaryan, Berg, Paradis, & Mazer (2006).

The 12-stage ISWT, only allowing participants to walk during the test, has been practiced in the rehabilitation program for cancer survivors at LHL- clinics, Røros, since 2009. Experiences from this testing indicate a large number of patients not being able to walk fast enough to reach the level of breathlessness required to measure exercise capacity. Bradley et al. (1999) modified the ISWT by adding three levels and permitting participants to run. At the end of the level, the patients are told to increase the speed, and also reminded that they are allowed to run at any time during the test. The patients are encouraged to continue the test until they are exhausted and breathless, or enable to keep up the set pace. The results registered are walking distance, level completed, heart rate and perceived breathlessness and subjective experience of exertion. Reasons for stopping or failing to maintain the pace are registered. Bradley, et.al. (1999) validated the Modified shuttle test (MSWT) in adults suffering from cystic fibroses, and found that there was a strong relationship between VO2peak and the MSWT performance in patients with cystic fibrosis (Bradley et al., 1999). The test was recently validated for patients with sarcoidosis (DeBoer, Kolbe & Wilsher, 2014). To the best of knowledge at this stage no previous studies have evaluated the MSWT in cancer patients, now this is an ongoing study in the LHL- clinics, Røros.

Using a field test like the MSWT in the cancer population might have some additional benefits in term of higher chance to motivate the patients to become more active. For instance, a study from 2011indicate that environmental settings influence physiological, perceptual and affective responses to exercise at a self-selected pace, comparing over ground walking with treadmill walking to 34 participants aged 18-30 (Dasilva et al., 2011). The actual walking speed was faster at over ground walking, but the intensity and perceived exertion significantly lower, compared to treadmill. Self- paced exercise also showed lower perceptual and more positive affective responses at over ground walking (Dasilva et al.,

2011). Because in the MSWT the pace is externally imposed by a beeper and the test continues until complete exhaustion, it may be assumed that such activity will not be perceived by the participant as self-determined, but the MSWT is performed over-ground and therefore implies a great component of voluntary motor control, a question might raise about whether it could be associated with lower perceived exertion and more positive affective responses as compared to a traditional treadmill test.

2.3 Summarizing the litterature

From the review of literature, the following key points have been identified:

1. Health behaviour has a strong social gradient, and physical inactivity is a separate risk factor in developing chronic diseases as severe cancer diagnoses.
2. Early diagnosis and better treatment lead to higher survival percentage among cancer patients, and we face a growing population of cancer survivors.
3. PA is recommended to cancer survivors to reduce negative side effects from cancer treatment, such as CRF, still many cancer survivors do not meet the national recommendations to PA.
4. Affective responses, such as enhanced mood and enjoyment, and also future intentions to exercise serve as determinants of participation in regular PA and implicate future behavior.
5. In the field of cancer rehabilitation, physiological tests are commonly used, mainly to target physical activity level, and also based on assumptions that they will motivate the patients to exercise more. Still, there is very limited evidence about the impact that such tests can have on motivation for future exercise. Actually, some evidence

suggests that physiological test might have a negative impact to future exercise in some individuals.

Based on reviewed literature no studies were identified exploring whether there is a connection between cardiopulmonary field testing and motivational change towards PA participation in cancer patients, and the following questions are therefore emerging:

Will participation in the MSWT impact motivation to future exercise among the cancer survivors? And will the participant`s motivation be influenced by affective responses during the test, as well as previous level of CRF and pervious levels of PA?

3. Methodology and research process

3.1 Choice of methods

Worldviews can be seen as general philosophical orientations of the world and the nature. The positivist worldview has represented the traditional form of research, and is often called the scientific method (Creswell, 2010). The knowledge that develops through this approach is based on observing the reality, trying to keep an objective perspective. The approach in the present study is deductive, as theories and hypothesis is the basis of the empirical observations (Bryman, 2012). This study suits Creswell's (2010) definition of experimental research, as it seeks to determine if a specific treatment, undergoing the MSWT, influences an outcome; affective responses and intention to exercise. The design of this study is within-subject experimental, a design in which the same sample undergoes several measurements before and after they underwent a treatment (Bryman, 2012). Unfortunately, it was not possible to include a control group in this study even though this is highly recommended, as participating at the MSWT is regular procedure during the rehabilitation program to match individual fitness level, and it would be unethical if some patients would have to abstain from physiological testing to be placed in a control group.

According to Creswell (2010), experimental researchers need to identify potential validity threats, and develop designs that minimize these threats, both internal threats, as the procedures, and external threats, as incorrect interferences. The quantitative approach is suitable to test relationship between variables, which is essential for testing the research hypothesis of the present study. Quantitative research based on questionnaires and a strict

structure is easy to replicate, which is important for the quality of this study and future developments of this research field. The data collection in quantitative research is characterized by selectivity and distance to the respondents (Bryman, 2012). The researcher in this experimental study knows the characterization of the patient group, from three years of practice and work experience in the cancer team in the LHL- clinics, but the individuals representing the particular selection are all unknown to the researcher. By using the quantitative approach with questionnaires the possible impact of the researcher may be avoided, but at the same time the method will not give any deep answers to the research question (Bryman, 2012). To reduce such limitation, one open-ended question was specially developed for this study, in order to give the participants the opportunity to tell more about their experience.

It should be noted that the present study is connected to a larger study with the working title "Measurement properties of the MSWT in cancer survivors attending rehabilitation" that is conducted at the LHL- clinics in Røros. The LHL- clinics in Røros is a rehabilitation facility located in the middle part of Norway, offering rehabilitation programmes to persons with heart- and lounge disease or substernal overweight, occasional rehabilitation and rehabilitation to cancer survivors with severe cancer diagnoses. The rehabilitation programmes are structured by five interdisciplinary expert teams supervising patients through the rehabilitation process. The clinics also have a small research department cooperating with all five rehabilitation teams. The cancer rehabilitation team and the research department at the LHL- clinics now lead the cross-sectional study validating the MSWT in cancer survivors. A second and independent part of this study is the focus of this masters` project, investigating possible motivational change for future exercise among cancer survivors undergoing the MSWT during rehabilitation.

An important requirement for data if they are to be considered meaningful is that they must be reproducible (Winter, Jones, Davidson, Bromley & Mercer, 2007). This project has the potential to be reproduced in a similar population at the same or other rehabilitation centres, or in other populations, undergoing the MSWT or other similar field tests.

3.1.1 Validity

The main measurement issues to be considered for all research variables are validity, objectivity and reliability, and according to O`Donoghue (2012) validity is the most important of these three. Validity is the extent to which a test measures what it purposes to measure, and also the importance of the measure (Winter, et al., 2007), therefore using instruments that have been validated is recommended (Bryman, 2012). In empirical research it is important to judge the validity of the instrument, to make sure we measure what we want to measure (Bryman, 2012). The validity of studies using translated instruments may be questioned if there is lack of attention to explain equivalence between the languages (Bryman, 2012). The instrument used for data collection in the present study consists mainly in questionnaires, most of which have been previously validated and used in similar studies, and also used in Norwegian populations. Two scales are also adapted from similar studies, and in addition, one open optional comment was especially developed by researcher in order to give the participants the opportunity to tell more about their experience. This sentence was originally developed in Norwegian, and then the Norwegian answers were translated to English by the researcher during the analyses.

3.1.2 Objectivity and Reliability

Objectivity and reliability are related concepts because the objective focus in measurement procedures helps the researcher to consequent data measurement (O`Donoghue, 2012). Reliability is associated with the measuring accuracy, meaning repeated measures will give the same outcome (Creswell, 2010). Most of the instruments used in this study are validated in previous studies, and therefore they presumably present good levels of reliability. Depending on the nature of data there are different statistics that can be used to assess each of the four forms of reliability; inter-rater agreement, test-related reliability, parallel forms reliability and internal consistency (O`Donoghue, 2012). Internal consistency is one measure of reliability, and according to Pallant (2010), Cronbach's alpha is a common measure of internal consistency used in questionnaires, determining how much the items on a scale are measuring the same underlying dimension. The Cronbach`s alpha is widely used in social science, business and sports science (O`Donoghue, 2012), and is used in this study to test internal consistency reliability of the four PAAS components measured at baseline: positive affect, negative affect tranquillity and fatigue. Cronbach`s alpha was also used to evaluate the internal consistency of the 13 items of the Fatigue Questionnaire.

3.2 Approach and overarching study design

According to Bjørndal and Hofoss (2004) the data gathering in research should be controlled by a predetermined model. For this study the researcher wrote a thorough project plan, including the study design, which was approved as part of the written exam in the module "Specific methods" at Hedmark University College. In line with the plan, the participants were asked to fill in questionnaires at baseline (T0), before (T1a) and directly after (T1b)

participating in the MSWT. There was also a follow-up questionnaire three months after the first rehabilitation period (T2), before undergoing a second MSWT. Results from the physical tests and follow-up questionnaire were also registered. The study design, including measures and instruments, type of variables and relevance to research questions (RQ), is presented in table 1.

Table 1. The data collection measures

Measure	RQ	Baseline (T0)	Pre MSWT (T1a)	Post MSWT (T1b)	Follow- up (T2)
Intention to exercise	RQ1	Intention scale	-	Intention scale	Intention scale
Perceived motivational change (PMC)	RQ1	-	-	PMC Scale	-
Comment to PMC	RQ1	-	-	Written comments	-
Affective responses	RQ2	PAAS, mood version	PAAS affect version	PAAS, affect version	PAAS, mood version
Perceived exertion	RQ2	-	-	Borg`s CR 10	-
Level of PA	RQ3	LTEQ	-	-	LTEQ
Total Fatigue Level	RQ3	FQ	-	-	FQ
Physical capacity	Control	-	-	Results MSWT	Results MSWT
Background Information	Control	Sex, age, relationship status, level of education and income, cancer diagnose, time since last treatment	-	-	-

PAAS: Physical activity affect scale. LTEQ: Godin time leisure exercise questionnaire. MSWT: Modified shuttle walk test. FQ: Fatigue questionnaire

3.3 Sampling, data collection and instruments

3.3.1 Sample and data collection

The participants were recruited from the cancer rehabilitation program in LHL- clinics Røros, where about 15 to 20 cancer patients attend primary rehabilitation each month. They usually stay at the centre for three weeks, followed by a 12 week long home period and then one week of follow- up at the clinics. Inclusion criteria for rehabilitation participation at the LHL- clinics, and also this study, were adult men and women with various cancer diagnoses, who have completed curative treatment within the past 12 months. Exclusion criteria for participating in this study are walking aids or severe coronary diseases, or participating in other studies at the same time.

Participating in the study was voluntary, and all the cancer patients who were admitted to rehabilitation got study information by mail two weeks before entering the LHL- clinics. The cancer patients were invited to a voluntarily information meeting the day after arrival, including thorough oral information about the study before they decided whether or not to participate in the study. Both written and oral information included assurance that neither an eventual choice to abstain nor renunciation of participation would influence their rehabilitation program at the LHL- clinics. The patients who decided to participate then signed an informed consent.

The number of participants was 45 included at baseline, pre-test and post-test, and 36 participants at follow- up. Focht (2009) used the sample size of 35 in a study comparing affective responses in indoor and outdoor environments. A power calculation was done during the planning of the study, and based on an expectation of medium effect size (0.5=),

high correlation among the repeated measurements, and alpha value of 0.05, suggesting the sample size of 35. The power exceeding 0.8 is suggested to detect differences in main effect (Creswell, 2010).

The cancer rehabilitation team in LHL- clinics estimated that there would potentially be about 10 to15 cancer patients meeting the criteria in each group. Calculating some participants decline participation, some choose to withdraw and some are recommended to withdraw from health reasons, the researcher planned to include three groups of cancer patients to fit the ordinal time schedule for the master programme, which entailed submitting in May 2016. When the first three groups were included there was need for a few more participants to meet the recommendations from the power calculation. Based on the opportunity to include a few more participants to the study and also include data from follow- up, the submission was delayed to October 2016.

The repeated measurements in this study, filling out the questionnaires, were all conducted at the LHL- clinics in the same surroundings each time. The baseline questionnaire T0 was administrated upon arrival, to limit the rehabilitation program influencing the answers. The cardiopulmonary field test, the MSWT, and therefore the T1 pre-test and T1 post-test questionnaires were administrated after two weeks of rehabilitation, five days before completing the rehabilitation program. All the participants also completed a training MSWT test two days before the first main MSWT, so they knew how the test was performed and what to expect during the test. At last the T2 follow- up was administrated when the participants arrived for the follow- up in the rehabilitation center after a home period of 12 weeks. The study design is presented in a timeline in Figure 4.

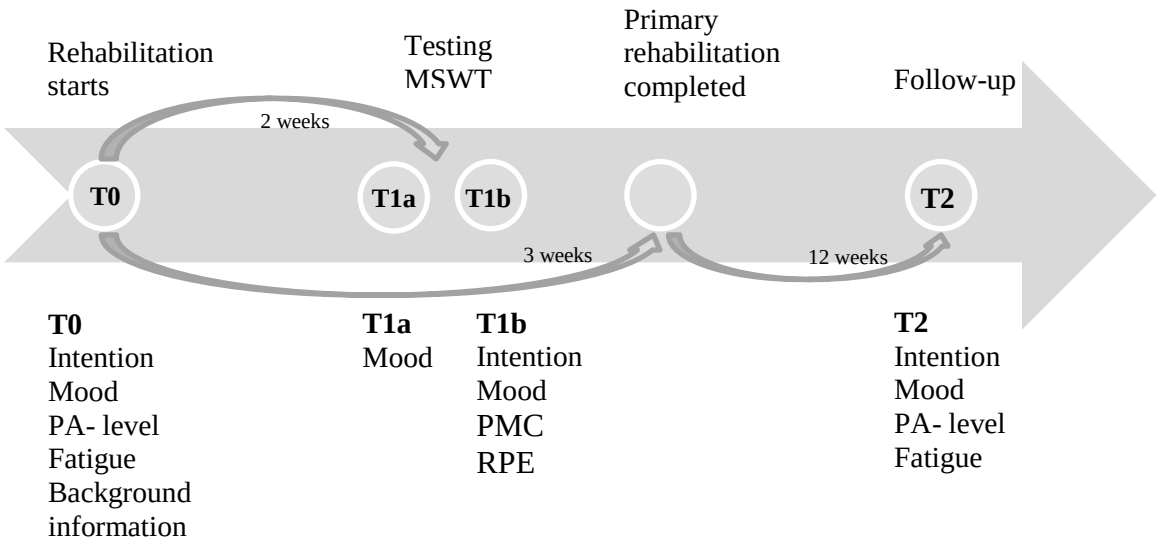

Figure 4. The study design presented in a timeline

3.3.2 Instruments

The instruments are organized in three questionnaires and presented in the appendix:

1. Questionnaire, baseline (T0)
2. Questionnaire, pre-test (T1a) and post-test (T1b)
3. Questionnaire, follow-up (T2)

The three questionnaires contained the following instruments:

Intention to future exercise

The intention to future physical activity participation here mentioned as meeting national PA recommendations was measured with an intention scale. The physical activity

recommendations from The Norwegian Directory of Health (2014) with at least 150 minutes of moderate intensity activities or 75 minutes of high intensity activities per week, exemplifying moderate as fast walks and high as running, that is recommended for adults, were presented followed by the question: "How motivated are you to fulfil the PA recommendations from the Directory of Health for the next three months?" This scale is similar to the scale described in the study by Focht (2009), adapted to the present study and translated to Norwegian. Participants rate their probability of regularly future exercise in a scale from 0 percent to 100 percent. This provided a numeric continuous variable.

Perceived motivational change

This measure consists in a 7- item lickert scale inquiring "Did your motivation to future exercise change by undergoing the field test?", with alternatives from -3 ("Much less motivated") to 3 ("Much more motivated"), with 0 corresponding to "No change in motivation". The scale is inspired to a similar scale in a Norwegian population in Calogiuri, Nordtug, and Weydahl (2015), providing another numeric continuous variable.

Comments to perceived motivational change

To the scale measuring Perceived motivational change, a comment field was added allowing participants to write a sentence or two about their opinion of the potential motivational change: "If you wish; please write a sentence or two about what you think is the reason that you were more / less motivated." The answers might capture important information about factors impacting participants` motivation to future participation in PA. These data were analysed thematically and the responses grouped based on the different emerging themes. Then the comments were treated quantitatively, providing categorical nominal variable. One

of the themes, representing more than half the answers, was dichotomized for further quantitative analyzes as a categorical nominal variable.

Affective responses

To measure the affective responses the Physical Activity Affect Scale (PAAS; Lox, et.al, 2000) was used. Results from the PAAS can give an indication to intention through incorporating a multidimensional perspective in assessing both valence and arousal. Lox et al., (2000) originally conceptualized the PAAS to approximate the feeling states associated with the four quadrants of the circumflex model of affect (Russel, 1980); positive- high arousal (positive affect), positive-low arousal (tranquillity), negative-high arousal (negative affect) and negative-low arousal (fatigue). This measure has showed adequate internal consistency and discriminant validity among the factors (Lox et al., 2000) and has predictive validity for future exercise behaviour and exercise motivation (Kwan & Bryan 2010a; Kwan & Bryan, 2010b). The PAAS consists of 12 mood expressions, e.g. satisfied and exhausted, asking the participants to which extent they agree or disagree in five answer possibilities from 0 to 4; 0) strongly disagree, 1) slightly disagree, 2) neither agree nor disagree, 3) Slightly agree and 4) strongly agree. The Norwegian version has recently been used in a Norwegian population (Calogiuri, et.al, 2014). The PAAS mood version was used in baseline and follow-up and the affect version was used before (pre) and directly after (post) undergoing the MSWT. The purpose of the affect version of the questionnaire is to look for changes in the acute affective response from undergoing the MSWT, while the mood version is done to look for changes in the four subscales developed from the 12 items; positive affect, negative affect, tranquillity and fatigue (Lox et.al, 2000), providing numeric continuous variables. O`Donoghue (2012) requires 0.7 to be the typically required ranging

for acceptable internal consistency. The internal consistency for the four PAAS components was adequate, as shown by the alpha coefficients of 0.70 for positive affect, 0.78 for negative affect, 0.69 for tranquillity and 0.84 for fatigue.

Perceived exertion

Rating of perceived exertion (RPE), was assessed by using the Borg`s 10- point scale, with descriptors in Norwegian, well established in previous research (Robertson, 2004) and is also used in intensity control during fitness training in the LHL- clinics. Gunnar Borg`s original rating of perceived exertion scale was accepted in 1973 as a valid tool within the field of exercise and sports medicine (Robertson, 2004). Participants are asked to answer one question about how exhausting the activity was to them, in a scale from 0 to 11, containing written explanations to some of the numbers. The general aim of using RPE is to quantify an individual's subjective perception of exertion as a means of determining the exercise intensity or regulating exercise intensity (Borg, 1982). This item provided a numeric continuous variable.

Level of physical activity

To measure the level of PA the Leisure-Time Exercise Questionnaire (LTEQ) was used. This measures self-reported frequency of exercise participation during a typical week (Godin & Shepard, 1985), asking how many times of participation in PA at 30 minutes duration, that can also be divided in two 15- minutes' sessions. The PA is graded as hard, moderate or easy. This questionnaire has demonstrated validity and reliability in self- reported PA, and correlates with accellometer readings in metabolic equivalents (MET) in min/day and treadmill exercise performance (Godin & Shephard, 1985). The variable provided from this item was also numeric continuous.

Cancer related fatigue

The Fatigue Questionnaire (FQ) was used to measure the level of CRF at baseline and follow- up (Chalder et al., 1993). The FQ contains 13 items asking about physical and mental fatigue during the last month, e.g. “do you have problems feeling exhausted?” and “do you feel weak?”. The respondents have four alternative answers to each item, 1) Less than usual, 2) Not more than usual, 3) More than usual and 4) Much more than usual. These items will provide numeric continuous variables. The FQ is the same questionnaire as used in LHL- clinics, Røros, examining the patients before attending rehabilitation. But because the time list for the cancer rehabilitation team currently is about six months, and the fatigue situation may be changed during, participants in the project was asked to fill out the questionnaire again at baseline. The internal consistency for the 13 items was good, as shown by the alpha coefficients of 0.91, which is well above the 0.7 typically required to conclude acceptable internal consistency (O`Donoghue, 2012).

Physical capacity

Physical capacity was estimated on the basis of the cardiopulmonary field test, MSWT. Results registered were walking distance, level completed, perceived breathlessness and subjective experience of exertion. The MSWT was validated to patients with cystic fibrosis (Bradley, et.al, 1999) and sarcoidosis (DeBoer, et.al, 2014) and is now to be validated to cancer suvivors in the ongoing study in the LHL- clinics.Test results were used as control variable.

3.4 Data analysis

The data were analysed using Microsoft Excel (Microsoft Office, version 2010) and Statistical Package for the Social Sciences (SPSS; IBM statistics, version 23). The Lærd Statistics (2016) was used as guideline during SPSS analysis. The statistical methods play a central role in the analysis of the collected data (Bryman, 2012), and the choice of tests depend on how the data are distributed, which was decided after carrying out explorative analysis. The choice of test depends also on the size of the selections (Bjørndal & Hofoss, 2004). The selection in this project is somewhat small, and the random variation will probably be greater than in larger selections. The Paired samples Student`s t-test is suitable to compare means of two samples related to the same groups, and can be relevant even with large standard deviations within the samples (Donoghue, 2012). To address the main research question (RQ1), as also recommended by Bjørndal and Hofoss (2004) for small samples, the paired-samples Student's t-test was used for testing possible differences between all the repeated measurements, which are:

- Intention to future exercise (Intention): Baseline compared to post-test, and baseline compared to follow-up
- Affect (PAAS): Pre-test compared to post-test, and baseline compared to follow-up
- Levels of physical activity (LTEQ): Baseline compared to follow-up
- Cancer related fatigue (FQ): Baseline compared to follow-up

According to Donoghue (2012), in quantitative research there are usually two hypotheses, the null- hypothesis with a statement that there is no difference between what being

compared, and an alternative hypothesis with a statement that there is a difference. The Student`s t- test is used here to test null hypothesis, describing no difference between the means from pre to post test and from baseline to follow-up. The t-value is the calculated difference represented in units of standard error. The greater the positive or negative t- value is, the greater the evidence against the null hypothesis that there is no significant difference and opposite, the closer t is to 0, the more likely there isn't a significant difference. The t-value determines also the p- value, which is an estimate of probability that a type 1 error has been made when statistical significance has been concluded. Type 1 error occur if the null hypothesis is true, but rejected, type 2 error if the null hypothesis is false but not rejected. The less the p- value is, the less is the chance that the differences is due to coincidences. Significance was assumed with $p<0.05$, as recommended by O`Donoghue, (2012.)

To address the first sub- research question (RQ2) about psychological factors associated with change in motivation by undergoing the MSWT, delta-values for the pre- post for all four PAAS variables and intention to exercise were first calculated (post-test value – pre-test value) in order to obtain a single variable quantifying the extent of the changes from pre-test to post-test, which was then used in further analysis. The variables examined are the intention to future exercise and perceived motivational change in association to RPE, the four dimensions of affect (positive affect, negative affect, fatigue and tranquillity) and mastery experience.

Bivariate Correlation is a measure of the strength of the relationship between two variables (Bryman, 2012). Spearman correlation is often used with scale or ordinal variables and when the data are non-normally distributed. This gives an indication of both the direction and the strength of the relationship (Bjørndal and Hofoss, 2004). The examination of the correlation

matrix established the extent to which these variables were associated with each other, and then provided a more in depth understanding (Pallant, 2010), in this study the motivational processes of undergoing the cardiopulmonary field test.

The correlation coefficient gives a numeric value to the strength and direction of a relation between variables, with a value between -1.0 and +1.0, where the sign informs us whether the relation is positive or negative. This means, if a perfect negative correlation exists the correlation coefficient will be -1.0, and for a perfect positive correlation 1.0 (O`Donoghue, 2012). Fallowfield, Hale & Wilkinson (2005) claim values at over 0.7 to be strong correlations, 0.45 to .07 to be moderate, 0.2 to 0.45 to be weak and less than 2.0 to represent no correlation.

The second sub-research question (RQ3) about whether previous level of PA and the level of fatigue influence the motivational change was examined using a similar approach. Finally the results from the MSWT were also added in the correlation matrix. Descriptive statistics were used to have an overview of the characteristics of the sample, which helped framing and understanding the results regarding the dependent variables. The background information may also be useful if someone want to replicate this study at a later stage.

3.5 Ethical considerations and report to REK

A central guideline in all social science research projects is that the participants should be informed about the project and what participation will involve, before they decide to accept or decline (Oliver, 2010). Potential participants to this project received written information by mail two weeks before entering the rehabilitation centre, including invitation to an

information meeting when entering the LHL- clinics, to be given opportunity to think thoroughly about whether or not they would like to participate. At the information meeting oral information was given by the researcher, before participants signing the informed consent. The form is listed in the appendix. Participants were free to withdraw from the project at any time during the project, without further explanation, and they were informed that this would not have any influence on their rehabilitation process or supervision at the rehabilitation centre.

As involved as researchers often get in own projects it is important to recognize the importance of looking at the project from the perspective of the participants, and if there will be any positive or negative effects of participating (Oliver, 2010). As this project was a side study to a larger validation study the benefits of taking part in this study as a whole were a thorough measurement of the physical function for some participants, and the information was used as guidance in further training schedule. To all the cancer patients as well as the study participants, excluding those with medical contraindications, the MSWT was a standard part of rehabilitation process at the LHL- clinics. Exercise guidance matching fitness level and a potential increase in motivation to future exercise by undergoing the physiological test might be the benefits of study participation. Participation in the present study entailed time and cognitive effort to fill out questionnaires; still there were no other known disadvantages from participation.

Secure storage of the collected data is important in all studies (Oliver, 2010). In the present study the questionnaires were coded to separate name lists, and all the written data were kept in LHL- clinics as sensitive data to ensure secure storage of sensitive information. Only

coded information was typed on researcher`s laptop and brought out of the clinics for further analysis.

The project validating the MSWT, including the form for informed consent, got the approval from REK in September 2015. A request for additionally including the present study investigating motivational change was sent to REK the last week of October 2015 for approval, with a positive response two weeks later. The approval is listed in the appendix.

4. Presention of the the findings

4.1 The study participation

4.1.1 The participation flow

Sixty-six cancer patients at the LHL- clinics met the inclusion criteria and were asked to participate in the study. Fifteen of these did not meet for the information meeting for variable reasons, which left 51 patients eligible for inclusion at baseline. Six patients could not attend physical tests for medical reasons, and were excluded from the study. The final sample consisted in 45 patients, who underwent all measurements at baseline and pre-test and post-test. At follow- up nine participants were excluded due to not completing rehabilitation programme (n=5) or not completing follow- up questionnaire (n=4). The participation flow is presented in Figure 5.

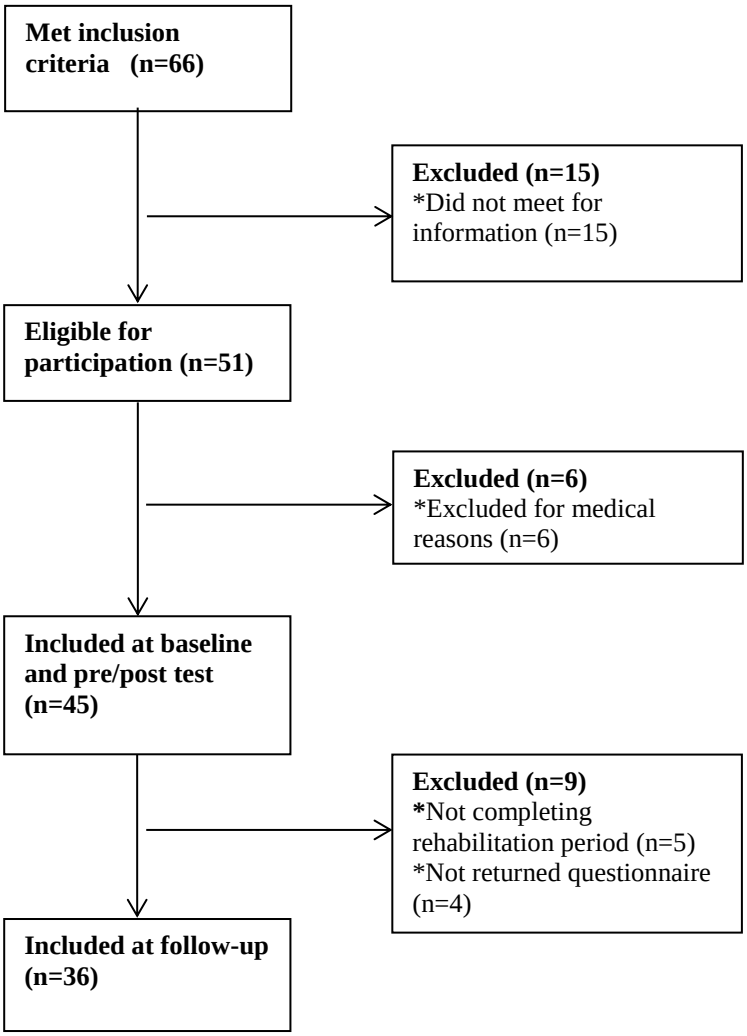

Figure 5. A flow chart of the completers and the drop- outs

4.1.2 The participants

The participants included in the study consisted of 36 women and nine men with a mean age of 54.7 years (SD= 9.04). Most of women (72.2%) which also constitute the majority of the sample (57.8%) were diagnosed with breast cancer. The other types of cancer which were little represented in the sample, included gynaecological cancer (11.1 %), gastro- intestinal cancer (8.9 %), lung cancer (4.4%), urological cancer (4.4%), lymphatic cancer (4.4%), prostate cancer (4.4%) and other cancer diagnoses (4.4%). Most of the participants (71.1%)

were married or living with a partner, and more than half (53.4 %) reported to have completed education at college or university level. Majority of the sample (73.4 %) finished the cancer related treatment in hospital during the last five months. Characteristics of the participants are presented in table 2.

Table 2. Characteristics of study participants, n=45

Characteristics		n=45
Sex n (%)	Female	36 (80.0)
	Male	9 (20.0)
Age M (SD)		54.71 (9.04)
Cancer diagnosis n (%)	Breast	26 (57.8)
	Gynaecological	5 (11.1)
	Gastro-intestinal	4 (8.9)
	Lung	2 (4.4)
	Urological	2 (4.4)
	Lymphatic	2 (4.4.)
	Prostate	2 (4.4)
	Others	2 (4.4)
Marital status n (%)	Married/cohabitating	32 (71.1)
	Living alone	13 (28.9)
Education level n (%)	Primary school	4 (8.9)
	High school	13 (28.9)
	Skilled worker	4 (8.9)
	College/university ≤3 years	8 (17.8)
	College/university >3 years	16 (35.6)
Income n (%)	< 100 000	0 (0.0)
	100 000 – 299 000	5 (11.1)
	300 000 – 499 000	24 (53.3)
	500 000 – 699 000	11 (24.4)
	> 700 000	5 (11.1)
	Unknown	0 (0.0)
Childcare ≤10 years		4 (8.9 %)
Months since treatment	0- 2	16 (35.6)
	3- 5	17 (37.8)
	6-8	9 (20.0)
	9-12	3 (6.7)

Months since treatment: Months since completing cancer related treatment in hospital.
n: Number. SD: Standard deviation.

4.2 Did thephysiological test lead to enhanced motivation in the participants?

4.2.1 Perceived motivational change

The large majority of the participants (75.5 %) reported a positive perceived motivational change by undergoing the MSWT. As presented in table 3, more specifically 17.8 % of the participants perceived they were “a little more motivated” after undergoing the MSWT, 44.4 % perceived they were “more motivated”, and 13.3 % of them perceived they were “much more motivated”. Only a relatively small part of participants (24.4 %) answered “no change” in their motivation after undergoing the MSWT, while none of them reported a negative perceived motivational change. Table 3 also contains registered comments as described in 4.3.2.

Table 3. Perceived motivational change from participating in the modified shuttle walk test

Perceived motivational change	n (%)	Reported comment, n=25 n (%)
Much less motivated	0 (0)	0 (0)
Less motivated	0 (0)	0 (0)
Little more motivated	0 (0)	0 (0)
No change in motivation	11 (24.4)	1 (9.0)
Little more motivated	8 (17.8)	7 (87.5)
More motivated	20 (44.4)	12 (60.0)
Much more motivated	6 (13.3)	6 (83.3)

PMC: Perceived motivational change

4.2.2 Affect and intention to future exercise

The Student's t-test showed a significant increase in intention for future exercise from baseline (M=81.44±17.83) to post test (M=89.44±11.49) with t- value of 3.41 ($p<0.01$). One may also notice that there was a significant increase in one of the four items representing the PAAS; positive affect, from pre-test (M=2.82±0.79) to post-test (M=3.11±0.68), with the t-value of 3.64 ($p<0.01$). This means the null hypotheses can be rejected for both positive affect and intention, and that there is a 1 % chance of type 1 error. Observing the mean values, there were also noticed a very small decrease in negative affect and fatigue from pre-test (M=0.80±0.93; M=1.65±1.07) to post test (M=0.63±0.81; M=1.42±0.92) with t- values

of -1.21 for negative affect and -1.75 for fatigue, but these results were not statistically significant. For the last of the four PAAS item, tranquillity, there was no change observed. The pre- post test data is presented in table 4.

Table 4. Affective responses and exercise intention measured before and after the cardiopulmonary field test MSWT in cancer survivors at rehabilitation, n=45.

		Pre test M (SD)	Post test M (SD)	t
Intention		81.44 (17.83)[a]	89.44 (11.49)	3.41**
PAAS (Affect)	PosA	2.82 (0.79)	3.11 (0.68)	3.64**
	NegA	0.80 (0.93)	0.63 (0.81)	- 1.21
	TRQ	3.02 (0.79)	3.07 (0.73)	0.44
	FTG	1.65 (1.07)	1.42 (0.92)	- 1.75

**p<0.01

[a] measured at baseline

PAAS: Physical activity affect scale. PosA: Positive affect. NegA: Negative affect. TRQ: Tranquility. FTG: Fatigue. Intention: Intention to future exercise.

As shown in table 5 the mean values of intention suggests a tendency of positive increase in intention to exercise from baseline (M=81.44±17.83) to follow- up (M=84.17±16.67), but the Student`s t- test showed that such increment was not statistically significant (p>0.05). However, the t-test showed a weak statistical significant increase in level of PA from baseline (M=49.81±33.82) to follow-up (M=67.14±29.67) with a t-value of 2.71 (p<0.05), meaning the null hypothesis can be rejected and there is a 5 % chance of type 1 error, indicating that participant tested at follow- up was more physically active than they were at baseline. One may also notice that there was a weak improvement in results from MSWT

from baseline (M=841.62±224.17) to follow-up (M= 853.24±279.00) with t-value 2.03, suggesting an improvement in the cardiopulmonary fitness of the participants, but the Student`s t- test showed that such increment was not statistically significant ($p>0.05$).

For the measure of CRF the Student`s t-test shows statistically significant decrease in the level of CRF from baseline (M=36.36±5.56) to follow- up (M=32.47±8.43) providing a t-value of -3.34 ($p<0.01$). This means the null hypothesis can be rejected, with a 1 % chance of type 1 error. Furthermore, as presented in table 5, results from the Student`s t-test showed no statistical significance in the four variables representing the PAAS ($p>0.05$), though there were observed a weak decrease in mean values of tranquillity and fatigue from baseline (M=2.71±0.80; M=2.25±1.12) to follow- up (M=2.48±0.62; M=2.03±1.02).

Table 5. Affective responses (mood version), exercise intention, PA- level and Total fatigue measured at baseline and follow- up, n=36

		Baseline M (SD)	Follow- up M (SD)	t
Intention		81.44 (17.83)	84.17 (16.67)	1.11
LTEQ, METs		49.81 (33.82)	67.14 (29.67)	2.71*
CRF		36.36 (6.56)	32.47 (8.43)	-3.34**
MSWT, m		841.62 (224.17)	853.24 (279.00)	2.03
PAAS (mood)	PosA	2.49 (0.85)	2.49 (0.89)	0.06
	NegA	1.20 (0.92)	1.26 (0.98)	0.36
	TRQ	2.71 (0.80)	2.48 (0.62)	-1.54
	FTG	2.25 (1.12)	2.03 (1.02)	-1.61

**p<0.01

*p<0.05

PAAS: Physical activity affect scale. PosA: Positive affect. NegA: Negative affect. TRQ: Tranquility. FTG: Fatigue. Intention: Intention to future exercise. LTEQ: Godin Time Leisure Exercise Questionnaire. CRF: Level of total fatigue, measured by the Fatigue Questionnaire. MSWT, m: Results from the modified shuttle walk test, reported in meters.

4.3 What are the psychological factors associated with increased motivation?

4.3.1 Correlation between psychological variables

As showed in table 6 no significant association was found between intention for exercise and perceived motivational change to neither affective responses nor RPE. Though the Spearman`s coefficient showed a positive correlation between the mastery experience and

perceived motivational change (rho = 0.36, $p < 0.05$), meaning a weak correlation with 5 % chance of a type 1 error, indication that those which comments were related to mastery experience, actually experienced greater increase in motivation from participating in the test than those who chose not to comment, or whom comments were not related to mastery experience.

Table 6. Spearman correlation of psychological variables in cancer survivors undergoing the physiological test MSWT during rehabilitation, n=45.

		Intention[a]	PMC
RPE		0.08	- 0.12
Mastery experience		-0.03	0.35*
PAAS (Affect)[a]	PosA	0.10	0.05
	NegA	0.02	0.06
	TRQ	- 0.22	0.01
	FTG	0.01	0.13

*p<0.05

[a] delta values (Δ = post-test – pre-test)

PAAS: Physical Activity Assessment Scale. PosA: Positive Affect. NegA: Negative Affect. TRQ: Tranquility. FTG: Fatigue. RPE: Perceived Exertion. Mastery experience: Comments related to mastery experience. Intention: Intention to exercise. PMC: Perceived motivational change.

4.3.2 Comments to perceived motivational change

Twenty-five participants chose to also write a comment to why or why not they experienced a change in motivation by undergoing the MSWT, as shown in table 3. All the comments were grouped in three themes on the base of their content. The first and most represented theme that emerged, including answers from 14 participants was “Mastery experience”. As

shown in the quotations below, this theme contained comments about being capable to complete the test, and even obtaining results above own expectations:

"I was only exhausted for a little while after the test and was quickly recovered. I want to challenge myself more."

"I recognise that my physical condition is not as bad as I thought, and it feels good to "take it all out"."

The second theme with comments reported by eight participants was named "Subjective norm", describing expectations from one self or perceived expectations from significant others. The perceived social pressure from important individuals may in this case relate to doctors and other health care workers at the cancer rehabilitation team, or even other cancer survivors in the group. Comments contained in this theme:

"Exercise leads to health benefits"

"Now I know where I stand, and have a goal to reach for"

The third theme that emerged reported by three participants was "High motivation start- point", obtaining comments like:

"I was already motivated, but still I think the test is helpful"

"I have no change in motivation, still I was motivated by the test, so maybe I should have scored lower the first time."

The prevalence of participants reporting comments within the different themes are graphically presented in figure 6. From this graph, it is easy to notice that most of participants reported 'mastery experience' as an important factor enhancing their motivation

for engaging in regular PA.

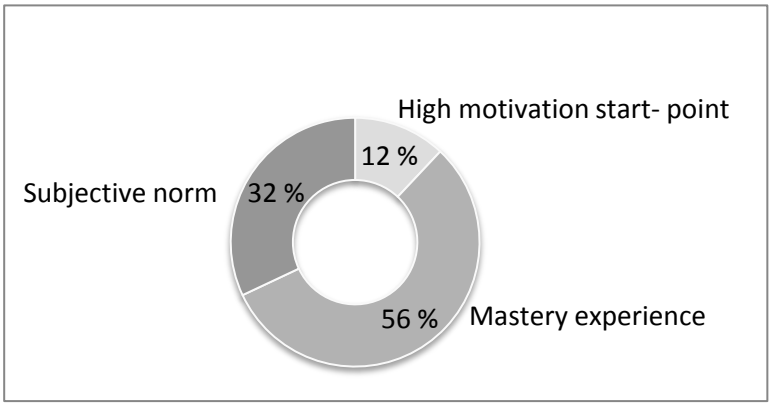

Figure 6. Comments to perceived motivational change, n=25.

4.4 The impact of previous level of physical activity and fatigue to motivational change

As showed in table 7, the Spearman's coefficient showed a negative and statistically significant correlation between the PA levels at baseline and the delta-value of future exercise intention (rho = -0.42; p = 0.001), meaning a moderate correlation with 0.1 % chance of type 1 error when the null hypothesis is rejected, indicating that the future exercise intention increased to a greater extent among the participants who had lower PA levels at baseline. A similar trend was observed in the association of the PA levels at baseline with the perceived motivational change, as a negative Spearman's coefficient (rho = -0.16), which was however not significant (p > 0.05). As presented in table 7, no correlations were found between test results and level of fatigue to neither intentions nor perceived motivational change. Nor was there correlation between affective responses and LTEQ, MSWT and CRF. The correlation matrix is listed in the appendix.

Table 7. Spearman`s correlation of the influence of PA- level, total fatigue, and test results to intention to exercise and perceived motivational change.

	Intention[b]	PMC
LTEQ[a]	- 0.42**	- 0.16
MSWT	-0.14	0.11
CRF[a]	0.07	- 0.02

**p<0.01

*p<0.05

[a] measured at baseline

[b] delta values (Δ = post-test – pre-test)

Intention: Intention to exercise. PMC: Perceived motivational change. LTEQ: Godin Time Leisure Exercise Questionnaire. MSWT: Test results from participating in the Modified shuttle walk test. CRF: Cancer related fatigue

5. Discussion

5.1 Summary of findings

The purpose of this study was to investigate possible motivational change towards future PA in cancer survivors undergoing the Modified Shuttle Walk Test (MSWT) during rehabilitation. The major interest of the study was whether undergoing the MSWT influence future intention to exercise and affective responses, and also weather previous level of PA and CRF influence the possible motivational change.

It was hypothesized that cancer survivors will experience positive motivational change for future PA by undergoing the physical exercise test MSWT during rehabilitation. However, it was expected that the motivational change will be associated with the patients' affective responses to the test; those who had more positive affective responses, as increased positive affect and tranquillity, and less negative responses, as lower fatigue and negative affect would experience increased motivation, whereas those who did not experiences positive affective responses or even experienced negative emotions, such as high fatigue and negative affect, would experience no change or even negative impact on their motivation. The level of PA and CRF at baseline was expected to have influence on the motivational change from undergoing the test. Higher levels of total fatigue at baseline might potentially have a negative impact on motivation, but participants with higher PA level might be able to address the test-related fatigue in a better way.

Here is a summary of findings structured in line with RQs:

RQ1. Most cancer survivors experienced positive scorings of PMC after undergoing the MSWT, and there was a significant increase in positive affect among cancer survivors from pre to post test. The results also show an increase in intention to future exercise from baseline to post test. Moreover, despite there was no significant change in intention to future exercise from baseline to follow-up, for the same period self-reported PA-level increased significantly and the level of CRF was significantly reduced, indicating a better health status among the cancer survivors after the rehabilitation period, in terms of less CRF and more PA participation.

RQ2. There was no association between the PAAS components and neither intention to exercise nor PMC to explain motivational change. Comments from participants add important information, indicating that the PMC was mainly due to mastery experience and subjective norm.

RQ3. Noticeably, there was a negative association between change in intention to future exercise and to previous level of PA, meaning those who were less active at baseline had higher improvement in intention future exercise. Moreover, there were no association between test MSWT and CRF at baseline to neither intention nor PMC, meaning actual performance and also CRF had no influence on motivational change.

5.2 Did the physiological test lead to enhanced motivation in the participants?

Results show that about three fourths of the participants reported that the test had a perceived positive motivational change regarding their future PA participation, one fourth reported no

change in motivation, and none of the participants reported that the test had negative influence on their motivation. These findings mean that most cancer survivors experienced an increased motivation from participation in the MSWT, and none experiences decrease in motivation. These results were somewhat surprising, as it was rather expected that CRF and low levels of PA, that is common in the population of cancer survivors, would have led to challenges during the test and induced some of the respondents to perceive a worsening in their motivation to become more physically active.

Most of cancer survivors who underwent the MSWT during the rehabilitation also reported improvement in their intention to exercise from baseline to post test. Intention represents an individual`s overall motivation to perform a behaviour (Bryan, et.al, 2007). According with the TPB intention towards a specific behaviour is the antecedent of the behaviour (Ajzen, 1991). The positive change in intention to exercise among cancer survivors, indicates that they will be more positive towards the idea of meeting the physically active recommendations in the future, than they were at the beginning of the rehabilitation, and this might lead to an actual change in their PA behaviour. It should be noted however that such increment in intention was measured from baseline to post-test. Between these two time-points, the patients spent two weeks in the rehabilitation program, therefore it is likely that a combination of factors, and not only undergoing the MSWT, has led to such increment. Based only on this specific measure it is not possible to conclude whether the increased intention to future exercise is caused by the test participation or rather by other elements in the rehabilitation process. To answer the research question of whether the MSWT participation actually leads to motivational change, other measures have to shape a better understanding. Another important finding corroborating possible motivational change of undergoing the MSWT consist in the enhanced positive affect from pre- to post-test. It was

expected that there would have been a positive change in affective responses from participating in PA. Still, there were divergent assumptions towards participating in a physiological test, to whether the test would have negative influences on affective responses as negative affect and fatigue. Even if the person has a general positive intention towards PA, negative emotions would possibly influence a person's behaviour on an unconscious level. Considering the fact that the cancer survivors have a high incidence of CRF, this phenomenon needs especial caution. Other studies suggests that people who experience an improvement in affective responses during PA tend to exercise more frequently in the future, than participants who have no change or negative change in affective responses (Bryan,et.al, 2007). Supported by Russel`s Circumplex model of affect (1980) improvement in affective responses means stronger intense-pleasant feelings (positive affect) and pleasant-mild feelings (tranquillity), as well as less intense-unpleasant feelings (negative affect) and unpleasant-mild feelings (fatigue). The present study shows an increase in one of the four components of the PAAS, positive affect, from pre-test to post-test. These results show that the participants had increase in positive affect as direct consequence of test participation. The improvement in positive affect is claimed to lead to more positive attitudes, self-efficacy towards the activity and improved intentions (Kwan & Bryan, 2010a). One may therefore claim that increased positive affect during test has a positive influence on exercise behaviour, by increase in intention to exercise as mentioned above. The three other components tranquillity, negative affect and fatigue did not change, initiating that there were no negative emotions trigged during MSWT participation. The fatigue measured as one of the four PAAS components showed a slight decrease in mean values, thought this not statistically significant, which was also the case in the third component negative affect. The fourth PAAS component tranquillity showed no change from pre-test to post-test. Having in

mind such increase in positive affect and no increase in negative emotions, one may therefore claim that the MSWT participation might at least have had some influence on the enhanced intention to future exercise, and consequent enhanced PA participation among the cancer survivors.

Further, the results showed a significant increase in the level of PAfrom baseline to follow-up. Observing the mean values of the outputs of MSWT, one may also notice a slight improvement in the patients' physical condition, although such change was not significant. The level of CRF was significant decreased from baseline to follow- up. Having in mind that CRF is reported by 80% of cancer survivors to be the most challenging late effect (Stone, et.al, 2000), also knowing that PA is recommended as treatment and prevention to CRF it is also interesting to notice the change in this measure. This actually means participants tested at follow- up had a positive improvement in health status during the rehabilitation period. However, it is important to keep in mind that methodological challenges related to the design of this study must be considered when interpreting these findings. These findings relate in fact to the entire participation period. During this period all participants underwent the MSWT, but this was only one of the planned activities. Moreover, because a control group was not included in the design of this study, it is not possible to conclusively establish what the impact of the MSWT, as a practice within the rehabilitation program on any subsequent motivation and behaviour change is. One may assume that the rehabilitation process, which includes repeated and varied supervised exercise participation, contributes to higher PA participation and reduces levels of total fatigue among the participants. These results are in line with reviewed literature (Meneses-Echavez, et.al, 2014) that recommend PA participation in all rehabilitation programs to people diagnosed with cancer, to promote

healthy lifestyle and prevent or even treat late- effects from cancer treatment, and especially due to the most commonly reported late- effect, CRF.

To summarize, participation in the MSWT increased positive affect in the cancer survivor, and had no change in negative affect or fatigue. The conclusion of enhanced motivational change is supported by results from follow- up, showing higher levels of PA and less CRF. Aalthough the measure of future intention to exercise has a number of limitations according to measure participation in MSWT it is likely that the test had something to do with the increased intention and therefore can contribute to enhanced motivation to participating in PA in the future. The specific measure showing increased PMC also support the study hypothesis.

5.3 What are the psychological factors associated with increased motivation?

The comments from participants suggest that motivational change was especially due to mastery experience and subjective norm. Mastery experiences, meaning performing better than expected in challenging situations, produce a higher, stronger and more generalized expectation of personal efficacy (Bandura, Adams & Beyer, 1977). In fact, mastery experience is the most effective way to a strong and solid self-efficacy, which is very central in personal behaviour described in SCT (Bandura, 1986). One of the comments “My physical condition is not as bad as I thought, and it feels good to “take it all out”” indicates that the mastery experience obtained through confirming capability is important, and even address some positive emotions related to exhaustion. Another comment exemplifying the

theme mastery experience, “I was only exhausted for a little while after the test and was quickly recovered. I want to challenge myself more.” even indicate that the mastery experience lead to immediate commitments towards future behaviour, through enhanced intention towards future PA participation, corresponding with the TBP.

By reading the patients’ comments, severe grouped in theme mastery experience indicate that the enhanced motivation was associated with performing better than expected. It was previously argued that people who score higher than expected in tests tend to become more motivated and committed to exercise, and that positive feedback from the test can help the participant to establish appropriate motivation (Mahoney, 2007). The findings of the present study corroborate this assumption, showing that positive feedback from the MSWT, both external and internal, can reinforce or strengthen behaviour towards PA by increasing the self-efficacy. This is also in line with what outlined in the Social cognitive theory, according with which self-efficacy not only have a direct influence of the actual behaviour, but also contribute to outcome expectations, socio- structural factors and goals, affecting behaviour. Cancer survivors that have experienced very invasive treatment often suffer from late-effects symptoms as CRF, leading to physical and psychological deconditioning (Blaney, et.al, 2010). Therefore we may assume that their expectations towards test result in general were low, and performing better during the MSWT than expected can be even more escalating to their mastery experience, and therefore positively change motivation to PA.

The second theme emerging from comments to PMC was subjective norm. According with TPB, perceived behavioral control and subjective norms are two of the main precursors of intention. Subjective norm, as the perceived expectations from significant others might be strengthened in a test situation in clinic surroundings, assisted by doctors and other health

care workers that are well known to the participants. Participants may also think that there are expectations from other cancer survivors, to perform well in the test and become more PA. For example, the comments "Exercise lead to health benefits" and "Now I have a goal to reach for" representing the theme "subjective norm". The expectations of becoming more PA may have been quite high among the participants when they first arrived the LHL-clinics, supported by high intention to exercise at baseline with a mean of 81.44 %. There is also a chance that it has even increased during the rehabilitation period, through the process of increased health literacy towards exercise as strategy of preventing late- effects and secondary cancer, recommending health behaviour that include regularly future PA participation. Therefore, participants may want to perform well, not only to achieve presumed expectations from significant others, but also to reflect their level of health literacy, showing at least some willingness and capability to improve.

In this study it was hypothesized that an increase in positive affect during the MSWT would be associated with PMC and intention. However, when investigating possible relationship of the affective responses with intention to exercise and PMC, no associations were found between affective responses to neither intention to exercise nor PMC. This is somewhat in contraindication with the literature, which claims that more positive affective responses to exercise lead to greater motivation (Kwan & Bryan, 2010 b). On the other hand, it has been argued that the positive emotions do not necessarily have direct influence on intention or perceived motivation, but rather influence humans in an unconscious level, through feedback, anticipation and reflection (Baumeister et al, 2007). Considering this, one may assume that positive affective response to PA can aid to build and sustain motivation over time. This is supported by both the TPB in terms of improved perceived behaviour control and the SCT, in terms of increased self-efficacy. Even though the change might be in an

unconscious level, it can contribute to positively influence a person's intention to exercise, as previously discussed. In this case one may first expose increase of intention to future exercise from positive affect during exercise or in this case participation in a test, in a long term perspective rather than immediate boosts of motivation. Still, the positive associations between mastery experience and the PMC also indicate that the patients' motivation to exercise was influenced by positive mastery experiences perceived during the MSWT on a conscious level.

Mastery experience seems to play a central role in several ways. Complex psychological and physiological processes during cancer treatment may reduce a person's expectations of capability, based on deconditioning described as common consequence of CRF (Blaney, et. al, 2010). Mahoney (2007) argues that especially people who have less experiences to physical activity are highly sensitive to both positive and negative feedback from tests, and therefore may feel especially motivated from positive feedback. It is likely that cancer survivors attending rehabilitation may feel particularly motivated from test participation, from feeling capability of challenging themselves physically, as well as sensitivity to both internal and external feedback. The issue of presumably low self-efficacy towards PA as result of serious disease and prolonged treatment (Lerdal & Fagermoen, 2011) may also explain that there were no participants who reported a decrease in perceived motivation by undergoing the test. Even if they had a bad experience during test followed by a bad test result, the expectation of performance might be so low that even being able to fulfil the test would lead to a positive total experience, resulting in a total perception of mastery experience towards PA.

Another question raised during literature review was whether the MSWT would be considered too challenging by the cancer survivors, as participants are asked to gradually increase the walking speed and go on until exhaustion. In the literature review it was found that continuous high intensity exercise can lead to negative psychological responses (Jung, et.al, 2014), and affective responses seem to be more positive when people are allowed to self-select their pace (Miller, et.al, 2005). Engaging in aerobic PA at a self-selected speed, tend to increase positive emotions in people undergoing a physical task, and therefore has the potential of influencing intention to future PA (Ekkekakis, et.al , 2011). Although physiological tests may be challenging, especially among cancer survivors, according with Dasilva, et.al (2011) individuals might perceive better overall experience by undergoing a "field test" like the MSWT rather than undergoing a "classical" VO2max test, which is typically performed on a treadmill. Dasilva, et.al (2011) found in fact that RPE was lower when performing an over-ground walking task, as compared to a walking task on a treadmill, even at higher speed. The fact that in this study a field test was used to test the patients' cardiorespiratory fitness, might have influenced the outcomes in this sense. It could be hypothesized that undergoing a treadmill-based test could lead to less positive affective responses, which might in turn have had different impact in the patients motivation and future exercise behaviour.

5.4 The impact of previous level of PA and fatigue to motivational change

In this study it was found that the patients' activity level at baseline correlated negatively with the change in intention to future exercise, meaning that those who were less active at

baseline became more motivated from baseline to post-test. This indicates that the rehabilitation program as a whole did manage to lead to enhanced PA motivation to those who really need it most in this selection. The ratings of PMC were however not significantly correlated with the patients PA levels at baseline, meaning that previous level of PA did not have influence of the personal experience of undergoing the MSWT. Although PMC was not significantly associated with the patients' PA levels, the correlation did had a somewhat similar pattern as described between intention and PA levels, since they were both negative. These results are not in line with what argued by Mahoney (2007) indicating that more active individuals are more likely to be motivated from participating in physiological tests. For example, a patient who has maintained higher PA levels throughout his treatment could be expected to handle negative emotions in a better way such as fatigue and exhaustion that typically emerge during this type of tests, and at the same time experience positive feelings of challenges that could strengthen his motivation. On the other hand, a person who did not maintain high levels of PA throughout the treatment, and maybe did not have high levels of PA before being diagnosed either, could be expected to have perceived such physical challenges as a sign of not being ready to start exercising more regularly. However, based on the results of this study such expectations were not met to the population of cancer survivors, undergoing the MSWT during rehabilitation. The comments from the participants suggest that apparently those who did not report a change in motivation (a fourth of the overall sample) were already motivated. The fact that PMC was not significantly correlated with the participants PA levels at baseline or their physical condition (i.e. the outcomes of the MSWT) is particularly encouraging, because side effects from cancer treatment often result in sedentary behavior and in line with what was claimed by Mishra et.al (2012) promoting high levels of PA is especially important in cancer survivors to reduce CRF and increase

quality of life. The present findings are somewhat in line with the study hypothesis since there was a correlation between previous level of PA and motivational change, but in fact the associations were opposite from what was expected. Expectations were a positive correlation between PA level and intention to exercise and PMC.

Looking at the impact of CRF, no significant correlations was found between fatigue at baseline and either intention to future exercise or perceived motivational change. These results are opposite from what outlined in the third hypothesis of this study, since cancer related fatigue can lead to physical deconditioning, social isolation and difficulties establishing exercise routines (Blaney, et.al, 2010), and based on these findings the third research hypothesis (H3) should be rejected. The expectation, that being part of a group at the rehabilitation centre, undergoing regularly exercise routines, and even the challenge of undergoing the MSWT, would be particularly challenging too those who suffer from higher levels of fatigue, was not met. There could have been positive influencing factors that offset the expected negative factors, like the increased positive affect during the MSWT and other supervised PA within the rehabilitation program, mastery experience leading to increased self-efficacy, and even strengthened motivation for PA based on for example greater confidence in safety of PA participation after cancer through increase in health literacy.

The fact that there was no associations between CRF and either intention to exercise nor PMC, indicating that the level of CRF had no influence on the motivational change, is positive when it comes to including MSWT as motivational strategy in rehabilitation programs for cancer survivors. Since CRF is the most common late effect symptom among cancer survivors (Patarca- Montero, 2004), a negative influence of CRF to motivational

change would actually have led to concerns in including the MSWT in rehabilitation programs to this population.

5.5 Strenghts and limitations

The issue of motivational change towards PA in cancer survivors by participating in tests is very novel, and therefore the findings are to a certain extent ground breaking, and may be of interest both in rehabilitation clinics and other facilities offering rehabilitation programs to cancer survivors. Still, considering this is a student`s Master thesis that may include severe novice mistakes, the results may be considered as uncertain.

In experimental designs the basic intent is to test the impact of a treatment or intervention, controlling for all other factors that might influence the outcome (Creswell, 2010). Strength of the present study is that most of the instruments used are validated and previously used in research. The study design is also structured and reproducible in similar or other populations, suiting recommendations by Creswell (2010), and data collection is conducted in a controlled environment at the LHL- clinics.

Conducting a study in a rehabilitation clinic in activity enhancing surroundings, this may also be considered a bias, assuming a possible influence on the participants' while answering questionnaires at all measurements. Still, by following a thorough plan for data gathering, this bias was attempted limited to a minimum. The baseline questionnaire was answered when patients first arrived at the LHL- clinics, and the follow-up questionnaire when they first arrived to their follow- up week, to minimize the influence of both the rehabilitation program and the social surroundings. The questionnaires related to the physiological test were filled out in private room, directly before and after the test participation. Still, filling

out the forms in the environment of the LHL- clinics, among other cancer survivors and well known health care workers, may have influenced the outcome.

In this study there was no control group, which is considered a clear limitation. The main reason to this is the ethical considerations, because at the LHL- clinics where the data gathering took place, all the cancer patients are asked to participate in the cardiopulmonary field test as part of the ordinary rehabilitation program, to register their physical condition during the rehabilitation program and at a follow- up three months after. Excluding some cancer patients from this part of the rehabilitation program to be put in a control group for a master`s project would be unethical.

Another possible limitation, as previously discussed, might be the selection, since participants are selected from a group of cancer survivors who are already motivated for a cancer rehabilitation program in the LHL- clinics. Preparing to go to a rehabilitation clinic may indicate the patients were already aware of the positive effect from PA, in promoting heath, reducing late effects and preventing secondary cancer incidence, or at least they had some kind of motivation to become more physically active. The results from this study may therefore give information about a possible motivational change of cardiopulmonary field testing of cancer patients attending rehabilitation; still one must be careful in transferring value to other populations, or even to the general population of cancer survivors.

5.6 Implications

Physiological tests are common practice in severe rehabilitation programs, and even recommended from health institutions. For example, the “Guidelines for healthy living

centers" recommend physical tests to help patients to be aware of one`s physical activity habits, and also to motivate to future PA participation (The Norwegian Directory of Health, 2016). Still, the evidence base towards a possible motivational change is still limited, and some evidence even claim that exercise tests are unlikely to separately result in motivation towards exercise, especially for beginners (Mahoney, 2007). Actual effectiveness of this practice is important to verify the accuracy of motivational change, potential unnecessary stressor to the patients, or even negative consequences to the patients, as well as required personal resources to carry out the tests.

Even a well-planned study of a selection of a population will only give an indication of the "truth", because there will always be uncertainty about the selection (Bjørndal & Hofoss, 2004). This is important to keep in mind also according to the present study, being very careful to generalize the results to be representative to other populations, including the growing population of all cancer survivors. Still, one may believe the findings are interesting to rehabilitation clinics and other providers of rehabilitation programs for cancer survivors, like Norwegian "Healthy living centers", since the results implicate that the field test can motivate to future participation in PA among cancer survivors. Even though there are also other factors affecting the outcome, the test can be used to enhance motivation as part of a rehabilitation program. One may also believe that the results arouse interest among researcher and health care workers to conduct similar studies in other populations.

5.7 Conclution

The cancer survivors who underwent a physiological test, the MSWT, during rehabilitation experienced a positive motivational change towards future PA, especially those who were

less active at baseline. Although the enhanced motivation is likely to derive from the rehabilitation program as a whole, many participants perceived that the test did help them becoming more motivated to engage in regular PA. Feedbacks from the participants suggest that such motivational change was especially due to mastery experiences and subjective norm. There was an increase in positive affect among cancer survivors from pre-to post-test, which can also influence behaviour on an unconscious level. There was an increase in intention to future exercise from baseline to post test, and those who were less active at baseline had higher improvement. Moreover, the participants' physical conditions and baseline level of CRF had no influence on their intention or PMC. Less fatigue and more physical activity participation from baseline to follow- up indicates a better health status among the cancer survivors after the rehabilitation period.

Future studies with randomized control design are needed to better understand the importance of including the MSWT as a motivational strategy during rehabilitation in cancer survivors.

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Appendix 1. Informed consent form

Forespørsel om deltakelse i forskningsprosjektet

"Kondisjonstester for kreftpasienter"

Bakgrunn og hensikt

Dette er et spørsmål til deg om å delta i et forskningsprosjekt som skal sammenligne to fysiske tester som måler kondisjon (fysisk utholdenhet). I tillegg ønsker vi å finne ut om det å bli testet virker inn på deltakelse i framtidig fysisk aktivitet. Prosjektet skal inkludere kreftpasienter som deltar på rehabiliteringsprogrammet ved LHL-klinikkene Røros, og derfor blir du nå forespurt om å delta. Det er forskningsavdelingen ved LHL-klinikkene Røros som har planlagt prosjektet og som er ansvarlig for selve gjennomføringen.

Hva innebærer studien?

Vi ber alle kreftpasienter som deltar på rehabiliteringsprogrammet ved LHL-klinikkene Røros om å gjennomføre en gå- og løpetest som en del av vår standard kartlegging ved innkomst. Dersom du takker ja til å delta i studien kan du i tillegg bli trukket ut til å gjennomføre en ekstra test på tredemølle for å måle din kondisjon, også kalt maksimalt oksygenopptak. Da vil du også bli forespurt om å fylle ut spørreskjema i tilknytning til testene, og dette er beregnet til å ta 10 minutter før oppstart og 5 minutter under/etter testene. Her følger en beskrivelse av ekstratesten på tredemølle samt den obligatoriske gå- og løpetesten:

Tredemølle-test: Din kondisjon måles best ved en direkte måling av maksimalt oksygenopptak på tredemølle. Maksimalt oksygenopptak er den største mengden oksygen som kroppen kan ta opp og utnytte under hardt fysisk arbeid, og oppgis vanligvis som antall milliliter oksygen, per kilo kroppsvekt, per minutt. Denne verdien reflekterer kroppens evne til å levere oksygen til muskelcellene og har dermed svært stor sammenheng med hvor god kondisjon du har. Under testen vil du puste gjennom en maske eller et munnstykke, og ditt opptak av oksygen registreres fortløpende. Testen gjennomføres ved at hastighet og stigning på tredemøllen øker gradvis. Testens varighet ligger normalt mellom 8 til 12 minutter. Registreringen av det maksimale oksygenopptaket forutsetter at du opprettholder testen til du ikke orker mer. Du vil gjennomføre en tilvenningstest for at du skal bli kjent med utstyret og testprotokollen før selve testen.

Gå- og løpetest: Denne fysiske testen er en enklere måte å måle din kondisjon på, og krever minimalt av utstyr. Testen innebærer at du beveger deg med jevn fart, frem og tilbake, langs en strekning på 10 meter. En CD-spiller gir et signal med jevne mellomrom som indikerer når du skal nå til motsatt ende av den 10 m lange strekningen. Hvert minutt minskes tiden mellom signalene og du må dermed bevege

deg raskere. Du kan når som helst begynne å løpe under testen. Testen avsluttes når du blir for andpusten til å opprettholde nødvendig fart for å nå motsatt ende av strekningen. Før testen skal du gjennomføre en tilvenningstest for å bli kjent med testprotokollen. Informasjon som registreres under testen inkluderer gangdistanse i meter, fullførte nivå og lengder, puls og opplevelse av anstrengelse.

Dersom du ikke ønsker å delta i studien vil det ikke få noen konsekvenser for ditt rehabiliteringsopphold ved LHL-klinikkene Røros.

Spørreskjema: Du vil bli bedt om å fylle ut et spørreskjema om informasjon om deg selv, samt et skjema i tilknytning til gjennomføring av den fysiske gå- og løpetesten.

Mulige fordeler og ulemper

Du vil få målt ditt maksimale oksygenopptak, noe som innebærer en grundig kartlegging av din kondisjon og fysiske form. Du vil få vite hvordan din fysiske kapasitet er i forhold til gjennomsnittet i befolkningen av samme kjønn og alder. Informasjonen som registreres under testen vil benyttes til treningsveiledning og til å planlegge treningen din i perioden framover.

Å gjennomføre maksimale tester kan oppleves som ubehagelig, men varigheten av testene er relativt korte. Testingen medfører ingen ekstra risiko utover det man kan forvente ved deltakelse på et rehabiliteringsopphold.

Hva skjer med informasjonen om deg?

Prøvene tatt av deg og informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene og prøvene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende 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. 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 din øvrige behandling. Dersom du senere ønsker å trekke deg

eller har spørsmål til studien, kan du kontakte Øystein Kojødal ved LHL-klinikkene Røros på telefon 72 40 95 33.

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)

Appendix 2. REK approval

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSKNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK midt	Hilde Eikemo	73597508	08.09.2015	2015/1202/REK midt
			Deres dato:	Deres referanse:
			15.08.2015	

Vår referanse må oppgis ved alle henvendelser

Jon Arne Sandmæl
LHL-klinikkene

2015/1202 Måleegenskaper av gangtest for kreftpasienter

Forskningsansvarlig: LHL-klinikkene Røros
Prosjektleder: Jon Arne Sandmæl

Vi viser til søknad om forhåndsgodkjenning av ovennevnte forskningsprosjekt. Søknaden ble behandlet av Regional komité for medisinsk og helsefaglig forskningsetikk (REK midt) i møtet 21.08.2015. Vurderingen er gjort med hjemmel i helseforskningsloven (hfl.) § 10, jf. forskningsetikkloven § 4.

Prosjektomtale
Det er i dag veldokumentert at fysisk trening gir bedring spesielt på fysisk funksjon hos kreftpasienter. For å muliggjøre optimal individuell treningseffekt gjennom riktig treningsdosering er testing av fysisk kapasitet anbefalt. Måling av VO2-peak regnes som gullstandard for testing av kardiovaskulær kapasitet, men testen krever kostbart utstyr og kvalifisert testpersonale. Gode felttester av enklere karakter vil være til nytte ved ulike rehabiliteringsprogram for kreftpasienter, men per i dag er få slike tester validert. Hensikten med denne studien er å validere Modified Incremental Shuttle Walk Test (MSWT) for kreftpasienter opp imot i gullstandarden VO2-peak. Siden MSWT er en test som krever lite utstyr og enkel opplæring vil validering av denne være klinisk relevant da den kan implementeres som en standard felttest for maksimal fysisk kapasitet i ulike rehabiliteringsprogram.

Vurdering

Komiteens prosjektsammendrag
Det er i dag veldokumentert at fysisk trening gir bedring spesielt på fysisk funksjon hos kreftpasienter. For å muliggjøre optimal individuell treningseffekt, må effekten kunne måles. Gode og enkle felttester vil være til nytte ved ulike rehabiliteringsprogram for kreftpasienter, men per i dag er få slike tester validert. Hensikten med denne studien er å validere Modified Incremental Shuttle Walk Test (MSWT) for kreftpasienter opp mot gullstandarden maksimalt oksygenopptak (VO2-peak). Studien skal inkludere 40 kreftpasienter som deltar på et rehabiliteringsopphold ved LHL-klinikkene Røros. Skriftlig samtykke innhentes fra samtlige deltakere.

Forsvarlighet
Komiteen har vurdert søknad, forskningsprotokoll, målsetting og plan for gjennomføring. Under forutsetning av at vilkårene nedenfor tas til følge, framstår prosjektet som forsvarlig og hensynet til deltakernes velferd og integritet er ivaretatt.

Informasjonsskriv
Komiteen ber om at hele kapittel A og B fjernes fra skrivet. Den generelle delen er god og dekkende.

Besøksadresse: Det medisinske fakultet Medisinsk teknisk forskningssenter 7489 Trondheim | Telefon: 73597511 E-post: rek-midt@medisin.ntnu.no Web: http://helseforskning.etikkom.no/ | All post og e-post som inngår i saksbehandlingen, bes adressert til REK midt og ikke til enkelte personer | Kindly address all mail and e-mails to the Regional Ethics Committee, REK midt, not to individual staff

Ansvarsforhold
Kontaktpersonen for forskningsansvarlig institusjon skal i utgangspunktet være virksomhetens øverste leder. Komiteen ber om at denne rollen gis til virksomhetsdirektøren.

Rekrutteringsprosedyre
Komiteen ber om at rekrutteringsprosedyren endres. Forespørsel om deltakelse i prosjektet sendes pasientene sammen med innkallingsbrevet i stedet for at de forespørres når de har kommet til klinikken. Endret rekruttering vil sørge for at de forespurte får god betenkningstid, og sikre frivilligheten.

Vilkår for godkjenning

1. Revidert informasjonsskriv skal sendes komiteen før det tas i bruk. Vennligst benytt e-postadressen post@helseforskning.etikkom.no og "REK midt 2015/1202" i emnefeltet. Prosjektet kan ikke igangsettes før komiteen har bekreftet at informasjonsskrivet er endret i henhold til komiteens merknader.
2. Informasjonsskrivet skal sendes de forespurte sammen med innkallingen til klinikken.
3. En bekreftelse på endret kontaktperson for forskningsansvarlig institusjon sendes komiteen. Der må det opplyses om telefonnummer og e-postadresse til vedkommende.
4. Komiteen minner om at de aller fleste kliniske studier skal registreres i det offentlig tilgjengelige registeret www.clinicaltrials.gov. Prosjektleder er ansvarlig for å avklare om forskningsstudien omfattes av kravet til registrering.
5. Godkjenningen er gitt under forutsetning av at prosjektet gjennomføres slik det er beskrevet i søknaden og protokollen. Prosjektet må også gjennomføres i henhold til REKs vilkår i saken og de bestemmelser som følger av helseforskningsloven (hfl.) med forskrifter.
6. Komiteen forutsetter at ingen personidentifiserbare opplysninger kan fremkomme ved publisering eller annen offentliggjøring.
7. Forskningsprosjektets data skal oppbevares forsvarlig, se personopplysningsforskriften kapittel 2, og Helsedirektoratets veileder for «Personvern og informasjonssikkerhet i forskningsprosjekter innenfor helse- og omsorgssektoren». Av kontrollhensyn skal prosjektdata oppbevares i fem år etter sluttmelding er sendt REK. Data skal derfor oppbevares til denne dato, for deretter å slettes eller anonymiseres, jf. hfl. § 38.
8. Prosjektleder skal sende sluttmelding til REK midt når forskningsprosjektet avsluttes. I sluttmeldingen skal resultatene presenteres på en objektiv og etterrettelig måte, som sikrer at både positive og negative funn fremgår, jf. helseforskningsloven § 12.

Vedtak
Regional komité for medisinsk og helsefaglig forskningsetikk Midt-Norge godkjenner prosjektet med de vilkår som er gitt.

Komiteen var enstemmig i sin beslutning.

Søknad om prosjektendring
Prosjektleder skal sende søknad om prosjektendring til REK midt dersom det skal gjøres vesentlige endringer i forhold til de opplysninger som er gitt i søknaden, jf. hfl. § 11.

Klageadgang
Du kan klage på komiteens vedtak, jf. forvaltningsloven § 28 flg. Klagen sendes til REK midt. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK midt, sendes klagen videre til Den nasjonale forskningsetiske komité for medisin og helsefag for endelig vurdering.

Med vennlig hilsen

Sven Erik Gisvold
Dr.med.
Leder, REK midt

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSKNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK midt	Hilde Eikemo	73597508	18.11.2015	2015/1202/REK midt
			Deres dato:	Deres referanse:
			02.11.2015	

Vår referanse må oppgis ved alle henvendelser

Jon Arne Sandmæl
Røros

2015/1202 Måleegenskaper av gangtest for kreftpasienter

Forskningsansvarlig: LHL-klinikkene Røros
Prosjektleder: Jon Arne Sandmæl

Vi viser til søknad om prosjektendring datert 03.11.2015 for ovennevnte forskningsprosjekt. Søknaden er behandlet av leder for REK midt på fullmakt, med hjemmel i helseforskningsloven § 11 og forskrift om behandling av etikk og redelighet i forskning § 10 annet ledd.

Ønsket endring
Det søkes her om å få legge inn et ekstra forskningsspørsmål om motivasjon for trening - altså om det å gjennomføre tester i seg selv er motiverende for senere trening. Deltakerne skal fylle ut tre ekstra spørreskjema.

Vurdering
Deltakerne vil antakelig måtte bruke en god del ekstra tid på deltakelsen pga. de ekstra spørreskjemaene. Det må stå i informasjonsskrivet ca. hvor lang tid det vil ta. Utover et revidert informasjonsskriv, har komiteen ingen innvendinger til de omsøkte endringene.

Vilkår for godkjenning
Komiteen ber om å få tilsendt revidert informasjonsskriv hvor det i avsnittet "Hva innebærer deltakelse" fremgår ca. hvor lang tid det tar å fylle ut spørreskjemaene. Revidert skriv skal sendes komiteen til orientering før det tas i bruk i prosjektet. Vennligst benytt e-postadressen post@helseforskning.etikkom.no og "REK midt 2015/1202" i emnefeltet.

Vedtak
Regional komité for medisinsk og helsefaglig forskningsetikk Midt-Norge godkjenner søknad om prosjektendring med det vilkår som er gitt.

Klageadgang
Du kan klage på komiteens vedtak, jf. forvaltningsloven § 28 flg. Klagen sendes til REK midt. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK midt, sendes klagen videre til Den nasjonale forskningsetiske komité for medisin og helsefag for endelig vurdering.

Med vennlig hilsen

Sven Erik Gisvold
Dr.med.
Leder, RTK midt

Hilde Eikemo
Sekretariatsleder

Kopi til: *hse.ciderveil@hf-ikbnikkene.no*

Appendix 3. Questionnaire T0, baseline

Preliminary assessments (4 pages) Subj.ID_____

Bakgrunnsinformasjon (Fyll ut i kolonnen til høyre)

Kjønn	[ ] Mann [ ] Kvinne
Alder (år)	
Gift/samboer	[ ] Ja [ ] Nei
Høyeste gjennomførte utdanning (Sett ett kryss)	[ ] Grunnskole [ ] Videregående skole [ ] Fagbrev [ ] Til og med 3 års høyere utdanning [ ] Mer enn 3 års høyere utdanning
Brutto årsinntekt (Før kreftdiagnosen)	[ ] Mindre enn 100 000 [ ] 100 000 – 299 000 [ ] 300 000 – 499 000 [ ] 500 000 – 699 000 [ ] Mer enn 700 000 [ ] Vet ikke / vil ikke svare
Har du hjemmeboende barn under skolealder?	[ ] Ja [ ] Nei
Type kreft (diagnose)	
Antall måneder siden siste kreftrelaterte behandling i sykehus.	
Har du omsorg for barn under 10 år?	[ ] Ja [ ] Nei

Tretthet (Fatigue)
Vi vil gjerne vite om du har følt deg sliten, svak eller i mangel av overskudd den siste måneden. Vennligst besvar ALLE spørsmålene ved å krysse av for det svaret du synes passer best for deg. Vi ønsker at du besvarer alle spørsmålene selv om du ikke har hatt slike problemer. Vi spør om hvordan du har følt deg i det siste og ikke om hvordan du følte deg for lenge siden. Hvis du har følt deg sliten lenge, ber vi om at du sammenlikner deg med hvordan du følte deg sist du var bra. (Ett kryss for hver linje)

1. Har du problemer med at du føler deg sliten?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

2. Trenger du mer hvile?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

3. Føler du deg søvnig eller døsig?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

4. Har du problemer med å komme i gang med ting?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

5. Mangler du overskudd?

[ ]	[ ]	[ ]	[ ]
Ikke i det hele tatt	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

6. Har du redusert styrke i musklene dine?

[ ]	[ ]	[ ]	[ ]
Ikke i det hele tatt	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

7. Føler du deg svak?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Som vanlig	Mer enn vanlig	Mye mer enn vanlig

8. Har du vansker med å konsentrere deg?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Som vanlig	Mer enn vanlig	Mye mer enn vanlig

9. Forsnakker du deg i samtaler?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

10. Er det vanskeligere å finne det rette ordet?

[ ]	[ ]	[ ]	[ ]
Mindre enn vanlig	Ikke mer enn vanlig	Mer enn vanlig	Mye mer enn vanlig

11. Hvordan er hukommelsen din?

[ ]	[ ]	[ ]	[ ]
Bedre enn vanlig	Ikke verre enn vanlig	Verre enn vanlig	Mye verre enn vanlig

12. Hvis du føler deg sliten for tiden, omtrent hvor lenge har det vart? (Ett kryss)

[ ] Mindre enn en uke
[ ] Mindre enn tre måneder
[ ] Mellom tre og seks måneder
[ ] Seks måneder eller mer

13. Hvis du føler deg sliten for tiden, omtrent hvor mye av tiden kjenner du det? (Ett kryss)

[ ] 25 % av tiden

[ ] 50 % av tiden
[ ] 75 % av tiden
[ ] Hele tiden

Ta utgangspunkt i en normal 7 dagers periode (en uke) på denne tiden av året: Hvor mange ganger engasjerer du deg i følgende fysiske aktiviteter i minst 30 minutter* i fritiden, inkludert «aktiv transport»?**

* 30 minutter= Kan også være fordelt på to økter på minimum 15 minutter hver på samme dag
** Hvordan du kommer deg fra sted til sted, som til og fra jobb, butikken, kino osv.

	Ganger pr uke
a) **Hard fysisk aktivitet (høy puls)** Eks: Løping, intensiv sport/ballspill, langdistanse – eller terrengsykling, intensiv svømming, osv.	_____
b) **Moderat fysisk aktivitet (litt anstrengende)** Eks: Rask gange, moderat anstrengende sport/ballspill, lett sykling, lett svømming, dansing, osv.	_____
c) **Lett fysisk aktivitet (minimal anstrengelse)** Eks: Lett gange, yoga, fisking, bowling, golf, gåturer, osv.	_____

Helsegevinster ved regelmessig fysisk aktivitet er veldokumentert. Helsedirektoratet anbefaler at voksne og eldre bør være fysisk aktive minimum 150 timer med moderat intensitet* eller 75 minutter med høy intensitet pr uke. Aktiviteten kan deles opp i bolker på minst 10 minutter.**
*Moderat intensitet: Aktiviteter som medfører raskere puls enn vanlig, for eksempel hurtig gange.
**Høy intensitet: Aktiviteter som medfører mye høyere puls enn vanlig, for eksempel løping.

Hvor motivert er du til å oppfylle Helsedirektoratets anbefalinger for fysisk aktivitet de neste tre månedene?
(Sett ett kryss på linjen nedenfor)

|———|———|———|———|———|———|———|———|———|———|

0 % 50 % 100 %

Helt umotivert Moderat motivert Topp motivert

Preliminary assessments (4 pages) Subj.ID_____

Her er en rekke ord og uttrykk som beskriver ulike følelser. Les hvert ord/uttrykk, og angi i hvilken grad du er enig eller uenig i hvordan de beskriver hvordan du vanligvis føler deg.
(Sett ring rundt ett tall på hver linje)

	Svært uenig	Litt uenig	Verken enig eller uenig	Litt enig	Helt enig
1. Lett til sinns	0	1	2	3	4
2. Rolig	0	1	2	3	4
3. Energisk	0	1	2	3	4
4. Trøtt	0	1	2	3	4
5. Tilfreds	0	1	2	3	4
6. Elendig	0	1	2	3	4
7. Utslitt	0	1	2	3	4
8. Avslappet	0	1	2	3	4
9. Utmattet	0	1	2	3	4
10. Motløs	0	1	2	3	4
11. Entusiastisk	0	1	2	3	4
12. Dårlig	0	1	2	3	4

Appendix 4. Questionnaire T1, pre and post test

T1 PRE and POST(4 pages) Subj.ID_____

FØR TEST

Her er en rekke ord og uttrykk som beskriver ulike følelser. Les hvert ord/uttrykk, og angi i hvilken grad du er enig eller uenig i hvordan de beskriver hvordan du føler deg akkurat nå.
Sett ring rundt ett tall på hver linje.

	Svært uenig	Litt uenig	Verken enig eller uenig	Litt enig	Helt enig
1. Lett til sinns	0	1	2	3	4
2. Rolig	0	1	2	3	4
3. Energisk	0	1	2	3	4
4. Trøtt	0	1	2	3	4
5. Tilfreds	0	1	2	3	4
6. Elendig	0	1	2	3	4
7. Utslitt	0	1	2	3	4
8. Avslappet	0	1	2	3	4
9. Utmattet	0	1	2	3	4
10. Motløs	0	1	2	3	4
11. Entusiastisk	0	1	2	3	4
12. Dårlig	0	1	2	3	4

T1 PRE and POST(4 pages) Subj.ID_____

ETTER TEST

Hvor anstrengende var den fysiske aktiviteten du nettopp har gjennomført? Anstrengelse arter seg som tretthet i musklene og som andpustenhet. Tenk på den totale opplevelse an anstrengelse. Ta utgangspunkt i ordene på skalaen og velg så et tall. Det viktige er din følelse av anstrengelse og ikke hva du tror andre mener. Tallet trenger ikke være foran et av uttrykkene.

Sett ring rundt det tallet som tilsvarer hvor anstrengende du opplevde den fysiske aktiviteten.

BORGS CR 10 SKALA

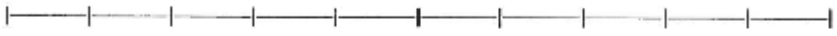
0	Ingenting	
0,3		
0,5	Ekstremt svak	Knapt merkbar
0,7		
1	Svært svak	
1,5		
2	Svak	Lett
2,5		
3	Moderat	
4		
5	Sterke	Tung
6		
7	Svært sterk	
8		
9		
10	Ekstremt sterk	«Maksimal»
11		
•	Absolutt maksimum	Høyest mulig

T1 PRE and POST(4 pages) Subj.ID_____

Helsegevinster ved regelmessig fysisk aktivitet er veldokumentert. Helsedirektoratet anbefaler at voksne og eldre bør være fysisk aktive minimum 150 timer med moderat intensitet* eller 75 minutter med høy intensitet pr uke. Aktiviteten kan deles opp i bolker på minst 10 minutter.**
*Moderat intensitet: Aktiviteter som medfører raskere puls enn vanlig, for eksempel hurtig gange.
**Høy intensitet: Aktiviteter som medfører mye høyere puls enn vanlig, for eksempel løping.

Hvor motivert er du til å oppfylle Helsedirektoratets anbefalinger for fysisk aktivitet de neste tre månedene?

(Sett ett kryss på linjen nedenfor)



0 % 50 % 100 %

Helt umotivert Moderat motivert Topp motivert

Ble din motivasjon til regelmessig fysisk aktivitet (som beskrevet ovenfor) endret som følge av deltakelse i den fysiske testen?

(Sett ring rundt ett tall)

-3	-2	-1	0	1	2	3
Mye mindre motivert	Mindre motivert	Litt mindre motivert	Ingen endring	Litt mer motivert	Mer motivert	Mye mer motivert

Dersom du ønsker; skriv gjerne en setning eller to om hva du mener er grunnen til at du ble mer/mindre motivert:

T1 PRE and POST(4 pages) Subj.ID_____

Her er en rekke ord og uttrykk som beskriver ulike følelser. Les hvert ord/uttrykk, og angi i hvilken grad du er enig eller uenig i hvordan de beskriver hvordan du føler deg akkurat nå.
Sett ring rundt ett tall på hver linje.

	Svært uenig	Litt uenig	Verken enig eller uenig	Litt enig	Helt enig
1. Lett til sinns	0	1	2	3	4
2. Rolig	0	1	2	3	4
3. Energisk	0	1	2	3	4
4. Trøtt	0	1	2	3	4
5. Tilfreds	0	1	2	3	4
6. Elendig	0	1	2	3	4
7. Utslitt	0	1	2	3	4
8. Avslappet	0	1	2	3	4
9. Utmattet	0	1	2	3	4
10. Motløs	0	1	2	3	4
11. Entusiastisk	0	1	2	3	4
12. Dårlig	0	1	2	3	4

Appendix 5. Questionnaire T2, follow- up

T2 (3 pages) Subj.ID_____

Follow-up

Tretthet (Fatigue)
Vi vil gjerne vite om du har følt deg sliten, svak eller i mangel av overskudd den siste måneden. Vennligst besvar ALLE spørsmålene ved å krysse av for det svaret du synes passer best for deg. Vi ønsker at du besvarer alle spørsmålene selv om du ikke har hatt slike problemer. Vi spør om hvordan du har følt deg i det siste og ikke om hvordan du følte deg for lenge siden. Hvis du har følt deg sliten lenge, ber vi om at du sammenlikner deg med hvordan du følte deg sist du var bra. (Ett kryss for hver linje)

1. Har du problemer med at du føler deg sliten?

[ ] Mindre enn vanlig	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

2. Trenger du mer hvile?

[ ] Mindre enn vanlig	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

3. Føler du deg søvnig eller døsig?

[ ] Mindre enn vanlig	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

4. Har du problemer med å komme i gang med ting?

[ ] Mindre enn vanlig	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

5. Mangler du overskudd?

[ ] Ikke i det hele tatt	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

6. Har du redusert styrke i musklene dine?

[ ] Ikke i det hele tatt	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

7. Føler du deg svak?

[ ] Mindre enn vanlig	[ ] Som vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

8. Har du vansker med å konsentrere deg?

[ ] Mindre enn vanlig	[ ] Som vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

9. Forsnakker du deg i samtaler?

[ ] Mindre enn vanlig	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

10. Er det vanskeligere å finne det rette ordet?

[ ] Mindre enn vanlig	[ ] Ikke mer enn vanlig	[ ] Mer enn vanlig	[ ] Mye mer enn vanlig

T2 (3 pages) Subj.ID_____

Follow-up

11. Hvordan er hukommelsen din?

[ ]	[ ]	[ ]	[ ]
Bedre enn vanlig	Ikke verre enn vanlig	Verre enn vanlig	Mye verre enn vanlig

12. Hvis du føler deg sliten for tiden, omtrent hvor lenge har det vart? (Ett kryss)

[ ] Mindre enn en uke
[ ] Mindre enn tre måneder
[ ] Mellom tre og seks måneder
[ ] Seks måneder eller mer

13. Hvis du føler deg sliten for tiden, omtrent hvor mye av tiden kjenner du det? (Ett kryss)

[ ] 25 % av tiden
[ ] 50 % av tiden
[ ] 75 % av tiden
[ ] Hele tiden

Ta utgangspunkt i en normal 7 dagers periode (en uke) på denne tiden av året: Hvor mange ganger engasjerer du deg i følgende fysiske aktiviteter i minst 30 minutter* i fritiden, inkludert «aktiv transport»?**

* 30 minutter= Kan også være fordelt på to økter på minimum 15 minutter hver på samme dag

** Hvordan du kommer deg fra sted til sted, som til og fra jobb, butikken, kino osv.

	Ganger pr uke
a) **Hard fysisk aktivitet (høy puls)** Eks: Løping, intensiv sport/ballspill, langdistanse – eller terrengsykling, intensiv svømming, osv.	_____
b) **Moderat fysisk aktivitet (litt anstrengende)** Eks: Rask gange, moderat anstrengende sport/ballspill, lett sykling, lett svømming, dansing, osv.	_____
c) **Lett fysisk aktivitet (minimal anstrengelse)** Eks: Lett gange, yoga, fisking, bowling, golf, gåturer, osv.	_____

T2 (3 pages) Subj.ID_____

Follow-up

Helsegevinster ved regelmessig fysisk aktivitet er veldokumentert. Helsedirektoratet anbefaler at voksne og eldre bør være fysisk aktive minimum 150 minutter med moderat intensitet* eller 75 minutter med høy intensitet pr uke. Aktiviteten kan deles opp i bolker på minst 10 minutter.**
*Moderat intensitet: Aktiviteter som medfører raskere puls enn vanlig, for eksempel hurtig gange.
**Høy intensitet: Aktiviteter som medfører mye høyere puls enn vanlig, for eksempel løping.

Hvor motivert er du til å oppfylle Helsedirektoratets anbefalinger for fysisk aktivitet de neste tre månedene?

(Sett ett kryss på linjen nedenfor)

|———|———|———|———|———|———|———|———|———|———|

0 % 50 % 100 %

Helt umotivert Moderat motivert Topp motivert

Her er en rekke ord og uttrykk som beskriver ulike følelser. Les hvert ord/uttrykk, og angi i hvilken grad du er enig eller uenig i hvordan de beskriver hvordan du <u>vanligvis</u> føler deg.
(Sett ring rundt ett tall på hver linje)

	Svært uenig	Litt uenig	Verken enig eller uenig	Litt enig	Helt enig
1. Lett til sinns	0	1	2	3	4
2. Rolig	0	1	2	3	4
3. Energisk	0	1	2	3	4
4. Trøtt	0	1	2	3	4
5. Tilfreds	0	1	2	3	4
6. Elendig	0	1	2	3	4
7. Utslitt	0	1	2	3	4
8. Avslappet	0	1	2	3	4
9. Utmattet	0	1	2	3	4
10. Motløs	0	1	2	3	4
11. Entusiastisk	0	1	2	3	4
12. Dårlig	0	1	2	3	4

Appendix 6. Correlation matrix

Nonparametric Correlations - Spearman's rho

	INT DELTA	PMC	LTEQ T0	MSWT T0	FQ T0	PA T0	NA T0	TRQ To	FTG T0	RPE TEST1	MASTERY	PA DELTA	NA DELTA	TRQ DELTA
INT DELTA	-													
PMC	0,020	-												
LTEQ T0	-,415**	-0,163	-											
MSWT T0	-0,126	0,180	0,083	-										
FQ T0	0,075	-0,018	-0,098	0,159	-									
PA T0	-0,079	0,054	,328*	-0,027	,381**	-								
NA T0	-0,253	,378*	-0,061	0,000	,311*	-,464**								
TRQ T0	-0,091	-0,240	0,153	-0,044	,455**	,492**	-,445**							
FTG T0	-0,245	0,098	0,122	0,066	,530**	-0,290	,668**	-0,249	-					
RPE TEST (1)	0,077	-0,123	-0,246	0,149	-0,001	0,077	-0,235	0,083	-0,121	-				
MASTERY	-0,032	.364*	-0,018	0,191	0,164	-0,233	,302*	0,217	0,222	-0,182	-			
PA DELTA	0,102	0,054	0,000	0,295	0,125	0,088	0,078	-0,086	0,024	-0,084	-0,092	-		
NA DELTA	0,021	0,064	0,046	0,023	0,156	0,118	-0,052	-0,084	0,161	0,096	-0,054	-0,071	-	
TRQ DELTA	-0,227	-0,001	-0,064	0,321	0,271	-0,268	,348*	-0,229	,311*	-0,177	0,002	,317*	-0,068	-
FTG DELTA	-0,004	0,134	0,216	-0,025	0,097	0,076	-0,070	-0,172	-0,243	0,106	-0,017	-0,046	,438**	-0,146

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

Appendix 7. Literature search strategy

To prepare the literature review I mainly searched Oria and Google Sholar, getting access to articles from the library of Hedmark University College. I used the following keywords in different combinations: Exercise; Physical activity; Physiological testing; Cardiopulmonary testing; Affective responses; Intention (to exercise); Cancer; Fatigue; Rehabilitation; Motivation. I also found some sources by reading the reference list in relevant articles, that lead to other interesting articles.

In addition, I read books, articles, tests and questionnaires recommended in different modules of the program Master in public health, with an emphasis on lifestyle in Hedmark University College, especially focusing on the module Specific methods and project description. I also read articles and books recommended by supervisor and by the research team in the LHL- clinics.