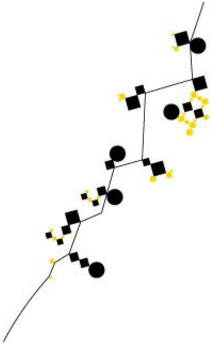
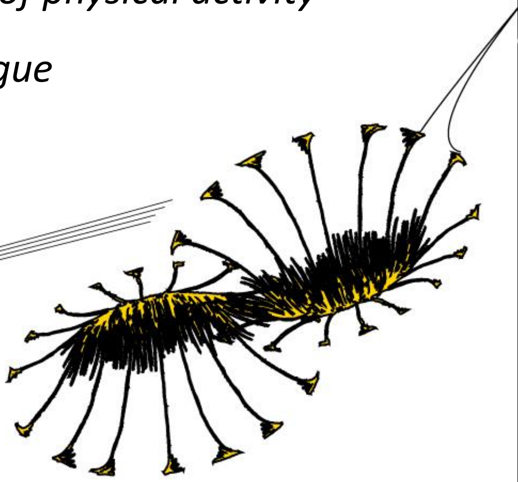


Improving Cancer Patients' Quality of Life

A qualitative study on the chances and barriers of physical activity

to alleviate cancer patients' fatigue



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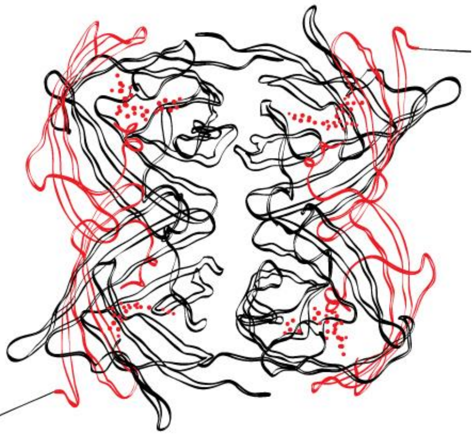

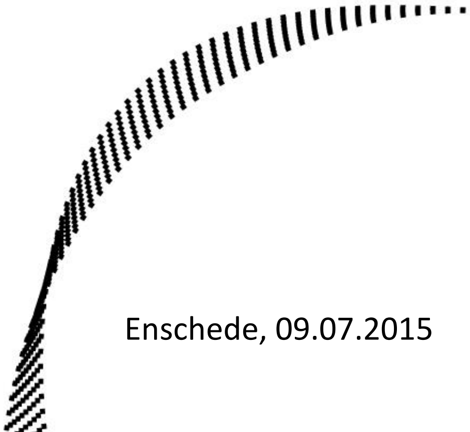

UNIVERSITY OF TWENTE.

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Samenvatting

Achtergrond: De behandeling van kanker is vaak verbonden met bijwerkingen, zoals kanker gerelateerde vermoeidheid (KGV) die door lichamelijke activiteit (LA) zou kunnen worden afgezwakt. De kansen en barrières van LA voor kankerpatiënten om KGV te verzwakken en daarmee hun kwaliteit van leven te verbeteren, zijn in deze studie onderzocht. De Theorie van Gepland Gedrag is ingezet om de interne factoren die de LA van kankerpatiënten beperkt of juist bevordert in kaart te brengen. Ook de effect van externe factoren die een impact hebben op de LA van de algemene populatie zijn in dit onderzoek onderzocht.

Methode: Op basis van een literatuur studie is het interview schema top down ontwikkeld. De semi-gestructureerden interviews bevatten 13 vrouwen en een man met kanker, met een gemiddelde leeftijd van 57 jaar. De respondenten hadden borstkanker (n=12), slokdarmkanker (n=1) en eierstokkanker (n=1) als hoofddiagnose. De interviews bevatten vragen over psychologische-, fysiologische en omgevingsfactoren, en over sociale steun. Bovendien werd de EORTC-13 afgenomen, om te onderzoeken in hoeverre de patiënten last hadden van KGV. De interviews werden opgenomen, woordelijk getranscribeerd, op basis van relevante citaten bottom up ingedeeld in subcategorieën en vervolgens geanalyseerd.

Resultaten: Psychologische factoren werkten zowel als kansen (attitude) als barrières (gebrek aan zelfvertrouwen bij LA, angst voor nadelige invloed van LA en negatief lichaamsbeeld). Fysiologische factoren (16 verschillende bijwerkingen) bleken uitsluitend als barrière te werken ten aanzien van LA, en omgevingsfactoren zowel als kansen (aantrekkelijke omgeving, empathische trainers, klein aantal groepsleden en individueel advies in sportscholen) als barrières (openingstijden van faciliteiten, onveilige voetpaden, koud weer, hoge lidmaatschapsbijdragen en slechte ervaringen in sportscholen). Sociale steun (groepssport) bleek een kans (motivatie), maar ook (n=1) een mogelijke barrière (te weinig uitdagend) te kunnen zijn. Ondanks alle gerapporteerde barrières waren bijna alle respondenten (n=13) regelmatig lichamelijk actief, en de resultaten op de EORTC-13 konden niet aantonen dat een hoge niveau van vermoeidheid gerelateerd was aan verminderd LA.

Conclusie: De waargenomen kansen bleken de LA van de respondenten beter te voorspellen dan de barrières, en de meeste barrières bleken bovendien onveranderbaar te zijn. Een vervolgonderzoek en gezondheidsbevorderende programma’s zouden zich daarom meer moeten richten op de kansen van LA. Bovendien is er op basis van de resultaten van dit onderzoek een nieuw model ontwikkeld om zowel de interne als de externe factoren op LA van kankerpatiënten te kunnen verklaren.

Abstract

Background: Treatment of cancer is often interconnected with side effects like cancer related fatigue (CRF), which could be attenuated by physical activity (PA). Therefore, this study aimed to investigate the chances and barriers for cancer patients toward PA, to decrease CRF and thereby improve their quality of life. It was based on Theory of Planned Behaviour, which seemed to include appropriate factors to predict PA in cancer patients and external factors that seemed to affect peoples' PA in general.

Method: The interview scheme was developed top down, based on the results of a review of scientific literature. The semi-structured interviews included 13 women and one man with cancer, with a mean age of 57 years. The respondents had breast cancer (n=12), oesophagus cancer (n=1) and ovarian cancer (n=1) as their main diagnosis. The interviews contained questions about psychological-, physiological- and environmental factors as well as about social support, associated with PA. Furthermore the EORTC-13, a questionnaire measuring various levels of CRF, was used to examine to what extent cancer patients suffer from different kinds of fatigue. The interviews were recorded, transcribed verbatim and analysed later on. Then, the quotes were classified in subcategories, based on relevant expressions of the respondents (bottom up).

Results: Psychological factors worked as a chance (attitude), as well as a barrier (lack of self-confidence in performing PA, fear of detrimental exercises and a negative body image). Physiological factors (16 different side effects) only worked as a barrier and environmental factors worked as chances (attractive neighbourhood, empathic trainers, small numbers of group members and individual advises in sport centres) as well as barriers (opening times of facilities, unsafe footpaths, cold weather, high costs of memberships and dissatisfying earlier experiences in sport centres). Social support (in group exercises) worked as a chance (motivation) and as a barrier (under challenge) in one case. Unless all reported barriers, almost all respondents (n=13) performed PA frequently and the results of the EORTC-13 did not show that a higher level of fatigue was related to less PA.

Conclusion: Chances seemed to have more effect on the participants' PA than barriers and most barriers also seemed to be unchangeable. Therefore, future research and health promotion programs should focus on the chances toward PA, instead of its barriers. Furthermore, a new model has been developed to explain the internal and external factors, influencing PA of cancer patients.

ACKNOWLEDGEMENT

For the completion of the Master Psychology: Health Psychology at the University of Twente, I accomplished a research at the Evangelisches Krankenhaus Wesel, Germany about the chances and barriers for cancer patients toward physical activity, to decrease fatigue and thereby improve their quality of life.

Thanks to the internship in the hospital, where I was allowed to carry out the interviews and to get insight in the daily processes in psycho-oncology, and the research itself, I had the chance to learn a lot. Conducting the interviews, writing my thesis and analysing the data was a challenge and not always easy for me. In this time, I learned a lot about myself and my own attitude and handling with serious illness and death. In hindsight, I am very thankful that I was allowed to learn that much and to make this (personal) experience.

In this context, I would like to express my deepest appreciation to Dr. Christina Bode, who made it possible for me to work on a topic that was of great interest to me. My appreciation and my deepest gratitude for your help, support and encouragement. Despite your incredible knowledge and skills, you always gave me the feeling of being on a par with you, which made working with you a very special experience for me. Thank you so much for your guidance and support! In addition, special thanks to Nadine Köhle (MSc.), whose work pointed me (connected with my bachelor thesis) the way to Health Psychology in general and to the target group of cancer patients, in particular. For the implementation of this study, I was again allowed to work with her as a tutor. Nadine, thank you so much for your creative input, for your kind words and suggestions, and for being a source of motivation.

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I am also very grateful to my friend Kaoutar, who has not only proofread this thesis, but also supported me during my study. Kaoutar, your hints and comments made my thesis much more worthy and words are not enough to thank you.

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Table of content

1. Introduction

In 2010 there have been more than 1.5 million people in Germany living with cancer (prevalence of diagnoses within the last 5 years), and every year there are about 500.000 new cases of cancer in Germany (Robert Koch Institut, 2013). Thanks to new treatment methods the mortality decreases, and more than 50% of all cancer patients can be healed. However, those new treatment methods are interconnected with long times of treatment, including a high risk on side effects that can have a negative influence on patient's quality of life (OOL) (National Cancer Institute, 2008). There is evidence that side effects like chronic fatigue can be attenuated by physical activity (PA). Therefore this study aims to investigate the chances and barriers for cancer patients toward PA to decrease fatigue and thereby improve their QOL.

1.1 Treatment methods for cancer

Nowadays, there are numerous kinds of treatment available for cancer patients, and the goal of the treatment differs just like the treatment itself. It can be to ''cure'' cancer, to prolong survival in patients with advanced disease, and to improve patients' QOL. Either way, it is important to preserve the highest possible QOL in both the long and short term, which is also a possible goal of the treatment (Siegel et al., 2012). The most common methods of treatment for cancer are surgery, chemo therapy and radiation therapy.

Surgery often leads to wounds, lymphedema and scar tissue (Kwan et al., 2002), decreasing the patients' ability to perform PA (Courneya et al., 2008). Chemotherapy circulates in the bloodstream and for this reason, damage to healthy cells is unavoidable, causing side effects such as pain, nausea, vomiting, hair loss, weight changes, fatigue and anxiety (Bower et al., 2000; Longman, Braden & Mishel, 1999). Furthermore, about half of all cancer patients receive some kind of radiation therapy during the period of treatment (Siegel et al., 2012). The goal of this kind of treatment is to damage cancer cells, with as little harm as possible to normal cells. However, it can lead to a number of side effects like diarrhoea, fatigue, skin reactions and sleep problems (Kim, Roscoe & Morrow, 2002).

Many survivors feel unprepared for the lingering side effects of the treatment. Adjuvant chemotherapy treatment, whether given before or after surgery, often lasts more than 6 months and radiation therapy, which is usually deferred until completion of adjuvant chemotherapy, further extends treatment time (Ganz et al., 2004). Even the ending of radiotherapy and chemotherapy means a stressful life event for 48%, and 27% respectively as this means less frequent visits to the oncologist, resulting in feelings of lost safety because of fear of recurrence which deteriorate patients’ QOL (Green et al., 1998).

1.2 Quality of life in patients with cancer

Over the past decennia, much clinical effort has been expended in the treatment of cancer, aiming improvement of the survival rate (Montazeri, 2008). A growing number of cancer patients become long-term survivors leading to physical health consequences, such as a variety of late side effects and a wide range of psychosocial problems and needs. Cancer treatment is a long lasting process, influencing patients even years after the diagnosis (Ganz et al., 2004) and professionals are increasingly recognizing that measures of diseases alone are insufficient determinants of health status (Skevington, Lotfy & O'Connell, 2004). For this reason, more than just medical attention is needed (Patterson, Pearce & Slawitschka, 2011).

Consequently, prevention and management of obstacles, affecting patients’ QOL after treatment are important. Therefore, QOL has become increasingly important in clinical oncology (Detmar, Aaronson, Wever, Muller & Schornagel, 2000). According to the World Health Organisation, QOL refers to “[…] an individual’s perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns” (WHOQOL Group, 1994). However, it is so personal that it can only be described by the individual itself (Felce & Perry, 1995). There are numerous studies showing that it is important to improve chronic patient’s QOL (e.g. Montazeri, 2008; Montazeri, et al., 2001; Calman, 1984) and Coates et al. (2000) found that QOL even has a predictive value on the survival rate in breast cancer patients.

Cancer patients’ QOL is often related to side effects of the disease and its treatment. Side effects, affecting patient’s QOL vary depending on individual circumstances, the kind of cancer and its treatment. The most commonly reported side-effect is fatigue, occurring in 70% to 90% of cancer patients and in 80% to 100% of those receiving chemotherapy (Jacobsen et al., 1999; Atkinson et al., 2000; Mock et al., 2000; Maughan et al., 2002; de Jong et al., 2004).

1.3 Cancer Related Fatigue (CRF)

Definition of CRF

The European Association of Palliative Care (EAPC) defined fatigue as “[…] a subjective feeling of tiredness, weakness or lack of energy” (Radbruch et al., 2008). For most individuals, tiredness is a protective response to physical and psychological stress which is easily alleviated by sleep and rest (Prue et al., 2006). However, the majority of patients receiving anti-cancer therapy are unable to cure their tiredness by rest. Patients experience fatigue that is chronically and dissimilar from that, experienced by the general population (Romanelli, Bozzone, Magrone, Pascoli & Sterzi, 2003). Cancer Related Fatigue (CRF) is experienced as a multidimensional phenomenon, affecting physical, cognitive, affective and behavioural domains (Glaus, Crow & Hammond, 1996). It is not the result of an organic disease or ongoing exertion, rest does not remedy it and it results in significant reduction of occupational, educational, social and personal activities (Fukuda et al., 1994). Cancer patients experience significantly more fatigue before, during, and after the cancer treatment, compared with individuals without a history of cancer (Jacobsen, Donovan, Vadaparampil & Small, 2007; Prue et al., 2010). CRF can therefore not be compared with normal feelings of fatigue and should be treated separately.

Prevalence of CRF

In a qualitative research, 90% of the participating patients explained that they suffer from decreased physical performance and weakness (Glaus, Crow & Hammond, 1996). Moreover 90% of the patients described to be unusually tired, compared with the time before the diagnosis, and have an unusual need for rest (75%). Insomnia seems to affect between 30% and 50% of newly diagnosed cancer patients, and even persists for several years after treatment (Stone et al., 2000). About a quarter of cancer survivors still suffer from CRF, months or even years after completion of curative treatment, reducing patient's QOL (Servaes et al., 2003; Hjermstad et al., 2005; Bower et al., 2006; Prue et al., 2006; Servaes, Gielissen, Verhagen & Bleijenberg, 2007). Studies on disease-free cancer survivors show that more than 50% continue to suffer from fatigue even after the completion of treatment (Broeckel et al., 1998; Okuyama et al., 2000).

Consequences of CRF

CRF has an enormous impact on a patient's life with devastating social and economic consequences (Prue et al., 2006). It is described as the most distressing symptom associated with cancer, and patients report greater concern over this symptom than even pain or nausea and vomiting, which can usually be managed with medication (Vogelzang et al., 1997). CRF significantly impairs patients' QOL (Curt et al., 2000) and has strong impact on daily functioning, associating higher fatigue with lower daytime activity (Berger & Walker, 2001;

Berger & Farr, 1999). Besides this, it can reduce daily functioning and induce negative effects on QOL (Jacobsen & Stein, 1999; Dow KK, et al., 1996), self-care capabilities, and treatment adherence (Gramignano et al., 2006). Improving patients fatigue can therefore also increase patients' desire to continue treatment.

Causes of CRF

Identifying the aetiological factors, leading to fatigue seems to be complicated, as there are multiple causes which may have additive effects. Moreover, the causes may differ between individuals as well as according to the phase of the disease and its treatment (Ryan et al., 2007). CRF sometimes results from the disease itself, its therapies, and/or a broad range of physical and psychologic comorbidities (Curt et al., 2000). Some researchers have identified cancer- or treatment-related factors as risk factors for CRF (Woo et al., 1998; Mast, 1998; Bower et al., 2006; Casso, Buist & Taplin, 2004), whereas others did not find that relation (Okuyama et al., 2000; Burgess et al., 2005; Bower, Ganz & Desmond et al., 2000; Servaes, Verhagen & Bleijenberg, 2002; Bardwell, Natarajan & Dimsdale et al., 2006). There are numerous studies that have reported a close relationship between fatigue severity and psychological distress in cancer patients (Stone et al., 2000).

Treatment of CRF

CRF should not be treated by its roots as these differ from individual to individual and tailored treatment for all patients seems to be impossible as some factors, like the kind of treatment, are unchangeable and others are difficult to identify.

However, inactivity seems to play a major role in CRF, independent of the treatment method and other external factors. Insufficient physical activity (PA) can lead rapidly to muscular and cardio-respiratory de-conditioning. There is also a correlation found between inactivity and insomnia (Sprod et al., 2010, Janson et al., 2001), and insomnia and fatigue (Ancoli-Israel, Moore & Jones, 2001). Decreasing insomnia seems therefore to affect patients' fatigue in a positive way. Moreover, following a period of prolonged rest, activity levels that were previously well tolerated may be perceived as being excessively fatiguing (Stone et al., 2000).

In summary, it can be stated that PA seems to play a major role in the treatment of CRF.

1.4 Physical activity and fatigue

Relation between physical activity and fatigue

The relationship between treatment adherence of cancer patients and symptom management has been determined as a major research goal by the US National Institutes of Health (2002). There is evidence that physical activity (PA) interventions can improve QOL, cardiorespiratory fitness, physical functioning and fatigue in cancer patients and survivors (McNeely et al., 2006). Therefore, PA can be redemption from CRF as a side effect of cancer and its treatment. According to Ahlberg (2003), PA even offers the strongest evidence of value in alleviating CRF and should be recommended to patients as non-pharmacologic therapy (Mock & Olsen, 2003).

Benefits of physical activity on fatigue

The physiologic benefits of PA on fatigue include lowering of resting heart rate and blood pressure, more efficient energy use, muscle strengthening, and promotion of restful sleep (Dimeo, et al., 1997a). Moreover, there is evidence that there is a relation between restful sleep and fatigue and people with a restful sleep, are usually more alert and have a higher sense of well-being than those, suffering from insomnia.

Psychosocially, PA decreases stress hormone levels and increases the patient’s sense of well-being. It also imparts a feeling of control, provides an opportunity to commune with nature and replaces fatigue with a healthy response to the effects of treatment (Mock et al., 2001). For this reason, PA seems to be a promising strategy to alleviate fatigue during and after cancer treatment (Gielissen et al., 2012), and there is evidence that PA can decrease symptoms of fatigue in cancer patients (Cramp & Daniel, 2008). According to Gielissen et al. (2012), Cognitive Behavior Therapy (CBT), tailored to the needs of people who suffer from post-cancer fatigue and including PA, is highly effective in reducing severe fatigue. In particular breast cancer patients seem to benefit from PA regarding CRF (Schwartz et al., 2001; Kirshbaum, 2007). It increases self-esteem, physical fitness, body composition, and chemotherapy completion rate without causing significant adverse effects like lymphedema (Courneya et al., 2007). Moreover, frequently walking three to five hours per week at an average pace can reduce cancer patients’ risk of death (Holmes et al., 2005). Furthermore, PA can improve patients’ body image (Pinto, Clark, Maruyama & Feder, 2003), and thereby again increase their willingness to perform PA and increase QOL.

Many studies have targeted PA interventions for cancer patients (Dimeo, et al., 1997a, Segal et al., 2001). Findings of these studies indicate that PA interventions result in multiple benefits for cancer patients, including reduced fatigue (Mock et al., 1997; Schwartz et al., 2001) and decreased sleep disturbances (Mock et al., 1997). These studies also show that PA could improve patients' QOL.

Suitable kinds of physical activity for cancer patients

There are numerous kinds of PA suitable for cancer patients. Some are tailored to the special needs of this target group while others are offered to the general public and are also appropriate for cancer patients. One of these kinds of PA is aerobic exercise.

Aerobic exercise has been proposed as a suitable method for rehabilitation of cancer patients who suffer from ‘‘energy loss’’ (Pinto, Trunzo & Reiss, 2002). Exercise groups can improve the communal spirit, create friendships between group members, and improve the psychological well-being as well as the adherence to the exercise class. However, exercises in rehabilitation centres and supervised exercise groups require transportation and time scheduling which could lead to organisational barriers for patients.

Some studies have attempted to overcome those barriers by providing home based fitness programs. These have several advantages: they are less expensive than supervised programs, they reduce transportation and scheduling difficulties, and participants are not required to attend classes or maintain a health club membership to sustain PA (Pinto, et al., 2005). Courneya et al. (2003) found out that patients who followed group psychotherapy plus home exercise programs could decrease their fatigue significantly, compared to patients only visiting group psychotherapy. Thus, home exercise seems to be an effective alternative to supervised fitness lessons, hence, the presence of needed equipment and abilities is provided.

There is also evidence that patients undergoing adjuvant therapy, as well as those who have completed treatment, were able to maintain a regular exercise programme without experiencing major adverse effects or increased fatigue (Stevinson, Lawlor, & Fox, 2004). On the other hand, the decision to join a regular exercise class is not only based on peoples' physical capabilities but also on their emotional feelings. For this reason, some cancer patients prefer an exercise group with other cancer patients (Blaney et al., 2010), while others do not share this preference (Rogers et al., 2007).

According to Rogers et al., most cancer patients prefer exercise of low or moderate intensity (Rogers, Courneya, Shah, Dunnington, & Hopkins-Price, 2007).

Moreover, there is a lack of consensus on the optimal PA prescription for cancer patients, and general guidelines for this population are missing (McNeely et al., 2006), which leads to differences in recommendations of health professionals.

1.5 Chances and barriers toward physical activity in patients with cancer

Despite the benefits of PA for cancer survivors, as described above, PA participation rates are relatively low (Courneya, Vallance, Jones & Reiman, 2005). Several studies indicate that people with cancer reduce PA during and after treatment (Pinto, Trunzo & Reiss, 2002; Courneya & Friedenreich, 1998) and it was found that the US national recommendations for PA were not achieved by up to 70% of cancer patients (Blanchard, Courneya & Stein, 2008).

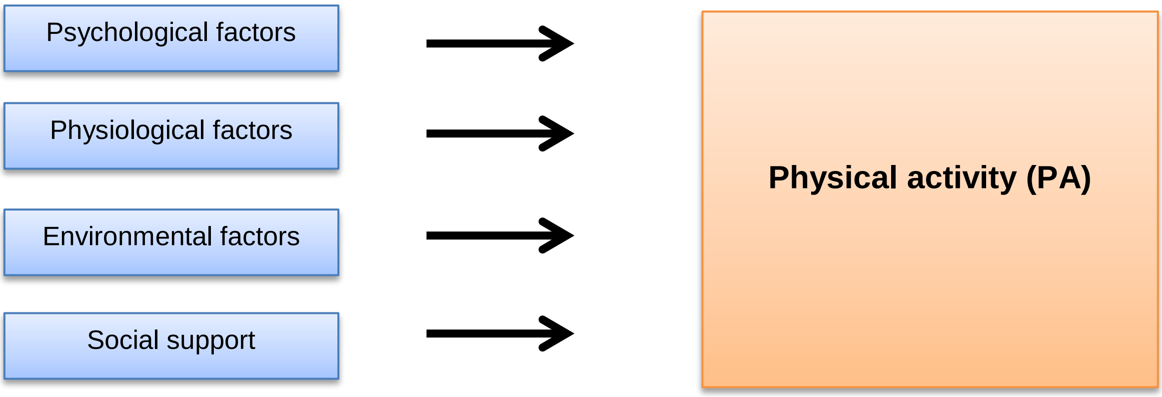
PA is not generally incorporated into cancer care or discussed with patients (Jones & Courneya, 2002; Stevinson & Fox, 2004), and historically, health professionals often even recommended their patients to rest and limit their daily activities (Dimeo et al., 1997b). Consequently, many CRF patients cope with their disease by resting or avoiding PA (Vercoulen et al., 1998). On the one hand, some patients are physically unable to perform any kind of PA, because cancer and its treatment affect their physical condition too much. On the other hand, some patients could perform PA, but avoid it, fearing detrimental exercises or thinking that they should rest to get healed. This significant decline in PA is not recovered, even after treatment has been completed (Courneya & Friedenreich, 1999). Therefore, understanding the chances and barriers toward PA can be a first step to improve the situation of this target group.

Almost all major social cognitive behaviour models contain chances and barriers to behaviour change, including the Theory of Planned Behavior (TPB) (Ajzen, 1991), the Social Cognitive Theory (SCT) (Bandura, 1997), and the Health Belief Model (HBM) (Rosenstock, 1990). Previous studies have either applied or modified PA barrier scales developed for other populations (Nelson, 1991; Young–McCaughan & Sexton, 1991), or developed scales by asking cancer survivors to recall PA barriers in the distant past (Courneya & Friedenreich, 1999; Cooper, 1995; Leddy, 1997). However, the former approach may be problematic as it could include barriers that are not relevant for cancer survivors or exclude barriers that are in fact important to this target group. The latter approach may also be problematic, because it relies on recall strategies that can be influenced by errors in human memory and cognitive biases (Brawley, Culos-Reed, Angove & Hoffman-Goetz, 2002).

Moreover, most research seems to be limited to the barriers of PA, disregarding the chances and those were limited to the internal factors (psychological factors, side effects) influencing a patient's PA. According to Bronfenbrenners' social ecological model, internal as well as external factors, affect human development (Bronfenbrenner, 1992). This model can also be used to explain different levels of factors that affects peoples' decision making.

Based on results of researches about the PA adherence of the population in general and results of studies about cancer patients in particular, the following heuristic model has been developed, including internal factors as psychological and physiological factors as environmental factors and social support:

Model I: Heuristic model of factors, influencing physical activity



Model I shows four different domains that may influence PA of cancer patients: psychological factors, physiological factors, environmental factors and social support. These factors will be described below. The aim of this study is to identify the chances and barriers that have an influence on the PA of cancer patients, and could improve patients' QOL by counteracting fatigue. Therefore, the patients' perception on chances and barriers are taken into account. The research question is therefore:

What are the chances and barriers to physical activity as a treatment method for the improvement of quality of life of cancer patients in Wesel (Germany) by reducing their fatigue?

Psychological factors

In cognitive behaviour models, it has been hypothesized that pervasive avoidance of PA decreases the tolerance for physical exertion, and as such can perpetuate the CRF-related symptoms (Goedendorp et al., 2012). The Theory of Planned Behaviour (TPB) seems to be an appropriate method to identify determinants that predict the performance of PA (Courneya & Friedenreich, 1999; Karvinen et al., 2007). TPB is based on the idea that there are three kinds of consideration, namely attitude, subjective norm and perceived behavioural control, guiding human behaviour (Ajzen, 2011).

Somebodies' attitude toward PA with cancer can be described as his behavioural beliefs about the perceived advantages and disadvantages of performing PA. As the attitude could be related to anxiety of side effects through the performance of PA, it could be a barrier for the target group. However, Blaney et al. (2010) found that the perceived benefits of PA also act as facilitators. Patients expect PA as counteracting fatigue, decreasing weight (after a weight gain) and regaining a sense of achievement and normality. The attitude toward PA with cancer could also be affected negatively by a negative body image as this is related to avoidance of PA in women (Vartanian & Shaprow, 2008). However, there is evidence that PA improves individual's body image (Hausenblas & Fallon, 2006). Therefore, this could be seen as a vicious circle, though there are no studies known on the relation of cancer patients, their body image and PA in particular. There are also studies, showing that patients prefer exercise program that is conducted with other cancer patients, due to a lack of confidence and self-image issues (Blaney et al., 2010).

The subjective norm is determined by normative beliefs, whether or not specific individuals or groups, who are important to a person think that he/she should perform a particular behaviour. The subjective norm of cancer patients toward PA could be influenced by the perceived expectations of relatives, friends, health professionals and other patients.

Finally, the perceived behavioural control can be defined as the patient's focus on the opportunities and resources available to perform a particular behaviour. In this case, the patient's ideas about his/her physical and psychological capability to perform PA, could influence their intention to be physical active. The perceived benefits of PA seem to be also an important motivator to perform it (Blaney et al., 2010).

According to a review by Godin & Kok (1996), attitude, subjective norm and perceived behavioural control explained about 40% of the variance in intention to perform PA.

Environmental factors

Next to the psychological impact on the performance of PA, also the physical environment can play a role in that context. As mentioned, home exercise seems to become a popular kind of offer for cancer patients. Still, there are environmental factors that influence home exercise.

For instance, there is a significant relation found between home equipment and PA (Sallis, Johnson, Calfas, Caparosa & Nichols, 1997). Therefore, missing equipment, could be a relevant explanation for insufficient in-home PA of cancer patients, and should be taken into account by researchers which study patient's behaviour toward PA.

For supervised PA in sport centres, the availability of facilities offering opportunities (Ståhl et al., 2001), people's awareness of it (Leslie et al., 1999), and their satisfaction with the offered facilities (MacDougall, Cooke, Owen, Willson & Bauman, 1997) seem to be significant related with people's PA. Professional supervision in PA programs can improve the perceived behavioural control by decreasing the fear of detrimental exercises (Blaney et al., 2010). Cancer patients prefer supervised, tailored group exercises with a trained health care professional as leader (Blaney et al., 2010). They like to avail themselves of the professionals' knowledge, guidance, feedback, and in particular their motivational support (Blaney et al., 2010). The guidance of a professional trainer offers assurance that patients do not perform detrimental exercises and it should be offered within a hospital setting (Blaney et al., 2010). Furthermore, most patients prefer groups with other cancer patients as group members as it is expected that they have undergone the same path since diagnosis and treatment, and have a similar fitness level (Blaney et al., 2010). Though, the costs of a membership in a sport centre and a perceived lack of available specialized PA services seem to be a barrier toward PA. Cancer patients often suffer not only directly from the disease itself and its side-effects but also from the impact of it on their financial situation through long-term sick leave or retirement (Blaney et al., 2010). Benetton et al. (2009) found that 40% of all cancer survivors reduced their working hours or quit working as a result of the disease itself, its side-effects or the treatment. By this means, the financial aspect becomes even more influential on their decision whether to perform PA or not, than for the general population.

For outside activity, the attractiveness of the local area (Ball, Bauman, Leslie & Owen, 2001) seems to be significant related with the performance of PA. Neighbourhood friendliness (Ball, Bauman, Leslie & Owen, 2001), and its safety (Centers for Disease Control and Prevention, 1999) can promote physical outdoor activity, just like an enjoyable scenery (Wilcox, Castro, King, Housemann, & Brownson, 2000; King et al., 2000) and the safety of footpaths in people's neighbourhood (Booth, Owen, Bauman, Clavisi & Leslie, 2000).

Physiological factors

Cancer patients often suffer from side effects of the disease itself and its treatment. These side effects should therefore be taken into account to explain patients' behaviour concerning PA. Research of Courneya et al. (2008) showed that "feeling sick" (40%) and "fatigue" (33%) had been the biggest barriers for cancer patients, receiving chemotherapy. Moreover, “nausea/vomiting” (18%), “flu/cold” (17%), “infection” (8%), and “pain” (9%) worked as barriers toward PA (Courneya et al., 2008). Medical complications, dizzy, diarrhoea, low blood counts and tachycardia - typical side effects of chemotherapy – have also been reported to be cancer-related barriers to perform PA.

Also organizational problems seemed to be a big barrier for cancer patients. These problems can be related as well to cancer and its treatment as independent of it. Organizational problems related to the disease were days of chemotherapy treatment (21%) and hospitalization (13%). An inserted line or an appointment with the doctor made the PA difficult or even impossible for patients, and was therefore perceived as a barrier by them. Not directly related to cancer have been organizational difficulties like a closed sport centre (21%), vacation (22%), absence of the town (19%) and lack of time (11%). Furthermore, an ill family member, work issues, transportation problems, lack of childcare, visitors and miscommunication worked as barriers toward PA in cancer patients.

Patients that have been physical active before the diagnosis could have a higher chance to become physical active when they have cancer as they want to get back to their old fitness level (Blaney et al., 2010). These physical impacts on the perceived capability to perform PA should be estimated in the research on patient’s barriers and chances to counteract CRF.

Social support

Support from family members, friends and trainers are in general the strongest long-term predictors for PA adherence (Oka, King & Young, 1994). There is also evidence that there is a relation between PA in general, and spouse support, family-, peer- and social influence through staff and exercise partners (Dishman, Sallis & Orenstein, 1985). Also group support plays a major role in group exercises as it is seen as a facilitator of PA and generates friendship, solidarity and feelings of belonging (Blaney et al., 2010).

In TPB, it is hypothesized that there are three domains influencing the behaviour of individuals, namely attitude, subjective norm and perceived behavioural control. Social support can lead to a change in all three domains. The patients’ attitude toward PA can be influenced by conversations and opinions of other individuals who are important to the patient. The subjective norm can be affected by the regular behaviour of relatives, close friends and also by the behaviour of other patients. If this social environment, expect the patient to perform PA, the chance that the patient follows this social norm increases. Supervised group-based PA programs could therefore provide an opportunity to improve the subjective norm of cancer patients toward PA (Blaney et al., 2010). Also the perceived behavioural control can be influenced by the social environment. Families and friends of cancer patients often advise the patients to rest (Blaney et al., 2010) and there also seems to be a lack of guidelines for patients with CRF, leading to a feeling of uncertainty in professionals (Blaney et al., 2010). If spouses, other patients, or even PA supervisors expects the patient to be less able to perform PA than he is, the patient's PA performance could decrease. Moreover, the patient could become apprehensive to perform PA and avoid it as a result. The influence of social support therefore should not be underrated in examining patient's perceived chances and barriers to PA.

Most research about the avoidance of PA in cancer patients is done about psychological and physical determinants that influence patients' behaviour. However, next to the internal determinants there are also some external factors, like the physical environment and social support that work as chances or barriers, and make patients less or more likely to perform the recommended PA. These can improve or subvert the intention toward PA, and may thereby also have influence on patient's QOL.

This review of scientific literature leads to a number of chances and barriers that influence the PA of cancer patients. The expected outcomes of this study are summarized in table I.

Table I Summary of the expected outcomes of this study

	Chances	**Barriers**
Psychological factors	- Perceived benefits of PA	- Lack of confidence - Negative body image - Fear of detrimental exercises
Physiological factors		- Side effects
Environmental factors	- Attractiveness of the local neighbourhood (outdoor activity) - Offers of hospitals for guided PA - Support of supervisor decreases fears	- Missing equipment (home exercises) - Existence, awareness & satisfaction with facilities (sport centre) - Costs of membership (sport centre) -Unsafety & unsafe footspaths in the local neighbourhood (outdoor activity) - Organizational problems
Social Support	- Motivational support of group exercises (peers & staff) - Social support of family & friends - Friendship with exercise partners - Group support	- Partner & family advise the patient to rest - Lack of guidelines leads to uncertainty of professionals and patients - Underestimation of the patients' skills

2. Method

In this chapter the method used to address the research question will be explained. First the approach of this study will be described (2.1). Then the demographic data of the respondents (2.2), the procedure of the selection (2.3) and the interview schedule used in this research (2.4) will be presented. Finally, the data analysis will be described (2.5).

2.1 Study approach

In this study, a qualitative research design with semi-structured interviews was chosen to analyse the research question. The open character of qualitative research methods makes these interviews particularly useful when describing a phenomenon from the individual perspective. Within qualitative research, semi-structured interviews should be used to increase the validity of results within qualitative research (Brod, Tesler & Christensen, 2009). This study aims to describe the chances and barriers of patients from the native's perspective. Therefore, a qualitative research approach is well suited. In contrast to quantitative research methods, it allows the respondents to propose own perceptions and ideas about the topic. This can increase the researcher's perspective on the subject and thereby improve the value of the study. Moreover, a natural conversation with the respondent is supported which offers more space to respond to questions.

Before the qualitative interviews took place, the EORTC QLQ-FA13, was used to get insight in the actual fatigue-state of the respondents. The EORTC QLQ-FA 13 is a CRF-questionnaire, measuring physical, emotional and cognitive fatigue in cancer patients as well as its interference with daily life and social sequelae (Weis et al., 2013). The scale varies from 0 (no fatigue) to 100 (high level of fatigue) and indicates to what extend cancer patients suffer from different kinds of fatigue. The fatigue questionnaire needs only 5-10 minutes to be filled in, and it is internationally used in research (Heim & Weis, 2014). It has a very good linguistic intelligibility and is validated in German language for clinical trials (Heim & Weis, 2014).

2.2 Participants

Table II present the demographic data of the respondents. For this research, 14 German respondents have been interviewed, 13 women and one man. The age of the respondents varied from 37 to 79. The mean age of the population is 57. Twelve respondents got breast cancer as their main diagnosis, while three of them also had another kind of cancer. One respondent had oesophagus cancer and another one had ovarian cancer. Regards the educational level and the employment, it was a heterogeneous group of respondents.

Tabel II: Demografic data of the respondents

No	Age	Gender	Marital status*	Children**	Disease	Moment of last diagnosis***	Treatment	Education ****	Employment *****
1	74	Female	5	3	Breast-, stomach-, liver- and lung cancer	1	Anti-hormone therapy	2	5
2	54	Female	3	3	Brest cancer	3	Anti-hormone therapy	2	3
3	47	Female	3	2	Breast cancer	1	Chemotherpy	5	3
4	78	Male	5	3	Esophagus cancer	1	Chemotherapy	1	5
5	79	Female	5	3	Breast cancer	1	---	2	5
6	53	Female	3	3	Breast cancer	2	Chemotherapy, Radiation Therapy, Anti-hormone therapy	3	3
7	52	Female	2	3	Breast cancer	3	Radiation therapy; Anti-hormone therapy	3	4
8	52	Female	1	0	Breast cancer	2	Chemotherapy	2	3
9	45	Female	3	2	Breast cancer	4	Anti-hormone therapy	2	1
10	58	Female	3	3	Ovarian cancer	4	Chemotherapy; Radiation therapy	2	2
11	52	Female	3	1	Breast-, colon-, ovarian cancer, liver metastases	4	Chemotherapy	2	5
12	50	Female	3	2	Breast cancer	2	Chemotherapy; Anti-hormone therapy	3	2
13	73	Female	5	1	Breast-, lymphoma, liver cancer	4	Chemotherapy	2	5
14	37	Female	2	2	Breast cancer	3		3	3

* 1. Single; 2. Living together; 3. Married; 4. Divorced; 5. Widowed

** 1. No; 2. Yes, living home; 3. Yes, not living home

*** 1. Less than 3 months ago; 2. 3-6 months ago; 3. 6-12 months ago; 4. More than 1 year ago

**** 1. Hauptschulabschluss; 2. Realschulabschluss; 3. Abitur; 4. Universität; 5. Promotion

***** 1. Unemployed; 2. Employed, less than 20 hours/week; 3. Employed, more than 20 hours/week; 4. Unemployable; 5. In pension

2.3 Procedure

Participants were recruited in a hospital in Wesel, Germany. Participants were allowed to participate in this study, if they had cancer in any stage and if they received regular cancer treatment in the participating hospital (EVK Wesel), Germany. Cancer patients with another disease, leading to an inability to perform any kind of PA are excluded of this study. Furthermore, for ethical reasons, palliative cancer patients were excluded from this study. Cancer patients were asked verbally by Dr. Zilch-Purucker, psycho-oncologist at the "Evangelisches Krankenhaus Wesel (EVK)" and by N. Bauer (BSc) to participate in this study. Moreover, the patients were informed about the study by distribution of printed information material which was spread by nurses of the oncological unit of the hospital. Patients could enrol to participate in this study by phone call or sending an Email to make an appointment for the interview. The interviews took place in the hospital.

Before the meeting for the interview, the participants of this study got a leaflet, informing them about the aim of the study, explaining the course of the interview and the privacy protection. The respondents had the chance to ask questions about the leaflet and the study, before the interviews. Then they were asked for permission through an "informed consent" for both the participation in this study and the sound records with a digital recording device. The interviews were recorded to maintain the interviews concentrated and without constantly writing down. If desired, a debriefing about the results, conclusion and discussion of the study will take place at the end of the study.

2.4 Interview scheme

All interviews started with a short introduction about the aim of this study and its background. Then, the patients introduced themselves regarding their demographic data and the persona- and disease-related characteristics. After that, patients were asked about the perceived chances and barriers regarding PA in all four domains, namely psychological factors, physiological factors, physical environment and social support. These domains were designed by deduction of findings in scientific literature to relevant categories (top down). After the first interview, the content and quality of the interview scheme were analysed and it has been adapted regarding the questions about the subjective norm, and those about social support, as they seemed to be perceived similar to each other by the respondents. For this reason, these questions have been combined.

2.5 Analysis

For the development of the interview scheme, firstly main categories (topics) of the interviews were created, based on the results of a review of scientific literature about this topic (model I). Based on these categories, the interview questions were developed top down. After the first interviews (n=2) took place, the interview scheme was adapted, as the questions about the subjective norm and about social support were perceived as similar by the respondents. For this reason, these questions were combined. After the interviews took place, the audio recordings of the interviews were transcribed verbatim. To preserve the respondent's anonymity, the names of as well the participants as their relatives (if mentioned in the interview) were not stated in the transcripts. Furthermore, the audio recordings were deleted right after the transcription. The transcripts were processed in 14 files with "Atlas.ti", a qualitative data analysis program and therein classified in relevant fragments and labelled. Then, the chosen quotes were classified in subcategories, based on relevant expressions of the respondents (bottom up). The subcategories were developed by one coder with a consensus principle. In some cases, combining quotes within subcategories seemed to be difficult. If those were single quotes, fitting almost but not totally to an existing subcategory, the relevant subcategory was renamed with a more general title, if possible. Thereby, the subcategory became wider, allowing the inclusion of more quotes. In addition, some quotes seemed to include a similar topic, but there was no fitting subcategory, yet. In those cases a new subcategory was created and the fitting quotes were included. By means of the patients' relevant answers, the research question was finally answered.

3.0 Results

In this chapter the most important results will be summed up. First some general information about PA of the participants will be shown. Then, in accordance with the expected outcomes (table I), the results of the interviews will be given and they are divided into the four categories:

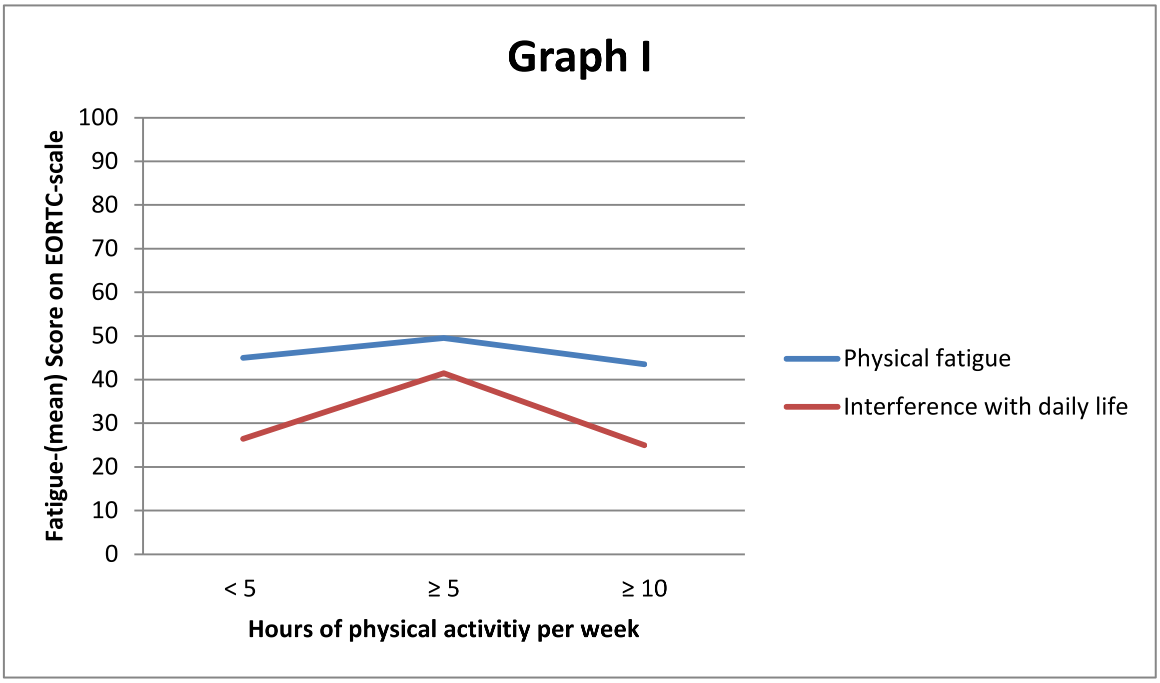
1) Psychological factors
2) Physical factors
3) Environmental factors
4) Social support

Each of these categories will be divided into chances and barriers.

3.1 Physical activity in people with cancer

Despite the serious impact of cancer and its related side effects, 13 out of 14 respondents reported to be frequently physical active. Physical fatigue did not seem to be a predictive factor for PA, as those patients who performed PA 5 hours per week or more had a higher mean score on physical fatigue than those who performed sport for less than 5 hours per week. The mean-scores on physical fatigue only differed minimal between those participants who performed less than 5 hours per week and those who worked out 10 hours or more. However, there seemed to be a relation between PA and the fatigues' interference with daily life. While participants who worked out less than 5 hours per week had a mean score of 26.4, those respondents who reported to work out more than 5 hours per week had a mean score of 41,5 and those who performed 10 hours of PA or more per week, had a mean score of 25. This describes a tendency as the results were not statistically calculated because of the small number of respondents.

Graph I: Relation of the respondents' physical activity and their fatigue scores on the EORTC-FA-13-scale



The in-depth interviews showed that the comparability of respondents' frequency of PA performance was limited, because the idea about the definition of PA varied. While respondent 2, understood PA as most of the other (younger) respondents as performing sport, other respondents (respondent no. 5, 12 and 13) included all kinds of PA such as walking, housekeeping and gardening in their sum of weekly PA *("[...] I always rode bicycle, gardened, did the household, yes.", Respondent 5)*. Respondent 12, stated to move about 50 hours per week. On more detailed demand, she reported that she moved a lot by keeping her house and garden clean, too.

On request what kind of PA was recommended by experts, respondent 5 even included "therapeutic touch" *(spiritual healing through laying-on of hands)*:

> *"Well, what I benefitted a lot of was "therapeutic touch". But unfortunately, it is not available anywhere else than here in hospital". (Respondent 5)*

> *„Yes, what kinds of sport I do. Well, maybe my hobby, painting also belongs to this category. When I had surgery on my hip, I was not able to walk and then, I painted." (Respondent 5)*

In general, the respondents had a positive attitude toward PA. Thirteen respondents reported that PA could be good for cancer patients:

> *"I would say you should definitely do that. It is important. Go for a blow and activity. And you should do it in a way that you do not get overexerted and that you do not feel any pain and then, I think it is good." (Respondent 1)*

3.2 Psychological factors

Psychological factors were divided into perceived benefit of PA, (lack of) self-confidence in performing sport, fear of detrimental exercises, negative body image and social norm. Chances as well as barriers were mentioned by the respondents in regard to the perceived benefit of PA and the (lack of) self-confidence in performing sport. Fear of detrimental exercises and a negative body image were associated only with barriers, while the social norm was only noticed as a chance.

Perceived benefit of PA

Three respondents mentioned that PA in general leads to a healthier body and so it should be healthy for cancer patients, too *("I think, physical activity is healthy, in general."; Respondent 2).* Moreover, the idea of getting healed by PA, directly or indirectly was represented by seven patients. While two respondents reported that PA could destroy cancer by increasing the oxygen level and leading to a hyperthermia, killing cancer cells *("I would say it is healthy. Because a doctor once told me, and this is true that cancer does not like oxygen and that oxygen is good of course, I am aware of it."; Respondent 13),* two other respondents also stated that they wanted to strengthen their body to prepare it for the handling of cancer such as illustrated in the following quote:

> *"And now, I do that again, just to build up my muscles and to become fit again. Because if you execute, your body is provided with oxygen and tumour cells do not like oxygen. And to get warm, once per day, it is a little hyperthermia and tumour cells no not like that heat. And for this reason, it is better than swallow tablets. […] In Öschebronn (an anthroposophic clinic), they say: "sport is as good as chemotherapy." (Respondent 10)*

> *"In the evening, we always walked about 3 to 4 kilometers. [...] Well, I really did not do more than that and then, because of the tumour, because I knew that I would need more surgeries, because the first one was not sufficient I wanted to make my nature and my body fit to survive the next surgery." (Respondent 12)*

Next to the physical benefits of PA, it was stated by six participants that PA could improve the psychological well-being by deflection and a good, satisfied feeling after the workout.

> *"Thinking of something else than cancer, being among people. And moreover, if you do something for yourself, you just get a good feeling. Solely for that good feeling, for this "Yes, I did it!", therefore I would always do it again." (Respondent 7)*
>
> *"Well, the only thing I looked forward to within the whole week was that Wednesday evening, and I always worked toward it. Today, you go once more to radiation therapy but tonight, you can go out dancing again." (Respondent 9)*

Besides the chances of perceived benefit of PA, there was also one respondent who did not see any need to perform sport, because of a lack of perceived benefits, as illustrated in the following citation:

> *"Well, I think sport is useless to me, if I get enough motion and so, I do not need any sport. Thus, I do not want to say sport kills you (German phrase), but most people who do sport, they exaggerate." (Respondent 1)*

(Lack of) Self-confidence in performing sport

On the one hand, six respondents had a high level of self-confidence in performing sport and reported that cancer patients should just do any kind of PA that they have done before. They stated that patients could pay attention to the signs of their body, because those would tell them if they need to stop PA.

> *"You should just do everything the way you have done it before [...]."(Respondent 11)*

> *"Yes, I feel able to do it. […] Well, I do not have to overdo it. I do not want to do a triathlon or so and I do not have to hurt my body. […] when it hurts, I stop [doing my exercises]. Of course, when I do some exercises for the abdomen or for the bottom and it hurts it is okay but if I note that it hurts in my arm or in my breast, I do it slower." (Respondent 2)*

On the other hand, some respondents (n=4) were uncertain what kind of PA they were able to do and this acted as a barrier toward the performance of PA as the following citation of respondent 6 illustrates:

> *"At the moment, I also cannot estimate what kind of exercises I am able to do and what not, if I go to a sports rehabilitation group. Of course, I would ask the trainer, but it is irritating me a little bit, because I have a part thrombosis. The thrombosis is directly on the port catheter, and for this reason I also have to inject myself, daily […]." (Respondent 8)*

Fear of detrimental exercises

The fear of detrimental exercises worked solely as a barrier toward PA in cancer patients. Thereby, not only the destructive characteristic of the PA itself played a role (mentioned by two respondents), but also the assumption that every kind of action could be harmful because you should rest to recover was mentioned by two respondents:

> *"I take more breaks, because I think that my body needs it to survive that strain." (Respondent 10)*

> *"I think sport in general is good. […] but if you have cancer, all these things are not so good because the body gets weaker and you just cannot do anything anymore and you should not do that to your body. […] You should rest, because your body is really, really weakened by these things." (Respondent 4)*

Negative body image

The absence of head hair as a result of chemotherapy led to a negative body image in five respondents. For this reason, patients did not want to leave their home without wearing a wig*:*

> *"I really have a strong personality: However, just with the wig, everybody says that you cannot see it at me. However, I feel uncertain about it. I also asked A. (a friend of the respondent who also has cancer): "Tell me, do you wear your wig when performing sport?", "No, a cap.", she answered. I am uncertain. Some people pretend it and say: "No, that is not true.", but I admit: "I am uncertain!"" (Respondent 8)*

> *"But it is also this hair loss, that is really, really extreme. I must say honestly, it is so humiliating. When you stay in front of the mirror, in the morning, you feel so small. And every drop of water, falling on your head, in the shower, hurts. And it is also so that I see every morning that I am sick. And that is not appreciated enough, because the physicians just say: "Well, these hairs will grow again."(Respondent 10)*

However, performing sport exercises with a wig on seemed to be almost impossible as illustrated by two respondents:

> *"I always wanted to wear a wig when I do sport. But this is very troublesome, because you start sweating under it very fast." (Respondent 7)*

> *"When performing sport, I just do not feel comfortable, wearing a wig because there is a little space between my head and the wig. Now, my hair starts growing again and therefore, the wig even gets more space to slip." (Respondent 6)*

Moreover, one respondent mentioned that her breast was deformed in a way that she could not find a suitable swimsuit to cover it when she goes swimming.

> *"Once, we have been on vacation and we went swimming. And then, the material of my swimsuit changed, because of its contact with water and also the inlay, and I asked myself if people could see that. When I go to the medical supply store, the employees always say: "Oh my god, it is almost impossible to find something for you.", because my whole chest has been hollowed out. There, my skin is just as welded with the bones. If I had an idea, I would devise swimsuits which are closed to the top of the body. Once, I also tried to wear a thin T-shirt under it, but that is also not such a good solution." (Respondent 13)*

The psychological factors affecting PA in cancer patients, namely a lack of self-confidence in performing sport, fear of detrimental exercises and a negative body image, worked as barriers. Patients had the idea that they could harm their body by performing sports. According to patients, these fears could be reduced in many cases by information of professionals. Most respondents mentioned that physicians themselves did not talk about the positive effects of sport for cancer patients, but they did till patients asked about it. Moreover, some side effects had psychological consequences for the participants. They explained to feel weak, and perceiving a lack of energy and power (sometimes as a result of insomnia), which resulted in less motivation and the ability to perform sport. Furthermore, they reported to have cognitive limitations, resulting from cancer and its treatment. However, almost all respondents had a positive attitude toward PA with cancer. The only participant with a negative attitude toward sport with cancer was the only male participant and the second oldest respondent of this study.

Psycho-Physiological factors

Some respondents (n=5) stated that they wanted to hide their disease from strangers because they did not want to scare them. That affected all patients who were bald-headed by avoidance of swimming and going outside without an appropriate cover of their head, and those patients who suffered from nosebleed.

> *"Yes, I bought such a swimming cap in a wig shop and, well probably I will be the only one wearing a swimming cap and I do not have any problem with it but presumably people will look weird at me but yes, you must try it. Hence, I do not know it, yet. […] I do not feel ashamed but I think that I could overstrain the others. I do not hurt them, but maybe I overstrain them. […] I only wear the wig for the others!" (Respondent 6)*

> *"No, I do not want that (Note: That people notice her sickness by seeing her bald head), and therefore I wear a wig when I perform sport. I do not want that strangers see me and know that I am ill. I want to be treated normally. I do not want any compassion. Compassion hurts if you are sick and therefore, I do not want that. I do not need any compassion." (Respondent 10)*

One respondent reported that her stressful children decreased her power, and thereby her ability to perform sport. Furthermore, patients' cogitating decreased their ability to relax significantly. This in turn was related to insomnia and a lack of power and energy. Moreover, the change in daily routine as a result of the treatment schedule, led to less power and motivation in one patient.

> *"Sometimes, I have to assert myself and I must say: "No, first of all you finish your homework!", and this is something that strains me. […] For example in the weekend, if we have to practice something for a test at school or so, that is straining me a lot, so that I am not in the constitution to become physical active. […] I am also very afraid that my older child gets a traumatized psyche at age of 11 years. Certainly, because he is more farsighted than me and he does not see the disease as uninhibited as the smaller child." (Respondent 3)*

Psychological side effects of cancer and its treatment

Three respondents reported that they had cognitive limitation, less memory performance and concentration disturbances *("[...] I have massive problems to concentrate on something and I have massive problems with memory performance").*

3.3 Physiological factors

Side effects of cancer and its treatment

All respondents reported to suffer from side effects of the disease and its treatment, making it more difficult to become physical active. No one said to have side effects that are connected to chances to become more active. Side effects can be divided in these affecting PA directly and those, working more indirectly.

Decreased mobility of body parts

A decreased mobility of body parts as a result from scars was reported by one respondent:

> *"It is still difficult with my arm. I am not able to stretch it the way I was able to stretch it before. I am just not that agile, what is also because of the scar under my arm." (Respondent 2)*

Pain/Joint problems

Pains in bones and joints, as back pain, knee pain, and pain in hands, wrists and toes, were mentioned by seven respondents to affect directly the patients' ability to become active as illustrated in the following citations:

> *"I have so many side effects, hence joint pain and so, and that of course has a high impact. [...]That means I cannot lay on my side, because my thighs hurt so much and the bones. At the moment, it is really intense. In the thumb joint, it is so bad that I am not able to open bottles."[...] I feel like it is getting worse, because now I even get this problem in my toes and especially when dancing. Last time it was acceptable, but the time before I had to stop because it hurt so much." (Respondent 9)*

Shortness of breath

Two respondents reported to feel a shortness of breath, resulting in a barrier to become physical active.

> *"Yes, that you are relatively fast short of breath. Well, due to the fact that you are not really loadable at the moment and that you are quite fast out of breath. Hence, you are not that powerful." (Respondent 3)*

> *"Well, in the last few months, I felt quite lousy. I constantly had back pain and had problems to breath. Therefore, I had to lie down in the afternoon, to gather strength. And this is the reason I went to the hospital, because I just had problems to breath and I thought that I had a lung infection or water in the lungs. But that was not the case." (She got the diagnosis lung cancer) (Respondent 1)*

Insomnia

Eleven respondents stated to suffer from sleeplessness *("[...] I just cannot sleep anymore.";*

Respondent 8). The reported reasons for insomnia were as well physical (related to side effects) as psychological (because of cogitating) as illustrated in the following citations:

> *"When I am at home and I do not want to take a sleeping pill, I sometimes stay awake till half past one in the night, lying in bed. I am not really asleep but also not really awake. That is due to the treatment, I think." (Respondent 4)*

> *"Sometimes, I cannot even turn around in bed, because I have so much pain. Because my bones hurt so much if I turn around. Hence, since last week, I even get awake because my body hurts so much when I am asleep that I am afraid to turn around, because everything is just so heavy." (Respondent 7)*

> *"Sometimes, when I am outside or when I have appointments with doctors or so, I notice that I have not slept, yet. But that ruminating about problems and so, in the night, it is substantially more." (Respondent 13)*

Irritated mucous membranes (nosebleed)

Two patients reported to have irritated mucous membranes, leading to a higher risk of nose bleeding. That led to a more uncomfortable feeling regarding supervised group exercises as illustrated in the following citation:

> *"Yes, I am afraid of it. Therefore, I always take about handkerchiefs as a precaution. If you make that experience, you become more careful, next time. Even with sport. Hence, if I blow my nose and there are a few spots of blood in it, that is not so terrible, but I have experienced twice that I thought I probably should call a doctor, because I thought that I could not stop it anymore. If something like that happens to me when I am performing sport somewhere, where the others think "Uh, blood!" or also "Contagious!", and these things you just avoid." (Respondent 8)*

Skin damage

Three patients had skin damage, resulting from radiotherapy. That became even worse when sweating, making it more difficult to perform PA. Moreover, even wearing a bra seemed to be insufferable, as it rubbed at the damaged skin.

> *"The skin was so damaged and then the sweat, the friction and the bra, hence I did almost do nothing, that time." (Respondent 14)*

Sweating fast

Some respondents reported to have a higher sweating tendency (n=3) and two of them perceived it in combination with hot flashes.

> *"I have noticeably more hot flashes. [...] At the beginning of this chemo therapy, I had massive hot flashes, so really massive hot flashes. [...] Well, I also still had menstruation and therefore, it was a big step and quite extreme, but my doctor told me that this is a good sign, showing that the medication is effective." (Respondent 6)*

Discomfort of port catheter

Two respondents reported that the port catheter was uncomfortable in performing PA. They explained that it felt like a foreign matter, pressing on the patients' chest, limiting their mobility as illustrated in the following citation:

> *"Well, I just got the port catheter implanted in September and it is a kind of a foreign matter, and sometimes it pinches a bit and that is uncomfortable, and well the surgical scar is not that impairing hence it is more the port catheter that is obstructive. [...]Hence, because it pinches, for example you cannot perform the exercises you did before. All these exercises I did for my back muscles for example and all the equipment training became impossible. [...] You are restricted in movements and you always feel that there is a foreign body in your chest." (Respondent 3)*

Fatigue

Five patients reported to suffer from fatigue, leading to less motivation and power to perform PA.

> *"Well, at the moment I am quite tired. That is inter alia because of the medicine that I get, currently. Constitutionally, I am very tired at the moment. Like today at the day of chemotherapy, fatigue is simply present. The other days, I am very tired in the afternoon. Hence, when I ate and tidied up, I lay down. Sometimes, I cannot manage to do that, and then I really miss it. Sometimes I even just fall asleep in the afternoon. Previously to the disease, that never happened to me. Therefore, I definitely would not perform sport exercises on Monday [Monday was the regular day of chemotherapy]." (Respondent 6)*

> *"The weekend after chemotherapy, I was always so done in that I felt asleep everywhere, it did not matter where I was. Even if I sat in the car or when I was in the bakery with my partner and my body just wanted to rest, I simply felt asleep." (Respondent 14)*

Tingle and cold feeling in feet and fingers

Three respondents reported to have tingle and cold fingers and feet. Therefore, it was hard to walk or perform other kinds of sport as illustrated in the following citations:

> *"Yes, I have sensory disturbances in my feet. As if they are totally cold and I have pins and needles in my feet." (Respondent 8)*

> *"It feels as if my hand gets electric shocks all the time. [...], I also had burning soles of the feet. For this reason, I am not able to walk." (Respondent 13)*

Lymphedema

There was one patient, suffering from lymphedema, leading to a swelling in the arm. On this account, the doctor recommended to rest.

> *„Well, at the moment, I have a thick arm. It is swollen because of an accumulation of water in it. And Therefore, I also demanded if I generally may do rehabilitation sports or not. The doctor told me that it would be better to take a break first." (Respondent 6)*

Increased frequency of Toileting

Some respondents (n=2) reported to have an increased frequency of toileting. The consequences were that one respondent had trouble to perform PA outside, because of a lack of public toilets in the local neighborhood. The other respondent explained that her main problem, resulting from an increased frequency of toileting, was insomnia. She had to stay up a couple of times in the night, to urinate, leading to sleeplessness and less restorative sleep as illustrated in the following citation:

> *"If you need to go to the toilet, for example defecation it is very difficult because you just do not have a toilet everywhere. I have a friend in Cologne and I know all the toilets of every hotel in Cologne. That is a consequence of these anti hormones and anti-bodies and the chemotherapies. And that is a problem. That is really shabby." (Respondent 1)*

> *"In times of chemotherapy, I slept very badly, because I had to stay up often. I had a lot of water retention in body and therefore, I had to take them away in the night." (Respondent 14)*

Inflammation of the treated body part

One respondent had an inflammation of the treated body part (breast), resulting from the treatment. Consequently, she was not able to do any kind of sport because she could not move her arm and could not lie on her side.

> *"Well, my breast was so severely inflamed and it was very swollen. And then, I did not even go to the yoga-class, because I could not lie on de side of my body and I also was not able to lift the arm properly." (Respondent 14)*

Nausea

Three patients reported to suffer from nausea, aggregating their performance on PA as illustrated in the following citation:

> *"I was at the hospital ward, because I suffered from vomiting for a couple of months. It was so severe that even the trainees said: "You must eat or drink something!". I was not even able to drink a glass of water. Therefore, I always wanted to stay overnight, because I live alone. And I came home, I smelt something, I was not able to eat anything and just these crazy habits that are actually only known at pregnant women and I was quite angry about that whole situation." (Respondent 13)*

Circulatory problems

There was one respondent reporting circulatory problems as a consequence of the disease and its treatment. Moreover, two patients mentioned that they had these problems as a consequence of decreased fitness.

> *"Well, walking was very important to boost the cardiovascular system, but some things were just much more difficult for me. Hence, I did it but slower, it made me getting faster out of breath, palpitation, I sweat faster." (Respondent 14)*

Diabetes

One respondent reported that she got diabetes, resulting from cancer treatment. Therefore, she had to take care for her medication when performing PA as illustrated in the following citation:

> *"I also have diabetes and the doctors say that it is presumably also a result of the whole chemotherapy and all these things. I have never had any problems with diabetes, before. And now, I always have to pay attention that I take that insulin for injections with me, for example. And that is annoying." (Respondent 13)*

To sum up the physiological factors affecting PA in cancer patients, the respondents mentioned 16 different side effects of the disease and its treatment that work as barriers in performing sport. Side effects as insomnia and fatigue were reported independently of the kind of cancer and its treatment. However, as the presence of a port catheter, loss of head hair and nausea are common side effects of chemotherapy, problems which are connected with it were reported only by those participants underlying this kind of treatment. Moreover, skin damage, as a common side effect of radiation therapy was only mentioned by those respondents who underwent that kind of treatment. Pain and joint problems were reported only by those respondents undergoing anti hormone therapy. Physical fatigue, measured using the EORTC-13 questionnaire, did not seem to be a predictive factor for PA of cancer patients. The highest mean score of physical fatigue was found in the patient group which performs sport for five hours and more per week. The patient group that performed sport for 10 hours and more per week scored minimal lower in mean score of physical fatigue, than the group of patients that performed sport less than five hours per week. However, the highest individual scores of physical fatigue could be found in patients performing five and more hours sport per week.

3.4 Environmental factors

The environmental factors, affecting PA of cancer patients can be divided in attractiveness of the local neighbourhood, expert recommendation, organizational strategies/problems, presence/absence of equipment, existence, awareness and satisfaction with facilities, costs of membership and unsafe feelings or footpaths in the local neighbourhood. Chances as well as barriers were mentioned regarding the attractiveness of the local neighbourhood, organizational strategies and problems, the existence, awareness and satisfaction with facilities and unsafe footpaths in de local neighbourhood. Expert recommendation and the presence of equipment were only connected to chances, whereas costs of membership and weather were only connected to barriers.

Expert recommendation

Explicate recommendations to become active, given by doctors and physiotherapists, were reported to be a chance regarding the performance of PA (n=5).

> *"The physicians encouraged me a lot to perform sport, because many cancer patients think if you get chemotherapy, you may not perform any kind of sport." (Respondent 6)*

> *"I went to the physiotherapist and he told me that I always have to do some specific stretching exercises. Normally, you would stop with it, because it hurts but he told me that you have to do it because the ligaments were shortened because of that relieving posture." (Respondent 14)*

3.4.1 Outdoor activity

Attractiveness of the local neighbourhood

A natural environment was generally associated with relaxation, tranquillity, fresh air and beautiful impressions of the nature (n=8). These worked as chances toward PA (outdoor).

> *"Outside, there is fresh air, a lot of oxygen, just enjoy nature, independently of the season." (Respondent 3)*
>
> *"When I go outside, I walk about half an hour or forty-five minutes to the Rhine to fish there. That makes it more attractive to me. I think hiking in the fresh air is just better. […] The tranquillity you get at the water. You throw the fishing-rod with the worm and then, you wait or even not. In fact, I always have two, three or four fishing-rods in water and I always walk from one to the other." (Respondent 4)*
>
> *"Well, you go for a blow, you get the sunlight if it is shining and there is also some energy in it, you perceive the environment much more intensive, if you do not talk too much with your friend. […] That natural experience is just wonderful." (Respondent 6)*

In line with those quotes, presence of nature worked as a chance, the absence of it had an opposite effect. Two respondents reported that they could not imagine performing sport in a more urban environment.

> *"Tranquillity and relaxation is important to me. Hence, that there is not a heavy traffic road and I also would not like to walk in the pedestrian road. Well, all these things should be appropriate." (Respondent 2)*

Unsafe footpaths in the local neighbourhood

The existence of unsafe footpaths in the local neighbourhood and unsafe feelings were associated with the chance of an extra hard sport exercise for one respondent (n=1) , because she ran harder that part of her way *("If I do not feel safe, I just run harder that part of the way."; Respondent 14).*

However, most respondents (n=5) reported that they avoided unsafe ways, working as a barrier toward outside activity. Reasons were that they would avoid these footpaths even if they were healthy, but also that they did not feel strong enough to feel secure in some areas, fearing faintness as illustrated in the following citation:

> *"Well, to be honest I do not feel brave enough to walk alone, because I am concerned I could get a dizzy spell and then, I lie somewhere in the forest and nobody finds me." (Respondent 3)*

Weather

Cold weather worked as a barrier to two respondents. Patients were afraid to perform outside activity, as they were afraid to become ill, because of their weakened immune system, resulting from cancer and its treatment.

> *"Well, now in this cold season I presumably would not perform sport outside, because the immune system shuts down. [...] I am afraid to get a cold." (Respondent 3)*

3.4.2 Home exercises

Presence/Absence of equipment

All respondents had equipment at home to perform PA. However, only two respondents used it frequently. The others mentioned that it was too boring and that their motivation to perform home exercises was too low. One respondent mentioned that it was a chance to have the equipment at home, because she did not need to go outside, increasing the chance to really do sport as illustrated in the following citation:

> *"And I do not have to get in the car and then, one's weaker self comes and says: "No, just stay at home." That is just the advantage of it." (Respondent 10)*

3.4.3 Supervised exercises in fitness centres

Organisational strategies/problems

One respondent stated that the doctor took into account that she needed time for PA. Therefore, the treatment schedule was customized, working as a chance in the performance of PA.

> *"I and also the doctor attached much importance to the organizational possibility to perform sport. She told me: "It does not matter if you are able to do it that day or not, but we give you that day off." (Respondent 7)*

The barriers were that the business hours for special exercise groups did not fit to the patients' needs and that people had a long way to facilities with special offers (n=3). Opening times of the fitness-centres in general were acceptable for all respondents, while special groups meeting the patients' needs were only offered in the morning. Therefore, a couple of patients (n=3) decided not to use this offer, because they could not stay in it when starting to work again, after a few months.

> *"I visited that special group but the opening times for these groups are tailored to the fact that patients are at home. But since I will not be unable to work all the time, I had to make a decision for something I can still do afterwards. Since, it is useless to enrol there and for example get 50 hours sports rehabilitation prescribed by the doctor because there, I would not be able to use all these 50 hours, but maybe only 20 hours and I would lose 30 hours that way." (Respondent 2)*

For the other respondent, an interaction of the early start time and a high distance between living place and fitness-centre led to rejection of the offer. A long way to satisfactory fitness-centres, which met the patients' needs, seemed to be a general problem. However, offers in the local neighbourhood did not meet one patients' wishes and needs, as illustrated in the following citations:

> *"I have seen the flyer of "Visalis". They offer it on Thursday morning at 8.30 o'clock and if I wanted to do that, I had to go out of the house at 7.30 o'clock. And this is too early." (Respondent 8)*

> *"There are not enough offers. I informed myself and the supply is not available. Of course, there are offers in other cities but the distance also plays a role. You have to get there, somehow. […]Here, in the rural area, it is more difficult. Of course, you can drive 20 kilometres or more but how long do you do that? Maybe you do it for these 50 times or for 6 months and then, it becomes too exhausting and that cannot be the purpose of it." (Respondent 2)*

Existence, awareness & satisfaction with facilities

A small number of group members, empathic trainer and the existence/awareness of facilities worked as chances toward PA (n=3), whereas earlier dissatisfying experiences with facilities and other members worked as barriers (n=2).

Respondents reported that a small number of group members, leading to more individual advises worked as chance toward PA. They perceived better support, advice and guidance related to smaller groups.

> *"Yes, I feel to be in good keeping, because if there are some exercises I cannot do, the trainer notices that or I tell him: "I will not do that exercise" and then, he shows me another kind of exercise, that I am able to perform" (Respondent 2)*

According to two respondents, the existence of empathic trainers worked as a chance toward PA *("[...] the trainer should be very empathic, because sometimes you do not feel fine, emotionally."; Respondent 6).* The existence and awareness of facilities worked as a chance to become active, for three respondents.

> *"I know that there is a special group for breast cancer patients and it is a good approach. […]Maybe, I can start in January because then, the most impacting chemotherapies will be completed. (Respondent 3)*

Moreover, three patients also reported that negative earlier experiences and dissatisfaction worked as barriers for them to become physical active.

> *"My experience is that these people who are employed at the rehabilitation centres do not have any idea of their job. They tell you how to use the*

> *equipment, and then they leave you and go to the next patient. And once, we were in a fitness centre with all the equipment and you were totally alone with it. My wife did not even know how to use these machines. Well, we discovered it but there was a lack of guidance. […] Because the stuff just do not have time for consultations. […] Someone is there and helps you for 15 minutes and then, you must wait for 2 hours or so, for the next one and so.” (Respondent 4)*

Moreover, not only experiences with the facility itself, but also with other members, seemed to work as a barrier as one respondent stated that she did not want to go to a particular fitness-centre because of earlier experiences with other members of it.

> *“To another rehabilitation centre, I did not want do go because I do not like its members, because of their ideas and behaviour. […] They think, they are someone very special.” (Respondent 2)*

Costs of membership

Costs of membership were associated only with barriers. Respondents (n=3) reported that they did not choose the exercise program they preferred, because it was too expensive.

> *“Well, I have seen something with electronic equipment. There, you have a chip and the machines automatically identify the way they must be adjusted for me. That is great. For example, it knows exactly how far I can spread my arms to prevent overstraining of my breast. There is one fitness centre that got these machines but it costs 45 EUR per month and only if you enrol for 2 years. And this is quite expensive, and of course you have to contemplate it.” (Respondent 14)*

In line with that, one respondent explained that her exercise program was paid by her insurance, while drinks were excluded of this offer. However, it was forbidden to take own drinks to the fitness-centre. The extra costs for drinks were too high for that respondent, resulting in the decision to do those exercises without drinking, as illustrated in the following citation:

> *“You can enrol for a subscription of drinks for 2,50 EUR per week and I do not really want to invest that additionally. […] I am not allowed to consume my own drinks there, besides in the changing room.” (Respondent 6)*

In sum, the environmental factors, which are divided in different kinds of PA, and their impact on performing PA. Firstly, for the outdoor activity, the presence of a natural environment in the local neighbourhood seemed to be very important for the respondents as all respondents lived in a rural area. However, this rural environment had influence on the presence of special offers in the local neighbourhood. As the opening times for special sport groups for cancer patients often did not meet the participants’ needs, patients had to go high distances to use facilitation of more urban areas, supplying more tailored offers for the target group. Unsafe footpaths led to avoidance of physical outdoor activity in some cases, while one participant reported that she ran harder that part of her way, improving her workout. As the interviews were done in winter, patients reported to be afraid to become ill because of a weakened immune system when performing outdoor activity in the cold.

Secondly, for PA at home the presence of equipment did not seem to have a predictive character for the execution of it. All respondents reported to have special equipment for home exercises. However, only two of them frequently used it, as PA at home seemed to be too boring for participants. Only one respondent explained that the presence of equipment increased her chances to perform sport as she did not have to go outside for PA.

Finally, the usage of supervised group exercises in fitness centres was affected by too high cost for memberships, and earlier dissatisfying experiences with facilities and members of it. However, the presence of empathic trainers, small numbers of group members and individual advises increased patients’ willingness to enrol there.

3.5 Social support

Statements about the connection between social support and PA of cancer patients were divided into 4 categories. The first three categories, namely motivational support of group exercises, social support of family and friends, and friendship with exercise partners were associated with chances as well with barriers toward PA. Insufficient knowledge and experience of trainers with the target group is the last category and was only perceived as a barrier.

Motivational support of group exercises

Some respondents reported that the presence of other group members motivated them to go to the fitness-centre and perform exercises *("It is a group dynamic [...]"; Respondent 4).* Moreover, respondents stated that the presence of others motivated them to execute harder and more effective.

> *"We had the option to stop exercises and sit down at the edge if we were not able to hold on the exercise, but no one wants to disgrace oneself and be the first one who gives up." (Respondent 14)*

However, different levels of fitness between group members were perceived as a barrier by one respondent (n=1) as she was not challenged and stimulated enough if the average group level was too low.

> *„I did not go to the tumour-group, as it was too undemanding for me, because I was just too fit for it." (Respondent 10)*

Social support of family & friends

The chances of social support can be divided into emotional support *("He (partner of the patient) encouraged me a lot to do sports rehabilitation"; (Respondent 6))* and practical support of family and friends.

> *"He (partner of the patient) put the home trainer on its place, connected it and showed me how to adjust the wattage of it and so. Hence, he would be happy if I do that, but he also says: "Go slowly and do not rush, and so" (Respondent 3)*

About half of the respondents had friends who recommended them to rest. However, in practice all respondents explained that their friends' recommendations did not have any influence on their behaviour.

> *"My friends always say: "Oh, you should not do that much!" and "But you have breast cancer!" and " Ah!" and "Oh!"." (Respondent 9)*

> *"Well, when I had that satisfied deep breath, I saw that concerned gaze (of the partner), telling me that I should not burden my body additionally. I*

> *think it was that fear that the chemotherapy could even work harder or exhaust me even more. During chemotherapy, my friends gave me the advice: "Do not exaggerate!" or "But then, relax!" (Respondent 13)*

Friendship with exercise partners

Friendship with exercise partners was perceived as a good chance to be not treated like a patient for a moment, by two respondents. Respondents enjoyed, to be perceived in a normal way and to talk about everything else, but the disease *("You want to be perceived in a normal way. And there, I could have some nice contacts, even with cancer patients."; Respondent 6).*

However, one patient reported that she did not like the lamentation of others in sports-rehabilitation groups that worked as a barrier for her.

> *"To be honest, what disturbs me is that lamentation. When I hear that: "Oh, we feel so bad and we have problems with hips, in the arms, in the legs." I cannot hear that anymore. I also do not want to hear it anymore." (Respondent 10)*

Uncertainty of professionals leads to underestimation of the patients' skills

One respondent told that trainers without special education and experience with cancer patients were less confident, and guided in a less challenging way, showing less hard exercises, leading to less efficiency of the workout. She assumed that regeneration could be improved and accelerated by employment of better trained trainers and special education for staff as illustrated in the following citation:

> *"I think if the trainer got special education, they also are less careful. Well, I recognized it in the rehabilitation. When we had an untrained trainer, you were directly treated more carefully than by those trainers who had special training. Well, I think if there was more trained staff, and you would work closer with them, you would recover more rapid because it contributes to the rehabilitation process." (Respondent 14)*

In summary, social support affected patients especially by motivation. Partners and friends supported the participants psychologically and practically by setting up the equipment and motivation to enrol in sport classes. Moreover, the respondents explained that friendship with exercise partners gave them the chance to be treated in a normal way, without telling anybody (but the trainer) about their disease. Most patients told that their friends recommended them to rest, underestimating the patients’ skills. However, all participants explained that this did not affect them in any way. They just did what they expected to be good and healthy for them. The presence of other group members in supervised exercise groups worked as a chance, as it motivated to go frequently to the lessons and to execute harder because of a competition between members. However, different levels of group-members worked as a barrier as it led to an under challenge in one case. Moreover, professionals in fitness-centres should be trained in working with cancer patients to allow an effective training.

4.0 Discussion

The purpose of this study was to examine the chances and barriers toward PA, experienced by cancer patients. To reply to the research question, firstly a short summary of the results of this study is presented. Subsequently, an interpretation of these results is given and the implications for further research are shown. In the end, the strengths and limitations of this study are presented.

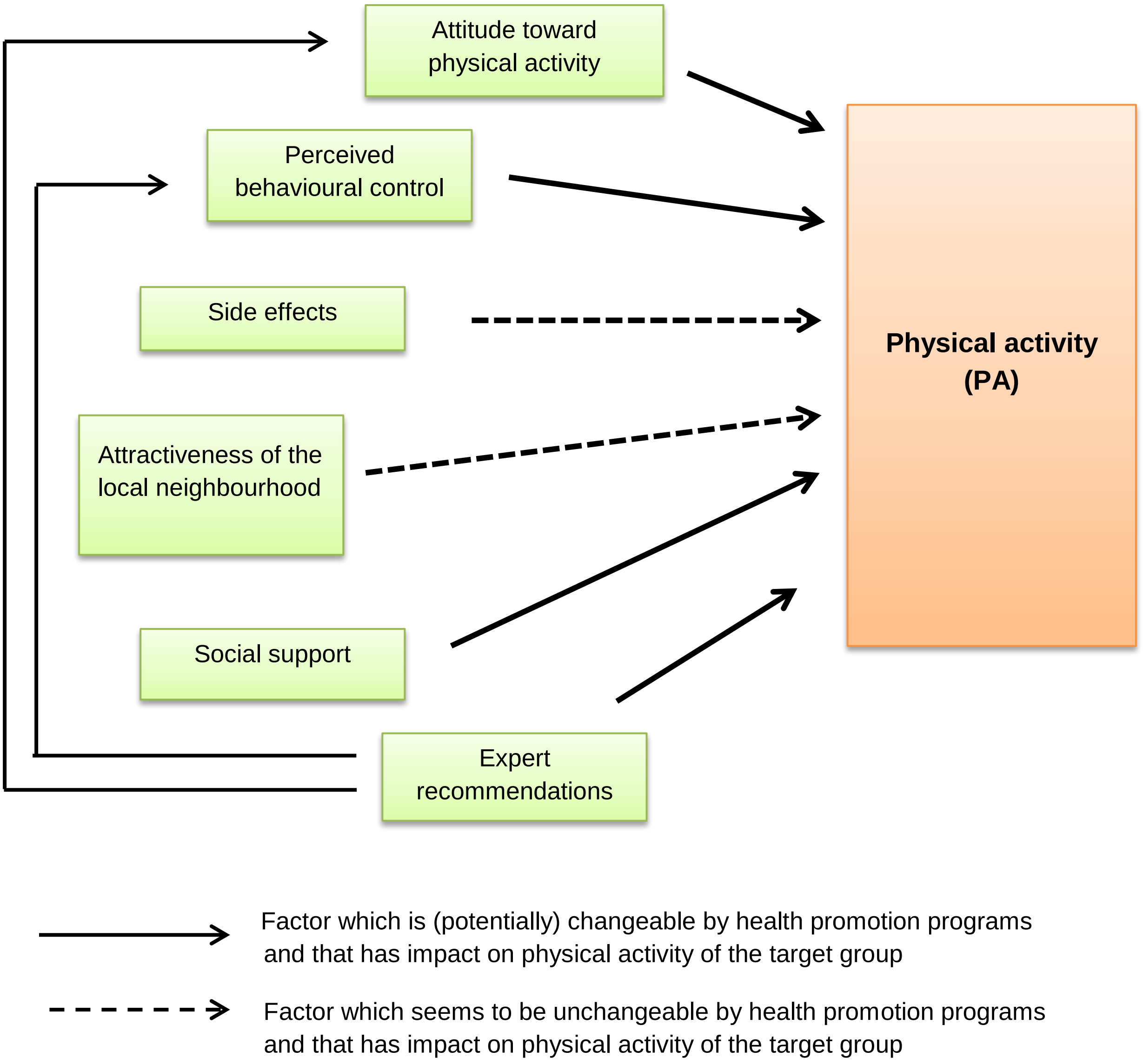
4.1 Summary and Analysis

We have found that all participants with a positive attitude toward PA with cancer were frequently physically active. However, they mentioned that they decreased the intensity and frequency of their workout after the diagnosis. This finding can be underpinned by outcomes of other studies, indicating that most cancer patients either do not perform PA or reduce it during and after cancer treatment (Pinto, Trunzo & Reiss, 2002; Courneya & Friedenreich, 1998). The main reason for this decrease were side effects of the disease and its treatment, leading to (temporary) inability to perform PA. However, the found barriers seemed to be immutable, without causing negative effects on health outcomes and they also did not seem to prevent people from performing PA.

In conclusion, a closer look should be taken at the chances. Some psychological factors, such as the attitude, perceived benefits of PA, the perceived behavioural control and patients' self-confidence, seemed to contain important chances, just as environmental factors like the attractiveness of the local neighbourhood and expert recommendations. However, while psychological factors and expert recommendations could be improved by health promotion interventions, the attractiveness of the local neighbourhood seems to be less changeable by professionals as cancer patients do not live gathered at particular places.

For this reason, health promoters should focus on a combination of psychological factors and expert recommendations, to improve PA in cancer patients effectively. Therefore, psychological health promotion interventions could be used to improve patients' attitude toward PA and their perceived behavioural control. To upgrade expert recommendations, physicians and students of relevant studies should get special training in handling and communication about this topic with the target group as this did not always seem to be efficient, yet. In addition, for the development of trainings and to get more insight in this topic, further research is indispensable. While a number of studies indicated that TPB would be a good method to predict PA of cancer patients (Courneya & Friedenreich, 1999; Keats, Culos-Reed, Courneya & McBride, 2007), the results of this study lead to the assumption that an extension of TPB could increase the understanding of patients' performance of PA. For this reason, a new model (model II) has been developed based on the outcomes of this study to explain relevant factors which have impact on PA in cancer patients.

Model II: Heuristic model to predict physical activity in people with cancer



TPB is based on the idea that there are three components predicting peoples' behaviour, namely their attitude toward that behaviour, the subjective norm and the perceived behavioural control. The results of this study indicate a relation between the attitude toward PA and the performance of it and the importance of this relation was also found by Hagger, Chatzisarantis & Biddle (2002), who found that the attitude seemed to play a major role in TPB, concerning PA.

According to TPB, the social norm and according to scientific literature, social support of spouses and friends could be important factors, regarding PA of cancer patients (Dishman, Sallis & Orenstein, 1985; Oka, King & Young, 1994), but this relation could not be found in this study. However, these results could be due to self-serving bias because of the participants' view on themselves as self-determined individuals as they have been asked directly about this topic, leading to self-serving bias (Campbell & Sedikides, 1999). It was noticeable that all participants wanted to be perceived as independent individuals, reporting that their friends recommended them to rest, which was unjustifiable for them and had no impact on their behaviour as they felt fit and healthy enough to perform PA. Instead, external factors as expert recommendations and the attractiveness of the local neighbourhood seemed to play major roles in patients' decision to either perform PA or not.

Expert recommendations seemed to decrease fear from detrimental exercises and to improve the participants' attitude toward PA. However, some respondents complained that physicians were not empathic enough when advising them to perform PA. This led to frustration and the feeling of being not understood. Many studies show that physicians need special training and a more patient-centred education than just knowledge about diseases and good techniques, as the doctor-patient communication changed a lot within the last decades (Ha & Longnecker, 2010). In this study it was noticeable that some respondents wanted to be perceived as a sick person and treated with a lot of sympathy, while others wanted to be treated in a more normal way, rejecting any kind of compassion. For this reason, physicians should take the patients' personality into account, when recommending PA to them. Therefore, special training is recommended as Tongue, Epps & Forese (2005) found that the physicians' self-assessment did not seem to be realistic. In their study, 75% of the orthopaedic surgeons believed that they communicated satisfactory with their patients, while only 21% of the patients reported satisfactory communication with them. However, good doctor-patient communication does not only seem to improve patients' PA, but also their adherence (Arora, 2003).

4.2 Strengths and limitations of this study

This study used a qualitative research design, which is a strong point as it permits the respondent to tell his own story, outside of fixed response options. Some of the participants' answers were not expected as the scientific literature did not describe it. Moreover, the qualitative interviews revealed that the patients' idea about the definition of PA and their employment status differed a lot, leading to less comparable responses. While some respondents answered with their last employment before they were certified unfit for work (because of their diagnosis), others stated they were unable to work (because they were on sick leave). However, all participants did not work at the time of the interviews.

Another strong point of this study was the respondents' diversity. The respondents' variance in ages (37-79 years) met the most important age ranges regarding the occurrence of cancer, namely 40-79 years in women and 60-79 years in men (Jemal et al., 2005). Also the moment of the last cancer diagnosis varied a lot and thereby reflected the general population of cancer patients. Furthermore, there was diversity of the educational backgrounds and in having children. Hence, the respondent group can be viewed as a heterogenic one, leading to more generalizable results for the target population.

Almost all participants had breast cancer as a main diagnosis. That leads to a high generalizability of the results for this target group. Moreover, breast cancer is the most occurring kind of cancer in women (Parkin, Bray, Ferlay & Pisani, 2005), leading to an even higher importance of the inclusion of this target group in research and reflecting the prevalence of breast cancer within the general population.

Next to its strengths, this study also had its limitations. The cross-sectional design of this study delivers snapshots of the patients' well-being. The respondents even mentioned that their well-being differs a lot by days' form and that their score on the EORTC-13 questionnaire would differ a lot, depending on that. However, a longitudinal research design did not seem to be required as the patients differed in medical history, leading to results that cover the chances and barriers of the target group in all different cancer stages (except the palliative), independently of the moment of the last diagnosis.

Concerning the demographic background of the respondents, the fact that only one of 14 participants was male decreased the generalizability of the results for men with cancer. Moreover, all respondents were recruited in Wesel (Germany) to participate in this study. Wesel and its surroundings is a rural area and most participants did not even live in Wesel itself, but came from even smaller villages in its neighbourhood. Therefore, especially the participants' ideas about outside activity and the accessibility of fitness centres are only restricted generalizable to patients in more urban areas. Furthermore, the respondents did not differ in their cultural background as all participants were from German origin, leading to limited generalizability of the result to cancer patients with different cultural background.

Besides this, the fact that most participants had breast cancer was mentioned as strength of this study as it makes the results generalizable for this target group. However, the homogeneity of the respondents' diagnosis (only two respondents did not have breast cancer) also leads to a decreased generalizability to cancer patients with other kinds of cancer.

In this study, the exclusion criteria comprised patients in the palliative phase. However, adherence to this criterion seemed to be more difficult than it was expected. According to the medical definition, all patients with more than one kind of cancer get palliative care, as healing cancer seems to be impossible in this stage and prolonging life and increasing the QOL is the major issue for those patients. However, palliative cancer patients do not implicitly give the impression of someone who is going to die as it could be expected. Thanks to the modern treatment methods, many palliative cancer patients are in a good health state, or at least comparable with those who have earlier stages of care. Therefore, it seemed to be difficult to exclude cancer patients in the palliative phase from this study. Three participants had more than one kind of cancer and could have been excluded, according to the exclusion criteria. However, they did not see themselves as dying persons and wanted to participate in this study, not mentioning that they were in the palliative phase of their disease. With hindsight, the inclusion of those patients was not a huge contravention as the definition of the inclusion criterion was not accurately enough. In addition, the participation of these respondents led to the insight that PA is just as important for palliative cancer patients who feel good enough to cope with it, as for those, receiving curative treatment, as many people who receive palliative care still have a couple of years to live and their QOL could be improved that way.

4.3 Conclusion

The chances toward PA seemed to have a stronger impact on the participants' PA than its barriers as almost all respondents, (and even all respondents with a positive attitude toward PA with cancer) frequently performed PA, unless they faced a high number barriers. Moreover, many barriers are hard to change without causing any negative impact on patients' health outcomes. For this reason, scientists and health promoters should focus on the chances toward PA instead of its barriers.

4.4 Recommendations

Recommendations for practitioners

- Professionals and students of relevant studies need to get special training to improve the doctor-patient communication.
- Even if friends' advises to rest did not seem to have impact on the patients' behaviour, it can change the social norm. To close the circle of optimal patient care, more public relations work is needed to show not only the miserable part of cancer patients, but to emphasize also their capabilities.

Recommendations for scientific research

- Further research, including the practitioners' point of view is needed to identify chances and barriers on both sides. Therefore, further research about the ideas of professionals toward PA, its benefits and feasibility is recommended to identify obstacles on professionals' side and improve the flow of information.
- To increase the incomparability of the outcomes about the respondents frequency of PA, comparison of the difference of the respondents PA before and after diagnosis (moment of the interview) based on their own reports and ideas about it.is recommended. By this, bias could not be eliminated, but the perceived change in PA can be identified.
- The impact of the subjective norm on PA of cancer patients needs to be tested in future research. To avoid bias, questions should be formulated indirectly.
- As the definition of the exclusion criterion was not explicit enough in this study, not only the definition of the inclusion- and exclusion criteria, but also the way of implementing should be defined beforehand in future research.

Note that cancer patients' longing to have a normal life makes many of them strong enough to perform physical activity and to make their own choices to improve their quality of life. Still the environment has to show some empathy and understanding toward these choices and especially professionals should encourage them in performing physical activity.

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Appendix

1. Information sheet about the study for the respondents

Krebs – Ist da noch Raum für Bewegung?

Wissenschaftliche Studie über Müdigkeit und Bewegung bei Krebspatienten
Krebs ist eine Erkrankung, welche oftmals von vielen Nebenwirkungen begleitet wird. Müdigkeit ist eine von vielen möglichen Nebenwirkungen dieser Erkranung und kann unter anderem durch körperliche Aktivität verbessert werden. Sind die Patienten jedoch überhaupt in der körperlichen und seelischen Verfassung um Sport zu treiben? Welche Faktoren fördern oder hemmen die körperliche Aktivität bei Krebspatienten?

Nathalie Ait Taleb, Mastertudentin der Univerität Twente plant zum Abschluss ihres Studiums die Situation der betroffenen Patienten zu erfragen um dadurch nach Möglichkeit zur Verbesserung der Lage von Krebspatienten beizutragen. Begleitet wird sie dabei von der erfahrenen Psychoonkologin Frau Dr. Zilch-Purucker, welche am Evangelischen Krankenhaus Wesel als Psychoonkologin tätig ist. Außerdem wird diese Studie begleitet durch Frau Dr. Bode, welche als Dozentin an der Universität Twente tätig ist und Frau Nadine Köhle, die sich im Rahmen Ihrer Promotion mit der Situation von Krebspatienten und ihren Angehörigen beschäftigt.

Was beinhaltet die Teilnahme an der Studie?
Die Studie besteht sowohl aus Interviews mit Krebspatienten, als auch mit Physiotherapeuten. Während der Interviews werden wir Ihnen als betroffener Patient, Fragen stellen, welche Bezug haben auf eventuelle Müdigkeit als Begleiterscheinung der Krebserkrankung. Außerdem möchten wir Ihnen gerne Fragen stellen, die sich auf den möglichen Einfluss der Erkrankung auf Ihre körperliche Aktivität bezieht.

Die Interviews werden in einem Zeitraum von Oktober 2014 bis Januar 2015 gehalten und finden im Evangelischen Krankenhaus Wesel statt. Die Länge der Interviews beträgt ca. 45 Minuten.
Alle Daten werden selbstverständlich streng vertraulich behandelt.

Teilnehmen?
Wollen Sie an dieser Studie teilnehmen, so können Sie den untenstehenden Antwortstreifen ausfüllen und diesen Frau Dr. Zilch-Purucker geben. Frau Nathalie Ait Taleb erreichen Sie per Email unter n.bauerstudent.utwente.nl oder telefonisch (01573/9052540).

Name:…………………………………………………………………..
Telefonnummer: ………………………………………………….

2. Interview scheme (Introduction)

Name Interviewer:	
Nummer Respondent:	
Datum Interview:	
Ort des Interviews:	
Uhrzeit Interviewbeginn:	
Uhrzeit bei Ende des Interviews:	

Das Interview

Willkommen

Vorstellung
Mein Name ist Nathalie Ait Taleb und ich bin Masterstudentin des Faches Gesundheitspsychologie an der Universität Twente. Ich befinde mich derzeit in den letzten Zügen meines Studiums und führe diese Studie aus, zur Erstellung meiner Masterarbeit. Ich werde diese Studie ausführen unter Begleitung von Frau Dr. Christina Bode, Frau Dr. Zilch-Purucker und Nasine Köhle.

Dank und Erklärung des Ablaufs des Interviews
Zuerst möchte ich mich ganz herzlich bei Ihnen bedanken für Ihe Bereitschaft an dieser Studie teilzunehmen. Ich weiß dass dies ein sensibles Thema ist und umso mehr weiß ich Ihre Teilnahme zu schätzen. Wie Sie bereits in dem Informationsblatt gelesen haben, möche ich mich als Masterstudentin der Gesundheitspsychologie zur Erstellung meiner Masterarbeit gerne mit dem Phänomen der Müdigkeit als Nebenwirkung von Krebs beschäftigen. Ich erhoffe mir daraus neue Erkenntnisse über die Situation der Patienten, welche möglicherweise zur Verbesserung der allgemeinen Lage der Patienten dienen können.

Das Interview wird ungefähr 45 Minuten dauern. Während des Interviews werden wir Ihnen Fragen über die Krebserkrankung, eventuelle Müdigkeit und den Einfluss der Erkrankung auf Ihre körperliche Aktivität stellen.

Falls Sie eine Frage nicht verstehen, zögern Sie bitte nicht nach einer genaueren Erklärung zu fragen. Es gibt keine falschen Antworten. Sie können alles sagen was Ihnen wichtig erscheint und ich möchte Sie gerne ermutigen offen über Ihre Erfahrungen als Patient zu sprechen.

Die Daten des Interviews und die Einverständniserklärungen werden nach dem Interview getrennt von einander aufbewahrt. Niemand, außer den Wissenschaftlern an der Universität Twente (also auch nicht die behandelnden Ärzte des Krankenhauses) bekommt Einblick in die Trankskripte. Auch in der Masterarbeit werden keine persönlichen Daten angegeben. Außerdem möchte ich Sie darauf hinweisen dass Sie zu jedem Zeitpunkt die Möglichkeit haben das Interview zu beenden.

Zustimmung zur Aufnahme des Interviews erfragen

Wir würden dieses Interview gerne als Audiodatei aufnehmen, sodass wir nicht ständig mitschreiben müssen, sondern das Gespräch in aller Ruhe führen können. Nach dem Interview wird das Gespräch ausgeschrieben sodass wir es anschließend anonymisiert weiter verwenden können. Die Audioaufnahme wird nachdem sie abgetippt wurde gelöscht. Sind Sie mit der Aufnahme des Interviews einverstanden?

Falls ja;

- O.k. dann möchte ich Ihnen kurz den Aufbau des Interviews erklären.

Falls nein;

- Könnten Sie mir sagen was der Grund dafür ist? *(Erklären dass auch die Möglichkeit besteht unter einem erfundenen Namen zu sprechen; möchte der Respondent trotzdem nicht der Aufnahme zustimmen, erklären dass man in diesem Fall alles mitschreiben muss und dass das Interview dadurch länger dauern wird.)*

Kurze Erklärung von dem Aufbau des Interviews

Übersicht der Abschnitte *(auf einem seperaten Blatt, sodass der respondent immer sehen kann wo wir gerade sind)*

1. Fatigue Test
2. Hintergrund
3. Einfluss der Erkrankung auf Müdigkeit
4. Einfluss der Erkrankung auf körperliche Aktivität
5. Persönliche Daten

Abschnitte ausgearbeitet *(als Beispiel für den Interviewer)*
Ich möchte Ihnen zunächst kurz erklären wie das Interview aussehen wird. Das Interview besteht aus fünf Teilen. In dem ersten Teil möchte ich Sie bitten ein paar einfache Fragen zu Ihrer derzeitigen körperlichen Verfassung zu beantworten. In dem zweiten Teil würde ich gerne mehr über Ihre Erkrankung erfahrenund darüber wie es Ihnen momentan geht. Danach möchte ich Ihnen gerne ein par Fragen stellen, die sich auf eventuelle Müdigkeit als Nebenwirkung der Erkrankung beziehen. Im vierten Teil möchte ich gerne mit Ihnen über Ihrer körperliche Aktivität sprechen und erfahren ob Ihre Erkrankung in irgendeiner Form Einfluss darauf hat oder hatte. Zum Abschluss möchte ich Ihnen dann noch ein par allgemeine Fragen zu Ihrer Lebenssituation stellen.

Haben Sie bis hierhin noch Fragen?

Ich möchte Sie dann jetzt bitten die Einverständniserklärung zu lesen und, wenn Sie dieser zustimmen, diese zu unterschreiben.

Einverständniserklärung ausfüllen lassen.

3. Informed consent

Einverständniserklärung Respondent

Sehr geehrter Teilnehmer,

Sie werden gebeten den unten stehenden Text zu lesen. Möchten Sie an der Studie teilnehmen, so tragen Sie bitte unten Ihren Namen, Adresse, Datum und Unterschrift ein.

- Ich habe das Informationsblatt über diese Studie gelesen. Ich hatte die Möglichkeit weitere Fragen zu stellen. Meine Fragen wurden ausreichend beantwortet.
- Ich weiß dass die Teilnahme vollkommen freiwillig ist. Ich weiß dass ich jederzeit entscheiden kann die Teilnahme ohne Angabe von Gründen zu beenden
- Ich gebe meine Erlaubnis die Daten für die in dem Informationsblatt genannten Ziele zu verwenden.
- Ich weiß dass die Teilnahme oder Nicht-Teilnahme an dieser Studie keinerlei Auswirkungen auf meine Behandlung hat.
- Ich weiß dass die Aufnahmen, nach dem wörtlichen Absschreiben gelöscht werden.

Name:
…………………………………………………………………………………………………
Adresse:
…………………………………………………………………………………………………

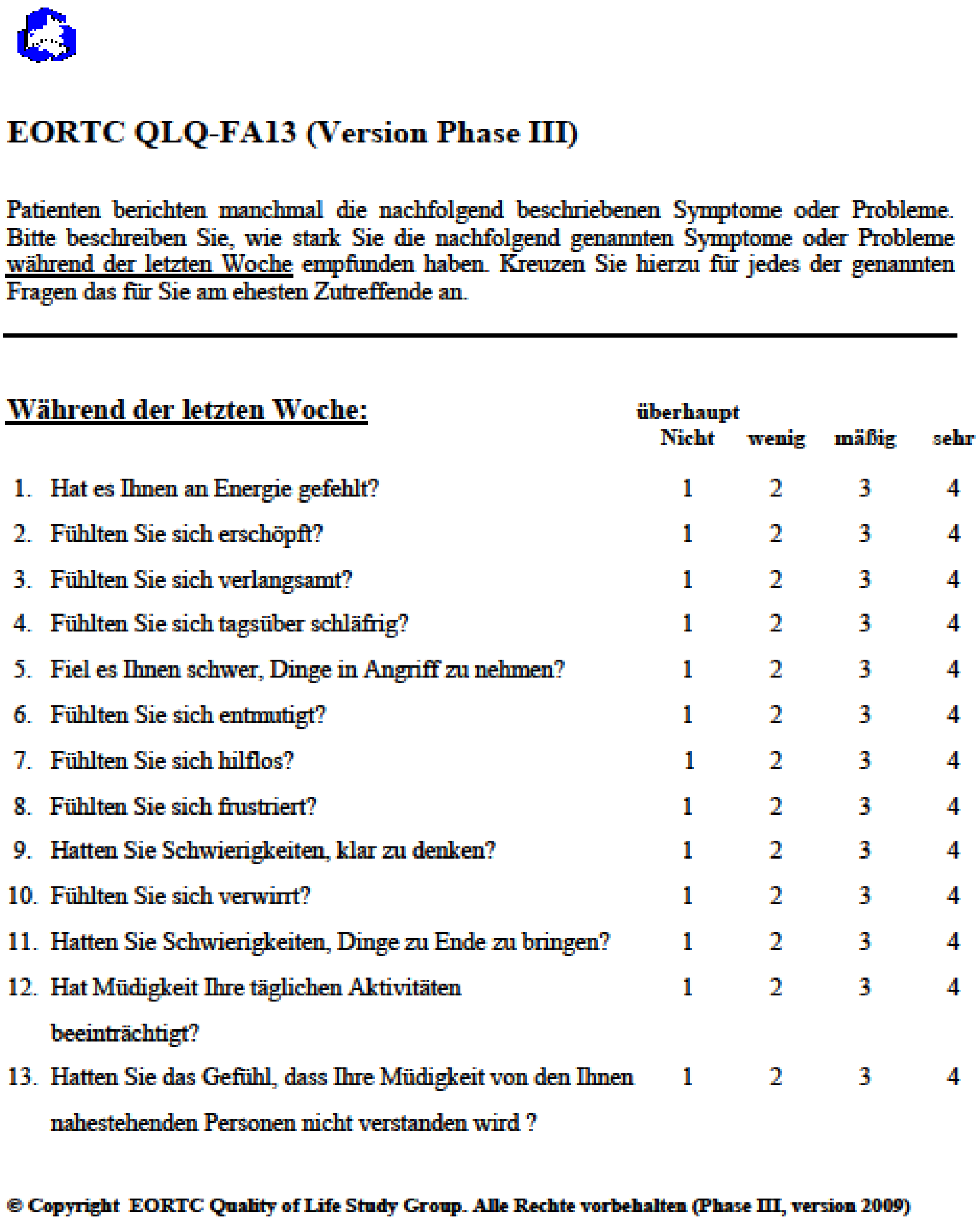
…………………………………………………………………………………………………
Telefonnummer:

……………………………………………………………………………………………........

Datum und Unterschrift:

……………………………………….....................

4. EORTC-13-questionnaire

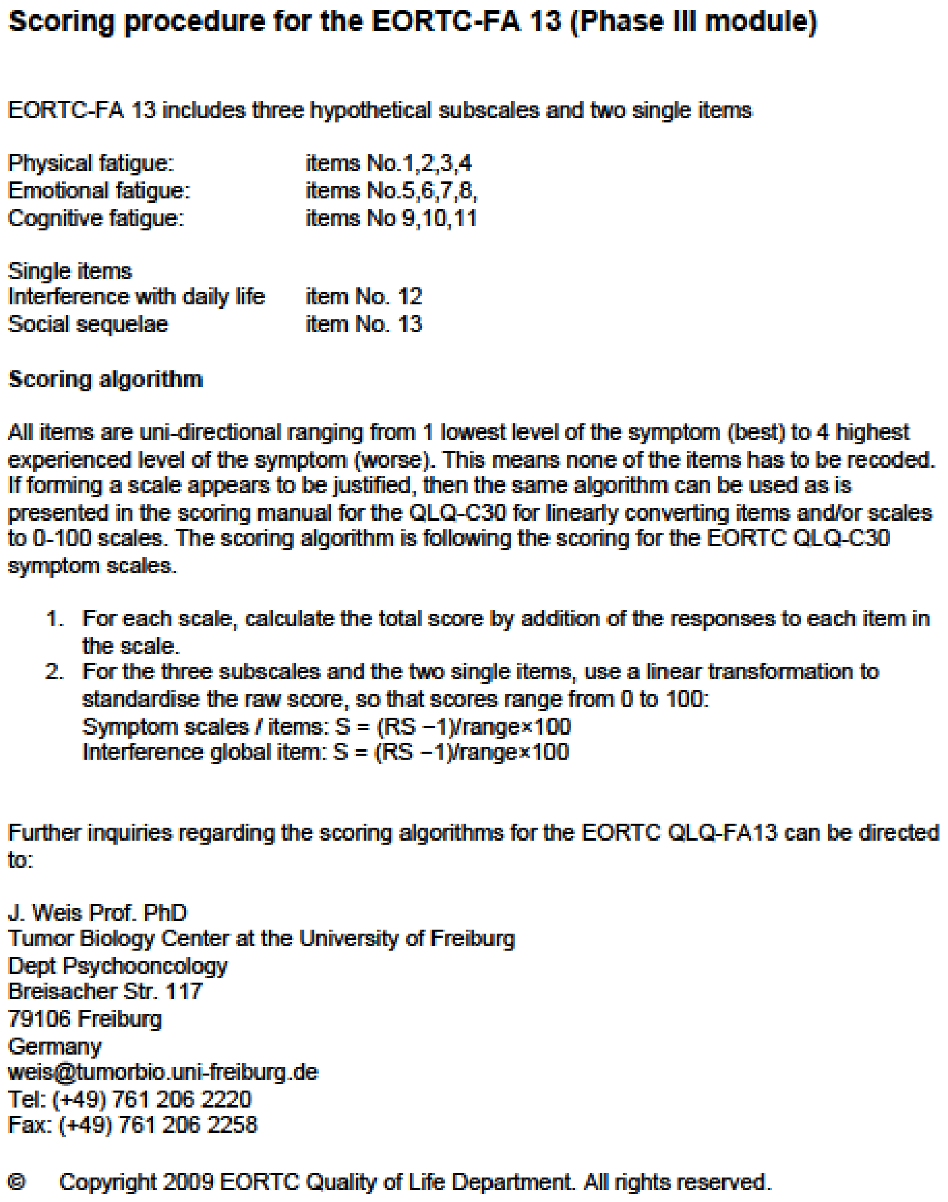


EORTC QLQ-FA13 (Version Phase III)

Patienten berichten manchmal die nachfolgend beschriebenen Symptome oder Probleme. Bitte beschreiben Sie, wie stark Sie die nachfolgend genannten Symptome oder Probleme <u>während der letzten Woche</u> empfunden haben. Kreuzen Sie hierzu für jedes der genannten Fragen das für Sie am ehesten Zutreffende an.

<u>Während der letzten Woche:</u>	**überhaupt Nicht**	**wenig**	**mäßig**	**sehr**
1. Hat es Ihnen an Energie gefehlt?	1	2	3	4
2. Fühlten Sie sich erschöpft?	1	2	3	4
3. Fühlten Sie sich verlangsamt?	1	2	3	4
4. Fühlten Sie sich tagsüber schläfrig?	1	2	3	4
5. Fiel es Ihnen schwer, Dinge in Angriff zu nehmen?	1	2	3	4
6. Fühlten Sie sich entmutigt?	1	2	3	4
7. Fühlten Sie sich hilflos?	1	2	3	4
8. Fühlten Sie sich frustriert?	1	2	3	4
9. Hatten Sie Schwierigkeiten, klar zu denken?	1	2	3	4
10. Fühlten Sie sich verwirrt?	1	2	3	4
11. Hatten Sie Schwierigkeiten, Dinge zu Ende zu bringen?	1	2	3	4
12. Hat Müdigkeit Ihre täglichen Aktivitäten beeinträchtigt?	1	2	3	4
13. Hatten Sie das Gefühl, dass Ihre Müdigkeit von den Ihnen nahestehenden Personen nicht verstanden wird ?	1	2	3	4

5. Scoring procedure for the EORTC-FA 13



Scoring procedure for the EORTC-FA 13 (Phase III module)

EORTC-FA 13 includes three hypothetical subscales and two single items

Physical fatigue: items No.1,2,3,4
Emotional fatigue: items No.5,6,7,8,
Cognitive fatigue: items No 9,10,11

Single items
Interference with daily life item No. 12
Social sequelae item No. 13

Scoring algorithm

All items are uni-directional ranging from 1 lowest level of the symptom (best) to 4 highest experienced level of the symptom (worse). This means none of the items has to be recoded. If forming a scale appears to be justified, then the same algorithm can be used as is presented in the scoring manual for the QLQ-C30 for linearly converting items and/or scales to 0-100 scales. The scoring algorithm is following the scoring for the EORTC QLQ-C30 symptom scales.

1. For each scale, calculate the total score by addition of the responses to each item in the scale.
2. For the three subscales and the two single items, use a linear transformation to standardise the raw score, so that scores range from 0 to 100:
   Symptom scales / items: $S = (RS - 1)/\text{range} \times 100$
   Interference global item: $S = (RS - 1)/\text{range} \times 100$

Further inquiries regarding the scoring algorithms for the EORTC QLQ-FA13 can be directed to:

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6. Interview scheme (questions)

Hintergrund

Ich habe gerade eine Menge erzählt über diese Studie.

- **Vielleicht können Sie mal kurz erzählen wer Sie sind und wie alt Sie sind?**

- **Haben Sie Kinder?**

- **Können Sie mir etwas über Ihre Erkrankung erzählen**
  - **Welke Krebsart?**
  - *Wie lange haben Sie bereits Krebs?*
  - *Sind Sie derzeit in Behandlung?*

Auszufüllen durch den Interviewer

Welche Krebsart?
☐ Brustkrebs
☐ Darmkrebs
☐ Hautkrebs
☐ Lungenkrebs
☐ Sonstiges, nämlich …………………………………………………..

Wie lange ist es her dass die Diagnose Krebs gestellt wurde?
………………….

Sie sie momentan in Behandlung?
☐ Ja
☐ Nein

Falls ja;

- Wie sieht die Behandlung aus?
  ………………………………………………………………………………
  ………………………………………………………………………………

Wenn Sie einverstanden sind, würde ich nun gerne zum dritten Teil des Interviews kommen.

I. Einfluss der Erkrankung auf körperliche Kondition

Wie ich bereits angegeben hatte, möchte ich in disem Teil gerne mit Ihnen über Ihrer körperliche Verfassung seit der Erkrankung sprechen.

- **Können Sie mir erzählen wie es Ihnen momentan geht?**

- **Welchen Einfluss hatte die Erkrankung auf Ihre körperliche Kondition??**

- **Empfinden Sie seit der Erkrankung mehr Müdigkeit als zuvor?** *(Gefühl schlapp zu sein, vermehrtes Schlaf- und Riuhebedürfnis, fehlende Energie, weniger erholsamer Schlaf, Svchlafstörungen)*
    - … seit wann haben Sie diese Beschwerden? *(vor, während, nach der Behandlung)*
    - ... wie haben sich die Beschwerden entwickelt *(hat die Müdigkeit stetig zu-/abgenommmen oder ist/war sie gleichbleibend?)*
    - … hat dies Einfluss auf Ihren Alltag? *(Arbeitssituation, Erledigen alltäglicher Aufgaben, Familienleben)*

- **Gibt es noch andere Auswirkungen der Müdigkeit auf Ihre Lebenssituation?**
- **Gibt es noch andere Probleme, die Sie mit der Müdigkeit in Verbidnung bringen?**

Vielen Dank für Ihre Offenheit. Ich habe nun ein deutliches Bild bekommen von Ihrer Situation und Ihr Müdigkeitsempfinden. Ich würde nun gerne mit dem nächsten Teil des Interviews weiter machen.

II. Einfluss der Erkrankung auf körperliche Aktivität

In diesem Teil würde ich gerne mit Ihnen besprechen ob und inwiefern die Krebserkrankung Ihre körperliche Aktivität beeinflusst. Dazu möchte ih Ihnen ein par Fragen stellen:

- ➢ **Waren Sie vor der Erkrankung regelmäßig sportlich aktiv?**

    - *Welche Form von Sport haben Sie ausgeübt?*
    - *Wie oft haben Sie sich sportlich betätigt?*
    - *Haben Sie den Sport alleine, oder in Gesellschaft mit anderen ausgeübt?*

- ➢ **Hat sich Ihre sportliche Aktivität seit der Erkrankung verändert?**

    - *In wiefern? (Art des Sports, Häufigkeit etc.)*

- ➢ **Wie denken Sie über körperliche Aktivität bei einer Krebserkrankung?**

    - *Erwartungshaltun: Gesund/Ungesund*

- ➢ **Wie denken die Menschen in Ihrer Umgebung (Familie/Freunde) über körperliche Aktivität bei Krebs?**

    - *Sollten Sie Sport treiben, oder lieber nicht?*

- ➢ **Denken Sie dass Sie in der Lage wären, trotz Ihrer Erkrankung sportlich aktiv zu sein?**

- ➢ **Wurden Ihnen bestimmte Sportarten empfohlen?**

    - ***Ja**: Welche? Wer hat Ihnen das empfohlen?*
    - ***Nein**: Was denken Sie, welche Sportarten für Sie geeignet wären?*

- ➢ **Haben Sie die Möglichkeit zu Hause körperlich aktiv zu werden?** *(Equipment, Platz, Fähigkeiten)*
    - *Nutzen Sie diese Möglichkeit auch? (Warum ja oder nein?)*

- ➢ **Gibt es in Ihrer Umgebung Fitnesstudios, die für Menschen mit Ihrer Erkrankung geeignet sind?**

    - *Ja: nutzen Sie diese? Warum nicht? Wie sind Sie darauf aufmerksam geworden?*
    - *Nein: Worüber sollte eine geeignete Einrichtung verfügen?*

- **Ist es für Sie eine Option im Freien Sport zu treiben?**

  - *Gibt es Faktoren, die die Bewegung im Freien besonders attraktiv oder unattraktiv für Sie machen? (Attraktivität der Umgebung, Gefühl der Sicherheit etc)*

- **Leiden Sie unter Nebenwirkungen, die es Ihnen schwer machen sich körperlich zu betätigen?**

  - ***Ja:** Welche?*

- **Empfinden Sie Schamgefühl gegenüber anderen, weil die Erkrankung Sie optisch verändert hat?**

- **Ist es organisatorisch für Sie möglich Sport zu treiben?** *(Kinder, Abwesenheit, Krankenhausaufenthalte, Öffnungszeiten des Fitnessstudios etc.)*

  - *Welchen Schwierigkeiten begegnen Sie?*

- **Wie verhält sich Ihr Partner/Ihre Familie wenn es darum geht dass Sie sportlich aktiv werden wollen?** *(unterstützend, ängstlich/beschützend)*

  - *Hat das Verhalten Ihres Partners/Ihrer Familie Einfluss auf Ihre körperliche Aktivitt?*

- **Gibt es noch andere Aspekte, die Einfluss haben, auf Ihre körperliche Aktivität?**

Weiter fragen!
Können Sie mir ein Beispiel nennen?
Können Sie mir das beschreiben?
Können Sie mir da noch mehr drüber erzählen?
Wie sieht das genau aus?
Oh, erzählen Sie mal...
Können Sie das noch genauer beschreiben?
Können Sie mir (noch mehr) erklären inwiefern die Erkrankung Ihre Situation verändert hat?
Können Sie mir sagen was Sie darüber denken?
Können Sie mir sagen wie Sie sich deswegen fühlen?

Weitere Fragen:

- **Denken Sie dass die Krebserkrankung Einfluss hatte auf Ihre körperliche Aktivität** *(sowohl positiv als auch negativ)***?**
- **Wie könnte man die körperliche Aktivität von Krebspatienten steigern?**
- **Gibt es noch etwas das Sie gerne los werden möchten?**

7. Demographic data

V. Persönliche Daten

Wir sind nun beinahe am Ende des Interviews angekommen. Ich möchte Sie gerne bitten noch einige persönliche Angaben zu machen.

Was ist Ihr Geschlecht?
☐ Mann
☐ Frau

Was ist Ihr Familienstand?
☐ ledig
☐ zusammen lebend
☐ verheiratet
☐ geschieden
☐ verwitwet

Haben Sie Kinder??
☐ Nein
☐ Ja, und die wohnen noch zu Hause
☐ Ja, aber die haben bereits eine eigene Wohnung

Welchen höchsten allgemeinbildenden Schulabschluss haben Sie?
☐ Keine
☐ Grundschule
☐ Schüler/in
☐ von der Schule abgegangen ohne Hauptschulabschluss
☐ Hauptschulabschluss/Volksschulabschluss
☐ Realschulabschluss/Mittlere Reife
☐ Fachhochschulreife
☐ Allgemeine Hochschulreife/Abitur
☐ Universität (Diplom, Bachelor, Master)
☐ Promotion
☐ Sonstiges, nämlich………………………………………………………………………..

Was ist die beste Umschreibung Ihrer heutigen Situation?
☐ Ich arbeite mehr als 20 Stunden pro Woche
☐ Ich arbeite weniger als 20 Stunden pro Woche
☐ Ich bin Hausfrau/Hausmann
☐ Ich bin Schüler/Student
☐ Ich bin arbeitssuchend
☐ Ich bin arbeitsunfähig

☐ Ich bin in Rente/Pension
☐ Sonstiges, nämlich …………………………………………………………………..

Haben Sie sich bereits über die Möglichkeiten und Vor-/Nachteile von körperlicher Aktivität bei Ihrer Erkrankung informiert?
☐ Ja
☐ Nein

Wie viele Stunden pro Woche bewegen Sie sich durchschnittlich?
In etwa ……………….. Stunden

Abschluss

Wir haben jetzt alle Interviewthemen besprochen.

- **Haben Sie noch Fragen oder Anmerkungen?**

Weiteren Vorgang erklären und Dank aussprechen
Das Interview wird ausgetippt und analysiert. Ihre Antworten, und die von anderen Paienten werden uns helfen die Chancen und Barrieren, die eine Krebserkrankung für die Patienten hinsichtlich körperlicher Aktivität bedeutet besser zu verstehen.

Dann sind wir nun am Ende des Interviews angekommen.

Wir möchten Ihnen ganz herzlich für Ihre Teilnahme danken.

Das Interview ist nun beendet und die Aufnahme wird gestoppt.

Datum und Unterschrift:

………………………………………...................

8. Coding scheme

	Chances	Barriers
Psychological factors		
Attitude		
Perceived benefit of PA		
(Lack of) Self-confidence in performing sport/Perceived behavioural control		
Fear of detrimental exercises		
Negative body image		
Physiological factors		
Side effects		
Environmental factors		
Attractiveness of the local neighbourhood		
Expert recommendation		
Organizational strategies/problems		
Presence/Absence of equipment		
Existence, awareness & satisfaction with facilities		
Costs of membership		
Unsafe feeling/footpaths in the local neighbourhood		
Weather		
Social support		
Motivational support of group exercises		
Social support of family & friends		
Friendship with exercise partners		
Uncertainty of professionals leads underestimation of the patients' skills		

9. Summary of the results of this study

	Chances	Barriers
Psychological fators		
Attitude	- Physical activity is healthy	
Perceived benefit of PA	- Healthy body -Physical activity destroys Cancer - Improvement of psychological well-being (deflection, good feeling) - Stronger body can fight harder against cancer	- No effect of physical activity
(Lack of) Self-confidence in performing sport – Perceived behavioural control	- You can do everything you did before - Listen to the signs of your body, it tells you if you need to stop	- Uncertainty what kind of sport is healthy/harmful
Fear of detrimental exercises		- If you have cancer, exercises could have detrimental effect - Body needs to rest
Negative body image		- Absence of hair - Swimsuit does not cover the deformed breast
Physiological factors		
Side effects		- Weakness/lack of energy and power - Decreased mobility of bodyparts - Uncomfortable to perform sport , wearing a wig - Pain/Joint problems - Shortness of breath - Insomnia - Irritated mucous membranes (nosebleed) - Skin damage - Sweating fast - Port catheter is uncomfortable - Fatigue

		- Lack of drive and energy - Tingle and cold feeling in feet and fingers - Swollen arms (water) - Increased frequency of Toileting - Inflammation of the treated bodypart - Cognitive limitations - Nausea -Circulatory problems - Diabetes
Psycho-Physiological factors		
		- Stressful children decrease power - Hide the disease to protect others - Cogitating decreases relaxing - Change in daily routine
Environmental factors		
Attractiveness of the local neighbourhood	- Natural environment	- Unattractiveness of the neighbourhood makes outside activity less attractive
Expert recommendation	- Patient got explicite recommendations to become physical active	
Organizational strategies/problems	- Doctors, take into account that patient needs time for sport	- Times of special exercise groups do not fit to patients' needs - Long way to facilities with special offers
Presence/Absence of equipment	- No need to go outside to perform exercises increases chance to do it	
Existence, awareness & satisfaction with facilities	- Small number of group members / individual advises - Empathic trainers - Existence & Awareness of facilities	- Earlier experiences-Dissatisfaction - Dissatisfaction with the behaviour of other facility-members
Costs of membership		- Too high costs for membership - Membership is paid by the insurance, but drinks are excluded and too expensive
Unsafe feeling/footpaths in the	- Improve the workout	- Avoidance of unsafe ways

local neighbourhood		
Weather		**-** Fear of becoming ill because of a weakened immune system
Social support		
Motivational support of group exercises	- Motivational support to perform exercises - Motivation to execute harder	- Different level of fitness of group members
Social support of family & friends	- Motivational support - Partner prepares sport equipment	- Friends advice to rest/ Underestimation of the patients' skills
Friendship with exercise partners	- Chance to be incognito (not treated like a patient)	- Problems with other group members
Uncertainty of professionals leads underestimation of the patients' skills		**-** Untrained professionals are less confident and do less hard exercises (less effective)