

REVIEW

Cancer survivors' experience of exercise-based cancer rehabilitation – a meta-synthesis of qualitative research

JULIE MIDTGAARD^{1,2}, NANNA MARIA HAMMER¹, CHRISTINA ANDERSEN¹,
ANDERS LARSEN¹, DITTE-MARIE BRUUN¹ & MARY JARDEN^{1,2}

¹Copenhagen University Hospital Rigshospitalet, The University Hospitals' Centre for Health Research (UCSF), Copenhagen Ø, Denmark and ²University of Copenhagen, Department of Public Health, Section of Social Medicine, Copenhagen K, Denmark

ABSTRACT

Background. Evidence for the safety and benefits of exercise training as a therapeutic and rehabilitative intervention for cancer survivors is accumulating. However, whereas the evidence for the efficacy of exercise training has been established in several meta-analyses, synthesis of qualitative research is lacking. In order to extend healthcare professionals' understanding of the meaningfulness of exercise in cancer survivorship care, this paper aims to identify, appraise and synthesize qualitative studies on cancer survivors' experience of participation in exercise-based rehabilitation.

Material and methods. Five electronic databases (PubMed, PsychINFO, EMBASE, Cinahl and Scopus) were searched systematically for articles published up to May 2014 using keywords and MeSH terms. To be included, studies had to contain primary data pertaining to patient experiences from participation in supervised, structured moderate to vigorous-intensity exercise.

Results. In total 2447 abstracts were screened and 37 papers were read in full. Of these, 19 studies (n = 390) were selected for inclusion and critically appraised. Synthesis of data extracted from eight studies including in total 174 patients (77% women, age 28–76 years) exclusively reporting experiences of participation in structured, supervised exercise training resulted in nine themes condensed into three categories: 1) emergence of continuity; 2) preservation of health; and 3) reclaiming the body reflecting the benefits of exercise-based rehabilitation according to cancer survivors. Accordingly, the potential of rebuilding structure in everyday life, creating a normal context and enabling the individual to re-establish confidentiality and trust in their own body and physical potential constitute substantial qualities fundamental to the understanding of the meaningfulness of exercise-based rehabilitation from the perspective of patients.

Conclusions. In addition to the accumulating evidence for the efficacy of exercise training in cancer rehabilitation, it is incumbent upon clinicians and policy-makers to acknowledge and promote the meaningfulness of exercise for the individual, and to use this knowledge to provide new solutions to current problems related to recruitment of underserved populations, long-term adherence and implementation.

Exercise therapy following a cancer diagnosis is one area of cancer rehabilitation with solid evidence for efficacy [1]. Specifically, previous research indicates that structured exercise training is safe for cancer survivors and produce improvements in fitness, strength, physical function, and cancer-related psychosocial variables [2]. Moreover, a growing number of epidemiological studies suggest a significant inverse relationship between self-reported exercise behavior and cancer-specific mortality or progression

in survivors of breast cancer [3], colon cancer [4] and prostate cancer [5], respectively. Meanwhile, recent studies [6,7] show that cancer survivors continue to report more sedentary behavior than non-cancer individuals, and although structured exercise training has emerged as an important factor to enhance cancer survivorship outcomes [8], exercise training recommendations and/or exercise-based rehabilitation programs are not part of standard clinical management following a cancer diagnosis [9].

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Correspondence: J. Midtgaard, Copenhagen University Hospital Rigshospitalet, Department 9701 (UCSF), Blegdamsvej 9, 2100 Copenhagen Ø, Denmark. Tel: +45 35457367/+45 35457335. E-mail: julie@ucsf.dk

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Incorporating exercise into clinical practice, including reaching individuals not already motivated to join an exercise program, demands clinical knowledge consisting of interpretive action and interaction involving questions and phenomena that cannot all be controlled, measured, and counted by means of quantitative methods [10]. Thus, the impact of the contextual dimensions [11] of exercise-based rehabilitation, e.g. human interactions, the organization of the intervention, the staff, the timing, the physical surroundings or the general atmosphere, remains relatively unknown. By allowing for the exploration of social events as experienced by individuals in their natural context [10], qualitative research methods may contribute to a broader understanding of the contextual dimensions of exercise-based cancer rehabilitation, which may be of importance in the application, implementation and dissemination of structured exercise training programs in clinical practice. Consequently, qualitative research within the field of exercise-oncology has delivered important knowledge on cancer survivors' exercise preferences, and motivation and barriers for exercise in diverse cancer populations. However, despite the value of this knowledge, the generalizability of isolated qualitative studies is low and has not yet to be analyzed in systematic ways to expedite the transfer of disparate qualitative findings into clinical practice and policymaking [12]. Thus, whereas the evidence for the efficacy of exercise training has been established in several meta-analyses [13–18], synthesis of the findings from qualitative research providing an understanding of the meaningfulness of exercise-based rehabilitation from the perspective of the individual cancer survivor is lacking.

Meta-synthesis has evolved as a rigorous method for integrating findings from multiple qualitative studies to produce a new interpretation of findings that is more substantive than those resulting from individual investigations [19]. Consequently, meta-syntheses give clinicians greater access to qualitative findings as they are integrated into a single paper [19].

This paper aims to identify, appraise and synthesize qualitative studies on cancer survivors' experience of participation in exercise-based rehabilitation. This knowledge may enable healthcare professionals to extend their understanding of the meaningfulness of exercise, which may serve to support the promotion and implementation of exercise in cancer survivorship care.

Method

Inclusion criteria

To be included, studies had to contain primary data pertaining to experience from and/or social interaction

during structured, supervised moderate to vigorous-intensity exercise-based cancer rehabilitation. A range of methods (e.g. interviews, participant observation) and approaches (e.g. phenomenology, grounded theory, or ethnography) were eligible for inclusion. Papers written in English and published up to May 2014 were considered. Studies using mixed methods were included only if qualitative findings were presented separately from the quantitative results. Only papers involving adults were considered.

Exclusion criteria

Papers that focused on home-based, unsupervised or self-initiated exercise training or physical activity were excluded, as were those that centered on mind-body interventions (e.g. mindfulness, imagery, relation therapy, breathing exercise, yoga) and other types of non-vigorous exercise (e.g. tai-chi, stretching, qui-gong).

Search strategy and selection of included studies

Identification of qualitative research papers for this meta-synthesis was conducted through a systematic search of five electronic databases (PubMed, PsychINFO, EMBASE, Cinahl and Scopus) using keywords and MeSH terms. The literature search was carried out by a librarian subject specialist (AL) in close collaboration with the first author (JM) and DMB. Initially, titles were screened for their potential relevance by the first author (JM). Following this initial stage, two reviewers (JM and NMH) examined the abstracts of references that appeared relevant to the review or lacked adequate information from the title to make a decision. Subsequently, we performed a full-text examination to check that identified papers met the inclusion criteria. Two others reviewers (CA and MJ) considered papers on which there was a lack of agreement, and a final decision about their inclusion was resolved through discussion. Finally, reference lists of included papers were hand searched for potential additional studies.

Assessment of quality

In order to ensure that research included in this meta-synthesis was adequately robust, we employed the CASP (Critical Appraisal Skills Program) qualitative research checklist (score range from 0 to 9). The first author and at least one other reviewer (NMH, CA or MJ) independently assessed the methodological quality of the papers meeting the inclusion criteria (n=19). Any disagreement on assessment was resolved through discussion with a third reviewer.

Data extraction and synthesis

In the analysis process we extracted, aggregated, interpreted and synthesized findings from papers illuminating patient perspectives on participation in exercise-based rehabilitation exclusively. As such, findings from studies on related topics (e.g. pain, fatigue, return to work, program feasibility) were excluded from the meta-synthesis. The meta-synthesis approach was inspired by the guidelines for synthesizing qualitative research developed by Sandelowski and Barroso [20] including six steps: 1) reading of each paper several times; 2) extraction of findings relating to *experiences of exercise-based rehabilitation* across the papers, i.e. the extracted data consisted of findings reported by authors in the Results sections of the included studies; 3) visual mapping of selected key findings; 4) clustering and translating the findings into themes; 5) re-reading of each individual paper; and 6) final description of themes and assigning of the theme titles (categories). At this final stage, the primary reviewer (JM) offered an interpretation of the relationships between the themes including key characteristics. The new interpretation was critically considered by all reviewers and validated by the first authors of the included papers not already involved in the study group.

Results

Characteristics of the included studies ($n = 19$)

The search yielded a final total of 2447 papers after removing duplicates. Of these, 37 were read in full, and 19 studies [21–39] were selected for inclusion and critically appraised. The hand search of the reference lists of the 19 studies resulted in 11 studies not included in the electronic search. These were retrieved in full text but were all subsequently excluded. Details of the search and its results are shown in Figure 1.

The majority of participants ($n = 390$) in the studies included in the systematic review were women (68.7%). Interventions were predominantly group-based (16/19) and lasted from 6 weeks and up to 12 weeks. In 11 of 19 studies the population was comprised of mixed diagnoses. Ten studies included patients undergoing treatment [21,26,27,30–34,37,38], five studies included patients post-treatment [24,28,35,36,39], while two studies [22,23] included both. One study [24] included palliative patients and in one case [29] treatment status was not informed. The most frequent data collection method applied was in-depth, semi-structured individual interviews (9/19) and focus group interviews (5/19); however, one study used patient diaries [27] and two studies used participant observation [26,29]. Supplementary Table I, to be found online at <http://informa>

healthcare.com/doi/abs/10.3109/0284186X.2014.995777 presents key features and quality scores of the 19 papers [21–39] included in the systematic review.

Quality appraisal

Quality scores (of 9) ranged from 6 to 9 with a mean score of 7.7 indicating a generally good quality of research across all papers. However in 12 of the 19 papers a third reviewer was involved to reach consensus between researchers. Typical methodological flaws included suboptimal explanation of recruitment strategy and discussion of saturation of data. Moreover, the papers typically failed to provide sufficient critical examination of the researchers' role.

Synthesis ($n = 8$)

Three main themes were identified across the eight studies [21–28] included in the meta-synthesis: **Emergence of continuity** including the subthemes *new purpose*, *goal-setting* and *positive distraction*, **Preservation of normality** including the subthemes *social support*, *autonomy* and *affirmation of own health*, and **Reclaiming the body** including the subthemes *enhanced performance*, *safety through professional supervision* and *overcoming barriers*. Table I presents a summary of the themes, sub-themes and sample quotations identified in the studies included in the meta-synthesis.

Emergence of continuity

This theme includes the subthemes *new purpose*, *goal-setting* and *positive distraction*, and reflects the psychological benefits of exercise-based rehabilitation including the potential of exercise to recapture the loss of continuity and consistency provoked by the disease and treatment.

New purpose. A prevalent and substantial quality of exercise-based rehabilitation is the potential of exercise to re-install structure in everyday life. The fact that exercise may be planned ahead, give the participants something to look forward and a feeling of purposefulness, influence and self-worth, including getting out of the house [21,23]. Specifically, female survivors in Emslie et al. [21] explained how attending exercise classes resembled going to work, which provided a feeling of control. Moreover, gaining a positive attitude to dealing with their cancer including a new purpose was reported by McGrath et al. [22]. Also, the structure imposed by exercise on everyday life was seen by survivors both as a prerequisite and welcomed consequence of building an exercise routine long-term [28].

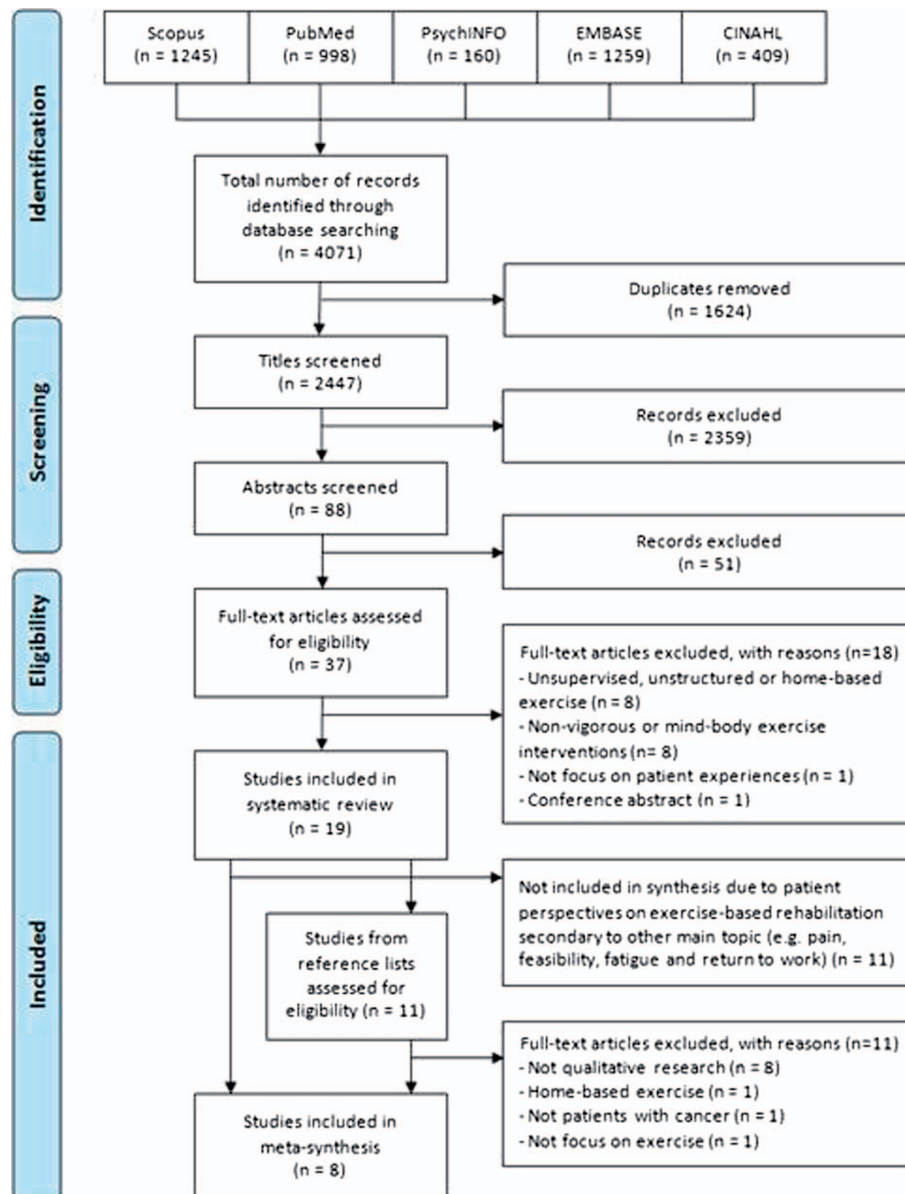


Figure 1. Flow diagram of studies identified, appraised and included in the meta-synthesis, with reasons for exclusion at each stage.

Goal-setting. A quality of exercise is that it may be closely monitored, measured, and recorded, which makes it possible to document positive progression and personal achievements [23,26,27], which for some is the reason for enrollment in exercise [21,26] or synonymous with the very purpose of exercise maintenance [28]. Paltiel et al. [25] emphasized how exercise helped patients in palliative care to establish a goal of physical gain, while Midtgaard et al. [27] pointed out how goal attainment may support the individual's belief in new opportunities including a feeling of being able to carry out desired actions.

Positive distraction. Participants undergoing treatment in the study by Bulmer et al. [23] described how exercise provided a structured retreat from the day-to-day focus on their disease including a respite from

anxiety and fear of dying, whereas post-treatment survivors emphasized participation in exercise as a moderator of unexpected emotions and fear of recurrence [23,28]. However, it should be noted also, that participation in structured exercise training may have the opposite effect in individuals experiencing pain and poor performance as described by Midtgaard et al. [27] including patients with advanced disease. As such, rather than a permanent removal or alleviation of uncertainty, exercise may be said to provide a welcomed distraction defined as 'the nice part of not being well' [21] or a 'lifeline' [23].

Preservation of normality

This theme includes the subthemes *social support*, *autonomy*, and *affirmation of own health* and reflects

Table I. Summary of the categories, themes and sample quotations identified in the studies included in the meta-synthesis (n=8).

Category	Theme	Papers that refer to Theme	Sample quotations
Emergence of continuity	New purpose	[21–23,27,28]	<i>“You reach a certain point after several months of treatment where it’s like getting going in the mornings is a hard problem and it [exercise] sort of forces you to plan your day and get out.” [23]</i> <i>[Diary note] Constitution Day. Worked out in my basement at home. I’ve done this several times. I better take advantage of getting in shape while someone is setting the pace for me. I’m generally pretty happy to have been lured into the project. It feels good to have a sense of an everyday life again. Ate pasta for dinner. I have to do the max test tomorrow. I’m looking forward to that. [27]</i>
	Goal-setting	[21,23,25–28]	<i>“[I]t was a goal, an appointment you had to keep.” [25]</i> <i>[Diary note] Today, I felt that I really got a lot out of the last five weeks of training. The goal I set when entering the program was to get my body moving again and to wake it out of that trance. I reached my goal today. I now know that I can do things, e.g. jog or something similar when the project finishes. [27]</i>
	Positive distraction	[21,23,25,27,28]	<i>“I thought it would just ... help the weeks go by and give me a focus other than attending hospital and all the horrible things ... something positive to do.” [21]</i> <i>“[...] And it gets you out of just thinking about yourself and your pain and your grief and all of the emotional drama and fear of dying and anxieties . . . it just raised my spirits. It made me feel much more positive and less anxious.” [23]</i> <i>“Just to get out and do something else, you almost forget things are so bad.” [25]</i>
Preservation of normality	Social support	[21,22,24,25]	<i>“I’m so sick of everybody at work asking how am I doing. I can’t forget it. This group doesn’t ask me all the time how I’m doing. That’s a really good thing. They know without asking how I’m doing.” [24]</i> <i>“Mentally, I wasn’t in the best condition, so I preferred to get together with others with the same sort of thing [cancer]. [pause] We were a more united group than if you turned up in poor condition at the gym where everyone’s in good condition.” [25]</i>
	Autonomy	[21–27]	<i>“You felt you were doing something FOR yourself ... whereas other things are being done TO you and it gives you ... a wee bit of control.” [21]</i> <i>“When you have cancer I think a lot of the time you feel that you’re not in control. You don’t really know what’s happening with your body. And the Chemo Club has given me some control over that. I’m doing something about it, and I suppose the word I’d use is empowering. It’s really empowering.” [22]</i>
	Affirmation of own health	[22,23,28]	<i>“[...] And so to be able to go to a place where I can affirm for myself that yes, my body is still capable of doing exercise, and it’s still capable of getting stronger is just enormously important psychologically. And I’m really, you know, feeling good about it because there’s something I can do to protect myself.” [22]</i> <i>“I feel emotionally better and physically better if I do some kind of exercise. It’s something that I do for myself. I think that is a big piece of it. It’s time for me and it makes me feel more normal having gone through all the things I’ve had to go through in my body. The fact that I can still workout makes me feel healthy.” [23]</i> <i>“My feelings about exercise are due to my feeling that actually exercise saved my life. Even if it has been a very tough period some good things have also come about, and why would I and how could I give up what I believe keeps my healthy. I am convinced that everything will turn out well.” [28]</i>
Reclaiming the body	Enhanced performance	[22–24,26,28]	<i>“It’s crystal clear that I’m able to do much more physically, mood wise and other things. If the results show anything different there must be an error in the measuring instruments.” [26]</i> <i>“You feel kind of clumsy and slow after the treatments. I’m not the same as I was before and don’t know if I ever will be. But I’ve gotten better, I don’t break into sweat quite as easily as in the beginning! During the year you’ve noticed that you’re developing and have already developed.” [24]</i> <i>“Love the atmosphere and the exercise is so good for you because you do feel the energy levels. If you make the effort and go there it reduces your nausea, it lifts your energy levels, you feel so much better. I don’t think I’ve heard anyone say that it doesn’t help their nausea and their energy levels.” [22]</i>
	Safety through professional supervision	[22–26]	<i>“I felt it was really important that we are instructed to do exercises that suit us. I’m really careful about how my hand and spine works and moves. I didn’t know how much strain I could put on it. And how much I can stretch it.” [24]</i> <i>“[I]f you wanted to talk about your diagnosis, it’s good that they have knowledge and understanding about your illness . . . and that they can answer things you wonder about . . . and if they weren’t able to answer, they could find out . . . or they could help me to get in contact with other health professionals.” [25]</i>
	Overcoming barriers	[21,22,24]	<i>“And as unpleasant as it is not to have any hair, you don’t feel as bad when you’re amongst women who have been through the same thing.” [21]</i> <i>“But you don’t get the feeling that here you are ill. I think it’s really well planned. All the exercises and everybody know how fit they are and do everything according to how they feel that day.” [24]</i>

the social benefits of exercise-based rehabilitation including the potential of group-based exercise to create a social context characterized by reciprocal approval/recognition and mutual encouragement. This allows the individual to preserve a normal identity and escape the otherwise dominant patient role.

Social support. Even though the experience of participation in exercise is subjective, it appears inseparable from the social involvement including giving and receiving social support from peers. Luoma et al. [24] emphasized how peer support was important for relieving stigma as the social interaction resembled normal life, e.g. at their workplace, while McGrath et al. [22] described the social component as ‘an enormous boost’ to the participants’ morale. Another important benefit of the group involvement, is the effect of the group on the individual’s motivation (commitment) and performance during sessions/classes [21,25], including empathy and solidarity, described by Paltiel et al. [25] as being associated with a possibility to verbally interact but with non-committal relationships and by Emslie et al. [21] as ‘a kind of informal counseling and support’.

Autonomy. Participation in exercise may facilitate the discovery of physical capabilities and help survivors redefine themselves as potentially ‘fit and athletic’ [23,27]. Bruun et al. [26] described how the participants through exercise felt able to fulfill their desire to take action and assume responsibility in promoting their own health [26], while participants in [21,24,27] described feeling a sense of mastery over their disease, and promoting and enabling a switch/transition in identity from being a cancer patient to being a healthy individual again. Similarly, women in Bulmer et al.’s study [23] described their exercise sessions as ‘empowering’ and how they felt proud of having done something positive and proactive for their health. Participants indicated that the focus on doing something constructive about their physical condition through exercise gives a sense of competence and increased confidence at a time when life seems out of control [22].

Affirmation of own health. Participation in exercise-based rehabilitation was described by participants as an affirmation of their healthy status. In Bulmer et al.’s study [23], the exercise sessions were viewed by participants undergoing active treatment as positive, proactive steps to improve health. Similarly, McGrath et al. [22] described how exercise may provide survivors with a positive and well supported perspective on their condition. In comparison, post-treatment survivors experienced exercise as a means to create distance from their previous status as a cancer patient [23] and an investment in healthy

living potentially protecting them from disease recurrence [28].

Reclaiming the body

This theme includes the subthemes *enhanced performance*, *safety through professional supervision* and *overcoming barriers* and reflects the physical benefits of exercise-based rehabilitation related to physical challenges enabling the individual to re-establish confidentiality and trust in their own body and physical potential.

Enhanced performance. Because participants feel that their physical fitness is impaired due to cancer treatments, physical recovery and the experience of enhanced performance is experienced as especially rewarding and motivating [24,26]. The survivors in Midtgaard et al.’s study [28] explained how participation in exercise had offered them sufficient personal experience to feel certain that regular exercise is preferable to sedentary behavior in that it is rewarding especially in terms of reduced fatigue. Similarly Bulmer et al. [23] emphasized how improvements in strength and aerobic conditioning from exercise enhanced women’s confidence about re-engaging in pre-cancer activities and taking on new physical challenges.

Safety through professional supervision. It is crucial for the participants, that the professionals in charge of the intervention have knowledge of cancer and its consequences including knowledge of basic physiotherapy skills [25]. When exercising under the supervision of health professionals, participants feel that they do not need to explain why their physical performance may be poor, nor why their movements may be restricted [22,24]. Luoma et al. [24] described the importance of the instructor tailoring the classes so that the activity was manageable, though also challenging the participants to exercise intensely, like healthy persons [24]. Accordingly, female survivors in Bulmer et al.’s study [23] described their relationships with their trainers as ‘nurturing’, ‘encouraging’, and ‘comforting’. Also, access to professional expertise and/or extensive medical examinations is imperative to alleviate concerns about sore muscles and painful joints and to clarify the difference between feeling frail and being in poor physical shape [24,26].

Overcoming barriers. Changes in appearance is perceived by many survivors as a barrier to joining an ordinary exercise class [21], whereas changed appearance is a common issue in exercise-based rehabilitation. During exercise-based rehabilitation, participants feel relieved that nobody stared or felt sorry for them because of their illness [24]. Participants in Luoma et al.’s [24] and Emslie et al.’s [21] studies stressed

the importance of exercising with women with similar experiences, since they felt that they did not need to take into account other people when they were undressing or taking a shower after the exercise. For some survivors, participation in exercise-based rehabilitation was also a way to overcome the barrier of feeling too frail to attend regular exercise groups [24] or feeling self-conscious in front of others [22].

Discussion

This review is the first to draw together qualitative research on the experiences of cancer survivors participating in exercise-based rehabilitation. The findings suggest that the potential of rebuilding structure in everyday life, creating a normal context and enabling the individual to re-establish confidentiality and trust in their own body and physical potential constitute substantial qualities. These qualities are fundamental to the understanding of the meaningfulness of exercise-based rehabilitation from the perspective of patients, and add to the current clinical evidence on physical activity by providing a substantive understanding of the patient perspective that cannot solely be measured and counted by means of standardized methods [10]. Specifically, this meta-synthesis illustrates that cancer survivors prioritize and benefit from exercise because of a wish to maintain or rebuild a normal daily life, preserve or rebuild their personal identity and feel in control of or (re)united with their body/physical self.

Although not motivated by the being together with other cancer survivors *per se*, the findings in this review indicate that cancer survivors appreciate the opportunity to exercise at a place where the physical limits of the body or altered appearance caused by the disease and the treatments are non-judgmentally accepted and sympathetically understood. Being in a context where everyone is familiar with the diagnosis of cancer, and the ways in which it may affect the body, participating in activities that are synonymous with health and self-determination, exempts the individual from the role as patient and may reduce the risk of perceived stigma, which may in itself be associated with an elevated risk of depression in cancer [40]. As such, the findings provide an understanding and explanation of the evidence of the effect of exercise on quality of life and depression/emotional wellbeing. Especially the opportunity to set goals implying a positive outlook and sense of directedness is a quality and an ability that is in direct contrast to the symptomatology of depression including lack of initiative and pleasure [41,42]. It appears from the findings in this review, that exercise may be a way for the individual cancer survivor to reinstall predictability and comprehensibility in their life known to be

fundamental to a positive self-rated health despite illness [43]. Also, exercise appears to serve as a means to achieve a sense of continuity whereby the individual may feel less alienated from themselves, their friends and family described by Little et al. [44] as a major task for survivors with reference to the experience of discontinuity caused by the cancer illness. As such, by participating in structured exercise the individual is offered a positive and potent narrative synonymous with new possibilities and hope including negotiation of positive outcomes [45]. However, regarding preservation of normality, including affirmation of own health, it should be noted also, that some cancer survivors appear to be motivated to exercise because of a (religious) wish to protect themselves from disease recurrence as described both in the study by Midtgaard et al. [28] and in the study by McGrath et al. [22]. As such, when promoting the meaningfulness of exercise to cancer survivors, health professionals need to be aware of the risk of self-blame in patients who experience disease recurrence and the risk of provoking or enhancing fear of recurrence in disease-free survivors. Evidence-based practical guidelines for exercise coaching of cancer survivors, taking into account the potential of exercise to create new meaning in the life of the individual, have been published previously by Midtgaard [45].

Although exercise has proven in some qualitative studies (e.g. [26,29]) to be especially appealing to male survivors otherwise reluctant to participate in rehabilitation, this review indicates that female survivors profit from exercise to the same extent as their male counterparts with regard to the experience of control and self-reliance. Thus, while some of the important qualities of exercise lie in its potential to facilitate a male-sensitive context based on active, rational, and action-oriented activities rather than verbalized emotional support, these exact qualities should be recognized also as equally beneficial and attractive for female survivors. More studies are warranted to conclude whether the meaningfulness of exercise-based rehabilitation is transferable to children and/or adolescents with cancer, as the context of interventions including these populations is likely to be different from the contexts examined in the studies included in this synthesis.

The motivational aspect of the group setting was emphasized in most studies (e.g. [21,37]), and supports the implementation of group-based exercise. However, given the time-limitedness of most structured and often center-based programs, the importance of the group could equally offer a potential explanation of the often modest/suboptimal levels of long-term (post-intervention) adherence. More studies critically examining the risk of participants in structured, group-based programs becoming too dependent on the support from health professionals

and peers to transfer their experience to 'real life' settings outside the intervention are warranted. In this regard, community-based, time-unlimited exercise opportunities, such as dragon boat racing [46–48], may be superior to center-based, structured interventions in terms of improved/better long-term adherence. However, more research is needed to demonstrate whether programs that are unsupervised by health professionals and less structured possess the same psychological qualities as the interventions examined for the purpose of this review.

Methodological considerations

This meta-synthesis is dependent on the studies included, and it is possible that important publications might have been missed as we only included English language studies. Also, we did not conduct 'berry-picking' [20], i.e. performed footnote chasing, grey literature searches, author searching and hand searching selected journals, and may have retrieved just a sample of all relevant studies in the field. Nine of 19 papers included in the systematic review, and three of the papers included in the meta-synthesis were authored by one or two of the reviewers involved in this study, however the decision to include them was reached in consensus. Moreover, the synthesis as presented in the Results section of this study has been approved by 7/8 of the first authors of the included papers. Specifically, we emailed all authors asking them if the integrity of their original research was intact following our meta-synthesis, including whether they felt that their work had been misinterpreted or extrapolated beyond the limits of the data. Only minor changes were made on this basis, supporting the trustworthiness of the novel interpretation presented in this study. However, the synthesis of the qualitative framework is a dynamic process, and it is possible that other researchers would have arrived at a different interpretation.

Conclusion

The findings in this meta-synthesis suggest that cancer survivors experience participation in exercise-based rehabilitation as a means to fulfill their mental, social and physical wellbeing independent of disease status. In addition to the accumulating evidence for the efficacy of exercise training in cancer survivorship, it is incumbent upon clinicians and policy-makers to acknowledge that exercise-based rehabilitation involves human behavior and interaction, which is both informed and mediated by context [11]. Accordingly, the effect of structured exercise cannot be properly interpreted and promoted without taking into account the meaningfulness of exercise, and the

use of this knowledge may provide new solutions to current problems related to recruitment, adherence and implementation.

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Supplementary material available online

Supplementary Table I.