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TUTORIAL REVIEW

Physical activity and patient-reported outcomes: enhancing impact

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Abstract Physical activity (PA) is beneficial for cancer survivors across the cancer trajectory. Evidence indicates physical and psychosocial benefits, and ultimately, enhanced overall quality of life, for individuals who are more versus less active (Semin Oncol Nurs 23:285–296, 2007; Cancer Epidemiol Biomarkers Prev 14:1672–1680, 2005; J Cancer Surviv 4:87–100, 2010). A number of recent reviews have been conducted that examine different patient or survivor populations and outcomes. In general, the findings across the reviews reveal potential positive associations between exercise (structured activity one engages in for the purposes of enhancing health-related fitness outcomes) and PA (any physical movement, including lifestyle types of activity) with both physical and psychological outcomes. It is important to note, however, that depending on the nature of the review and the types of studies included in the review, the strength of the findings (i.e., effect size) vary. Despite this overwhelmingly positive evidence for the benefits of PA, activity levels are very low among cancer survivors, with one study reporting only 22 % of survivors as active enough to achieve health benefits (Cancer 112(11):2475–2482, 2008). This suggests that we must begin to better understand the factors that impact the uptake and maintenance of PA among cancer survivors. These potential factors are important when considering the patient-reported outcomes to assess and can include timing (i.e., during or after treatment completion), characteristics of the cancer diagnosis and subsequent treatments (i.e., early vs. late stage cancers), and characteristics of the individual (i.e., older vs. younger).

Keywords Physical activity · Cancer · Psychosocial benefit · Quality of life

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Patient-reported outcomes

Patient-reported outcomes, or PROs, are important indicators of the impact of any PA intervention. Commonly reported PROs include psychosocial indices of well-being, including depression, anxiety, stress, and overall emotional distress. The data strongly suggest that survivors undergoing cancer treatment generally report poorer psychosocial health, with upwards of 45 % of survivors indicating psychosocial concerns [6, 11]. For some survivors, poor psychosocial health indicators, such as depression and anxiety, may be acute. However, for many survivors, indices of poor psychosocial health are often sustained well into survivorship [4]. Non-pharmacological treatment modes, in which to facilitate optimal psychosocial health profiles among cancer survivors, are varied and can include group psychotherapy, educational resources, art or music therapy, and individual one-on-one counseling. While the data suggest that these modes of therapy have been found to have small effects on varied psychosocial health outcomes, they are unlikely to also address the physical and functional concerns experienced by cancer survivors, including the debilitating fatigue experienced by many cancer survivors [21]. And it is often these physical and functional concerns, as well as indices of emotional distress, that negatively impact overall quality of life [9].

PA has the potential to impact multiple aspects of health and well-being, including both the psychosocial and physical PROs [14, 21]. In a recent meta-analyses, the effectiveness of behavioral techniques and physical exercise on psychosocial functioning and health-related quality of life (HRQL) was examined in 56 studies of breast cancer patients and survivors [9]. Their analyses revealed that exercise interventions had as large or larger effect sizes on indices of fatigue, depression, body image, and HRQL in comparison to behavioral interventions.

In the cross-sectional literature, we see beneficial relationships between PA and the improved management of depression, anxiety, and self-esteem. These studies represent a variety of tumor groups at different points throughout the cancer trajectory [1, 10, 13, 19, 20, 22]. The literature to date also clearly indicates a number of potential considerations in the positive impact of PA on a variety of PROs. The first is timing of the intervention. In general, PROs are positively impacted by a PA intervention delivered post-treatment, while no significant benefits on psychosocial outcomes for studies completed during treatment [7]. However, this does not necessarily mean that we should only consider offering activity interventions after treatment. Rather, we must consider in the outcomes of interest whether we are looking for improvement or maintenance, and what dose is required for each of these outcomes. Belanger et al. found in young adult cancer survivors who receive chemotherapy that even smaller amounts of PA may result in PRO benefits [1]. However, for survivors not receiving chemotherapy, it may be possible and necessary to promote the achievement of recommended PA guidelines in order for benefits related to PROs to be realized (i.e., depression, self-esteem, stress).

Second, we must consider PROs as a primary outcome. While a number of the PA intervention studies include

Table 1 The program model

Principle	Critical components
1. Clinic support and physician referral	• Enlist physician support through program recommendation and direct survivor referral. Physicians are among the most powerful stimuli for promoting health-related behavior change [8].
	• Ensure survivor needs regarding referral to a PA program can be balanced within the demands of a busy clinical setting.
	• Referral process must be straightforward and all health care providers must understand the value (i.e., likely benefits) of the program, survivor eligibility criteria, and their role in the referral process.
2. Tailored program design based on population needs	• It is critical to consider the specific needs of survivors of specific cancer types and tailor the PA program to best suit the needs of each target group.
3. Integrated wellness education and behavior change strategies	• Provide survivors with tailored educational materials along with professional consultation. This strategy can promote survivor engagement and behavior adoption [5, 18, 23].
	• Implement behavior change strategies, including goal setting contracts that allow for the achievement of smaller goals promoting 'mastery' as the survivor works towards long-term goals [17].
	• Encourage self-monitoring techniques such as PA tracking journals.
	• Evaluate adherence through attendance checklists, midterm, and final reports. Follow up with survivors who miss scheduled sessions.
	• Monitor survivors and provide results allowing for reflection on program progress (goal achievement) and future goal development based on progress and unique needs (goals).
	• Record progress in health records, allowing for the development of a clinical feedback-loop, thereby reinforcing program referral.
4. Individualized PA prescription	• Include a component of personal individualization within the program so that all survivors receive the appropriate PA prescription including all elements of fitness, with their current and previous health history in mind.
	• Consider previous and current contraindications, including injury, disease, medications, and treatment side effects.
	• Recognize individual goals.
5. Group-based PA classes	• Allow for group interaction and socialization, capitalizing on social support among members, which in turn can improve adherence and enjoyment [15].
6. The promotion of independent PA habits	• Encourage survivors to engage in PA independent of the class and begin to choose activities that specifically interest them.
	• Encourage survivors to begin trying other types of PA classes to diversify their experience and allow for further community integration.

fatigue or quality of life, relatively little have a primary focus on depression or other indices of emotional distress. Given the importance of these PROs for cancer survivors, and the potential impact of these factors on subsequent engagement in regular PA, they must be considered and assessed when designing a PA intervention.

Third, we must consider addressing PROs in interventions beyond breast cancer and the potential changes in PA prescription that need to be considered depending on cancer type. For example, in their 2010 review, McNeely and Courneya indicate that resistance training is particularly beneficial for cancer-related fatigue in prostate cancer survivors [16]. This is different than in breast cancer, where the vast majority of work supports the role of cardiovascular activity for alleviating fatigue [16].

Finally, in understanding the role of PA on PROs, we must move beyond initial adherence and consider the issue of PA maintenance. Long-term benefits in PROs require long-term PA; thus, interventions must focus on the promotion of skill development for participants to become independent exercisers. Ultimately, this means shifting our research design process to including longer term follow-ups. And within the intervention, we must teach self-regulatory skills that will foster maintenance, including goal setting and efficacy for scheduling, overcoming barriers, and engaging in regular PA. These skills will aid in the transition to independence, and along with an individualized PA prescription that targets the outcomes meaningful to each individual and ensures steady gains in both physical and psychosocial well-being, self-regulatory skills will go a long way in promoting engagement in regular PA.

Building a sustainable PA program

The table highlights a number of the factors that are critical components in the development of a sustainable clinic or community-based PA program (Table 1). This model has been implemented in our work in both neuro-oncology and head and neck cancer survivors [2, 3].

Summary

There is a continued need in the literature to examine the role of PA—its benefits, how to best promote it, and ultimately, how to best sustain it—and this should be considered in future research and in building evidence-based programming. Irwin provides an excellent overview of key strategies and barriers in implementing PA programs [12]. With continued research and the translation of findings into evidence-based programming, many of the barriers can be eliminated and strategies promoting long-term maintenance can be enhanced, and ultimately, positively impacting the cancer experience for all survivors.

Conflict of interest The authors have no conflict of interest to declare.

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