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ORIGINAL ARTICLE

A qualitative study exploring what it takes to be physically active with a stoma after surgery for rectal cancer

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Abstract

Purpose Many adults must cope with the adverse effects of cancer and adjuvant therapies, which may limit their engagement in health-enhancing behaviors such as physical activity (PA). Furthermore, the placement of a stoma during surgery for rectal cancer may cause additional challenges to being physically active. The aim of this study was to explore the experiences of rectal cancer survivors who were living with a stoma and the impact on their engagement in PA.

Methods Interpretive phenomenological analysis was used as the approach for this qualitative study. Fifteen rectal cancer survivors took part in a semi-structured interview post-chemotherapy, and thematic analysis was used to identify themes within their accounts.

Results Three themes captured participants' personal lived experience: (1) *reasons for engaging in PA*, (2) *deterrents to engaging in PA*, and (3) *practical implications*.

Conclusions Participants' accounts offered insight into both their cancer and stoma-related experiences, highlighting both reasons for and deterrents to engaging in PA. Further, findings helped to identify tangible strategies that those learning to be physically active with a stoma may find useful.

Keywords Physical activity · Stoma · Ostomy · Qualitative methods · Rectal cancer

Introduction

Each year, an estimated 14.1 million cancer diagnoses are made worldwide [1]. Colorectal cancer is the third most common cancer in men and the second in women [1]. About 33% of colorectal cancer originates in tissues of the rectum. Although highly curable if detected in the early stages, most adults diagnosed with rectal cancer will require a temporary or permanent stoma (i.e., an opening on the side of the body for the evacuation of bodily waste) after surgical resection of the tumor [2]. Stomas present challenges that can reduce adults' quality of life [3–7]. Adults with a stoma may be apprehensive about pouch leakages, gas, and offensive odors, and subsequently avoid pleasurable and health-promoting activities (e.g., physical activity (PA); [3–6, 8, 9]) to avoid interacting with others. Moreover, they may avoid PA because they are worried about experiencing irritant and rash effects on the skin surrounding their stoma or other complications (e.g., injury, herniation). This notion is supported by evidence showing that although PA is safe and beneficial for adults during and after treatment for rectal cancer [10], most adults are largely sedentary after treatment [11]. This is concerning as a lack of PA increases cancer survivors' risk of morbidity and mortality [12, 13].

Experiencing treatment-related concerns and side effects (e.g., fatigue, pain), environmental challenges (e.g., unsuitable facilities), and psychosocial distress (e.g., depression, anxiety) have been reported as barriers to PA for cancer survivors [14–19]. It is possible that having a stoma can also be a barrier to PA for some cancer survivors who want to avoid exposing themselves and thus socially isolate themselves [5, 6]. Nevertheless, some may develop coping strategies and manage to participate in PA. Thus, understanding how cancer survivors cope with the impact of a stoma in order to be physically active is important to inform the development of support

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programs to increase PA uptake and maintenance. The aim of this qualitative study was to gain insight into the experiences of rectal cancer survivors who were living with a stoma and understand the impact on their engagement in PA.

Methods

Philosophical underpinnings

An interpretive phenomenological analysis (IPA) framework guided this study. It was underpinned by ontological realism and epistemological contextualism, whereby the emphasis was on exploring, interpreting, and describing how participants made sense of their personal experience within their own context [20]. Consequently, the results are a direct reflection and interpretation of participants' experiences.

Recruitment

Upon approval from the University of Ottawa and the Ottawa Hospital Research Institute research ethics boards, criterion sampling was used to recruit adults who met the following predetermined criteria: (1) had been diagnosed with non-metastatic rectal cancer; (2) had undergone surgery for the placement of a stoma, and; (3) had completed chemotherapy. Participants were recruited through referrals from healthcare providers and advertisements until data saturation [21] was reached.

Participants provided written informed consent and were interviewed 6 ($n = 3$), 9 ($n = 1$), or 12 months ($n = 6$) post-stoma placement, or 3 months post-stoma closure ($n = 5$). Semi-structured interviews were conducted at participants' home ($n = 1$), at the university/hospital ($n = 9$), or by telephone ($n = 5$). An interview schedule was used to structure the interview (see Table 1). In line with IPA [22], the schedule started with a series of broad exploratory questions, which were followed by more specific questions and follow-up probes. Interviews were conducted by the first author—a female graduate student with familiarity and training in qualitative methods who was working alongside an experienced qualitative researcher (i.e., second author). Prior to conducting the interviews, the first author conducted three mock interviews with her peers. Interviews were audio-recorded, lasted between 45 and 96 min, and were transcribed verbatim.

Table 1 Main interview questions

1. Can you describe for me your current level of physical activity?
2. How does your current level of physical activity compare with the level you had before having a stoma? (*Probes – To what extent is the change because of your cancer? To what extent is the change because of your stoma?)*
3. Do you have any goals for your health? Is physical activity an important component of being healthy for you? Why? (*Probe – what motivates you to achieve these goals?)*
4. Has your motivation to be active changed since acquiring a stoma? How so?
5. To what degree do you feel that having a stoma impacts your participation in physical activity? (*Probes – is it harder/easier? How so?)*
6. Do you think participating in physical activity helps you? *(Probes – How does it improve your physical health? How does it improve your mental health? Has it allowed you to become more connected to people around you (friends, family)?)*
7. Have people around you encouraged you to be physically active since your stoma placement? *(Probe – your doctor, another health professional, or someone close to you like a family member or friend, or someone else?)*
8. Can you tell me about some of the strategies you used to manage your stoma in order to continue participating in physical activity? *(Probes – For example, what do you do to limit the impact of it? Did you seek out any information to help manage your stoma?)*
9. Do you have any plans to change your level of physical activity in the future? Why or why not?
10. What are your future expectations of being physical active with a stoma?

Note. Questions were tailored based on if participants still had their stoma

Data analysis

Thematic analysis, an approach that is congruent with the ontological and epistemological assumptions that underpin IPA, was used to analyze the transcribed interviews inductively and identify themes [23]. This involved six iterative steps. First, both authors familiarized themselves with the data. Second, they generated salient initial codes from the data in a systematic fashion for each transcribed interview, creating a rich, contextualized, and holistic picture for each participant. During this step, they acknowledged that this involved *interpreting* the meanings, values, experiences, opinions, and behaviors of each participant. Third, they grouped together similar codes across participants' accounts to form subthemes. Fourth, they explored meanings and patterns, inconsistencies and conflicts in participants' thoughts and behaviors, and created themes that were consonant with the data as a whole. Fifth, they discussed these themes and mutually defined them while ensuring internal cohesiveness and external heterogeneity. Last, they created a narrative description for each theme and selected quotes from the transcripts to illustrate the meaning and sentiment of each theme.

Trustworthiness

Alternative criteria that have been proposed by qualitative researchers [24, 25] and that are compatible with the specific nature of this study in terms of its methodology, aims, and philosophical underpinnings, were used in combination to help ensure the quality, integrity, rigor, and relevance of this study. First, a homogenous sample of rectal cancer survivors who had undergone surgery for the placement of a stoma and who were willing to share their experiences were recruited. Second, information about participants is provided to aid readers in judging the transferability of the findings to other settings. Third, both authors engaged in a reflexive discussion, which provided an opportunity to consider multiple perspectives and alternative constructions of the data. Fourth, the strategies employed to collect and analyze the data matched the aims and embraced a relativist ontology and contextualist epistemology. Fifth, the results include quotes to: (1) provide sufficient evidence for the provided interpretations, (2) allow readers to arrive at their own interpretations, and (3) touch readers in some way. Last, an audit trail was maintained, which can be laid open to external scrutiny [26].

Results

Participants

Table 2 provides a profile of each participant. Briefly, participants were 15 rectal cancer survivors between the ages of 34–80 years who had a mean body mass index of 27 kg/m^2. Most were men (n = 11), identified themselves as White (n = 12), had completed post-secondary education (n = 11), had been diagnosed with stage III rectal cancer (n = 10), and had a temporary stoma (n = 8). Along with their demographic characteristics, Table 2 offers information about their involvement in PA divided into five domains: (1) physically active at home (e.g., housework, gardening, do it yourself maintenance); (2) walking; (3) sports (e.g., swimming, running); (4) exercise (e.g., CrossFit, yoga), and (5) physically active lifestyle (e.g., paid labor, active transport). Although participants reported engaging in less strenuous PA post-diagnosis, they all engaged in PA when interviewed.

Main findings

The findings are organized into three overarching themes: (1) *reasons for engaging in PA*, (2) *deterrents to engaging in PA*, and (3) *practical implications*. Table 3 summarizes the main findings.

Table 2 Participant characteristics

Pseudonym	Age (years)	Sex	Stoma status	Cancer stage	Activity profiles
Patrick	34	M	Permanent	III	Pre-cancer: physically active lifestyle, sports Current: walking
Lewis	64	M	Temporary	III	Pre-cancer: physically active at home, physically active lifestyle, sports Current: physically active at home, walking
Ahmed	45	M	Temporary	III	Pre-cancer: physically active lifestyle, walking Current: walking
Roger	67	M	Temporary	Unsure	Pre-cancer: walking Current: walking
Victor	65	M	Temporary (reversed)	III	Pre-cancer: physically active lifestyle, walking Current: walking
Carol	69	F	Temporary (reversed)	III	Pre-cancer: exercise, physically active lifestyle, sports Current: walking
Dave	62	M	Temporary (reversed)	Unsure	Pre-cancer: physically active at home, physically active lifestyle, sports Current: physically active at home, walking
Mark	50	M	Temporary (reversed)	II	Pre-cancer: exercise, sports Current: sports
Karen	53	F	Temporary (reversed)	II	Pre-cancer: exercise, sports Current: exercise, sports
John	54	M	Permanent	III	Pre-cancer: sports, walking Current: sports, walking
Ben	55	M	Permanent	III	Pre-cancer: sports, walking Current: walking
Julie	58	F	Permanent	III	Pre-cancer: exercise, sports Current: exercise
Ali	65	M	Permanent	III	Pre-cancer: physically active at home, physically active lifestyle, walking Current: physically active at home, walking
Will	80	M	Permanent	III	Pre-cancer: physically active lifestyle, walking Current: walking
Mary	70	F	Permanent	IV	Pre-cancer: exercise, sports, Current: exercise, sports

Note. M = male. F = female

Table 3 Summary of main findings

Themes	Subthemes
Reasons for engaging in physical activity	Enjoyment, health benefits (mental and physical), sense of achievement, weight management, sense of normalcy, spending time on themselves away from daily responsibilities
Deterrents for engaging in physical activity	Negative side effects of cancer and treatments, uncertainty in unfamiliar surroundings, physical restrictions, fear of injury, unclear guidance, stoma, public and private self-consciousness, negative past experiences
Practical implications	Social support and support networks, guidance, past experiences, experimentation, safe environment, skills and confidence

Reasons for engaging in PA Participants recognized that there were general health benefits associated with PA. These included feeling "energized," managing psychosocial concerns (e.g., depression, anxiety, stress, lack of confidence), maintaining functional ability and quality of life, reducing their risk of future illness, managing weight, improving fitness, and improving stoma health (e.g., prevent blockages, enhance stoma appliance attachment). For example, David was motivated to engage in PA to feel less depressed. He shared: "I realized that I was depressed. Sometimes if you just force yourself to do it [PA], it snaps you out of that state and brings you back to the real world." Ahmed discussed that he engaged in PA for health and weight management reasons. He said: "I keep walking to stay healthy and try to control the weight." For Julie, her reasons revolved around avoiding different problems related to having a stoma. She offered: "Being physically active keeps things moving through the intestine and the stoma as well. Quite often, if I'm feeling sluggish I will take my big glass of prune juice and go for a bit of a walk to get things moving. That really helps."

Participants also emphasized that PA played a key role in their self-care as it provided a means to improve their prognosis and maintain control. Illustrating this, Karen said: "When I was first diagnosed I had to stay healthy in my mind and in my body and I had to do as much as I possibly could to do my part in the care [of my cancer] and, to me, my part was eating and drinking as much as I could and keeping [physically] active."

The cited health benefits were not the sole reason for engaging in PA. Participants discussed other reasons, including experiencing enjoyment, gaining a sense of normalcy, and reclaiming their identity. For example, Ahmed said: "I love it. That's number one. I find I'm really enjoying it. It really reflects back on my happiness and my stress-free [life]." Julie described how running helped her regain a sense of her old self. She explained: "I was active going in so that's kind of who I am a little bit. I wanted to get back to who I was before [cancer]."

Participants also engaged in PA to feel a sense of achievement and have a dedicated time to clear their minds. After undergoing what participants often described as "painful" and "exhausting" treatments, they found improvements in their physical ability rewarding and reported feeling that they had accomplished something. Further, being physically active empowered them to step away from daily responsibilities that could sometimes be overwhelming. Karen explained: "You can conquer anything out on a walk. It becomes clearer, allows you to think. Stuff just sort of flows in your head. Whereas when you're not exercising and you're just in your environment going about your daily activity, you don't get that extra space in your mind."

Deterrents for engaging in PA Although participants had many reasons to be physically active, they found that the adverse side effects of common cancer treatments were a main deterrent because they made them feel unable to engage in PA. They recalled difficulties in staying motivated to be physically active when experiencing fatigue, pain, neuropathy, burns, nausea, and fevers. Ben described how the neuropathy from his treatment limited the types of activities he could do. He said: "I don't run anymore because I can't feel the bottom of my feet as much as I should. So, I have to be careful of the way I walk because I can't feel something and I could stumble easily."

Participants also recalled stoma-related issues as reasons for not consistently engaging in PA or for avoiding certain types of activities. Issues reported included wounds from the surgery and concerns about the risks associated with PA (e.g., skin irritation, risk of hernia). For instance, Mary found that the painful surgical procedure and resulting outcome was an issue for her. She explained: "I used to do triathlons and I can't do them now. That's got nothing to do with the actual colostomy, but the fact that they removed my tailbone and some of my nerves have been damaged. I can't sit on a bike anymore because I have chronic pain." Participants further described that being unsure about the right amount or types of activities was an impediment. Patrick stated: "Part of being physical with the ostomy in terms of lifting and stuff like that I'm very cautious. There are a lot of those unknowns, and so I'm erring on the side of caution just to protect myself and protect the ostomy as best as I can." Pouch leakages were also seen as a nuisance. Whereas for some it was the fear of leakages, for Karen it was the actual experience of having an accident that changed her plans. She shared: "Your ostomy totally affects that step-by-step bit because you could make all the plans you want in the world [to participate in PA], but if you're going to have a leak or your bag is bursting, you got to go home. It's done, you've got to go home."

Other stoma-related reasons that limited participants' ability to be physically active had to do with concerns about making other people uncomfortable and their own self-consciousness. Participants worried about other people's reactions and this fear ultimately led them to avoid PA. For example, the belief that others would feel uncomfortable at the sight of his stoma led Will to avoid PA. He explained: "I'm not too self-conscious about it [my stoma]. That doesn't really bother me too much, but I don't want to cause discomfort to other people." Further, participants did not want to expose themselves to negative reactions that would occur in the event of pouch leakages, gas, and offensive odors. David shared this saying: "I wouldn't go swimming. I wouldn't do the activities because I was afraid of the stoma. I've had accidents and it's embarrassing when that happens, especially when you're among people, because you've got the odour and all that. I didn't feel safe to go."

Moreover, participants withdrew from organized sport due to feeling uncomfortable around others. John found it difficult to hide his pouch and keep it out of other people's sight, leaving him feeling anxious. He said:

> How do I change my equipment in the dressing room without everybody seeing? I'm not too vain, but that's not something I want to advertise either. I can't shower after hockey. Maybe I'll be in that place one day where I can take a shower with 10 other guys and have a bag attached to my stomach. It's not anything I've ever seen so I don't think that's going to happen.

Practical implications Participants' accounts suggest that a complex interplay of physical, psychosocial, and environmental factors influenced their engagement in PA. Participants stressed that they strongly valued being physically active, which encouraged them to spend time and energy trying out various techniques to minimize potential stoma-related complications. They highlighted the importance of maintaining a strong and supportive social network made up of friends and family, health professionals, other stoma recipients, and athletic coaches. Especially important was receiving encouragement, positive feedback, information, and insight on how to deal with common problems resulting from both cancer and having a stoma (e.g., skin irritation, pouch leakage, offensive odors). This was exemplified by Victor who said:

> It was encouragement from people more than anything. Really, that was what it was. It was just gentle encouragement. When I was in the hospital there was one doctor, he finally met me on the last day to release me and he said: 'You know, I kept coming to have a talk with you but you were never there' and I said: 'Well, I'm sorry' and he said: 'No, it means you were out walking. That's good.' So, I took that to heart.

Participants lacked knowledge about the appropriate types and intensities of PA for someone with a stoma, and advocated that consulting a trained professional who would be able to develop a tailored program would be valuable. Mary mentioned that she found her coach's advice helpful. She stated: "I have a coach. I go to her when I need a training program and she knows my limitations. She knows I can't strain too much here because otherwise my bowel will come through my muscle and stuff like that. So she tailors them for me." Participants' perceived lack of knowledge also decreased their confidence as they felt unsure about returning to previously enjoyed activities. They explained that having a realistic role model and seeing other stoma recipients engage in vigorous PA helped (or would help) to alleviate their concerns. Ali expressed this when he said: "I'd like to run and play sports like tennis or something, like badminton. I used to play it. I'd like to play it and get back to my normal life. So if I see somebody is playing with an ostomy then maybe I will have confidence."

Feeling accomplished was important in motivating participants to engage in PA. Current PA guidelines and returning to prior levels were generally perceived as unattainable and no longer relevant as a result of declines in their physical capabilities after undergoing treatment and receiving a stoma. Rethinking goals and putting emphasis on rewarding effort and achievements was listed as a strategy to improve PA uptake and maintenance. For instance, given the flexible nature of running (i.e., the frequency, intensity, and duration can be modified to suit the skills and limitations of each person), Julie was able to acknowledge that she could not currently do what she used to do and was able to adjust her goals to still be physically active. She offered: "I can't seem to get over 10 kilometers in my PA. It just seems my body can't do it anymore. Sometimes [the stoma] causes me problems or a blockage or things like that. Sometimes it's just a physical issue. I'm resigned to 'I try to be active every day as best I can'." Victor found that setting a daily step goal helped him. He stated: "Every day, I set a goal. I'll walk at least half an hour to an hour everyday outside of everything else."

Participants discussed that planning and monitoring their stoma prior to and during PA was helpful to avoid different problems (e.g., gas, offensive odors, obstructions, constipation). Examples of how to do this included making a plan on what to do if a leak happens, following a special diet or modifying their diet to prevent blockages and gas, eating at different times, staying hydrated, finding ways to "dress" the stoma to go swimming, identifying signs that the stoma might leak, keeping the area dry as sweat could lead to a breakdown of the seal causing a leak, ensuring the pouch was empty, monitoring fullness of the pouch, ensuring the seal was fully dry before trying to move the appliance, using extra “paste” and heat to seal the appliance, and bringing along extra supplies in case of a leak. Victor highlighted this when he said: “I knew that it was starting to break down a bit because you could start to see [the seal] bubbling. I would, for emergency, tape it up which would get me through the day until I got home to change the bag.”

An additional component of being physically active with a stoma involved making personal comfort a priority to ensure peace of mind. This meant wearing attire that was conducive to being physically active with a stoma. For instance, participants suggested wearing a stoma-belt accessory, which served multiple purposes: it helped with comfort; stopped leaks, and; reduced noises related to fecal and gas emission. For Ben, this really helped him feel more secure during PA. He said: “They call it a stoma-belt and it’s basically a bag holder. It’s a belt that fits around your waist and the appliance is inside it. So, if something actually happens, like the bag breaks the seal, or the phalange breaks the seal it’s kind of contained within that belt rather than elsewhere.” Besides the stoma-belt, participants reported wearing a tight under-layer shirt to keep the stoma pouch tight to the skin and prevent the pouch from digging into the skin, with a loose top layer in order to keep the bag from swinging around too much.

In addition to wearing comfortable clothes, finding appropriate facilities was important; otherwise, participants would avoid PA. For them, this meant facilities had several washrooms nearby, and that these were suitable to changing a stoma pouch. Roger explained: “I always have to be very cognisant of if there is a washroom I can access in relatively short order if I need to, and is that washroom a practical one for me to use… It’s definitely an incentive to stay home more.” Nevertheless, alternatives to going out were also considered. For example, Carol preferred home-based PA. She stated: “I felt better using that [treadmill] than going outside because if I had a leak I was right by the bathroom so it was no big deal.”

Discussion

The aim of this study was to provide insight into the experiences of rectal cancer survivors who were living with a stoma and the impact on their engagement in PA. Three themes that reflect participants’ accounts are offered: (1) *reasons for engaging in PA,* (2) *deterrents to engaging in PA,* and (3) *practical implications.* These themes collectively demonstrate that rectal cancer survivors experience a range of stoma-related challenges that can impact their engagement in PA, but that it is worthwhile to employ strategies to manage these to maintain a physically active lifestyle due to its wide-reaching benefits.

Participants were motivated to engage in PA because of their desire to experience its benefits. Specifically, they found being physically active improved their physical health as it made them feel energized, and helped them manage their weight, maintain functional ability, reduce their risk of future illness, and improve their fitness. It also improved their mental health as it reduced psychosocial concerns (e.g., depression, anxiety, stress, lack of confidence), enhanced their quality of life, and offered opportunities to experience enjoyment, gain a sense of normalcy, reclaim their identity, feel a sense of achievement, and have a dedicated time to clear their minds. These findings are consistent with results from previous qualitative [19, 27, 28] and quantitative studies with colorectal cancer survivors, which have demonstrated that cancer survivors perceive PA to be beneficial [15, 16, 29]. Based on previous research showing that strategies aimed at shifting people’s motivation from extrinsic toward more intrinsic may be necessary to help them maintain participation [30, 31], helping rectal cancer survivors develop intrinsic motivation for PA may help them adhere to a physically active lifestyle. This may involve strategies to increase rectal cancer survivors’ knowledge of the physical and mental health benefits of PA through education campaigns, advice, and/or counseling. It may also involve creating opportunities for rectal cancer survivors to have pleasant and enjoyable experiences while engaging in PA.

Beyond the general health benefits of PA, a unique finding of this study was that participants used PA to improve their stoma health. Indeed, they revealed that although having a stoma presents challenges in everyday life because of gas, offensive odors, constipation, and pouch leakages, PA can help bowel function. Krouse et al. [16] also reported that rectal cancer survivors who were active had better bowel function. Collectively, these findings suggest healthcare providers should inform rectal cancer survivors that PA may be a potential stoma self-care strategy and may have favorable consequences.

Although participants were motivated to be physically active, they nevertheless experienced treatment-related side effects similar to those previously reported in the literature [15–17, 32], and that these impacted their engagement in PA mostly in terms of intensity and type. It is therefore important to ensure rectal cancer survivors learn that there are strategies that may help to mitigate some of these challenges (e.g., wearing compression garments, having the support of trained experts and professionals; [10, 33]). Nonetheless, over and above “traditional” treatment-related concerns, participants in this study described stoma-related challenges (e.g., gas emission, pouch leakages, offensive odors, noises from the appliance), which impacted their engagement in PA. On the one hand, these caused anxiety as participants lacked confidence to participate in usual activities and/or feared they may damage their stoma by participating in PA. On the other hand, participants’ worries that the stoma may leak or that sudden outputs might break the pouch restricted the activities they engaged in. These concerns echo previous research. For instance, Russell [34] found that adults reduced their participation in PA due to safety concerns (e.g., developing a hernia), and that adults who had a stoma due to cancer, as opposed to the other illnesses, were most concerned about participating in PA. Considering that anxiety can reduce participation in pleasurable activities [35], ensuring rectal cancer survivors receive education and support to gain confidence to return to the types of activities they enjoy most is important.

Another novel finding was that embarrassment due to the visibility of their stoma to others held participants back from engaging in PA. Whereas in previous PA studies [34, 36], adults with a stoma did not mention stoma visibility concerns as a great hindrance to their ability, desire, and commitment to engage in PA, some researchers have reported that the fear of others seeing their stoma or having the stoma system leak in public can cause embarrassment and are common reasons given by adults for avoiding certain activities [5, 8, 37]. These findings emphasize the importance of accounting for individuals' self-conscious concerns, and underscore the need to ensure PA environments are inclusive.

Despite the challenges participants experienced, they offered novel insight into how they continuously adjusted to living with a stoma in order to be physically active. They reported that learning from past experiences and experimenting with new techniques allowed them to continue engaging in PA. They also reported that receiving guidance and acquiring skills that would help them to manage their stoma would subsequently help them overcome the barriers to engaging in PA. These findings underscore the need to develop support mechanisms that cancer survivors can access to promote better coping and adjustment to living with a stoma. Whereas participants' accounts demonstrated that adaptations were individualized and based on trial and error, stoma self-management programs may be an effective way to teach these skills, helping rectal cancer survivors gain a sense of accomplishment [38, 39], which in turn may make them more confident and better able to execute these skills in the future [40]. A final point that was made by participants is that providing opportunities to learn in a safe and nurturing setting that evokes positive feelings may help those who are deterred from PA due to stoma-related challenges. Indeed, giving participants the opportunity to learn how to manage their stoma in a safe space may reduce some of the anxieties surrounding the unknowns expressed by participants.

Limitations

The limitations of this study should be acknowledged when interpreting the findings. First, not all interviews were conducted in person. Although it is not likely that there would be discernible differences in the data [41], the possibility cannot be discounted. Second, interviews were conducted with participants at various stages of their cancer experience. Whereas this likely enriched the findings by providing maximal variation within the selected group, interviewing more participants at different time points after stoma placement and over time might add knowledge about how adults' experience can vary over time. Last, given that participants were volunteers and that physically active adults were eligible, this could have conferred a self-selection bias. Nevertheless, this provided detailed information about the ways adults were able to adapt to their stoma and continue engaging in PA—information that can be shared with other stoma recipients.

Conclusion

Taken together, three themes captured rectal cancer survivors' experiences and demonstrate the considerable impact a diagnosis of rectal cancer and subsequent placement of a stoma may have on their participation in PA. In addition to providing support to the qualitative and quantitative literature on the motivations and barriers to engaging in PA among cancer survivors, the findings highlight strategies rectal cancer survivors may use to overcome challenges to being physically active. They also highlight how future training programs and services may support rectal cancer survivors' endeavors to engage in PA.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Research involving human participants and/or animals All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

Informed consent Informed consent was obtained from all participants included in this study. Identifying characteristics have been removed or altered to protect anonymity, yet this does not distort scientific meaning.

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