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| RESEARCH ARTICLE

Introducing Research into Practice: Establishing the Evidence-based Moving on Programme as Part of Standardized Cancer Care

J. Richmond[1]✉, T. Toby[1], T. Kerr[1], A. Hobbins[2], P. Gillespie[2], and M.G. Kelly[1]

[1]*Letterkenny University Hospital, Donegal Ireland*
[2]*Centre for Research in Medical Devices (CÚRAM, SFI 13/RC/2073_P2) and Health Economics and Policy Analysis Centre, University of Galway, Ireland*
Corresponding Author: J. Richmond, **E-mail**: janicep.richmond@hse.ie

| ABSTRACT

The Moving On Programme (MOP) was developed as a specific intervention to fill an identified service need. This programme was piloted and analyzed by previous research and this paper outlines the process and challenges of introducing the MOP to become part of standardized cancer care. Any adaptations that were required due to the global COVID-19 pandemic restrictions are outlined. Health economic analysis outlines the cost of the MOP and participants' evaluations are presented. MOP has the potential to be far reaching in its appeal and could easily be transferred to other regions.

| KEYWORDS

Cancer, survivorship, diet, exercise, health economics.

| ARTICLE INFORMATION

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Key points:

- Following a cancer diagnosis, there is a need to provide education and support to individuals to promote healthy eating and physical activity to assist in rehabilitation and reduction of future cancer risk.
- The Moving On Programme (MOP) was developed as a specific intervention to fill an identified service need as an intervention to facilitate weight loss/promote healthy eating and an active lifestyle.
- The proof of concept for MOP was analysed by prior research and this paper outlines the process of introducing MOP to become part of standardized cancer care and the adaptions forced by the COVID-19 pandemic.
- This paper presents the current structure of the MOP, participant evaluations and the cost of the intervention.

Reflective questions

1. Explain and discuss the health risks associated with weight gain/obesity following a cancer diagnosis.
2. Identify and analyse the benefits and challenges of the Moving on Programme as an intervention to facilitate weight loss/active lifestyle.
3. Reflect and discuss how the Moving on Programme (or a similar initiative) could be adapted/used in your clinical practice.

Introduction:

The epidemiological evidence clearly demonstrates that global cancer incidence is increasing (Krupa-Kotara & Dakowska, 2021). Cancer is a leading cause of morbidity and mortality and is progressively an important factor in the global burden of disease (Hardman & Munir, 2022). The WHO estimate that over 35 million new cancer cases are predicted in 2050, a 77% increase from the estimated 20 million cases in 2022 (Filho et al, 2024). In Ireland, the authors' home country, over 180,000 individuals who had cancer were alive at the end of 2017 which is equivalent to almost 4% of the Irish population, and this figure is expected to continue

to rise (National Cancer Registry Ireland, 2019). The WHO reports that the predicted continued increase in cancer incidence is mainly due to steadily aging populations alongside current trends in the adoption of unhealthy lifestyles (Bray & Soerjomataram, 2015).

These unhealthy lifestyles include poor diet-specifically excessive intake of food compared to energy expenditure and lack of physical activity, which contribute to high body mass index (BMI)/obesity (Bray & and Soerjomataram 2015; Krupa-Kotara & Dakowska, 2021) which are all modifiable risk factors. Emerging evidence demonstrates that obesity is a complex condition however, reducing food intake and moving more will always assist in weight reduction (Safaei et al, 2021). Even with the recent advanced use of GLP-1 receptor antagonist medication for weight loss and in the absence of any recent research/evidence of the use of this in the cancer survivorship setting, the promotion of eating healthy and exercising more remains the optimal advice for reducing BMI. High BMI is considered the second major risk factor for developing cancer after tobacco smoking (Krupa-Kotara & Dakowska, 2021) and various studies report differing levels of risk for cancer due to obesity. In Europe, for example, obesity has been reported to cause 11% of colon cancers, 9% of postmenopausal breast cancer, 39% of endometrial cancer, 25% of renal cancer and 37% of oesophageal cancer (Bray & Soerjomataram, 2015) and several broad categories of mechanism have been proposed to explain this relationship (Krupa-Kotara & Dakowska, 2021; Hardman & Munir, 2022). Overall, obesity predisposes individuals to a higher risk of at least 13 different cancers (Basen-Engquist & Chang, 2011; Organization for Economic Cooperation and Development (OECD), 2019). More specifically this includes but is not limited to increasing the risk of recurrence among those who had prostate cancer (Jayachandran et al, 2009), colorectal cancer (Doleman et al, 2016) and breast cancer (Park et al, 2014; Bao et al, 2016), therefore representing an adverse factor to overall cancer prognosis.

With the adverse effect of increased BMI/obesity, individuals who have had cancer (often called cancer survivors), should be educated, supported and empowered to make positive lifestyle changes to improve their prognosis (Demarhk-Wahnefried et al, 2017; Fasano et al, 2024). Furthermore, the positive news, is that while physical inactivity is a risk for obesity-related cancers in women, for example (Godinho-Mota et al, 2018), even low-moderate intensity exercise can have a protective effect (Garcia et al 2023). This proactive message can be challenging to impart however, as cancer survivors face unique challenges that result from their disease and its treatment, not least of which are fatigue and general deconditioning, causing them to function at a lower physical capacity than prior to diagnosis.

The majority will experience impairments which can be cognitive, psychological, or physical and be either from the disease itself or treatment toxicity leading to fatigue and a decrease in their quality of life (Palesh et al, 2018; Lange et al, 2019; Grégoire et al, 2020; Hung et al, 2011; Weaver et al, 2012). Consequently, the treatment sequelae can contribute to cancer survivors having a more sedentary lifestyle therefore contributing to an increasing BMI post-cancer treatment. A study in the USA demonstrated this, in that obesity increased more rapidly among adult cancer survivors compared with the general population, specifically in survivors of colorectal and breast cancer (Greenlee et al, 2016). Furthermore, in Ireland, 60% of our population are either overweight or obese before their cancer diagnosis (Healthy Ireland Survey, 2016) so increasing physical activity is often even more difficult in what can be an already challenging time.

Healthy lifestyle behaviors, such as regular exercise and healthy diet, have the potential to reduce treatment-associated morbidity and mortality in cancer survivors (Jones & Demark-Wahnefried, 2006). Therefore interventions that support cancer survivors' management of lifestyle behaviors are imperative (Groarke et al, 2021). Firstly, exercise can mitigate the adverse, synergistic fatigue and general deconditioning of cancer treatment (Hardman & Munir, 2022). Secondly, physical activity and reduction in BMI is clearly associated with a reduced cancer incidence for the development of subsequent primary cancers (Bray & Soerjomataram, 2015) and thirdly as outlined above, reduce the risk of recurrence for the already diagnosed disease. In addition, the psychological benefits of physical activity have been demonstrated in improving low mood and depression, improving sleep which are all factors in improving quality of life and reducing risks of long-term mental health issues as well as many other chronic diseases (Mahindru et al, 2023).

Background and development of a targeted intervention:

Cancer survivors are a well-placed group to receive health education interventions regarding reduction of BMI. They have frequent contact with health care professionals (HCP) and there exists multiple time points where health education could be delivered and reiterated (Kelly & Richmond, 2018). The nursing authors however, have consistently observed that in practice, interventions regarding healthy behaviors are difficult to deliver in busy clinical settings where the focus is often on assessing for disease recurrence. Education is often reduced to opportunistic windows in clinical practice and while the concept of 'making every contact count' (Health Service Executive, 2016) can offer appropriate opportunities to deliver health education, there is a requirement for evidence-based multidisciplinary patient-centered targeted interventions to improve awareness of the link between BMI and

cancer and be part of the actual treatment plan (Fasano et al, 2024) and consequently reduce morbidity and mortality risk (Walsh et al, 2021). Such interventions need to be easy to access, inexpensive, and to be able to feasibly reach large numbers. Technology is an attractive option to achieve this and can maximise access to rural populations and remove barriers such as travel, mobility and cost. This has particular relevance to Ireland which has a significant rural population.

Within this context and in response to this identified deficit in cancer survivorship care, the Moving on Initiative (MOI) was developed (2017) and delivered (2018) as part of a randomized control trial (RCT) by some of the current authors in collaboration with the University of Galway (Groarke et al, 2021; Walsh et al, 2021). The MOI had 62 participants in the intervention group (61 in the control group) and commenced with a half-day lifestyle information and education session to groups of 15-20 participants and repeated 4 times to target all participants. It was delivered by HCPs (physiotherapist/dietitian/psychologist) from Letterkenny University Hospital with online support and prompts via text messages thereafter for 12 weeks. Over the duration, participants were advised to gradually build up their exercise tolerance to 20-30 minutes a day and exercise at least 5 days per week. The acceptability of the MOI has been reported by Groarke et al (2021). The 13 participants interviewed as part of a qualitative nested mixed methods study within the RCT were very positive about the MOI in terms of both content and delivery and was perceived as having the additional broad goal of "moving on" psychologically. Walsh et al (2021) analysed the effectiveness of the MOI for overweight in cancer survivors and in summary, the results of the RCT demonstrated that those who participated in the intervention (n=62) had a significantly greater reduction in BMI than those in the control group (n=61) at 12 weeks ($F(2,200) = 3.02$, $p = .05$, $pn2 = .03$) concluding that overall the intervention was effective for BMI loss (figure 1).

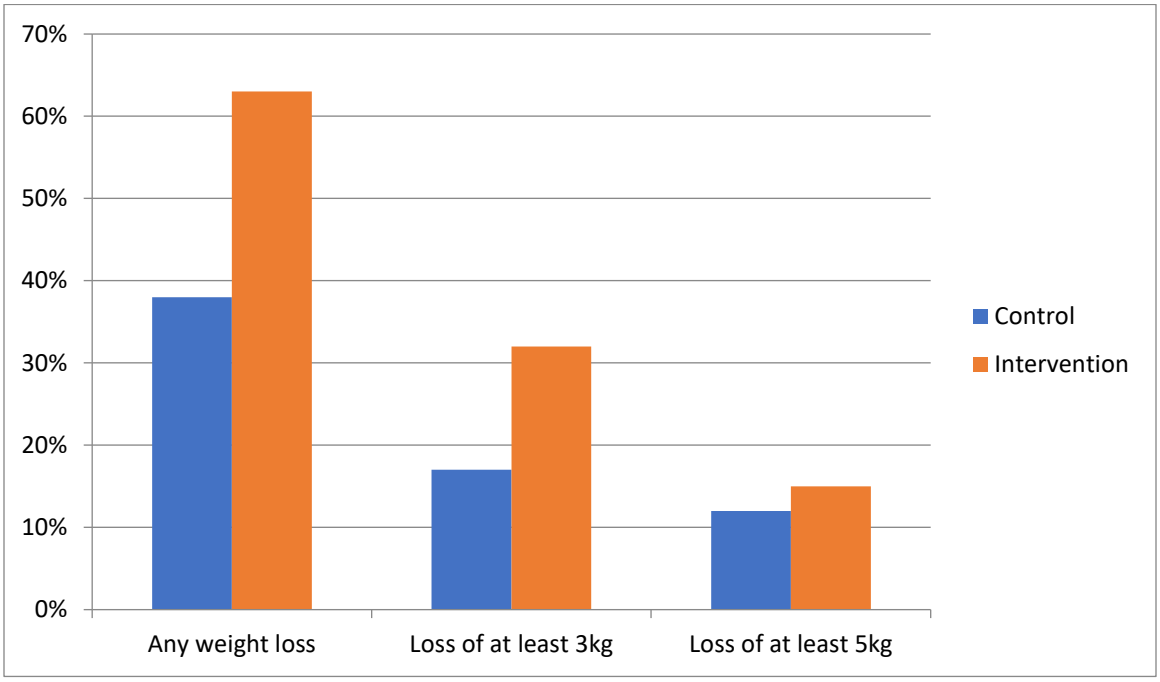

Figure 1: Participants' weight loss throughout the study period

For waist circumference, Walsh et al (2021) reported no significant difference between the two groups across the time points ($F_{(1,93)} = 6.07$, $p > .05$, partial $n^2 = .02$). Secondary analysis, however demonstrates that that majority of participants did reduce their waist size while on this study but as both the control and intervention had this effect there was no significant difference between groups (table 1). From a clinical perspective, however this is an important clinical result with potential benefits for long-term health.

	Waist Loss > 0-2 cm	**Waist Loss > 2-4cm**	**Waist Loss > 4-6cm**	**Waist Loss > 6cm**
Both groups	70%	51%	30%	22%

Table 1: Participants' waist circumference change throughout the study period

Analysis of activity levels (step count) revealed that MOI participants had higher physical activity during the 12-week period and were averaging approximately 2,000 extra steps per day (Walsh et al, 2021). Again, from a cancer rehabilitation perspective, this is an important clinical outcome that participants on the programme were more physically active on a day-to-day basis. Analysis of participants' medication lists which were taken by the nurses at each assessment revealed that three of the participants reduced their medication needs. One person was able to discontinue metformin for diabetes during the study due to the extent of their weight loss and consequent improved blood sugar control. A further two participants reduced their dose of anti-hypertensives during their participation. Although this number is small it shows the potential health benefit of this type of intervention for individuals on a wider level and for potential prospective health and economic benefits.

Aims:

The aim, following on from the RCT, was to introduce the MOI to become part of standardized clinical practice so cancer survivors could be referred to this following the completion of their cancer treatment. A secondary aim was to develop online resources around survivorship care that would be foundational yet could be built upon and adapted should new evidence or approaches become available. A third aim was to perform a health economics analysis of the entire initiative.

Methods:

As the MOI was developed and piloted in the authors' hospital, it was a logical conclusion that following completion of the research, it would be introduced into clinical practice in the hospital in which the research was performed, which is a regional general hospital in the North West of Ireland. Funding was secured to employ a coordinator for the programme in 2020. The global COVID-19 pandemic interrupted the plans and forced a restructuring of the initiative. The following changes were made:

- The name was changed to the "Moving on Programme (MOP)" in recognition that the initiative had been tested and that it was now an actual programme.
- During COVID-19 restrictions, the MOP was adapted to be a solely online 12-week programme. This required creating an online site to host it. Collaboration with the Health Service Executive (HSE) Digital Communications Division ensued and a digital platform on OpenSocial was developed. Evidence based content was created by authors MGK and TT. This OpenSocial platform enabled participants to enter a closed group, which is *General Data Protection Regulation* compliant and gives access to the following which are managed by the MOP coordinator:
    - Bi-weekly posts: include new information and encouragement on healthy eating and increasing physical activity.
    - Resource section with content on multiple survivorship issues, video links, screening/prevention links.
    - Information on relevant meet up days/local cancer related information events.
    - During a seasonal occasion (e.g. Easter), additional support/guidance is given to help them cope with the change in lifestyle that may occur.
    - Ability to engage/ask questions openly within the group as well as directing questions privately to the coordinator.

Participants are referred to the MOP coordinator via email by the clinical nurses when they complete their active cancer treatment. Throughout 2022 two programmes were held. The first one was online only, 20 people were referred and 15 enrolled. Following the easing of COVID-19 restrictions in 2022, MOP was adapted to be more reflective of the original research structure of the half-day in-person event. For this programme 54 people were referred, 37 enrolled and 18 attended the in person half day and 19 participated in the virtual only component. The MOP continues to run twice per year using rolling recruitment as individuals complete their active cancer treatment.

At the first MOP post COVID-19, all of the HCP talks/demonstrations were video recorded and uploaded onto the OpenSocial Platform to allow participants to revisit the information following the MOP or opt to attend online only. Participants are invited to attend the half-day educational event in a local hotel and while attendance is proactively encouraged, for those who cannot attend they can receive the education via the prerecorded videos and then within this hybrid model continue to engage online throughout the 12-week duration. For example for the second event in 2022, 54 individuals were referred, 37 enrolled of which 18 attended the half day and 19 opted for the online version only. Since COVID-19 restrictions were further relaxed, and to reflect the findings of the qualitative study within the RCT that participants wanted further "meets ups", there now is an informal 2-hour event half-way though. At this event, there is a healthy eating cookery demonstration, Q&A session with the dietician and physiotherapist and exercise instruction. The pathway for the MOP is outlined in figure 2.

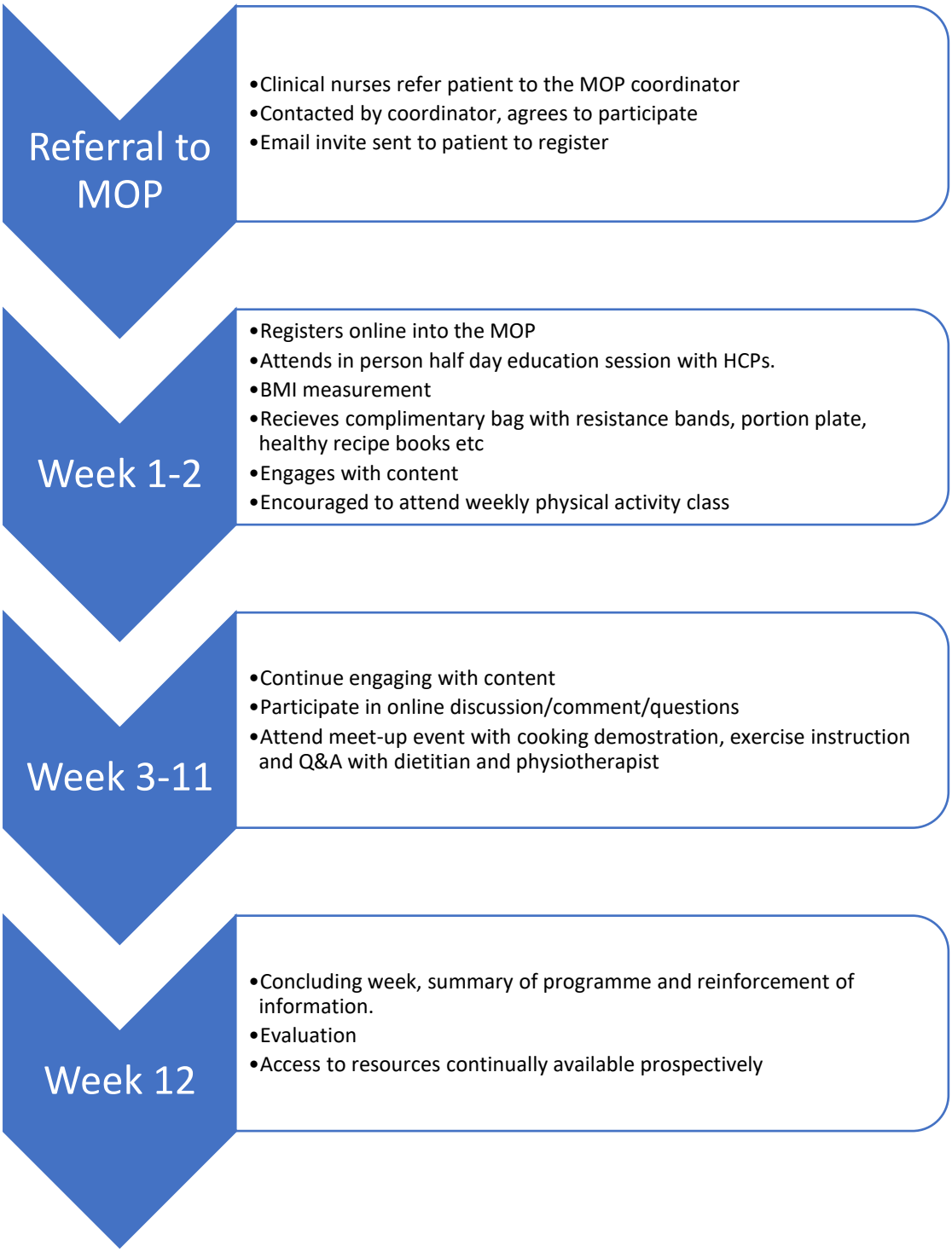

Figure 2: Pathway of MOP

Health economic analysis:

The health economic assessment assessed the cost of implementing the MOP into clinical practice. The cost analysis was conducted to identify, measure and value the healthcare resources required to implement the MOP in clinical practice. To determine this, the specifics healthcare resources required were listed by the study team over the 12-week period of the second MOP of 2022 where the hybrid model was in use for both the in-person (n=18) and online (n=19) (n=37 participants in total).

Unit cost data was identified and applied to calculate individual resource costs and the total cost per participant of implementing the MOP. This included a range of resources such as staff time (Senior Nurses, Senior Dietician, Physiotherapist, Psychologist and administration support), equipment (e.g., laptop, phone), consumables (e.g., resistance bands, home exercise cards, portion size plates) and room rental. This data was recorded prospectively by the study team. Where necessary, unit costs were transformed to 2023 prices using the health component of the consumer price index from the Central Statistics Office (CSO, 2023) as per Health Information and Quality Authority (HIQA) guidelines (HIQA, 2020).

Findings:

The findings of introducing the MOP to clinical practice are useful to report to facilitate shared learnings from the process of transitioning research to practice. The main finding is that the online platform (which was introduced due to the global pandemic), while time consuming to establish, has been a valuable asset. This has enabled a hybrid approach to information delivery, and for those who cannot or do not want to attend the in-person half-day (e.g. rural living, lack of transport, caring responsibilities), they can access the information remotely and still participate.

With the advance of time and developments of personal technology, the team found that deviation from the original research in which wearable trackers were purchased but were not available for the MOP was not problematic. The use of these in the original RCT were never planned to be part of any implementation into clinical practice as they were used in the RCT to enable remote measuring of data (step count) for data analysis only. Furthermore, in the general population, more than half (54%) wear smart devices such as a smart watch, fitness band/activity tracker, (Information and Communications Technology Household Survey, 2022) and activity monitors are available on smartphones (e.g. on iPhones these are part of factory installed set up apps) therefore these items are more widely available now than during the RCT. In addition, while the use of technology can be barrier, the COVID-19 pandemic actually facilitated the use of technology as the general population became very familiar with online methods of communication. Consequently the pandemic helped the usability and acceptability of an online platform.

Anonymous evaluation forms are completed at the end of each MOP. Collectively for all the MOPs, these have been analyzed by the clinical nurses (TT/MGK/JR) (n=72) and they reveal what the team considered to be mostly positive comments with some suggestions for improvement. Examples of comments are outlined in Table 2.

Category of feedback	Positive quotes	Suggestions for improvement
Education delivered	"The expert knowledge transmitted" "(physio) talk was very good" "I feel like I have a plan now" "I like it and is was a good course"	"I felt one talk was a bit basic - didn't enjoy that + didn't learn anything new" "would like more information on food additives"
Support obtained	"Meeting people on a similar journey" "Telling our stories to each other" "Lovely to meet others going through the same thing" "Being kept in contact with that you are not on your own"	"Introductions of the participants would have helped"
Appropriateness of environment/date	"Very comfortable & not intimidating" "The venue was very comfortable" "Good location"	
General feedback	"Everything was marvelous, wouldn't change a thing" "Delighted to be invited to programme, feel it has come at the right time" "we all feel supported" "Many thanks for the opportunity to meet with other people, and be informed by professionals and have this platform too"	"It was a little bit long" "earlier meet up with participants to build support"

Table 2: Comments from evaluation of MOP

Collectively, most of the suggestions for improvement relate to the online component as the face-to-face meetings are preferable with a consensus that demonstrations are beneficial:

> "The most useful exchange of information was when we were together.....face to face. Remember at my age, 74, I'm not the most literate in the digital world. I know there is a bigger cost when you have to organise a meeting but for me it was the best way of absorbing the information and putting it into practice…the presence of (Physio) actually demonstrating was very effective" (participant 6, 2024)

> "Also seeing and eating the actual foods was great.....can't do that on-line" (participant 6, 2024)

Some participants appreciated having the online option as "I had to get back to work right away as I was self-employed and unfortunately the bills don't stop coming" yet the same participant acknowledged that "I think meeting up ….would be of benefit to everyone" (participant 4, 2023). On review of the entire initiative, the hybrid version of the programme was reviewed more positively than the online only programme.

On average the health economic analysis calculated the cost of implementing the MOP was estimated at €1,108 (n=37) per participant. Excluding the cost of setting up the platform, the cost per person was estimated to be €483 per individual. In clinical practice, this cost will reduce if additional participants attended the group sessions. The results from the costing of the MOP intervention are presented in Table 3 (prices in Euro 2023).

Resource Item	**Total**	**Cost per Participant**
		n= 37
Fixed Costs		
Setting up Platform	€22,941	€620
Ongoing Support	€576	€16
Intervention Delivery		
Half Day programme in person. Staff costs and Room rental	€1,639	€44
Mid-way Meet ups		
Staff Costs and Room rental	€3,621	€98
Consumables e.g. Resistance bands, home exercise cards, Portion size plates.	€1,560	€42
Coordinator		
Equipment e.g. Phone, Laptop.	€1,070	€29
Staff costs for 12 week program 2 days per week	€9,407	€254
Moving On Intervention Cost	**€40,814**	**€1,103**

Table 3: MOP intervention Cost (n=37)

Discussion:

The introduction of the MOP to clinical practice, has been a positive development in clinical care as demonstrated by the mostly positive evaluation. It has also filled an identified gap in oncology practice as anecdotally patients often reported feeling "lost" or "forgotten" following active cancer treatment when their contact with HCPs rapidly diminished. Barriers have however been encountered in the introduction of the MOP to clinical practice. In the clinical areas, referrals to the MOP were initially slow due to the pressures of work, particularly within a COVID-19 environment. Through continual engagement with the staff and presentations at local events (e.g. journal club), this referral process has improved. The evaluations in Table 2 are positive, but it's important to note that the level of online engagement is impossible to measure. While many participants engage online, some choose not to and the MOP coordinator (TT) cannot elicit if these individuals are passively watching/reading content or not.

Not surprisingly, securing adequate and appropriate staff to facilitate the MOP has been a barrier. Managing senior staff to be available on the day for the in-person events is problematic for the MOP coordinator and then securing their release from work has also been challenging. This has been helped by funding being secured from Novartis pharmaceutical company which has enabled payment to guest speakers from related areas working outside of their contracted hours. While the health economic analysis has cost MOP, prospectively with longevity, this cost will fall as some of the costs are startup costs and with more participants attending each in-person event, the cost per participant will decline. Furthermore, it must be noted that the online platform is now well established and could be rolled out to other hospitals/areas with minimal cost or adaptation; however there would be a requirement to have a local coordinator to lead the MOP and to respond/direct questions posted online.

Conclusions

There is an urgent need to develop initiatives that promote the adaptation of healthy lifestyles following a cancer diagnosis both to aid recovery from cancer and also to reduce the risk of disease recurrent or development of new primary cancers. In this clinical context, the Moving on Programme was developed as a specific intervention to fill an identified service need. The proof of concept was analyzed by prior research (Groarke et al, 2021; Walsh et al, 2021) and this paper outlines the process of introducing MOP to become part of standardized cancer care. The global COVID-19 pandemic affected this transition and forced an online approach which, on reflection, has been advantageous as there is now the option of an in-person, online only or hybrid MOP which has the potential to be more far reaching in its appeal and can more easily be transferred to other regions. The nursing authors continue to host the MOP locally and enroll participants into it for their clinical benefit in an attempt to promote the adaptation of healthier lifestyles following the completion of active cancer treatment.

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Conflict of interest statement:

The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The authors have no conflict of interest to disclose.

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