UcanACT
Physical Activity for Cancer Prevention

DESK STUDY ON GOOD PRACTICES IN ORGANIZING PA SESSIONS FOR CANCER PREVENTION FOR ADULT AND SENIOR CITIZENS WITHIN URBAN ENVIRONMENTS (deliverable D2.2)

Contribution to WP2 – RESEARCH ACTIVITIES

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1. Abbreviations and Acronyms

CPPA	Cancer Prevention Physical Activity
PA	Physical Activity
PIM	Practical Intervention Methodology
PUGS	Public Urban Green Spaces
UGS	Urban Green Spaces
WHO	World Health Organization

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2. Glossary

Aerobic physical activity – Activity in which the body's large muscles move in a rhythmic manner for a sustained period of time. Improves cardiorespiratory fitness (Bull et al, 2020)

Balance – an individual's ability to control their centre of gravity within the limits of base of support (Sturnieks, 2021)

Balance training - static and dynamic exercises that are designed to improve an individual's ability to withstand challenges from postural sway or destabilizing stimuli caused by self-motion, the environment, or other objects (Bull et al, 2020)

Cancer Prevention Physical Activity – physical activity that may play a role in cancer prevention

Exercise – a subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective (Caspersen et al, 1985)

Muscle-strengthening activity – Increase muscle strength, power, endurance and mass (Garber et al, 2011)

Physical activity – any bodily movement produced by skeletal muscles that requires energy expenditure (Caspersen CJ et al, 1985)

Physical inactivity – an insufficient physical activity level to meet present physical activity recommendations (Bull et al, 2020)

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Physical exercise – A subcategory of physical activity that is planned, structured, repetitive, and purposeful in the sense that the improvement or maintenance of one or more components of physical fitness is the objective. Physical activity includes exercise as well as other activities which involve bodily movement and are done as part of playing, working, active transportation, house chores and recreational activities (WHO, 2019)

Practical Intervention Methodology – contains guidelines and recommendations for physiotherapists and other health professionals for implementation of CPPA sessions for adults and senior citizens within PUGS in accordance with emerging scientific research evidence on cancer prevention

Prevention – Activities that are directed toward achieving and restoring optimal functioning, minimising impairments, limitations, and participation restrictions, maintaining health (thereby preventing further deterioration or future illness), creating appropriate environmental adaptations to enhance independent function.

- Primary prevention – actions to avoid or remove the cause of a health problem in an individual or a population before it arises.

- Secondary prevention – actions to detect a health problem at an early stage in an individual or a population, facilitating cure, or reducing or preventing spread, or reducing or preventing its long-term effects.

- Tertiary prevention – actions to reduce the impact of an already established disease by restoring function and reducing disease-related complications (WHO, 2011; APTA, 2001)

Public Urban Green Space – land covered by vegetation of any kind, that is an important part of urban public open spaces and common services provided by an

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urban area (cities and towns) serving as a health-promoting setting for all members of the urban community (e.g., garden, parks, playground, urban meadow, urban woodlands, forests and natural wildlife areas) (WHO, 2017)

Sedentary behaviour – any waking behaviour characterized by an energy expenditure of 1.5 METS or lower while sitting, reclining, or lying (Bull et al, 2020)

Types of physical activity: occupational, recreational, domestic, active transport (Caspersen CJ, Powell KE. Christensen GM, 1985)

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3. Desk Research Objectives

The aim of this desk research (2.2) is:

- Identifying efficient ways of engagement of adult and senior citizens to Cancer Prevention Physical Activity
- Providing indication to guarantee safe conditions for practicing Cancer Prevention Physical Activity within Public Urban Green Spaces
- Identifying how Public Urban Green Space environments and infrastructure (e.g., benches, stairs, fences, boarders, walls) can be used for Cancer Prevention Physical Activity.

The information and knowledge obtained and published in D2.2 will be used to develop new PIM (D3.1) that will be used for the Pilot Implementation. (WP4).

Search methodology implemented to implement the document:

ISCP: Scientific literature was reviewed. Pubmed was accessed and relevant journal articles searched using keywords. Physical activity AND motivation, attitudes, behaviour, perspectives, efficient, barriers.

Literature selected based on:

- Relevance, since the aim of the literature was to provide knowledge on efficient ways of engagement of adult and senior citizens with physical activity, the documents were chosen accordingly.
- Institutional documents known to the researchers were included

Due to relevance the Age and Opportunity documents were also included based on the knowledge and expertise of the authors.

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OAC: Literature was searched and collected since 2015. The sources used here were Pubmed, Google, Google Scholar, and other digital publications from the American College of Sports Medicine (ACSM), American Cancer Society, National Institutes of Health, National Cancer Institute (NCI), European Cancer Leagues, Cancer Patient Europe, among others, and magazine articles were searched using keywords: Physical Activity, Mental Health, Motivation, Healthy Lifestyle, Sport, Targeting Senior Citizens, Urban Outdoor Sports, Sport & Cancer in Older Age, Prevention, Health Promotion. The literature selection was based on the following criteria:
Target group and physical activity in urban areas, cancer prevention offers for the target group, motivation models for the target group, meta-studies on physical activity in old age - best practice models from scientific studies and taking into account the interdisciplinary, scientific OAC Advisory Board.

AIFI: The search methodology aimed to identify primary studies and reviews in electronic databases. Keywords used: Physical activity and PUGS, exercise, cancer. We searched the following electronic databases for primary studies:

- MEDLINE (via PubMed).
- Green File (via EBSCO host).
- ScienceDirect.

We searched also manually in Google and Google Scholar. Journals, reference lists of included studies and previous reviews related to urban green spaces and cancer were hand searched for additional studies. Websites of key organisations involved in addressing and reporting research on green spaces were consulted (World Health Organization (WHO), Agency for Healthcare Research and Quality, National Institute for Health and Care Excellence (NICE)**.**
Literature selection was based on relevance to the specific needs of this search in order to provide the most current evidence on the opportunity of practising PA in PUGS for adult and senior citizens.

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4. Efficient ways of engagement of adult and senior citizens to CPPA

4.1 Introduction

It is important to have insight and understanding of efficient ways of engagement and motivational factors that may determine adult and senior citizen participation in physical activity, as senior citizens may have low activity levels and face a number of unique barriers.

4.2 Internal motivators / strategies

An internal motivator or strategy may be described as an individual's own internal thoughts about physical activity or strategies that encourage participation (Opezzo et al, 2022). Examples include positively reinforcing past experiences or celebrating success with exercise to motivate continued participation.
A large cohort of 4108 older women, aged 70-99, investigating motivators to be physically active when they did not feel like being active, identified both internal strategies (occurring inside the head) and external strategies (using the world as a prop) to motivate activity. Subcategories within internal strategy included intrapsychic (self-encouraging talk and cognitive reframing among others); avoid bad (cons of non-movement); and approach good (pros of movement) (Opezzo et al, 2022).

Most women reported using one strategy, with 15% reporting two or more. Amount and intensity of physical activity increased with the number of strategies used (either internal or external) until 4 or more, when a diminishing return was noted. The total number of strategies, rather than the number of a particular category (internal or external) appear to matter (Opezzo et al, 2022). A similar

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finding was reported in a study conducted in Ireland, in which those who were more active reported a greater number of motivating factors (Age and Opportunity, 2011).

Using an internal strategy demonstrates a positive correlation with the amount and intensity of physical activity completed. Those who reported 'approach good' strategies as opposed to the other two internal subcategories (intrapsychic and avoid bad), had more physical activity hours per week, as well as greater physical activity intensity per week (Opezzo et al, 2022).

General health as a primary motivator to participate in physical activity is frequently reported. In a survey of 1000 older peoples (50 years and older) attitudes to and participation in physical activity and sport in Ireland, getting healthier for day-to-day wellbeing, wanting to be healthier for long term wellbeing and weight loss, were strongly reported motivators. The survey was a repeat of a 2006 and 2008 study and used a modified version of the International Physical Activity Questionnaire and measured the intensity and duration of physical activity. The results demonstrate an increase in physical activity participation rates of those aged 65+, from 34% to 37% and a further increase to 39% from 2006, 2008 and 2011 respectively. Questions relating to attitudes concerning benefits and draw backs of physical activity were unpromoted and multiple factors could be mentioned, with answers coded into a list of themes which emerged (Age and Opportunity, 2011).

The most frequently mentioned benefit by all respondents was 'it is good for your physical health'. Those aged 50-64 were more likely to be motivated by their general health than those aged 65+ (55% and 45% respectively). Weight loss appears to be more of a motivator in the 50-64 age group than those aged 65+ (23% and 6% respectively). The 65+ group mentioned 'it is enjoyable/it makes you feel good' (21%) more than those aged 50-65 (Age and Opportunity, 2011).

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Health and wellbeing factors were similarly endorsed in a survey of 1845 respondents, aged 60-67, in Australia in which the three leading motivators reported for women and men included 'to prevent health problems' (97% and 86% respectively), 'to feel good' (95% and 91% respectively), and 'to lose weight' (88% and 84% respectively) (van Uffelen et al, 2017).

Similarly in a systematic review (of thirty-four papers between 2000 and 2017), which examined motivators and barriers in adults over 60 years of age, the most important set of motivators that encouraged participation in physical activity was improving one's physical condition. This included improving balance, walking ability, reducing muscle pain, improving sleep and strengthening one's muscles (Yarmohammadi et al, 2019), and in another systematic review, which included 132 qualitative studies on the perspectives of physical activity among people aged 60 years and older, the benefits of physical activity (strength, balance, flexibility, self-confidence, improved health and mental well-being) as an important motivator are reported (Franco et al, 2015).
Whilst it has been proposed that greater consideration must be given to the wider set of goals and aspirations which are of greater personal importance to older people and focus on how physical activity can contribute to a sense of role fulfilment, a sense of purpose and contribute to life satisfaction (Morgan et al, 2019).

A theory was generated by how older adults think and feel about physical activity in a study which conducted a systematic and qualitative synthesis of qualitative research describing influences of physical activity in those over 60 and the experience of physical activity, which included primary qualitative studies and systematic reviews (Morgan et al 2019). The theory emerging from the synthesis of thirty-nine papers suggested the transition to older age can challenge a person's role in life and sense of self. Regaining a feeling of purpose, being needed in group activities, and creating routine and structure can be facilitated by participating in physical activity which builds self-esteem and contributes to

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fulfilling older age (Morgan et al, 2019). Five key third-order constructs were interpretively synthesised from extracted data from the 39 studies and were used to generate a line of argument theory: how physical activity fits in with transition events in ageing; the role of physical activity in older adults' sense of purpose and self-belief; physical activity creates and strengthens feelings of togetherness, community and belonging; physical activity effects on physical, emotional and cognitive health; and barriers to physical activity. Three third-order constructs are presented in the table below, a fourth third-order construct included under external factors and the fifth third-order construct included under barriers, later in the document.

Influence on physical activity - Third-order constructs (1st - 3rd)

Three Third-order constructs	
Physical activity fits in with transition events in ageing	Awareness of the body getting older may be triggered by major life events. Negative feelings may be compounded by societal attitudes, stereotypes, and the expectations of others. Continuing with patterns of physical activity can assist in the transition and create motivation to maintain energy levels, look after the body and maintain independence.
The role of physical activity in older adults' sense of purpose and self-belief	Physical activity contributes to an older adult's role identity and sense of purpose viewed as a personal responsibility which requires discipline. Physical activity provides a sense of personal achievement and satisfaction by maintaining or learning a new activity, despite getting older, and provides a sense of personal gratification and a reason to get up and out of the home.
Physical activity effects physical, emotional and cognitive health	The benefits of physical activity contribute to a feeling of positive wellbeing through laughter, fun and enjoyment, and helps maintain an active mind. Enriching and aesthetic components which include music and nature have been identified by older adults as important benefits of participating in physical activity

(Morgan et al, 2019)

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This is echoed in looking at participation in physical activity in cancer survivors, a shift to increased engagement may be facilitated by a shift to 'moving forward' and providing confidence and a sense of control as well as coping with a precarious future (Lynch et al, 2022).

Similarly, in a systematic review which examined motivators and barriers to physical activity, the second most important set of intrapersonal motivators that encourage participation in physical activity was enjoyment and addressing psychological issues. This included relief from stress, feeling more efficient, having positive perceptions of PA, having a positive self-image, being less depressed, enhancing sleep and motivation (Yarmohammadi et al, 2019).

A number of the motivators reported above are similarly reported in a small qualitative analysis which looked at barriers and facilitators of adherence to perioperative physical activity interventions for older adults with cancer (gastrointestinal and lung) and reported that social and family support, awareness of the benefits of physical activity, creating a routine, reduced stress, and ability to perform activities of daily living, served as motivators to participate in physical activity (Sun et al, 2020).

One of the pillars of cancer survivorship is secondary prevention in those who have had cancer and principles of cancer prevention apply.

4.3 External motivators / strategies / environment

An external strategy may be described as an individual making use of the world to aid motivation (Opezzo et al, 2022), and examples of external motivators may include social connections, within a setting that instils confidence and safety (Lynch et al, 2022).

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In the large cohort study of 4108 women, aged 70-99, conducted by Opezzo and colleagues (2022) described above, subcategories of external strategies identified as motivators to being physically active included those which 'Manipulate' (change the environment to encourage motivation or facilitate the movement), or 'Capitalize' (use something already in place in the environment, like a role as a pet-owner) situations (Opezzo et al, 2022).

Using an external strategy as a motivator for physical activity was the most reported strategy employed by the women surveyed and demonstrated a positive correlation across measures of physical activity hours and intensity of physical activity per week. 'Manipulate' as an external strategy was a consistent correlator across measures of both physical activity time and intensity per week., whilst 'capitalise' as an external strategy correlated with physical activity intensity per week (Opezzo et al, 2022).

Of the 4108 women, 19% used a social motivation strategy and of those 86% of the social strategies were external. Having a social strategy or motivator to participate in physical activity shows a positive association with walking and physical activity intensity (but not time) (Opezzo et al, 2022).
Similarly, in a survey of 1000 older peoples (50+) attitudes to and participation in physical activity and sport in Ireland, 'meeting new people' was the most reported external motivating factor to participate in physical activity. Those aged 65+ appear to be more socially motivated than those aged 50-64 (13% and 7% respectively. Females were twice as likely to mention 'meeting new people' as a motivator to physical activity than males (12% and 6% respectively) (Age and Opportunity, 2011). Importantly note, those who engage in some forms of physical activity are more likely to have heard of physical activity guidelines (Age and Opportunity, 2015).

This theme of social contact is repeated in the fourth of the five, third-order constructs as discussed above, and is presented in the table below.

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Influence on physical activity - Third-order constructs (4th)

Fourth Third-order construct	
Creates and strengthen the feeling of togetherness, community and belonging	Physical activity provides access to others and social contacts. This can build a sense of belonging to a group, a feeling of togetherness and of community, and through this enhance self-esteem.

(Morgan et al, 2019).

Similar findings are reported in a systematic review which examined the motivators and barriers to physical activity, in adults over 60 years of age. The most important interpersonal motivator to participating in physical activity was being social. This included communication and exercise with friends and others, support from peers and others, social coherence, and companions for walking. The second most important interpersonal motivator identified was supervision by a health professional (Yarmohammadi et al, 2019).

The social influences are once again echoed in a systematic review, which included 132 qualitative studies on the perspectives of physical activity among people aged 60 years and older, in which social influences emerged as an important theme. Social influences included valuing interaction with peers and encouragement from others. Participants in eighty-four studies (64%) reported the social contact as a motivating factor for participating in physical activity and enjoyed seeing familiar faces when participating in physical activity, participating in group-based activities which gave a sense of belonging, enjoyment and creating friendships. Support from others was identified as an important contributor in 62% (82) of the studies included (Franco et al,2015).
The social contact theme is similarly reported in cancer survivor engagement in physical activity, where creating social relations and a support system as well as a setting for information sharing (with a hopeful model of cancer survivor) aid participation in physical activity (Lynch et al, 2022).

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Furthermore, having no companion has been identified as an important barrier to participating in physical activity, (Yarmohammadi et al, 2019), highlighting the social contact theme.

In contrast, in a survey of 1845, 60–67-year-olds in Australia, fewer participants endorsed the social factors, when compared to the health and wellbeing factors. Women were more likely than men to agree with motivators of 'spending time with others' and 'meeting new friends'. 'Spending time with others' was endorsed as a motivator by 68% of women and 52% of men, while 'meeting new friends' was endorsed by 58% of women but only 38% of men (van Uffelen et al, 2017). The age group included in this study was slightly younger than some of the other studies mentioned. It may highlight that external motivating factors may be different in different age groups, or the role of social factors may be less in younger age groups. Competing work or family demands may also differ between different age ranges of older adults.

A strong correlation exists between membership of a group or club and likelihood to participate in sport or physical activity health and quality of life self-rating (Age and Opportunity, 2015). This relationship is particularly strong for men, who are more likely to belong to a sports club. Sporting and leisure facilities may motivate senior citizens to participate in physical activity, as 86% of older people agree sporting and leisure facilities are welcoming places for older people, and 50% of non-participants of physical activity report a positive perception of sport and leisure facilities (Age and Opportunity, 2015). Availability of sports facilities was similarly identified as an important interpersonal motivator in a systematic review of those aged 60+ in a systematic review which examined motivators and barriers to exercise (Yarmohammadi et al, 2019).

In addition to encouraging participation in physical activity, promoting membership of social and sporting clubs and groups provides additional benefits of mental stimulation, and social and psychological benefits (Age and

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Opportunity, 2011), however awareness of the setting where physical activity takes place is important, and must instil confidence for participation in physical activity (by cancer survivors) (Lynch et al, 2022).

To further examine the value of social connections, McMahon and colleagues (2017) compared the effect of interpersonal behaviour change strategies, including social support and friendly social comparison, compared to intrapersonal support including goal setting and barrier management, on physical activity participation in 102 community dwelling older adults. Those who received interpersonal support had higher levels of weekly activity which was maintained at 6 months while activity participation did not change in those receiving intrapersonal support.

The theme of social connection is similarly reported in a small study of 78 older (59+) and younger adults (18-26), which examined how exercise motivation differs for older versus younger adults. Older adults, aged 59+, reported opportunities for social interaction, exercising with friends being fun and enjoyable and an opportunity to promote close connections or make new ones, and exercising with others as motivating factors to participate in physical activity (Steltenpohl et al, 2019).

The most important environmental motivator for participating in physical activity identified in a systematic review of those aged 60+ was suitability of the environment and included pleasant and attractive landscape and environment, green space, benches for resting, streetlights, sidewalks, bike and walking paths, food availability as well as free of smoking, drinking, and gambling. The second most important environmental motivator identified was a safe space (Yarmohammadi et al, 2019).

Physical activity promotional advertisements may be effective in motivating older adults to participate in physical activity, if they depict everyday older people enjoying a range of relevant activities. An advertisement video showed older

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adults participating in moderate to vigorous physical activity (tennis, line dancing, swimming, cycling, and jogging), but did not include other types of physical activity which are important for health ageing (resistance training, balance, flexibility). The overall response to the fifteen second video advertisement was positive with average to high scores for motivating factors. The motivating factors were categorised into intrinsic motivation ('to what extend did the ad make you think you want to do more physical activity; and extrinsic motivation ('to what extent did the ad make you think you should do more physical activity'). It was reported that females typically found the video more motivation, both intrinsically and extrinsically. Limitations of the study however include testing the effect of only one video and post-exposure behaviour change was not tested (Pettigrew et al, 2021).

4.4 Barriers

When asked about the downsides of exercise and physical activity, in a survey of 1000 older people in Ireland, aged 50 and over, 60% could not think of any. This was an increase from 52% in a similar survey conducted in 2008 (Age and Opportunity, 2011). In identifying barriers to participation in physical activity in Ireland, the top three across all aged 50+ include 'not enough time' (28%), 'my health' (18%), and 'the weather' (18%). This remains the same when compared to a similar survey conducted in 2008. Interesting to note is in a survey conducted in 2015, those reporting 'weather' as a barrier to physical activity dropped to 4% (Age and Opportunity, 2015, 2011).

Similarly, time limits have been reported as a barrier to participating in physical activity in a systematic review which examined barriers to physical activity in those aged 60+. Family responsibility, including taking care of grandchildren and sick children and people at home inhibited being able to engage in physical activity (Yarmohammadi et al, 2019). Competing priorities, with little or no time to perform physical activity due to work and family responsibilities was identified as

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a barrier in a systematic review which included 132 qualitative studies on the perspectives of physical activity among people aged 60 years and older, with some studies reporting participants felt taking care of frail partners or grandchildren was more important (Franco et al, 2015).

A difference was noted for those aged 50-64 and those aged 65+ in the study in Ireland, mentioned above. For those aged 50-64 ‘a lack of interest/motivation/laziness’ was the primary barrier while in the 65+ age group barriers included ‘my health’, ‘muscular/skeletal problems’, and ‘my age’ (Age and Opportunity, 2015, 2011).

Between those who engage in moderate activity level and those who engage in low activity level, different barriers were reported. ‘Not enough time’ and ‘a lack of adequate facilities locally’ was mentioned by 37% and 12% respectively, of those of a medium activity level. While those of a low activity level reported ‘my health’ and ‘muscular/skeletal problems' more (Age and Opportunity, 2011). Whilst, for those working full time the barriers reported include ‘not enough time’ (50%), lack of adequate facilities locally (9%), and ‘dangers’ (7%). Dangers included darkness, country road, traffic, and crime. The percentage of the cohort working full time is not indicated in the survey (Age and Opportunity, 2011).
Between 2011 and 2015 in Ireland, the percentage of those surveyed reporting ‘my health’ as a barrier to physical activity participation rose from 18% to 29% (Age and Opportunity, 2015, 2011). In reviewing the results from the survey in 2015, 43% of those in the low activity level stopped participating in physical activity due to injury or health (Age and Opportunity, 2015), indicating that physical activity is stopped due to a health issue.

A similar picture emerges from a systematic review in those aged 60+ in which barriers to participation in physical activity were examined. Physical problems, which included difficulty in walking, physical health problems, physical weakness, respiratory problems, a lack of energy, fear of falling, and a lack of facilities were

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identified as key barriers to physical activity engagement (Yarmohammadi et al, 2019).

This is similarly reflected in the fourth of the key third-order constructs interpretively synthesised from extracted data of thirty-nine studies which have been presented above. The fifth third order construct presented as a theory is 'barriers to physical activity'.

Influence on physical activity – Third-order constructs (5th)

Fifth Third-order construct	
Barriers to physical activity	Older adults experience external and logistical barriers to physical activity. These can be overcome with support from others including family. Fear of injury and pain is an internal barrier. Support from a healthcare professional may be helpful.

(Morgan et al, 2019)

Similarly, in a systematic review, which included 132 qualitative studies on the perspectives of physical activity among people aged 60 years and older barriers identified included physical limitations, which included pain, discomfort, concerns about falling and comorbidities (Franco et al, 2015).

Many of the barriers discussed above, emerged as barriers to adherence to physical activity in a small qualitative analysis which looked at barriers and facilitators of adherence to perioperative physical activity intervention for older adults with cancer. Ten themes emerged which are presented in the table below (Sun et al, 2020).

Barriers to adherence to physical activity

Comorbid health conditions	Multiple comorbid conditions Cardiovascular, pulmonary, and arthritis related comorbid conditions
Physical symptoms	Physical symptoms secondary to comorbid conditions Chronic pain syndrome (back, hip, joint)

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Functional limitations	Difficulties with activities of daily living Gait and balance issues
Anxiety	Emotional well-being, including anxiety, psychological distress, and stress
Other roles and responsibilities	Full-time employment, chores, other caregiving responsibilities
Unexpected life events	Unexpected life events, such as car accidents, additional medical issues, and unanticipated long-distance travels
Lack of time	As a result of multiple roles and responsibilities and unanticipated life events, and a lack of time
Lack of motivation	Decreased motivation after surgery, preference for sedentary lifestyles, disinterest, dislike of structured programs, and 'laziness'
Not accustomed to physical activity	A lack of personal history of physical activity engagement resulting in disinterest and dislike of walking
Environment / weather	Hills, uneven walking services and rainy weather

(Sun et al, 2020).

4.5 Recommendations / Conclusion

Based on the evidence presented above a number of recommendations can be made to address and use internal and external motivators and overcome barriers to physical activity participation.

The tables below summarise the results presented above and are presented under general strategies/motivators, internal strategies/motivators and external strategies/motivators.

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4.5.1 General strategies to consider to encourage physical activity participation

Adopt multiple strategies	Opezzo et al, 2022
Campaigns with a strategic approach to initiating physical activity (with internal and/or external motivation strategies)	Opezzo et al, 2022
Highlight the benefits of physical activity, (rather than nothing sedentary behaviour risks)	Opezzo et al, 2022 Yarmohammadi et al, 2019
Interventions that make an explicit connection between physical activity and cancer recovery for secondary prevention	Lynch et al, 2022
Promote preventative benefits and benefits for those with established health conditions	Van Uffelen et al, 2017

4.5.2 Internal strategies to consider to encourage participation in physical activity

Address how PA can contribute to a sense of purpose, fulfilment and life satisfaction	Morgan et al, 2019
Enjoyable	Yarmohammadi et al, 2019
Provide relief from stress	Yarmohammadi et al, 2019
Create positive perceptions of physical activity	Yarmohammadi et al, 2019
Goal setting	Sun et al, 2020

4.5.3 External strategies to consider to encourage participation in physical activity

Promote social aspects of physical activity	Sun et al, 2020 Yarmohammadi et al, 2019 McMahon et al, 2017
Encouraging walking via promotion of walking groups	Age and Opportunity, 2011
Encourage walking via the promotion of designated areas	Age and opportunity, 2011
Improve awareness of facilities	Age and Opportunity, 2011

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	Yarmohammadi et al, 2019
Promoting membership of social and sporting groups	Age and Opportunity, 2011
Encourage trial of new sport or activity	Age and Opportunity, 2011
Utilise the surrounding environment	Opezzo et al, 2022
Make use of the external environment	Opezzo et al, 2022
Promote a sense of safety	Lynch et al, 2022
Facilitate interpersonal relationships	Lynch et al, 2022
Pleasant and attractive landscape and environment	Yarmohammadi et al, 2019
Green space	Yarmohammadi et al, 2019
Safe	Yarmohammadi et al, 2019
Supervision by health professional	Sun et al, 2020 Yarmohammadi et al, 2019

Physical Activity Guidelines for adults and senior citizens must continue to be promoted (Age and Opportunity, 2015) and suggest ways in which physical activity can be incorporated into daily lifestyle (Age and Opportunity, 2015), and Critically, long term health and wellbeing is a driver to engage in physical activity (Age and opportunity, 2011), however an approach overly focused on the health benefits of activity may not result in increased levels of physical activity in older adults (Morgan et al, 2019). Changing approach to ‘swop, don’t stop’ and ‘chose to move it’, or ‘move towards a good mood’ which provides a positive framing may be more successful to messaging than the negative effects of sedentary behaviour, such as ‘move it or lose it’ (Opezzo et al, 2022; Age and Opportunity, 2015).

It is proposed the approach to encouraging physical activity is reframed to consider the wider set of goals and aspirations which are important to older adults (Morgan et al, 2019), and internal and external motivators as identified are considered when designing physical activity programmes to engage with and encourage older adults.

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5. Providing safe conditions for practicing CPPA within PUGS

5.1 Overview

How can regular physical activity help in primary prevention against cancer, but also during and after cancer treatment?

Research shows that PA and exercise is helpful for people in the primary, secondary, and tertiary prevention of cancer. PA helps improve quality of life, manage side effects of treatment, and reduce the risk of recurrence in the future (Campbell et al, 2019).

There is only one main risk for cancer survivors and cancer patients, when doing sports:

Chemotherapy is likely to damage heart function and vascular function. Since cancer patients receive regular ECGs during chemotherapy and to detect heart damage early, an ECG just before starting exercise is not mandatory, but should be recommended (Schmitz et al, 2011). For the general group of adult and elderly people, there are some specific topics to be aware of when practising physical activity outdoors.

5.2 Methods to reduce risks of injuries

To provide safety and reduce risks for adult and senior citizens:

1. Clear instructions provided.
2. Organised activities and programs, instructional exercises.
3. Safe equipment and settings (e.g., soft, non-slippery surface, shade cover)
4. Infrastructure (toilets, lights (crime safety), public transport access)
5. Green open spaces instead of woody, narrow, shadowy trails
6. Rest areas: benches in shade, water access

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The design of age-friendly outdoor spaces should be incorporated into decision-making using a set of age-friendly considerations, where the chosen equipment is safe, targets balance, functional strength and day-to-day movements and activities. Providing clear instructions and information, as well as promotion, organised activities and programs are important factors in maximising engagement and social connectedness of older people in the community in order to achieve positive health outcomes (Levinger et al, 2021). Five Settings and safe ground surface (Levinger et al, 2021):

1. Benches and sheltered resting areas
2. Water fountain
3. Nonslip and compliant surface (soft fall or equivalent)
4. Safe sidewalk/trials
5. Shade cover

Manufacturers should provide clear equipment operation guides (or demonstration videos) on the correct use of their equipment and warning messages regarding risky behaviours. Manufacturers should also design OFE with suitable ranges of swing angles or fixed operating positions. Governments or local authorities that authorize or sponsor the installation of OFE might conduct instructional sessions in which professional trainers can explain how to use OFE properly, safely, and effectively in order to meet each individual's capability and fitness level. This is especially required for older adults who might lack confidence when using the equipment. Information sessions should also target parents with children, emphasizing the risks posed to children in adult only OFE areas. These instructional sessions can also serve as marketing strategies to attract park visitors or to promote new OFE sites (Chow et Wu, 2019).

To allow independent, free of charge, broader public use of the exercise park, signage in each station with simple instructions and safety precautions would be important additions. Employment of colour coding signage to represent exercise

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difficulty and progression might also be useful. The addition of a user guide might further support sustained participation (Levinger at al, 2018; Playparc, 2023).

Fig 1: Example of display boards on outdoor sports fields ®playparc
Yellow: first 4 weeks (12-15 repetitions; 2-4 sets)
Green: after 4 weeks (20 repetitions; 2-4 sets)
Blue: after 6 weeks (25 repetitions; 2-4 sets)

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Fig. 2 – 4: OAC Outdoor training course with cancer patients; Location Outdoor Fitness Parcours (4F Circle), Munich, ®OAC (DW Español, 2022)

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5.3 Methods to increase the subjective feeling of safety

Regarding crime related safety and traffic related safety, the following study sums up:

5.3.1 Crime

Participants stated that fear of crime was higher in the absence of street lighting. Participants were also more fearful in areas that were not well-kept. They disliked vacant houses, overgrown lots, and vandalism (e.g., graffiti, littering, and sabotage of benches). Desolate streets were also mentioned as decreasing the sense of crime-related safety. The presence of people in the street was mentioned as both increasing and decreasing the sense of personal safety depending on the type of people. The presence of families with children, friendly, smiling, and familiar people, socially responsible residents, or people walking, biking, or jogging were considered to improve crime-related safety. On the other hand, large crowds, criminality, and the presence of intimidating groups of youths, beggars, immigrants, and homeless people were perceived as decreasing crime-related safety. In the same manner, the presence of police and other law-enforcement staff was mentioned as having both positive and negative effects on crime-related safety. Positive effects were attributed to the presence of senior patrol, police, or security personnel, and to the presence of staff in public facilities. Negative effects were attributed to slow or inappropriate police response to neighbourhood crime and to the worrying presence of police.

5.3.2 Traffic

Within the subtheme “traffic-related safety”, two different environmental factors were identified: zebra-crossing characteristics and reckless driver’s behaviours. Zebra-crossing characteristics emerged as a major issue. Participants mentioned several zebra-crossing’s attributes that made it difficult and unsafe to crossroads,

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such as: unclear indication of pedestrian crossing, long crossing distances across multiple traffic lanes and inadequate signal times (e.g., too short green crossing phases). Interestingly, long distances between regulated pedestrian crossings were mentioned as a reason for ignoring red traffic lights. Other traffic-related issues concerned reckless driving behaviours, including speeding, impatient drivers, and drivers distracted by phoning while driving.

5.4 Methods to make people feel comfortable regarding accessible recreational and rest areas

For access to exercise opportunities, it was generally argued that there are not enough recreational facilities for older adults. Additional problems were having existing facilities located too far from home, the lack of transportation to those facilities, and the high costs to use the facilities. Age-appropriate provision and senior-oriented group activities emerged as essential. Moreover, some informants mentioned that leisure provision is primarily designed for younger people and raised the need for group activities designed for seniors. Following facilities were preferred: indoor gyms, indoor pools, and buildings dedicated to older adults. Informants also mentioned feeling uncomfortable and unsafe exercising in recreational facilities without instructions. Green open space was also mentioned as an inviting setting for PA. However, participants did not like to use isolated trails in wooded areas with poor visibility.

The third subtheme was access to rest areas, including access to benches and public washrooms. Various aspects concerning the presence of benches emerged, including distance between seating areas along walking routes and in hilly areas. Also, the usability of seating areas was mentioned, referring to designing benches that are easy to sit on and the importance of sheltered

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benches, especially during the winter. The need for seating areas was accentuated considering older adults' physical limitations and their increased need for rest. Access to public washrooms also emerged as an important issue, including the presence of clean washrooms in public areas close to daily destinations (Playparc, 2023).

Overall findings retained the conclusions that exercise training and testing was generally safe for cancer survivors and that every survivor should "avoid inactivity". Enough evidence was available to conclude that specific doses of aerobic, combined aerobic plus resistance training, and/or resistance training could improve common cancer-related health outcomes, including anxiety, depressive symptoms, fatigue, physical functioning, and health- related quality of life. Implications for other outcomes, such as peripheral neuropathy and cognitive functioning, remain uncertain (Beauchamp et al, 2018). In addition, the relapse rate can be reduced by up to 35 percent (Mata et al, 2022).

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6. How PUGS environments and infrastructure can be used for CPPA

6.1 Overview

Recently we can find an increased attention in a variety of research fields in relation to the benefits that PUGS provide for human health. Research on larger green areas has shown that PUGS are beneficial to people's health, physically, socially, and mentally. "Urban green spaces" are considered as urban space covered by vegetation of any kind. This includes smaller green space features (such as street trees and roadside vegetation); green spaces not available for public access or recreational use (such as green roofs and facades, or green space on private grounds); and larger green spaces that provide various social and recreational functions (such as parks, playgrounds, or greenways) (World Health Organization Regional Office for Europe. Urban Green Space Interventions and Health; WHO Regional Office for Europe: Copenhagen, Denmark, 2017)

There are areas with lack of PUGS since the urbanisation causes a decrease in per capita space and thereby a loss of per capita UGS (James et al., 2009), which furthermore causes a decrease in daily exposure to more natural environments (Barton and Pretty, 2010). Reducing the use of natural environments is often associated with a number of lifestyle diseases such as obesity, diabetes II, osteoporosis and stress-related illnesses such as depression, heart diseases and mental fatigue (Ulrich, 2006; Mitchell and Popham, 2008). In urban areas, where nearly 55% of the world's population is now concentrated, the search for protective factors linked to the living environment is an important issue and green spaces could provide an answer because they have many qualities that enable them to have a positive and convincing effect on people's health. These

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protective effects have been demonstrated for different types of health outcome, cancer included.

Also, social contact is to be considered as a mechanism behind the relationship between green space and health (Maas et al., 2009). Based on these findings, UGS is thought to contribute to health, as defined by the World Health Organisation as ‘a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity’ (WHO, 2017). The WHO, therefore, encourages local administrators to increase the provision of UGS. However, providing more PUGS is challenging in increasingly dense cities and therefore finding space for new PUGS is often difficult and expensive, especially for larger areas.

Several studies report significant differences in the use of PUGS for different population segments. In a recent review (Hunter, Ruth F et al., 2014), age, gender, education level and health status were found to be significantly associated with differences in use of PUGS. Furthermore, the same study also found that size and distance from the home are associated with differences in use of PUGS; with larger areas closer to home being used more frequently.

6.2 Effect of PUGS

A list of possible positive effects is, for example:

1. Providing visitors with a sense of escape from noise and pollution in the city and can thus act as a protective factor for populations against environmental risks such as air or noise pollution or the urban health island effect.
2. Strengthening of the immune system and a drop in blood pressure.
3. Combating symptoms of anxiety, having a positive effect on mental health and reducing stress.
4. Reduce risks for chronic diseases by favouring physical activity.

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The links between green spaces and cancer are multiple, but compared with other chronic diseases we still have fewer publications. A recent meta-analysis (Porcherie, Marion et al., 2021) on green spaces and health mentions only four studies on the links between urban spaces and cancer. Another scoping study on the health effects of urban forms on the Canadian population, for example, mentions only one national study involving a link between green spaces and cancer among the 55 studies included (McCormack, Gavin R et al. 2019)

Among studies, the following elements could be the more frequents:

1. Exposure to heavy metals (34% of the studies)
2. Air pollution (24% of the studies)
3. Physical activity (14% of the studies)
4. Other factors
    A. Polycyclic aromatic hydrocarbons (PAHs) (14%),
    B. Positive psychological factors (7%)
    C. Reduced anxiety (7%)
    D. Ultraviolet (UV) radiation (7%)
    E. Pesticides (3%)
    F. Social engagement (3%).

Research should target psychological factors among populations in remission or undergoing cancer treatment. This would help to better distinguish between the benefits to be expected from the use of a green space and what is likely to have the greatest effect: its available surface area, the biodiversity, the practice of physical activity, the vision of the green, the presence of other people, etc.

6.3 Physical Activity in PUGS

The role of public green spaces and Physical Activity (PA) among people in remission from cancer, based on the model of therapeutic gardens that are being

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provided in healthcare establishments, should also become a topic of scientific investigation.

PA contributes to human health. PA has been shown to reduce the risk of cardiovascular disease, obesity and mental health problems such as depression, anxiety. PA also has been found to improve mood, well-being and general health (Dullah Akpinar, 2016)

The effects of green spaces depend on a lot of factors, such as:

1. Number of UGSs available
2. Distance to the nearest UGSs
3. Frequency of park visits
4. The view on to a park from home

For instance, some studies show that nearest **distance** to UGS is positively correlated to PA (Giles-Corti et al., 2005, Cohen et al., 2007, Toftager et al., 2011) and **frequency** of UGS use (Mowen et al., 2007, Björk et al., 200). Positive associations between **largeness** of UGS and increased levels of PA are also reported (Giles-Corti et al., 2005, Paquet et al., 2013). On the other hand, there are also studies which evidence no significant association between green space and PA. Due to the inconsistent findings further research is needed to understand the relationship between green space and PA.

As for the features and quality of the green spaces, studies revealed positive associations between levels of PA and **certain features** of UGS (i.e., paved trails, sport fields, water features, playgrounds, lights, walking path, shade, and drinking fountains) (Cohen et al., 2006, Kaczynski et al., 2008, Schipperijn et al., 2013). Studies also show that **aesthetics**, sometimes called as attractiveness, (Sugiyama et al., 2010) **maintenance** (McCormack et al., 2010), and **cleanliness** (McCormack et al., 2010) are positively associated with levels of PA. Therefore, quality of UGS needs to be considered (McCormack et al., 2010).

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6.4 Conclusions

In conclusion, there is a big chance for PUGS to be of great help for sick people, cancer survivors included, but nowadays we have a lack of evidence, especially in cancer management, although evidence of direct links remains difficult to establish researcher should seek for different approaches to get the best data out of studies.

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