Aging and Physically Active Lifestyle Project

Document no. 4

Ageism in active living promotion : a survey of Canadian seniors

The Aging and Physically Active Lifestyle Project is the result of the work of students on internship at the Quebec Office of the Public Health Agency of Canada (PHAC). This project explores themes related to a physically active lifestyle in the context of demographic and climate change. The views expressed do not necessarily reflect those of the PHAC or the INSPQ. The project is approved by the joint research ethics committee of Health Canada and the Public Health Agency of Canada, reference number CER 2021-025P.

This document was produced by Frédérique Brazeau, as part of an internship with the Université de Montréal School of Public Health's Master's program, Health Promotion option.

This 16-week internship took place in Winter 2023 in the Knowledge Unit of the Quebec Office of the Public Health Agency of Canada, under the supervision of Lucie Lapierre (Researcher-analyst, PHAC) and Mathieu-Joël Gervais (Specialized Scientific Advisor, INSPQ).

To cite this document:

Brazeau, F., Lapierre, L. and Gervais, M. (2023) Aging and Physically Active Lifestyle Project. Document no. 4. Ageism in active living promotion : a survey of Canadian seniors

What we already know about the subject...

- Ageism is present in society, and is detrimental to the physical and mental health of individuals.
- Internalized ageism is a barrier to the adoption of a physically active lifestyle among seniors.

What this study demonstrates...

- The more a person internalizes ageism, i.e., the more convinced they are that they are too old to take part in physical activity, the less physically active they are.
- Unanimously, individuals in their fifties, sixties, seventies and eighties confirm that they only see sexagenarians in the personification of physically active or sporty seniors in the media.
- Even if they don't see themselves in the media, older seniors are very interested in learning new physical activities.
- In our study, one in five seniors was prescribed or encouraged to take part in physical activity by their healthcare team. When this prescription was issued, a third of the group already had at least one chronic illness that restricted physical activity.

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RESEARCH CONTEXT

Problem

Canada is undergoing significant demographic changes, with a population that has been aging for several decades. In 2022, 39% of the Canadian population was aged 50 and over. This rate could increase to 44% by 2068 (1). Demographic aging contributes to the population's growing need for health services (2). With age, the risk of developing certain diseases such as cardiovascular disease, chronic respiratory ailments and cancer increases (3). Aging is associated with an increased risk of developing disability or dementia (4).

These health problems can be prevented by adopting healthy lifestyle habits, including regular physical activity. Physical activity helps to extend healthy life expectancy (5). It is associated with a reduced risk of developing cardiovascular problems, diabetes, high blood pressure, certain types of cancer, anxiety and depression (6). Physical activity has a beneficial impact on the cognitive health of seniors and plays a preventive role in the cognitive decline associated with aging (7).

Despite the known benefits of physical activity, the majority of Canadian seniors are not sufficiently active. According to self-reported data in 2021, only 46% of Canadians aged 50 and over were meeting recommended physical activity levels (8). Among this group, the most frequent barriers are, in order of importance: poor health, lack of companionship, lack of interest and, for women, lack of opportunities (30.3% versus 15.6% in men) (9). When segmented by age group, it appears that environmental factors and resources are common barriers for younger seniors (50-64 years old) and their older counterparts (65-70 years old). Younger seniors are motivated by goal setting, the belief that an activity will be beneficial, and social influences, while older people find their motivation in social influences, reinforcement and help with managing change related to aging (10). Beyond the messages conveyed, seniors attach importance to suggestions provided by healthcare professionals (11). Ultimately, many of the barriers identified in the scientific literature depend on the decisions of third parties, who may be unwittingly subject to ageist attitudes.

According to, the World Health Organization, ageism is a multidimensional concept and can take different forms over the course of a lifetime. Its presence in society, the workplace and the healthcare system is well documented (12). Its effects are felt on several levels, in the form of stereotypes (beliefs), prejudices (feelings) or discrimination (actions).

At the **institutional or global level**, seniors are perceived as frail and unable to perform certain activities (5). In the media, seniors are either invisible or portrayed in a negative and stereotypical way, with a strong emphasis on the physical and cognitive decline associated with aging (13).

In **living environments**, at the **interpersonal level**, older people who take part in various physical activities are sometimes victims of what is described as benevolent ageism from their loved ones. This could be the people around them being overly concerned about the risk of injury, or questioning the appropriateness of the physical activity. When it comes to physical activity, it has been shown that two important notions get confused: age and ability. This misunderstanding has consequences for the services offered to seniors, making them

redundant, limited and unappealing to physically fit seniors (14). In the healthcare field, professionals rarely prescribe physical activity to older patients (15), and when they do, they prescribe low-intensity exercises, without having assessed the patient's basic physical condition (16).

On a **personal level**, individuals exposed to ageism towards older people throughout their lives may internalize these negative thoughts or stereotypes. This is known as internalized ageism (17). According to the stereotype embodiment theory proposed by Levy (2009), individuals internalize stereotypes about seniors, and this can affect their behaviour. Moreover, when seniors have difficulty identifying with physically active or sporty models, it contributes to the internalization of ageism (13). Seniors who have highly internalized ageism are less inclined to adopt a physically active lifestyle (18).

In conclusion, the lack of positive representation in the media, a negative perception of senior's abilities, a limited and unappealing range of services, and the internalization of ageism, i.e., belittling oneself because of one's age, are all factors associated with the adoption and maintenance of a physically active lifestyle in the second half of life.

Study objectives

This study has two objectives:

1. To better understand whether people aged 50 and over recognize themselves in the models, images and representations of physically active seniors presented to them.
2. To better understand whether internalized ageism influences the practice of physical activity in adults aged 50 and over.

Research hypotheses

Hypothesis 1**:** As the age of individuals increases, they feel less adequately represented by physically active or sporty people in the media (TV, newspapers, magazines, advertisements, news) and in the promotion and advertising of service offerings or the sale of sports equipment. In this hypothesis, people's perception is the dependent variable, and their age is the independent variable.

Hypothesis 2**:** Seniors who experience ageism at one level or another are less physically active than seniors who are not. In this hypothesis, the dependent variable is physical activity, expressed in minutes per week. We have six independent variables. The first independent variable is ageism. Since ageism is a multifaceted concept that exists and manifests itself at many levels in our society, we have operationalized it using Bronfenbrenner's ecological model. This model emphasizes the interaction and interdependence between individuals and their social and physical environments. Thus:

- Overall, ageism is associated with perceived social norms. This norm is expressed by the degree to which seniors agree with sufficient representation of physically active, sporty people of their own age in the media.

- In living environments, ageism is expressed by the propensity (interest) of seniors to try new physical activities and sports, in the absence of being able to measure the density of opportunities in the service offerings aimed at them.
- Interpersonally, ageism is expressed by whether or not the healthcare team has prescribed or encouraged physical activity.
- Individually, ageism is associated with an ageism index internalized from a validated tool to which we have added questions specific to physical activity.

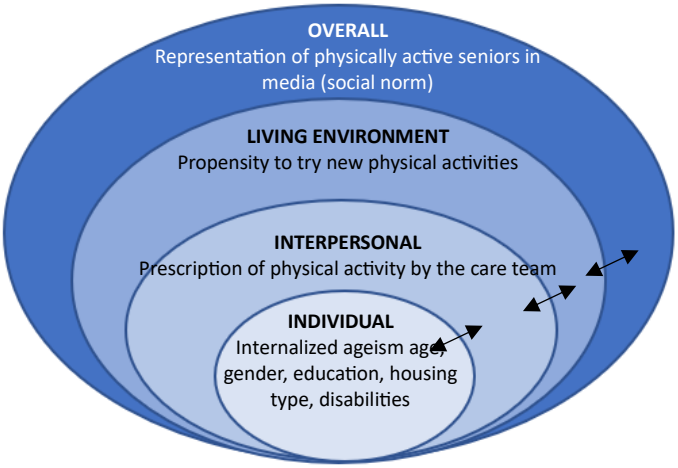
The five other independent variables associated with our second hypothesis are: age, gender, level of education, type of dwelling and health conditions, which in the opinion of the respondents, restrict their physical activity.

METHODOLOGY

Conceptual framework

The ecological model depicts a complex environmental system in which human beings are the centre of attention. In our case, the seniors are at the centre. We have identified our variables in Figure 1 according to the level at which each is contextualized.

Figure 1. Variables studied according to the different levels of Bronfenbrenner's ecological model.



Summary of data analysis, strategy or framework

We used SPSS software to analyze the data. Since our sample included some extreme data (reflecting an overestimation of physical activity), we assigned them a value equivalent to 3.29 standard deviations from the sample mean. With this experiment, we were able to retain all participants who had completed the survey.

We have calculated frequencies and means for all the variables of interest.

For our first hypothesis, we performed a simple analysis of variance (ANOVA) followed by a Bonferroni post hoc test to determine which of the different age groups stood out in terms of their responses.

For our second hypothesis, we performed a linear regression to determine the effect of the variables under study on participants' physical activity.

Presentation and explanation of the changes made to the initial estimate

After running a linear regression with the variables involved in our second hypothesis, we observed a negative association between the prescription or encouragement of physical activity by the healthcare team and the participants' actual physical activity This finding seemed contrary to what was expected from our initial hypothesis (Table 4). Therefore, we took the opportunity to investigate in greater detail the predictors of prescribing or encouraging physical activity among seniors, using this variable as the dependent variable.

Consequently, we developed a third research objective: to determine what predicts the prescription or encouragement of physical activity by the healthcare team. The results of this exploratory approach are explained in the Results section.

Recruitment strategy

We recruited participants using a non-probability sampling method through provincially and federally chartered organizations working in the field of aging or physically active living. Twenty-five of the 64 organizations contacted by e-mail agreed to promote the survey (Appendix 1) by placing a promotional insert with a hyperlink on their website, in their newsletter or on their social media.

Data collection instrument

The survey was conducted using the *Qualtrics* platform from January 31, 2023, to February 28, 2023, by Health Canada's Public Opinion Research Unit. An introduction page presented the confidentiality conditions and referred participants to the *Privacy Act*.

Our questionnaire (Appendix 2) consists of 29 questions, including those used to characterize our respondents. Examples: age, gender, education, postal code (rural-urban), province, type of residence. Questions are also used to characterize their potential for physical activity. Examples: mobility and presence of illness(es) restricting physical activity. Other questions deal with elements more specific to our subject of study:

1. Physical activity was assessed using validated questions from the "physical activity" component of the 2018 Canadian Community Health Survey (19).
2. The perception of a social norm promoting physical activity among seniors.
3. The propensity (interest) of seniors to try new activities, to test a very common ageist stereotype that older people have no interest in learning new skills.

4. Internalized ageism was assessed on the basis of Van der Horst's work (2019), to which we have added three more questions specific to our study subject.
5. Prescription of physical activity by the healthcare team based on the 24-Hour Movement Guidelines specific to people aged 65 and over issued by the Canadian Society for Exercise Physiology.

Social norms promoting physical activity among seniors

We formulated two questions to measure the self-reported perception of a social norm specific to supporting and valorizing physical activity among seniors. The questions were as follows, and participants rated their degree of agreement or disagreement on a five-point Likert scale:

- At my age, engaging in physical activity is not valued/encouraged by society.
- Active and sporty people my age are sufficiently represented in the media (television, newspapers, magazines, advertisements, news).

Internalized ageism scale and score

Van der Host's 4-item scale assesses the internalization of ageism by asking individuals to what extent on a Likert scale they feel old, and to what extent they feel their age is a hindrance to engaging in activities (20). It also questions their optimism about their health in the years ahead, and the extent to which old age is accompanied by a deterioration in health. To reflect the internalization of ageism on physical activity, according to the same Likert scale, we added three statements to this scale. These statements concern the age at which it is appropriate to be physically active, to take up new activities or sports, and the age at which there is a risk of injury from being physically active or sporty.

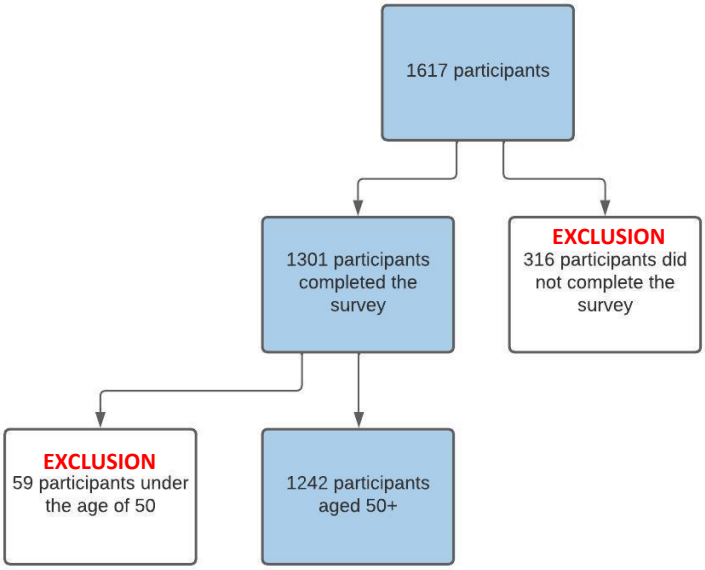
Following a factorial analysis of the seven items, it turned out that two items measured ageism in general rather than specifically to physically active lifestyles, and we had to remove them.

Finally, our measurement tool consisted of 5 statements, each worth a maximum of 5 points. This reverse-coded tool reveals that a low score indicates high internalized ageism, meaning that the person considers themselves too old to be physically active, and a high score means little internalized ageism, or that it's perfectly normal to adopt a physically active lifestyle at an older age.

Participants

To take part in our study, participants had to be aged 50 or over, live in Canada and be able to complete an online survey in English or French.

Figure 2. Selection of participants.



A total of 1,617 people took part in the survey. Of this number, 316 people had to be excluded because they did not complete the questionnaire, for a drop-out rate of 24%. Additionally, 59 people had to be excluded because they had not reached the minimum age for participation in the study, i.e., 50 years old. Our final sample comprised 1,242 respondents, most of them women, highly educated, physically active and largely based in Quebec. The characteristics of the participants are presented in Table 1.

Table 1. Participant characteristics.

		Percentage (%)
Gender	Male	20.7
	Female	78.7
	Other/prefer not to answer	0.6
Age groups	50–59 years old	25.7
	60–69 years old	39.9
	70–79 years old	28.8
	80–89 years old	5.2
	90 years and older	0.3
	Prefer not to answer	0.1
Education	High school or less	10.9
	CÉGEP or trade school diploma	22.1
	Bachelors' degree or higher	66.1
Residence	Quebec	76.7
	Canada (outside Quebec)	21.9
	Undetermined	1.4
Type of living environment (postal code)	Urban	64
	Rural	12.6
	Undetermined	23.4
Dwelling type	Personal dwelling	95.6
	Private seniors' residence	2.4
	Undetermined	2

Mobility	Walks without help	97.4
	Walks with a cane	1.5
	Walks with a walker	0.8
	Moves around in a wheelchair	0.2
Disability(ies) that make it difficult to practise physical activity	0	76.0
	1	16.0
	2	4.0
	3+	2.7
Internalized ageism score	1 Very high	0.3
	2 High	1.6
	3 Average	13.9
	4 Low	48.6
	5 Very low	35.5
Physical activity	Meets CSEP recommendations	69.3
	Does not meet CSEP recommendations	30.7
		(n)
Prescription or encouragement of PA by the care team	Received	270
	- Walking or cardiovascular	215
	- Weight lifting	94
	- Flexibility	115
	- Balance	92
	Did not receive	971
Propensity or interest in taking up physical activity	0 activity	16
	1 activity	62
	2 activities	67
	3 activities	155
	4 activities	180
	5 activities and more	761

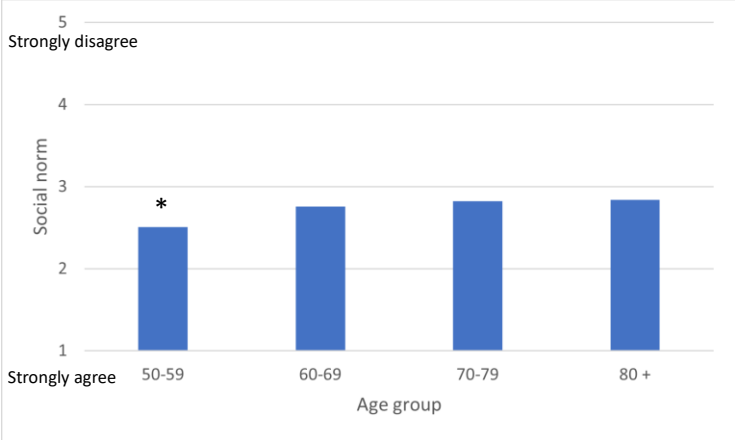
MAIN RESULTS

Perception of a social norm promoting physical activity in the second half of life

Reiterating that the ageism scale we've created is a reversed scale, we note in Figure 3 that the mean scores for all age groups fall close to value 3, i.e., neither agreeing nor disagreeing with the presence of a social norm promoting a physically active lifestyle among seniors.

The group in their fifties, with a mean score of 2.51, is the most likely of all age groups to recognize the presence of a social norm promoting physical activity.

Figure 3. Perception of a social norm promoting physical activity according to age group.



*The mean difference is significant at the 0.05 level.

Active, sporty seniors portrayed in the media are all the same age

We explicitly asked seniors who had no health conditions that prevented them from engaging in physical activity to estimate the age of the characters they saw in the promotion and advertising inherent in service offerings (e.g., leisure programming) and the sale of sports equipment. Table 2 unequivocally shows the uniqueness of the age of the characters used (i.e., 60).

Table 2. Age attributed to seniors featured in the promotion and advertising of service offerings and sales of sport equipment by age of respondents.

Age group of seniors with no health constraints limiting physical activity	Age
50–59	60
60–69	60
70–79	60
80 and older	60

Media portrayal of seniors and propensity to try new physical activities

Figure 4 illustrates the relationship between two concepts. The first (in blue) is the extent to which respondents agree that their own age group is sufficiently portrayed in the media. The second (in orange) is their propensity, also according to age groups, to try new physical activities.

With an average rounded to the nearest unit, more people in their fifties consider themselves sufficiently portrayed (score = 3) in the media (TV, newspapers, magazines, advertising, news) compared to their older peers, but this does not necessarily indicate that their representation is deemed sufficient in proportion to the population.

The propensity or interest to try new physical activities diminishes as age increases, but it's crucial to note that it does not die out. The octogenarians in our study showed an interest in learning four new physical activities, and among this group, the women chose an average of 6 activities, compared with 4.6 for the men (Appendix 6).

Lastly, two age groups, 60–69 and 70–79, do not feel sufficiently portrayed in the media compared with their younger counterparts. They show a decline in interest in engaging in new physical activities, compared with their younger peers.

Figure 4. Level of media portrayal (average rounded to the nearest unit) and propensity to try new activities by age group.

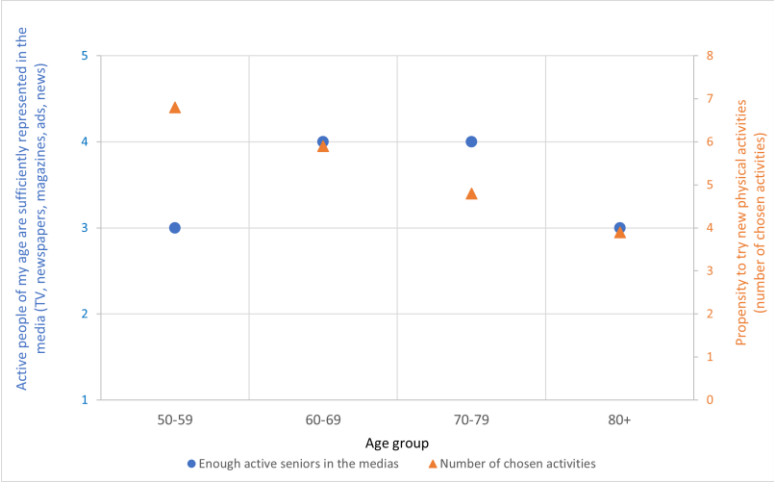


Table 3 shows, by count of occurrences, the three activities prioritized by respondents.

Table 3. Most popular activities among inactive and active respondents, by age group.

	50–59		60–69		70–79		80 and older	
150 min/week	Achieved	Not achieved	Achieved	Not achieved	Achieved	Not achieved	Achieved	Not achieved
Cross-country skiing								
Cycling								
Swimming								
Dance								
Aqua fitness								
Exercise (gym)								
Weight lifting								
Tai Chi								
Chair exercises								

Predictors of physical activity

The factors (Table 4) that predict the achievement of 150 minutes of physical activity per week among our respondents are, in order of importance:

- Absence of internalized ageism
- Propensity to engage in physical activity
- Absence of health conditions limiting the practice of physical activities
- Education level
- Absence of physical activity prescription from the healthcare team
- Feeling portrayed in the media by physically active and sporty seniors their own age (indicator of a social norm favourable to physical activity)

Our data show that, all conditions being equal, the absence of internalized ageism explains almost 20% of the variance in whether older people achieve the current recommended level of at least 150 minutes of weekly physical activity.

As expected, the data also suggest that the presence of (a) health condition(s) limiting the practice of physical activity is negatively associated with the achievement of the recommended levels of practice. People's propensity or interest in trying physical activities, measured by the number of activities selected, explains 12% of the variance, and being portrayed in promotions and advertising, explains 5%.

Conversely, dwelling type and gender have no effect, which could be explained by a lack of representativeness in our sample. The physical activity prescription is negatively associated with practising physical activity. As this seems counter-intuitive to us, this factor will be explained further in Table 5.

Table 4. Predictors of physical activity in seniors.

Variables	**Standardized coefficients Beta**	**SIG**
Absence of internalized ageism	.196**	< .001
Propensity (interest) to try physical activities	.125**	< .001
Presence of health condition(s) limiting physical activity	–.084	.003
Education	.073	.008
Physical activity prescription or encouragement by the care team	–.066	.016
Feeling sufficiently portrayed by physically active and athletic seniors in the media	.058*	.036
Age	.047	.112
Gender	.001	.965
Dwelling type	–.013	.633

** Statistically significant at p=0.01

* Statistically significant at p=0.05

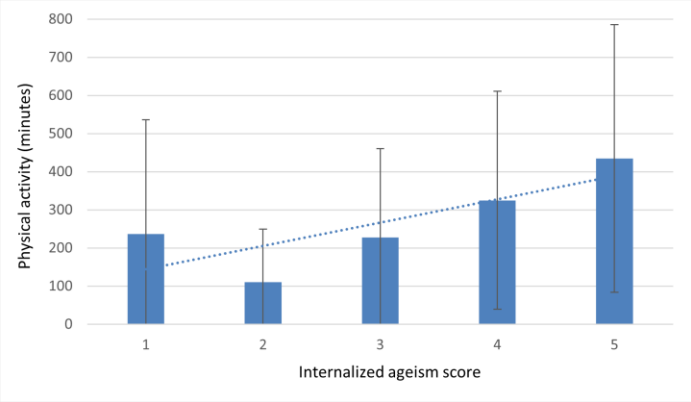
Role of health conditions moderator on explaining the relationship between internalized ageism and physical activity

Throughout this research, we questioned whether the presence of a health condition that limits physical activity (as is the case for 24% of our respondents) could increase a respondent's internalized ageism and thus influence the achievement of the recommended levels of physical activity.

In this regard, the previous table shows that health conditions that limit physical activity and internalized ageism are independent factors. In other words, these two factors coexist and neither takes precedence over the other.

However, as shown in the previous table, internalized ageism more strongly predicts achievement of the levels of weekly physical activity (150 minutes) recommended by the Canadian Society for Exercise Physiology. This is equivalent to saying that the less seniors perceive themselves as too old to take part in physical activity or sports, the more physically active they are.

Figure 5. Average weekly time spent on physical activity according to internalized ageism.



Predictors of physical activity prescription by the care team

Given that prescribed physical activity is associated with greater physical activity in adults older than 50 (21)(22), and the integration of physical activity into the healthcare system is an important strategy for healthy aging, we explored what predicts whether the healthcare team prescribes and encourages physical activity in our sample.

To address this question, we conducted a linear regression; this enabled us to determine the effect of the variables of interest on physical activity prescription by the healthcare team. The variables of interest are the following: absence of internalized ageism, media portrayal of physically active seniors, propensity to try new physical activities, age, gender, education level, and health conditions preventing physical activity.

The only variable significantly associated with physical activity prescription by the healthcare team is having one or more health conditions that limit the practice of physical activity. Furthermore, the association between health conditions and prescription by the healthcare team

(β = 0.15) is three times greater than the association between internalized ageism and prescription (β= -0.06) (Table 5).

Table 5. Factors associated with physical activity prescription by the care team.

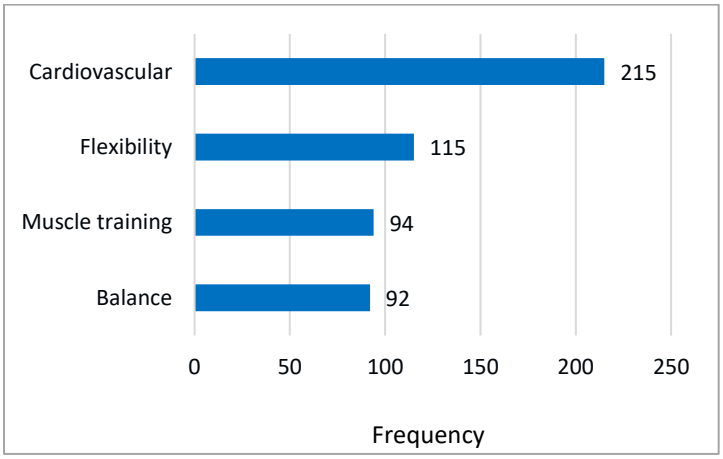
Factors	**Standardized beta coefficients**	**SIG**
Presence of health condition(s) limiting physical activity	0.15**	< 0.001
Absence of internalized ageism	–0.06	0.066
Feeling sufficiently portrayed by physically active and athletic seniors in the media	–0.03	0.269
Propensity (interest) to try physical activities	–0.001	0.964
Age	–0.05	0.109
Gender	0.014	0.633
Education	–0.04	0.122
Dwelling type	0.04	0.143

** Statistically significant at p=0.01

In our sample, only one in five seniors (21.2%) is encouraged to engage in physical activity through a prescription. Of this group, one in three (34%) report they have at least one condition that limits physical activity. This suggests that a third of the time, physical activity prescription rather than health promotion is used to delay the onset of avoidable health problems.

Among respondents who reported having received a physical activity prescription, the type of exercise prescribed according to the number of occurrences favours cardiovascular exercise and, to a lesser extent, the types of exercise recommended to them by the Canadian Society for Exercise Physiology (i.e., flexibility, strength and balance exercises) (Figure 6).

Figure 6. Types of exercise prescribed by the care team.



ANTICIPATED BENEFITS OF OUR RESEARCH WORK

First finding: In the absence of physically active and athletic role models, seniors are interested in getting moving, even at an advanced age.

The first objective of this study was to better understand whether people aged 50 and older recognize themselves in the examples, images and portrayals of active seniors presented to them. In our sample, participants aged 50 to 59 feel significantly more represented than older participants (Figure 4). This confirms H1, the first research hypothesis indicating that as people get older, they feel less sufficiently portrayed in sports and physical activity. As a result, all age groups say they only see 60-year-old examples in the media. This in itself is evidence of a certain form of ageism, perhaps unintentional, at a macro level in society, or possibly a lack of awareness or openness to properly representing the diversity of people's ages and abilities in the second half of life. Moreover, without implying a cause-and-effect relationship, we note that the less people feel they are sufficiently portrayed in the media, the more their propensity to try out new physical activities diminishes without, however, disappearing altogether (Figure 4).

There are many widely held stereotypes of seniors, including their lack of interest in learning new activities, including any form of physical activity other than walking. In the event that there were free, safe activities involving competent, trained staff, all respondents were motivated to try new physical activities.

These results underline the importance of portraying physically active seniors of all age groups in the media and in images used to personify the provision of services (e.g., municipal programming) or the sale of sports equipment. Seniors are often considered and portrayed as a homogeneous group. The survey results suggest that after the age of 60, respondents no longer feel represented. There is undoubtedly a need to produce practical guidelines for advertisers and promoters on the importance of being inclusive and using a variety of ages in the media, and not hesitating to personify septuagenarians and octogenarians, since for them as well science clearly demonstrates all the benefits of adopting a physically active lifestyle rather than being sedentary.

Our results support previous studies suggesting that seniors have needs, abilities and interests that are as diverse and heterogeneous as in the rest of the younger population (23)(24). These results also underline the importance of offering a variety of physical activities and supporting seniors' learning with qualified staff, even late in life.

Second finding: Internalizing ageist stereotypes and attitudes toward oneself is a barrier to physical activity in the second half of life.

The second objective of the study was to gain a better understanding of whether internalized ageism influences physical activity in people aged 50 and older. In our sample, internalized ageism is negatively associated with physical activity in all age groups and for both men and women. Seniors who have internalized ageism more (scoring low on the ageism scale) tend to be less physically active. This result confirms H2, the second research hypothesis, indicating that seniors who have internalized more ageism are less physically active. These results are

consistent with the literature in that several recent studies suggest that internalized ageism is a barrier to physical activity among seniors (11).

Typically, ageism influences physical activity on four levels: how individuals perceive the impact of aging on our physical abilities and activities, the motivation to engage in physical activities and sports, the opportunities to be active as one's ages, and the ambiguous positioning of seniors in the field of sports and physical activity (5).

Respondents who accumulate the most minutes of physical activity per week are those who internalize ageism the least, which seems consistent with the literature. Physical activity in itself promotes the internalization of positive stereotypes associated with aging, and the internalization of positive stereotypes mitigates internalized ageism (25). Some authors believe that the sense of self-efficacy that comes with physical activity could explain this relationship (26).

In our study, the internalized ageism score is the factor that best predicts the number of minutes of physical activity, followed by the propensity to try new activities.

These results suggest practical implications for the provision of physical activity services in the sense that such provision needs to be inclusive and varied for all age groups. Often, programs targeting seniors consist solely of chair activities, while promotion primarily emphasizes walking. While these activities are suitable for some seniors, there is room for innovation. Intergenerational activities are a beneficial avenue for reducing ageism and increasing physical activity (27). To achieve this, it's important to opt for facilities, infrastructures, rules, and policies that facilitate healthy cohabitation among users of different ages and abilities. The more seniors are seen engaging in physical activities in indoor and outdoor infrastructures and public and community spaces, the more visible they become, and the more it will contribute in the long term to defining a new social norm: aging while being physically active. Many seniors, including the oldest ones, want to take part in higher-intensity sports activities. In the survey, many participants expressed an interest in trying activities such as muscular training, cycling, dancing, swimming or cross-country skiing, for example.

That said, most of the activities that proved popular with our sample require equipment and infrastructure in order to be practised. This involves planning and allocating resources for the creation and maintenance of adapted infrastructures for physical activity for seniors (e.g., swimming pools, fitness gyms, cycling routes, cross-country ski trails).This would certainly require trained support personnel and financial assistance.

Third finding: Despite the benefits of physical activity at any age, the prescription and reinforcement of physical activity by the care team is underused and inconsistent with Canadian guidelines specific to the 65+ age group.

Lastly, we wanted to determine whether physical activity prescription by the care team played a role in the relationship between ageism and the practice of physical activity. Ideally, an entirely different type of study would have been needed to test this hypothesis, as our study is cross-sectional in nature.

Contrary to expectations, respondents who have received a prescription or encouragement in the past year are less physically active than those who have not. The negative association between physical activity prescription and the number of minutes of physical activity per week persists even when controlling for ageism and education level. This result can be explained by the fact that the majority of seniors with a prescription have conditions that prevent them from practising physical activities. Disability is one of the main barriers to physical activity among seniors (28)(29).

Our data suggest no association between physical activity prescription and internalized ageism. Consequently, we cannot infer that physical activity prescription would have the power to offset internalized ageism. However, as explained, the majority of seniors who received a prescription had conditions that prevented them from practising physical activities. This may explain the lack of association between these two concepts. Internalized ageism is associated with poorer health among seniors (30).

That said, knowing that few of our respondents had been offered a prescription or encouragement by their healthcare team in the past year, and that a third of them were already living with a limiting health condition, we observe a missed opportunity for an entire generation.

Exercise prescription by the healthcare team is effective in promoting physical activity and preventing chronic diseases (31)(32). The American College of Sports Medicine recommends that physical activity level assessment and physical activity prescription should become a standard part of healthcare in order to improve population health (33). In France, the Haute Autorité de Santé recommends that doctors prescribe physical activity as a full-fledged therapy in the prevention of risk factors and chronic diseases (34).

In the present case, the prescription comes too late on the life continuum, when some seniors have already developed health problems. It's important to emphasize that we are talking here about preventable health problems, most of which are behavioural and related to lifestyle habits(35). These risk factors can be modified by lifestyle changes, such as regular physical activity.

Furthermore, when physical activity is prescribed, it mainly consists of cardiovascular exercise such as walking. Prescription of strength, flexibility and balance exercises is less frequent in our sample. Prescribed strength, balance and flexibility exercises have long been shown to help preserve seniors' functional capacity and prevent disability (36). In addition, muscle- and bone-strengthening exercises are essential to reduce the loss of muscle mass associated with aging (37). In its 24-hour movement guidelines, the Canadian Society for Exercise Physiology recommends activities that involve the large muscle groups at least twice a week, and others that involve balance (38). Healthcare providers must therefore adapt their prescriptions to these parameters and to the specific condition of each individual.

MAIN CONTRIBUTIONS TO THE ADVANCEMENT OF KNOWLEDGE

From a theoretical perspective, our study deconstructed the myth that seniors have no interest in physical activity. This is an important finding for the practice since it leads to a different conception of what it means to grow old, with opportunities to safely try physical activities. In a society that designs its service offering and promotion for younger clienteles, this raises

questions of equity and inclusion. The pleasure that comes with socialization and self-improvement in learning a new physical activity in a club, group, or league is an important driver for adopting and maintaining this lifestyle habit. These opportunities should be offered on par with falls prevention and exercise break programs generally provided free of charge by the public health sector.

Our study clearly demonstrates an association between internalized ageism and weekly time spent on physical activity. To our knowledge, no study has linked this concept with tools that have been largely validated. We built on Van der Horst's tool to qualify internalized ageism and Statistics Canada's questions to quantify physical activity. This opens the door to further in-depth studies on ageism in the promotion of sports and physical activity. Moreover, the fact that respondents do not perceive any social norms concerning them, and only see sexagenarians in the media, is also evidence of an ageism that is probably unintentional, but no less embedded in the practices and policies of governmental and non-governmental agencies, and public and parapublic organizations, at all levels. The outcome is counterproductive in a rapidly aging society like Canada's.

Methodologically, we have created a new scale to measure internalized ageism specific to a physically active lifestyle. For later validation, our scale could be used with a more representative sample of the population under study and its level of physical activity. Adopting a physically active lifestyle is possible throughout one's life and involves several types of physical activity. It is therefore important to contextualize ageism issues in sports, outdoor activities, urban planning, healthcare and public health in order to measure their full scope.

COURSES OF ACTION SUPPORTED BY RESEARCH FINDINGS

Since, in our study, internalized ageism is by far the most important factor in practising at least 150 minutes of physical activity per week, it is important to equip our society with tools aimed at establishing a social norm explicitly in favour of practising physical activity from the second half of life until the very end. Because a physically active lifestyle involves several stakeholders in society, our findings have different meanings in different sectors, including:

In public health, large-scale surveys should further segment the various age groups under the designation of "seniors", so as to shed more light on the behaviour and lifestyle habits of this broad clientele. Attention must also be paid to the visuals and the content used in the various promotional campaigns to ensure that seniors of different ages and abilities feel targeted and encouraged to be physically active. The sector also needs to engage all its partners regarding the urgency of intervening differently, to have a diverse range of services that, where appropriate, facilitate cohabitation between different generations.

In the field of sports, associations and municipalities, we need to diversify the service offering and innovate in the way we publicize and manage this "new" range of services, particularly for seniors who do not use or are not familiar with community or private service providers, sports facilities, those located in parks, their public transportation links, cycling paths, walking trails, etc. As we have demonstrated, seniors and even octogenarians have shown an interest in learning new physical activities, provided they are safe and the staff are trained and competent. As a sports and community facilities manager or client, the municipality may require its

subcontractors to provide an inclusive service offering, with qualified instructors trained in andragogy.

Lastly, in healthcare, there is every reason to use physical activity earlier on the care and aging continuum, and in accordance with the Canadian 24-hour Movement Guidelines for people aged 65 and older. There may also be a case for kinesiologists to tailor physical activity prescriptions to specific health problems rather than opting for "*one size fits all*" types of prescriptions. Lastly, this network can also partner with the sports sector to establish a referral and support system for seniors who, over time, have lost touch with their local ecosystem of service providers.

LIMITATIONS IN INTERPRETING OR USING RESULTS

This study was conducted as part of a 16-week internship. This short time frame is at the root of methodological choices that have led to limitations and biases.

The sampling method used was non-probabilistic; participants were recruited online, through newsletters and social networks, by organizations that serve seniors or promote a physically active lifestyle. Although we recruited representative percentages of seniors in three of the five age categories, our sample is subject to selection bias, since it is predominantly composed of women who are highly educated and who are more physically active than the Canadian average (69% vs. 46%) (8).

The literature suggests that more educated people internalize less ageism and engage in more physical activity (5). Given the nature of our sample, we cannot generalize our results to all Canadian seniors. It should be noted, however, that the demonstrated relationship between internalized ageism and time spent on physical activity is valid for what we call the "best-case scenario" (i.e., physically active seniors). We were unable to infer the worst-case scenario (i.e., the sedentary seniors who make up the majority of Canadians).

Lastly, there is a non-coverage bias in the study. The survey had to be conducted online. Although a majority of Canadian seniors have Internet access, this method systematically excludes seniors who don't have access to a computer or who have low digital literacy (39)(40). A telephone survey, duly segmented, would have been a much better choice, but is not applicable to the limited duration and resources of a student internship.

NEW RESEARCH QUESTIONS

To follow up on this important research, it would be advisable to repeat the study with a representative sample, or to add the internalized ageism scale specific to physical activity to ongoing large-scale surveys.

Since ageism is a phenomenon that affects all levels and sectors of society. Therefore, it would also be appropriate to survey the next generation of professionals in nursing, leisure, kinesiology, urban planning and public health. Professionals in these fields could provide insight on ageism, their own representations of a physically active lifestyle in the current context of major demographic change, and possible changes in practices or policies. This would reinforce social norms that are free of ageism and more favourable to the adoption of a physically active lifestyle throughout life.

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APPENDICES

Appendix 1. List of Distribution Partners by Field of Activity and Level of Intervention.

Field of Activity	**Level of Intervention**	**Distribution Partners**
Aging	National (Canada)	Fédération des aînées et aînés francophones du Canada (FAAFC), CanAge, Active Aging Canada, Canadian Centre for Activity and Aging (Western University), Healthy Aging CORE
	Provincial (Quebec)	Conférence des tables régionales de concertation des aînés du Québec, Institut universitaire de gériatrie de Montréal, FADOQ Montréal, FADOQ Laval, FADOQ Rive-Sud Suroit, FADOQ Laurentides, Institut sur le vieillissement et la participation sociale des aînés (Université Laval), engAGE Centre for Research on Aging (Concordia University)
	Provincial (outside Quebec)	Fédération des aînés et des retraités francophones de l'Ontario (FARFO), Rendez-vous des aînés francophones d'Ottawa, Retraite en Action (REA), Saskatchewan Seniors Mechanism
Physically active lifestyle	National (Canada)	Sport Information Resource Centre (SIRC)
	Provincial (Quebec)	Espace Muni, Lucilab, Capsana, Montréal physiquement active
Injury/illness prevention	National (Canada)	Parachute Canada

Appendix 2. Questionnaire.

Sections	**#**	**Questions**	**Response Options**
Socio-demographic	1	Which of the following age groups do you fall into?	● 49 years and younger [THANK YOU AND EXIT] ● 50 to 59 years ● 60 to 69 years ● 70 to 79 years ● 80 to 89 years ● 90 years and older
Mobility and illness	2	Please select the statement that best describes your situation (choose one only):	● I walk without assistance ● I walk with a cane ● I walk with a walker ● I use a wheelchair
	3	Please select the health condition(s) that prevent(s) you from practising a physical activity or sport, if applicable:	● Diabetes ● Blood pressure ● Arthritis ● Hearing loss ● Vision loss ● Cognitive loss ● Injury from a fall ● Use of medication that alters balance ● Awaiting surgery such as cataract, hip replacement, knee replacement ●

			Other: please specify: ● No condition ● Prefer not to answer
Active transportation (Questions taken from the Canadian Community Health Survey [CCHS] – 2018)	4a	In the last 7 days, did you use walking for **a minimum of 10 continuous minutes** to get to places such as the bus stop, the library, a convenience store, the post office or to visit friends?	● Yes ● No ● Refused ● Don't know
	4b	On which days did you do these activities?	● Monday ● Tuesday ● Wednesday ● Thursday ● Friday ● Saturday ● Sunday
	4c	How much time in total, in the last 7 days, did you spend doing these activities? Please only include activities that lasted a minimum of 10 continuous minutes. Enter number of minutes.	
Moderate leisure-time physical activity (CCHS 2018)	5a	In the last 7 days, did you do sports, fitness or recreational physical activities, organized or non-organized, that lasted a minimum of 10 continuous minutes? Examples are walking, home or gym exercise, swimming, cycling, running, skiing, dancing and all team sports.	● Yes ● No ● Refused ● Don't know
	5b	Did any of these recreational physical activities make you sweat at least a little and breathe harder?	● Yes ● No
	5c	On which days did you do these recreational activities?	● Monday ● Tuesday ● Wednesday ● Thursday ● Friday ● Saturday ● Sunday
	5d	In the last 7 days, how much time in total did you spend doing physical activities in your leisure time? Enter number of minutes.	
Occupational physical activity (CCHS 2018)	6a	In the last 7 days, did you do any other physical activities **for a minimum of 10 continuous minutes** while at work, at home or while volunteering? Examples are carrying heavy loads, shoveling, climbing stairs, sweeping, mopping the floor or walking in a shopping mall.	● Yes ● No ● Refused ● Don't know
	6b	Did any of these other physical activities make you sweat at least a little and breathe harder?	● Yes ● No
	6c	In the last 7 days, on which days do you do these other activities?	● Monday ● Tuesday ● Wednesday ● Thursday ● Friday ● Saturday ● Sunday

	6d	In the last 7 days, how much time in total did you spend doing these occupational physical activities? Enter number of minutes.	
Vigorous physical activity (CCHS 2018)	7a	You have reported a total of xxx minutes of physical activity. Of these activities, were there any of VIGOROUS INTENSITY, meaning they caused you to be OUT OF BREATH?	● Yes ● No ● Refused ● Don't know
	7b	In the last 7 days, how much time in total did you spend doing vigorous activities? Enter number of minutes.	
Strength training (CCHS Rapid Response 2020)	8	In the last 7 days, on how many days did you do activities that increase bone or muscle strength? Examples are lifting weights, carrying heavy loads, shovelling, sit-ups, running, jumping or sports that involve a quick change in direction.	● 0 ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7
Balance (CCHS Rapid Response 2020)	9	In the last 7 days, how many days did you do any activities that improve balance? Examples are yoga, tai chi, dance, tennis, volleyball, and balance training.	● 0 ● 1 ● 2 ● 3 ● 4 ● 5 ● 6 ● 7
Sedentary behaviours (CCHS 2022)	10	Over the course of a day, how much of your free time do you spend, on average, watching television or a screen on any electronic device while sitting or lying down?	● 2 hours or less per day ● More than 2 hours but less than 4 hours ● 4 hours to less than 6 hours ● 6 hours to less than 8 hours ● 8 hours or more per day
Care	11 a	In the last year, has your care team (family doctor, day centre, nurse, physiotherapist, occupational therapist) prescribed physical activity for you?	● Yes ● No
	11 b	Please select all the activities you were prescribed:	● Walking or other cardiovascular activities ● Strength-training exercises ● Flexibility exercises ● Balance exercises ● Other, please specify:

Ageism (questions from van der Horst, 2019)	12	To what extent do you agree or disagree with each of the following statements? *a.* My age prevents me from doing things I would like to do. *b.* I don't think of myself as old. *c.* Old age is a time of ill health. *d.* I worry that my health will get worse as I grow older. *e.* At my age, I am too old to be physically active. *f.* At my age, I am too old to **try** new physical activities or sports. *g.* At my age, I run the risk of injuring myself if I take part in physical activity or sports.	● Strongly agree ● Agree ● Neither agree nor disagree ● Disagree ● Strongly disagree
Social norms	13	To what extent do you agree or disagree with the following statements? *a.* At my age, physical activity is not valued/encouraged by society. *b.* Active and athletic people my age are sufficiently represented in the media (television, newspapers, magazines, advertisements, news).	● Strongly agree ● Agree ● Neither agree nor disagree ● Disagree ● Strongly disagree
	14	In general, how old do you think the seniors are who are featured in promotions and advertising for service offers or the sale of sports equipment?	● 50 ● 60 ● 70 ● 80 ● 90 and older
Propensity to try new physical activities	15	Please select the activities you would be interested in practising, assuming they are free of charge and that qualified and competent staff would be available to assist you.	● swimming ● walking soccer ● judo ● strength training ● para-basketball ● downhill skiing ● dancing ● chair exercise ● spinning ● ballet ● para-tennis ● para-curling ● aqua fitness ● cross-country skiing ● tai chi ● cheerleading ● gymnastics ● cycling ● volleyball ● exercising ● other
Socio-demographic	16 a	What is your gender?	● Male ● Female ● Other ● Prefer not to answer
	16 b	What is the highest level of education you have achieved?	● Less than an SSD ● SSD ● Registered apprenticeship or trade school diploma ● DCS ● University degree below bachelor's degree ● Bachelor's degree

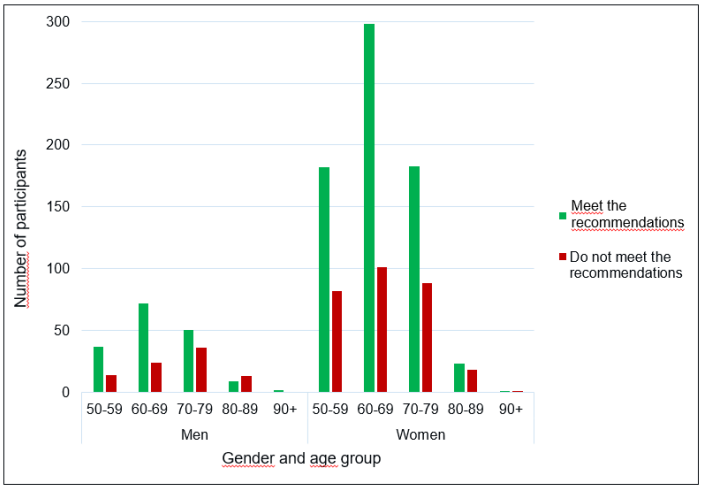
			● University degree above bachelor's degree ● Prefer not to answer
	16 c	What are the first three characters of your postal code?	
	16 d	In which province or territory do you currently live?	● British Columbia ● Alberta ● Saskatchewan ● Manitoba ● Ontario ● Quebec ● New Brunswick ● Nova Scotia ● Prince Edward Island ● Newfoundland and Labrador ● Northwest Territories ● Yukon ● Nunavut
	16 e	Choose the option that best describes your residence. (Choose 1 only)	● Personal dwelling (house, condo, apartment) ● PRH (private retirement home) ● LTCF ● Other, please specify:

Appendix 3. Internalized ageism scale.

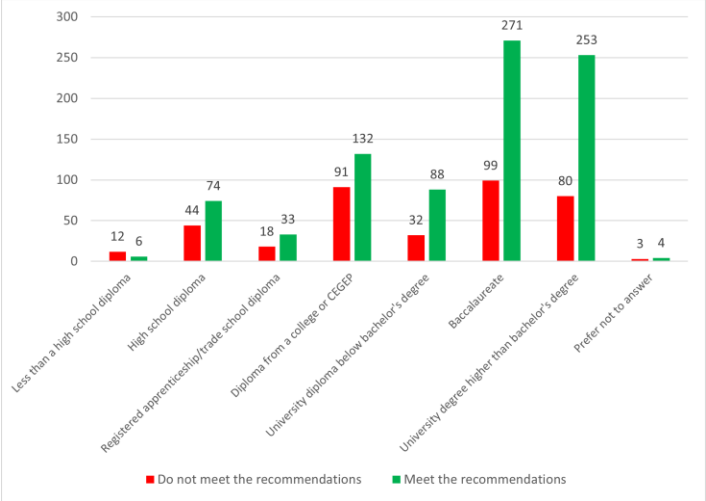
1- My age prevents me from doing things I would like to do.
~~2- I don't think of myself as old.~~
3- Old age is a time of ill health.
~~4- I worry that my health will get worse as I grow older.~~
5- At my age, I am too old to be physically active.
6- At my age, I am too old to try new physical activities or sports.
7- At my age, I run the risk of injuring myself if I take part in physical activity or sports.
8- At my age, physical activity is not encouraged/valued by society.

● Questions from Van Der Horst's validated tool (19)
● Questions added by the team

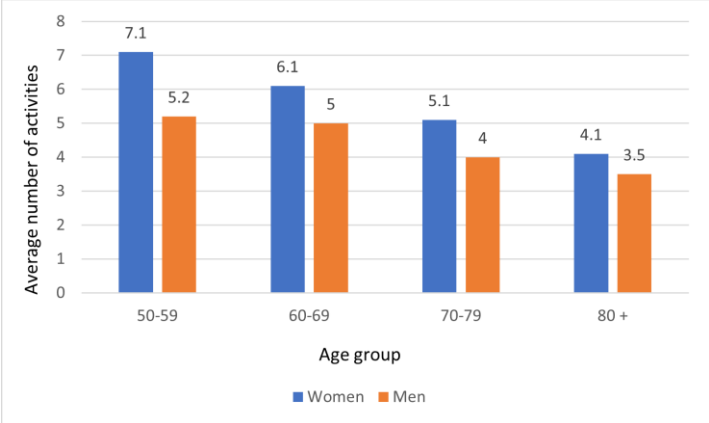
Appendix 4. Achievement of physical activity recommendations, by gender and age group.



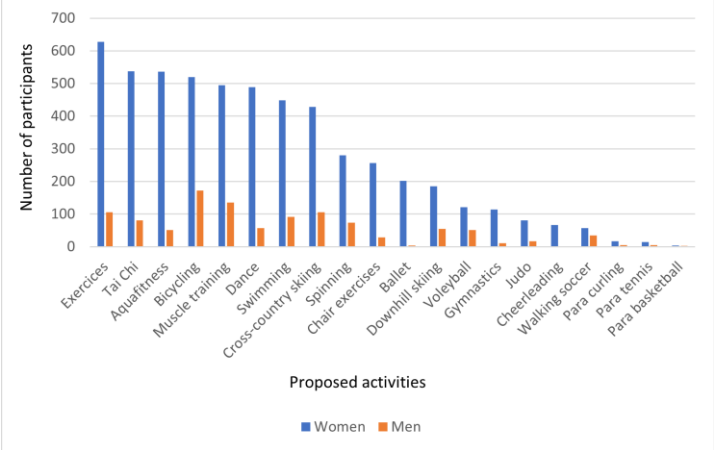
Appendix 5. Achievement of physical activity recommendations, by level of education.



Appendix 6. Average number of activities to try, by gender and age group.



Appendix 7. Choice of activities to try, by gender.



Appendix 8. Inactive respondents' choice of activities to try, by gender.