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Older adults' activity destinations before and during COVID-19 restrictions: From a variety of activities to mostly physical exercise close to home

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ABSTRACT

The aim was to study various types of older adult's activity destinations (counts, frequency of visitation, and distance from home) in the pre-COVID-19 era, and to study prospectively how COVID-19-related regulations limiting mobility affected these. Using a map-based questionnaire, 75-85-year-old participants reported activity destinations, that is, any destinations for physical exercise, destinations facilitating one's outdoor mobility, and destinations for other activities, which they had visited several times during the past month. At baseline, a variety of activity destinations was reported, but during COVID-19, destinations reported markedly declined in number, they were reported predominantly for physical exercise, and they were located closer to home.

1. Introduction

Out-of-home mobility, that is, the ability to move outdoors in the community is essential for maintaining independence and good quality of life in old age (Satariano et al., 2012). Research shows that once the area one moves through becomes more restricted, a person's quality of life and opportunities for participation in social and other activities decline (Baker et al., 2003; Rantakokko et al., 2016). Older adults have various reasons to be active outside of the home, such as physical exercise, social activities and daily chores (Tsai et al., 2016; Davis et al., 2011). Furthermore, leaving the home, for any reason, and traveling further away from home seems to increase the amount of daily physical activity (Tsai et al., 2016; Davis et al., 2011; Portegijs et al., 2015). The living environment may provide suitable activity destinations, e.g. services, parks and recreational areas, for older adults to visit. Definitions of activity destinations, however, vary (Sugiyama et al., 2012) and may be based on self-reports, reflecting places meaningful to or used by the individual, or alternatively, more objectively defined as characteristics of the environment (Weden et al., 2008). Regardless, presence and proximity to activity destinations have been associated with higher levels of physical activity (Barnett et al., 2017) and maintenance of mobility function into old age (Sugiyama et al., 2018; Gauvin et al., 2012). However, when relevant to the individual, attractive activity destinations located at greater distances may also provide motives for older people to travel further away from home, and be physically active (Portegijs et al., 2020). In the current study, activity destinations refer to actual locations visited by older adults.

Life-space mobility assesses the extent of the area an individual moves through, and it is commonly assessed by self-reports (Taylor et al., 2019). The Life-Space Assessment is a measure assessing frequency of movement in increasingly larger areas (home, yard, neighborhood, town, beyond town) while also accounting for level of assistance needed (Baker et al., 2003). However, concerning spatial aspects, it is a relatively crude measure. Moreover, assessing mobility in arbitrary areas rather than actual distances from home may be problematic as definitions of home neighborhoods vary according to an individual's level of function and social context (Perchoux et al., 2016). Therefore, alternative measures of life-space mobility have been proposed based on GPS data and map-based questionnaires (MQ) (Kestens et al., 2018; Hinrichs et al., 2020). Accounting for actual environments used by older people will help to better understand associations between the environment and an individuals' activity behavior (Laatikainen et al., 2018). Capturing GPS data currently burdens participants and research staff due to challenges in data collection and analyses, and is rather costly (Schmidt et al., 2019). MQ data is cheaper and easier to collect, but relies on participants' memory, which may be problematic in older populations with increasing prevalence of cognitive decline (Schmidt et al., 2019). However, only self-reports can provide

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information on motives to visit certain locations and differentiation of activities. MQ may thus be a useful addition to research on activity behaviors, even among older people, although rarely used so far (Gottwald et al., 2016).

Typically, with age, limitations in outdoor mobility are among the first to occur (Wilkie et al., 2006). Nevertheless, individuals aim to maintain activities, which are important for daily life or aligned with one's personal goals (Saajanaho et al., 2016; Baltes et al., 1990). With declining resources, an individual may adapt their behavior, rather than give it up, e.g. by walking more slowly or including short intermittent breaks (Baltes et al., 1990; Skantz et al., 2020). For example, one may enjoy nature by hiking through a forest or by sitting in a park close to home, thus enabling continuation of the activity, albeit in different form. Adaptation strategies my fail, however, when changes occur more rapidly, e.g. due to hip fracture or hospitalization, leading to greater declines in quality of life (Rantakokko et al., 2016) and worsening of disability (Gill et al., 2010).

Recently, in spring 2020, in response to a global threat of a COVID-19 epidemic, many governments actualized emergency regulations and guidelines to prevent further spread of the disease (ECDCCoronavirus disease, 2019). These typically involved limiting citizens' mobility and closure of activity destinations. In Finland, in mid March special advice was provided to the population over the age of 70, recommending them to refrain from out-of-home activities involving persons from outside the household for as much as possible and keeping sufficient physical distance from others (Valtioneuvosto, 2020). In addition, opportunities to participate in most activities were cut down, as restaurants, exercise and cultural facilities were closed, and civil society and religious events cancelled (Valtioneuvosto, 2020). Mobility and activity behavior of older people likely changed radically in an instant. The effects of such sudden societally evoked changes limiting one's mobility and activity are not known. Early COVID-19 reports using retrospective data showed both declines and increases in physical activity and exercise behavior among adult populations (Lesser and Nienhuis, 2020; Constandt et al., 2020; Brand et al., 2020; Di Renzo et al., 2020). A recent prospective study by our research group showed that, in 75–85-year-old adults, life-space mobility and active aging declined markedly compared to two years prior (Rantanen et al., 2020). For life-space mobility, these changes exceeded the expected changes based on reported annual changes attributed to typical age-related declines in health and function (Rantakokko et al., 2016). Thus, it seems that activity in general declined during COVID-19, but whether this extends to different types of activities and various spatial scales remains unclear.

The aim of the current study was 1) to establish, a baseline for actual activity destinations of 75-, 80-, and 85-year-old adults approximately two-years prior to the COVID-19 outbreak, and 2) to study how these activity destinations were affected by approximately two months of mobility-restricting governmental measures aiming to prevent a COVID-19 epidemic. Participants' spatial activity was assessed using MQ, and activity destinations included destinations for physical exercise, destinations facilitating one's outdoor mobility, and destinations for other activities; counts and frequency of use of these destinations, and their distance from home.

2. Materials and methods

2.1. Study design and participants

These are cross-sectional and prospective analyses of the Places of Active Aging –project utilizing participant data of the 'Active aging – resilience and external support as modifiers of the disablement outcome' (AGNES) cohort study (Rantanen et al., 2018). The Places of Active Aging –project aims to study locations where older people are active and to define active aging supporting environments.

In 2017 and 2018, 2791 community-dwelling 75-, 80-, and 85-year-old adults residing in Jyväskylä city in Central Finland were invited to participate in the study (Portegijs et al., 2019; Rantanen et al., 2018). Willing participants were excluded only if they were unable to communicate with research staff or not living independently in the community. In total, 1018 of adults participated in structured interviews on health, function and activity at their own home. Subsequently, 908 of them participated in physical assessments in the research center, including an interactive MQ on activity destinations completed with technical assistance by research staff. Compared to the full cohort, those participating in the research center assessments had somewhat better health and function (Portegijs et al., 2019).

Prospective data resemble a natural experiment of societally evoked COVID-19-related regulations; thus, a single-group intervention study without a control group. In May–June 2020, after about two months of strict regulations and guidelines effectuated by the Finnish government, participants were invited to participate in a study follow-up, which was not originally planned (Rantanen et al., 2020). By the end of June, the Central Finland Health Care District had registered 135 confirmed COVID-19 cases in the district (THL, 2020) with a population base of about 270 000, and to our best knowledge, none in our study population. Thus, the situation presented here reflects consequences of the mobility-restricting measures rather than of the disease.

All baseline participants not known to have died (n = 34) or withdrawn consent (n = 2) were recruited (Rantanen et al., 2020). In total, 809 participants (82%) returned a completed questionnaire on health, function and activity by post in a pre-paid envelope. Of the non-respondents, 8 had died or moved to an institutional care facility, 11 were found unable to communicate, 127 were not willing to participate, and 30 were not reached. At the end of the postal questionnaire, participants were asked to complete MQ on activity destinations via an internet address provided, if they were willing and able to independently use the internet. Research staff could be contacted via a telephone number provided for questions.

The study was conducted in accordance with the Declaration of Helsinki. The Ethical Committee of the Central Finland Health Care District provided an ethical statement for the baseline study protocol and the COVID-19-related follow-up. Participants signed a written informed consent form prior to baseline data collection. At follow-up, participants provided consent by returning the questionnaire to the research center.

2.2. Main measures

A map-based internet questionnaire on activity destinations was completed using the Maptionnaire ® tool (Mapita LTD, Espoo, Finland) via an internet browser at baseline (with technical assistance from interviewer) and at the COVID-19 assessment (independently using a website). Participants were first asked about presence of destinations visited several times during the past month and to locate each of them on a map. Activity destination categories included 1) destinations for physical exercise, 2) destinations facilitating one's outdoor mobility, and 3) destinations for any other activities (not related to physical exercise). For each location marked, the frequency of visitation in the past week (daily or nearly daily, several times, once, and less) was recorded. **Physical exercise destinations** included outdoor and indoor sports facilities and outdoor recreational areas. **Outdoor mobility facilitating destinations** included e.g. nature, lakeside, services and events. **Other activity destinations** included e.g. grocery stores and other shops, food and health services, and social visits. Participants' home addresses were geocoded using the Digiroad datasets January 2019 (Finnish Transport Infrastructure Agency, 2019) and January 2020 (Finnish Transport Infrastructure Agency, 2020), respectively, and linked to reported activity locations using geographic information system software ArcMap 10.6.1 (Esri Inc, Redlands, CA, USA) as reported earlier (Portegijs et al., 2020). Subsequently, distances between participants' homes and each of their reported destinations were computed using a straight line (expressed in meters).

For each participant, several descriptors of activity destinations were computed by activity destination type, and combined for all. The total number of destinations reported was counted (**total count**). The number of destinations visited more than once a week (i.e. several times, daily or nearly daily; **count >1x**), and the number of destinations beyond 1 km distance from home (**count ≥1 km**) were counted. Additionally, the number of destinations within 500 m and 1 km distance from home were divided by the total count, and multiplied by 100%, to obtain the **proportion of destinations within close range from home**. For distance from home and frequency of destination use, **minimum**, **maximum**, and **median** values were determined for each participant.

To demonstrate face validity of the activity destination variables used in this study, we computed Spearman correlations between activity destination variables with established measures of life-space mobility and physical activity (Supplementary Table A). For activity destinations, overall and those related to physical exercise, correlation coefficients ranged between 0.10-0.36 and 0.12–0.39, respectively, at baseline, and between 0.20-0.44 and 0.42–0.55, respectively, during the COVID-19 assessment. For destinations facilitating outdoor mobility and other activities, weak statistically significant correlations (range 0.09–0.12) were found at baseline only.

2.3. Baseline descriptive variables for group comparisons

Age and **sex** were recorded from the population register at baseline. **Cognitive performance** was assessed with the Mini-Mental State Examination (MMSE (Folstein et al., 1975)), and categorized into two using a common cut-off score of <25 indicating cognitive impairment (Creavin et al., 2016). **Self-rated health** and **self-reported financial situation** were assessed with a 5-point response scale ranging from very good to very poor, and for the analyses, categorized into good or excellent vs. poor to fair. The ability to walk a distance of 2 km was asked with a 5-point response scale ranging from no difficulty to unable even with help of another person (Manty et al., 2007), creating a dichotomous variable of **walking 2 km**; no difficulty vs. at least some difficulty or unable. **Life-space mobility** was assessed using the University of Alabama at Birmingham Study of Aging Life-Space Assessment (Baker et al., 2003), using a traditional paper-based questionnaire. The summary score (range from 0 to 120; higher scores indicating greater mobility) combines the extent of the area one moves through, the frequency of movement, and the required level of assistance. **Physical activity time of at least moderate intensity** was assessed by a traditional paper-based questionnaire by asking about frequency and time per occasion of doing vigorous intensity physical activity and walking for at least 10 min at a time as part of the Yale Physical Activity Survey for older adults (Dipietro et al., 1993). Daily minutes were approximated by summing daily minutes in both activities. For these calculations, the following formula was used [(frequency*duration)/7], after recoding frequency (0 'not at all', 1 '1–3 times/month', 2 '1–2 times/week, 4 '3–5 times/week', and 6 '5+times/week') and duration (20 '10–30 min', 40 '30–50 min', and 60 '60+ min') responses as reported earlier (Portegijs et al., 2019).

At COVID-19 follow-up, **use of digital devices** was assessed with a 4-item scale ranging from regularly to not even having tried and dichotomized to 'regularly' vs. 'less'. Furthermore, participants were asked about the extent to which the COVID-19-related situation limited their daily life on a 5-point scale ranging from a lot to not at all, and it was dichotomized to 'a fair amount or a lot' vs. 'not at all or a little' (**COVID-19 restriction**). The **time interval between assessments** (expressed in days) was computed from dates of the baseline home interview and completion of the postal questionnaire at COVID-19 follow-up (if missing, the return date was used).

2.4. Statistical analyses

At COVID-19, when participants reported specific destinations to be present, but these locations were missing, a score of one was added to the total count of activity destinations computed from available items (n = 12). Other activity destination variables were not imputed. At baseline, imputation was not needed due to few missing values in the interviewer-assisted assessments. Due to non-normal distribution of activity destination variables, non-parametric tests were used for most analyses.

Descriptive and activity destination variables are used to characterize the baseline sample completing MQ and the subsample completing MQ at COVID-19 follow-up using medians and interquartile ranges (IQR) or percentages. Group differences were tested using independent T-tests, Mann Whitney U tests, or Chi-square tests depending on variable distribution.

For those completing both MQ assessments, baseline and during COVID-19 activity destination variables were visualized in figures displaying overall medians (and IQR) and results for each individual participant ordered by their total count of activity destinations. Changes over time were tested with Generalized Mixed Model (GMM) analyses with unstructured correlation structure. Time was modeled using a dichotomous dummy variable indicating the baseline and COVID-19 assessment. Depending on distribution of the dependent variable, Poisson loglinear, negative binomial with log link or Gamma log link functions were used.

Finally, sensitivity analyses were conducted to check whether changes in living environment or participants' health and perceived restriction due to COVID-19 affected any associations found. For seven participants, living environment changed between baseline and follow-up due to a permanent move (n = 2) or alternative temporary residence during COVID-19 (n = 4). Ten participants experienced a decline in self-reported health. Excluding these seven and ten participants, respectively, from the analyses rendered similar results (data not shown). Furthermore, analyses results separating those perceiving more restriction (n = 26) or less restriction (n = 18) due to the COVID-19 situation were not markedly different (data not shown).

3. Results

3.1. Baseline sample completing MQ

Of the 908 participants at the research laboratory day, 901 completed MQ. Reasons of non-participation were interruptions of the day due to lack of time or health problems, and, in two cases, inability to respond due to limited cognitive function (Fig. 1). Nearly half of participants were 75-years-old and 57% of them were female. Participant characteristics are listed in Table 1.

At baseline, all but one participant reported 1–21 activity destinations in the past month. The median number of destinations reported was 6.0 (IQR 3.0; Table 2). Overall, 92% of participants reported at least one activity destination for physical exercise, 76% at least one destination facilitating outdoor mobility, and 97% at least one destination for other activities. A median of 2.0 destinations was reported for physical exercise and for other activities, and a median of 1.0 destination facilitating outdoor mobility in the past month was reported. Of all destinations reported, a median of 3.0 was visited more than once a week. Distances from home to activity destinations varied between 5 m and 1987 km (one location reported abroad (>4000 km) was considered an outlier and removed from subsequent distance analyses). The overall median distance between home and activity destinations was 1.4 (IQR = 1.5) km. Correspondingly, for physical exercise destinations and destinations facilitating outdoor mobility median distances were 1.1 km, and for other activities destinations the median distance was 1.8 km. About one-third of each participants' activity destinations was located within 1 km from home.

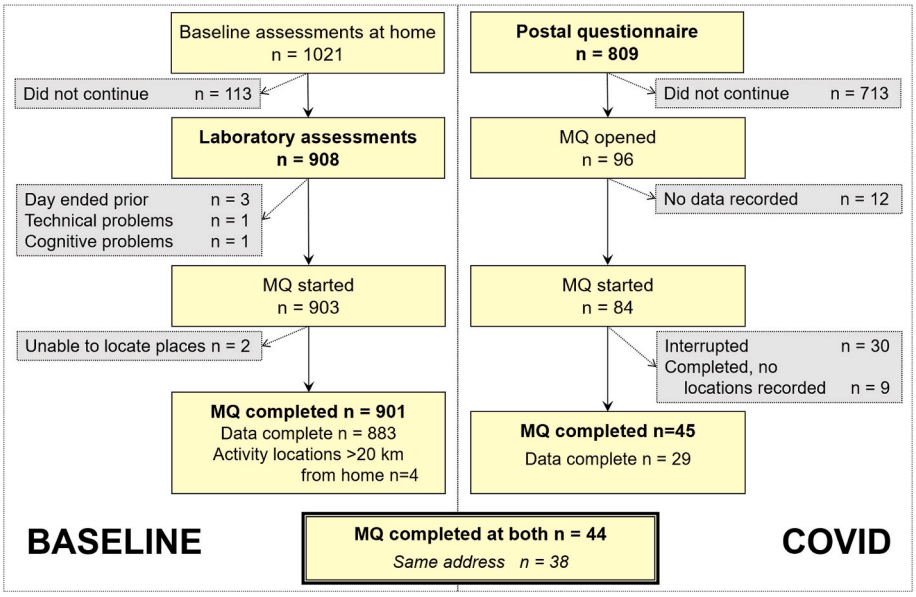

Fig. 1. Study flow. Flow chart of participants to the map-based questionnaire (MQ) assessments at the baseline and COVID-19 follow-up.

Table 1
Participant characteristics. Baseline characteristics for all participants who completed the map-based questionnaire (MQ) at the baseline (n = 901), and those who completed MQ also during COVID-19 assessments (N = 44).

	MQ completed at baseline	MQ completed at baseline & COVID-19
	Median (IQR)	Median (IQR)
Life-space mobility (0–120p)	74.0 (23.3)	84.0 (19.5)
YPAS walking & vigorous (0–103 min/day)	34.3 (27.8)	34.3 (25.0)
Time since baseline (days)	752.0 (221.3)	780.5 (224.0)
Sex (female, %)	56.9	27.3
Age at baseline (75yr, %)	47.9	61.4
(80yr, %)	32.0	34.1
(85yr, %)	20.1	4.5
Cognitive impairment (MMSE<25, %)	11.4	0.0
Self-reported financial situation (good – excellent, %)	59.8	84.1
Self-rated health (good – excellent, %)	47.4	68.2
Walking 2 km (no difficulty, %)	65.6	79.5
Use digital devices (regularly, %) [a]	57.4	97.7
COVID-19 restriction (some – a lot, %) [a]	50.8	63.6

YPAS=Yale Physical Activity Scale for older adults, MMSE = Mini-Mental Status Examination, IQR=Interquartile range. [a] Assessed at FU only.

3.2. Participant characteristics at baseline

During COVID-19, 96 participants started MQ, and 84 of them recorded some data (Fig. 1). Reasons for not completing the questionnaire are unknown. In total, 45 participants completed MQ recording also for spatial data, but one of them did not participate at baseline, leaving 44 participants for analyses.

Table 1 shows that men (72.7%) and those aged 75 years (61.4) were overrepresented in the group completing MQ during COVID-19 (Chi-square test $p < .050$). Generally, participants completing MQ at both assessment reported better self-reported health ($p < .010$) and cognitive function ($p < .050$), and at baseline, they perceived their financial situation better ($p < .010$) than did those who participated at baseline only. All but one participant completing MQ during COVID-19 reported regular use of digital devices compared to 57.4% of participants completing MQ at baseline only ($p < .001$), and the median life-space mobility score was higher for those completing MQ during COVID-19 than for those participating at baseline only (Independent T-test $p < .001$). With respect to baseline activity destinations, those completing

Table 2
Activity destinations reported at baseline. Activity destination variables for all participants who completed the map-based questionnaire (MQ) at the baseline (n = 901), and for those who completed MQ also during COVID-19 assessments (N = 44).

		MQ completed at baseline	MQ completed at baseline & COVID-19
		Median (IQR)	Median (IQR)
Total count	All	6.0 (3.0)	7.0 (3.0)
	Physical exercise	2.0 (2.0)	2.5 (1.8)
	Facilitators	1.0 (1.0)	2.0 (1.0)
	Other activities	2.0 (1.0)	3.0 (2.0)
Count >1x	All	3.0 (2.0)	3.0 (2.0)
	Physical exercise	1.0 (2.0)	1.0 (1.0)
	Facilitators	0.0 (1.0)	0.0 (1.0)
	Other activities	1.0 (1.0)	1.0 (1.0)
Count ≥1 km	All	4.0 (3.0)	4.0 (3.0)
	Physical exercise	1.0 (2.0)	1.0 (1.0)
	Facilitators	1.0 (1.0)	1.0 (1.0)
	Other activities	2.0 (2.0)	2.0 (2.0)
Maximum distance (km)	All	5.4 (18.8)	7.4 (25.0)
	Physical exercise	1.7 (3.0)	2.1 (5.1)
	Facilitators	1.7 (16.7)	1.4 (20.2)
	Other activities	2.9 (3.2)	3.6 (3.8)
Median distance (km)	All	1.4 (1.5)	1.5 (2.0)
	Physical exercise	1.1 (1.3)	1.3 (2.5)
	Facilitators	1.1 (4.1)	1.1 (9.9)
	Other activities	1.8 (2.1)	2.4 (2.6)

IQR=Interquartile range.

MQ during COVID-19 did not differ from those participating at baseline only (Table 2), except for a slightly higher overall count of destinations visited more than once a week (median = 3 (IQR = 2)) compared to those participating at baseline only (median = 2.0 (IQR = 2.0); Mann Whitney *U* test p < .05).

3.3. Changes in activity destinations over time

At follow-up, four participants reported not having any frequently visited activity destinations in the past month. Overall, a median of 4.0 activity destinations was reported (IQR = 4.8), which was a reduction of 46% compared to baseline (median = 7.0, IQR = 3.0, GMM Poisson loglinear p < .001; Fig. 2). Number of destinations declined most notably for other activities, dropping from a median of 3.0 (IQR = 2.0) to 0.0 (IQR = 1.0; GMM Negative binomial log link p < .001). Outdoor mobility facilitating destinations declined from a median of 2.0 (IQR = 1.0) to 1.0 (IQR = 1.0; GMM Negative binomial log link p < .001), but physical exercise destination count did not change over time (baseline median = 2.5, IQR = 1.8; follow-up median = 2.0, IRQ = 3.0; GMM Poisson loglinear p = .674). Half of participants (48% and 52%, respectively) reported not having visited destinations facilitating outdoor mobility and other activities, rendering further analyses of count and distance variables during COVID-19 redundant.

From baseline (median = 3.0, IQR = 2.0) to follow-up (median = 2.0, IQR = 2.5), number of destinations visited more than once declined (GMM Poisson loglinear p = .006). Fig. 3 shows that participants reported mostly destinations visited once or several times a week at baseline and follow-up, but during COVID-19, only few participants (n = 3) reported any destinations visited less than once a week compared to 73% (n = 32) at baseline.

At baseline, participants reported a median of 4.0 (IQR = 3.0) destinations beyond 1 km from home, and during COVID-19, this number dropped to 2.0 (IQR = 3.0; GMM Poisson loglinear p < .001). Fig. 4 shows that median distance from home to participant reported activity destinations was 1.5 (IQR = 2.0) km pre-COVID-19, and 1.3 (IQR = 2.3) km during-COVID-19 (GMM Gamma log link p = .115). Maximum distance from home declined from a median of 6.8 (IQR = 22.8) km to 3.5 km (IQR = 8.3, GMM Gamma log link p = .002). Furthermore, during-COVID-19, a larger proportion of destinations was reported within 1 km from home (median = 45%, IQR = 79%) compared to baseline (median = 25%, IQR = 35.7%).

For physical exercise, the number of destinations visited more than once a week did not change over the follow-up (pre-COVID-19 median = 1.0, IQR = 1.0; during-COVID-19 median = 1.0, IQR = 2.0, GMM Poisson loglinear p = .163). Median distance from home to physical exercise destinations declined from a median of 1.3 (IQR = 2.5) km to 0.6 (IQR = 1.9) km (GMM Gamma log link p = .011), but maximal distance changed less (pre-COVID-19 median = 2.1, IQR = 5.1; during-COVID-19 median = 1.4, IQR = 4.2; GMM Gamma log link p = .627). The number of destinations visited beyond 1 km for physical exercise remained at a median of 1.0 (pre-COVID-19 IQR = 1.0; during-COVID-19 IQR = 2.0; GMM Poisson loglinear p = .577). Proportions of destinations reported within 1 km from home increased from a median of 50% (IQR = 66.7) to 66.7% (IQR = 75.0), and within 500 m increased from 0% (IQR = 62.5) to 50.0% (IQR = 81.2).

4. Discussion

This study shows that pre-COVID-19, older adults reported a variety of activity destinations, but during COVID-19, destinations were reported predominantly for physical exercise. Furthermore, overall the number of destinations reported declined markedly, reported destinations were located closer to home and typically visited somewhat more frequently.

In the pre-COVID-19 era, in 2017–2018, older adults reported a mix of different types of activity destinations that they visited multiple times in the past month. These included destinations related to physical exercise, destinations facilitating one's outdoor mobility, and destinations for other activities, such as those related to daily chores (e.g. shopping and use of health and food services) and entertainment (cultural and social visits). Following a period of about two months of COVID-19-related regulations imposed by the Finnish government in spring

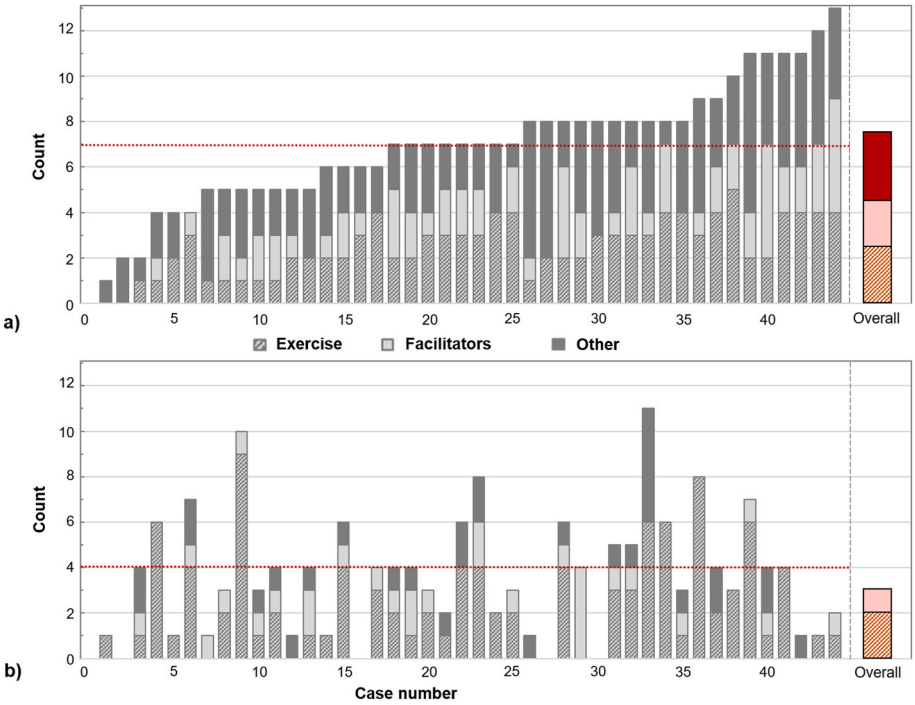

Fig. 2. Activity destination counts. Counts of different activity destinations reported by each participant, and the overall group median, at baseline (a) and during COVID-19 (b). Each bar represents one participant. Cases are ordered by baseline total count of reported destinations. Horizontal dotted lines represent the median total count of all destinations reported regardless of type.

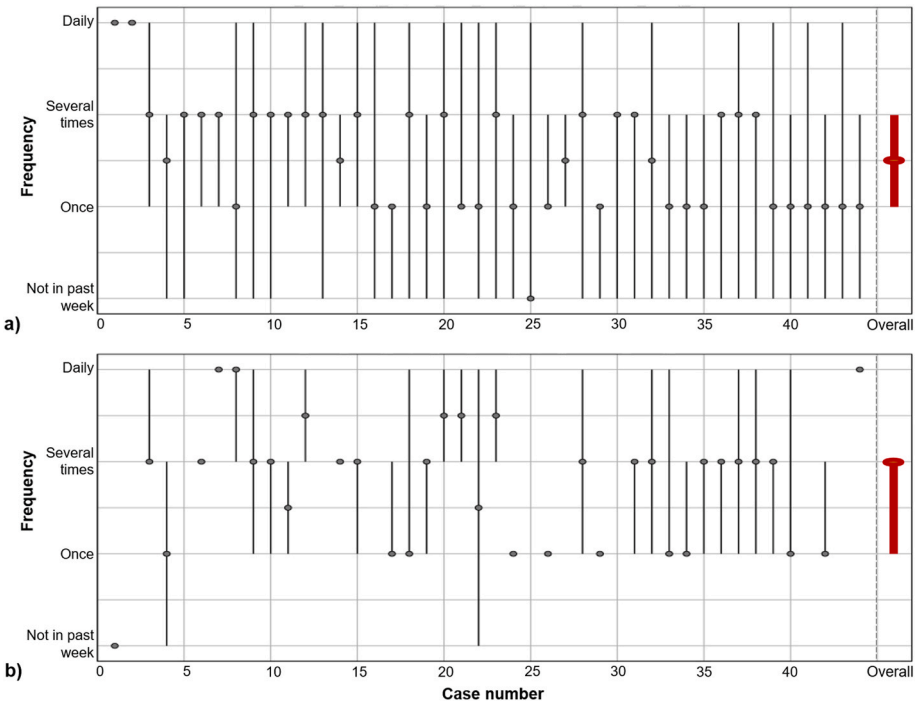

Fig. 3. Frequency of visitation. Minimum, maximum and median frequency of visitation in the past week for all activity destinations reported by each participant, and the median and interquartile range for the group overall, at baseline (a) and during COVID-19 (b). Each bar represents one participant. Cases are ordered by baseline total count of reported destinations.

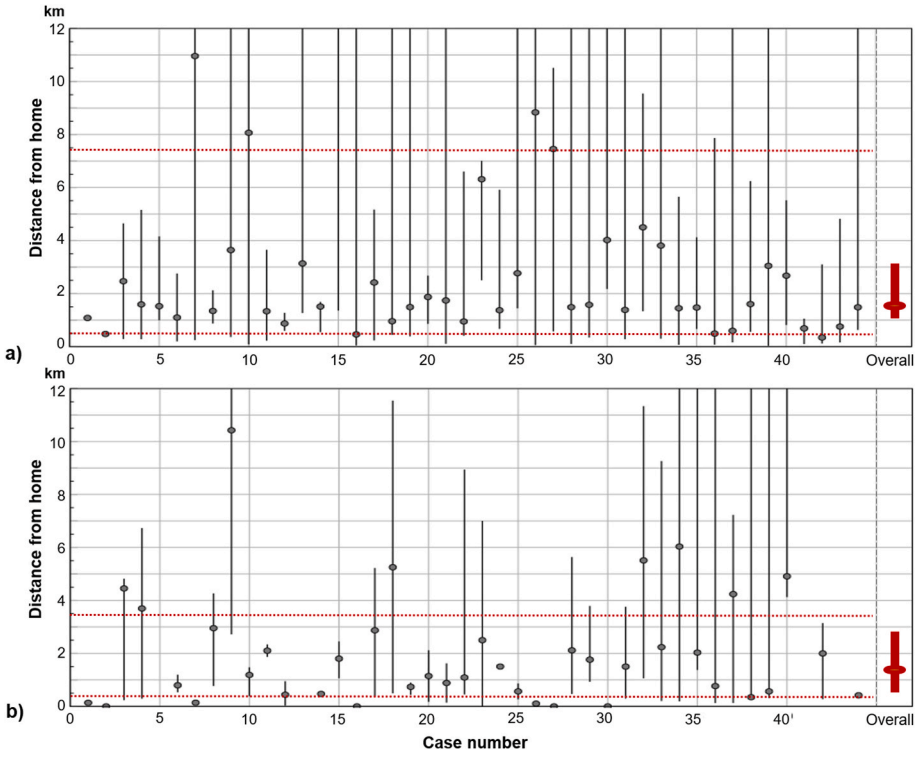

Fig. 4. Distance between home and activity destinations. Minimum, maximum and median distance from home to activity destinations reported by each participant at baseline (a) and during COVID-19 (b). Each bar represents one participant. Cases are ordered by baseline total count of reported destinations. The red bar presents the overall median and interquartile range of participants' median distances. Horizontal red dotted lines represent median values of maximum and minimum distances from home.

2020, older adults reported almost exclusively activity destinations related to physical exercise. During this period, participation in many other activities may have been impossible (e.g. restaurants, museums, and organized group activities were closed) or undesirable (e.g. shopping and social visits) for keeping distance to other people. If participants reported any other activities during COVID-19, these were mostly related to daily chores.

Previously, it was found that in the presence of mobility restricting regulations aiming to prevent the spread of COVID-19 disease, adults were physically active closer to home and older adults spent more time at home and in their neighborhood than pre-COVID-19 based on retrospective and prospective studies (Rantanen et al., 2020; Rice et al.,

2020). Furthermore, the decline in life-space mobility found in the current population exceeded the decline expected by typical aging (Rantanen et al., 2020). The current study confirms that activity destinations were more often located within closer proximity to home during COVID-19 than two years earlier. In addition, declines in out-of-home activity were specific to activity destination types, that is, physical activity destinations did not markedly change, while other activity destinations became virtually nonexistent during COVID-19. Typically, if any other activity destination was reported, it was identified as a grocery shop, thus suggesting that older adults generally complied with governmental recommendations by dropping non-essential out-of-home activities. It is important to note here that, in Finland, governmental organizations emphasized the importance of maintaining physical activity at home and in the open air during COVID-19.

Physical activity or exercise were among the few activities possible throughout the restriction period. Earlier studies in adult populations showed that some people replaced activities no longer possible or desirable with physical activities due to more available time (Constandt et al., 2020; Knell et al., 2020). Furthermore, positive changes in physical exercise behavior were mostly found among adults already active at baseline (Lesser and Nienhuis, 2020; Di Renzo et al., 2020) with few exceptions (Constandt et al., 2020; Brand et al., 2020), and less often in older people (Constandt et al., 2020). The current results show that for older adults, physical exercise destinations were less impacted by governmental COVID-19 measures than other activity destinations. A previous Japanese study in older adults showed that declines in physical activity were common and more likely to occur among those more physically active before COVID-19 (Suzuki et al., 2020), which may seem conflicting with our finding. The Japanese participants, however, were recruited from a convalescent rehabilitation hospital register. Our sample, especially the prospective sample, comprised relatively healthy and well-functioning older adults, who may have had more physical reserves (Schrack et al., 2012) enabling them to engage in physical exercise. However, differences may also relate to us looking at activity destinations for physical exercise rather than levels of physical activity, which correlate but are not fully aligned. Changes in types of physical exercise (Suzuki et al., 2020) likely occurred in the current study as well; physical exercise destinations reported were not exactly the same as reported at baseline as they were generally located closer to home and indoor sports facilities were unavailable during COVID-19. A next step is to understand older adults' choices of physical exercise destinations and determine whether use of new locations enabled older adults to maintain baseline levels of activity and physical activity.

COVID-19-related measures implemented by governments throughout the world varied from advice to refrain from certain activities and closure of some facilities to full lockdowns, prohibiting people to leave home for non-essential activities (ECDCCoronavirus disease, 2019). Also perceived disease risk varied due to different disease rates and communications strategies (ECDCCoronavirus disease, 2019; Lohiniva et al., 2020). Finnish regulations were mostly based on recommendation rather than enforcements, and the region studied encountered relatively few COVID-19 cases at the time of data collection. Therefore, declines in out-of-home mobility may have been less severe than in other countries with more restrictive measures. Yet, COVID-19 seems to have diminished the motives to go out. Earlier studies have shown the importance of any out-of-home activity and activities other than physical exercise for the total amount of physical activity in daily life (Tsai et al., 2016; Davis et al., 2011; Portegijs et al., 2015), and thus, research needs to establish whether compensation through replacement by other activities is possible.

Current analyses show that in the pre-COVID-19 era, older adults' out-of-home activity comprised a mix of activities including those related to physical exercise, daily chores and entertainment. Participation in out-of-home activities, such as shopping and exercise, has previously been associated with higher physical activity (Tsai et al., 2016; Davis et al., 2011; Portegijs et al., 2015). New physical activity guidelines acknowledge that even low intensity physical activity is important for maintaining health and function in old age (Piercy et al., 2018). Increased energetic costs of activities such as walking (Schrack et al., 2012), the most common physical activity for older adults either for recreational purposes or as means of transportation, may at least partly compensate for the typical decline in physical exercise occurring with age (Fishman et al., 2015). Considering the limited spatial extent of walking, the home environment or neighborhood is thought to play an important role in providing suitable destinations for older adults to go to (Barnett et al., 2017). A common way to identify home neighborhoods is to define it by 500 m circular buffers around the home (Barnett et al., 2017). The current study shows that at baseline, few activity destinations of these older participants were located within 500 m from home, with the majority of destinations being located beyond 1 km. Possibly, participants may travel to more distant destinations by car or public transport, although similar distances may also be attained walking or cycling (Prins et al., 2014). Moreover, our group earlier showed that reporting neighborhood destinations facilitating outdoor mobility, which were located beyond 500 m from home, were more relevant for achieving higher levels of physical activity than those located closer by (Portegijs et al., 2020).

The current study shows feasibility of using MQ on activity destinations, even among older adults over the age of 75. However, it seems crucial to provide technical assistance to enable all participants to complete such questionnaires regardless of computer-skills as the attrition rate in our prospective sample suggests. In line with an earlier report (Portegijs et al., 2020), in the current study, few participants experienced problems locating places on a map at baseline when technically assisted by an interviewer. However, at the follow-up, when we were unable to provide assistance other than via telephone upon request, participants completed the MQ independently. This resulted in few participants starting MQ ($n = 96$) and less than half of them successfully completing it ($n = 44$), thus rendering a rather small and biased sample. Unfortunately, reasons for dropping out are unknown, but men and those aged 75 years were more likely to complete MQ, which may be at least partly related to digital device-use proficiency. However, we have to acknowledge that our MQ may not have been optimally designed due to its abrupt implementation, leaving little time for pilot-testing. Pilot tests included few participants over the age of 60 ($n = 5$) and only one over the age of 75. Thorough testing and development may have led to better results as Gottwald et al. (2016) showed acceptable usability among adults 60-74-years-old, when a MQ on places of joy was completed independently using the same tool. In the current study, the small sample size, with an overrepresentation of younger men, may have overestimated the increase of activity destinations for physical exercise during the prospective follow-up. Possibly, those with higher age and poorer function may not have had equal opportunities or abilities to increase their physical exercise (Schrack et al., 2012). However, our findings of increased activity destinations for physical exercise are supported by questionnaire data on physical activity collected in this broader project, which show that a substantial proportion of participants (44%) reported an increase in physical activity level from baseline to the COVID-19 assessment ($n = 777$).

Strengths of the current study include the use of novel map-based research methods, which will become increasingly relevant in next decades when cohorts more familiar with use of digital devices and map-based applications age. The amount of detail obtained from this MQ provides relevant information about spatial and temporal aspects of older adults' activity behavior and enables studying the environmental characteristics of activity destinations and environments in future research. The baseline setting had a relatively large sample size and few missing variables providing a comprehensive picture of the use of activity destinations by people aged 75-85-years-old. According to our knowledge, few studies have looked at activity from a broader perspective, and especially not in relation to the COVID-19 situation. A strength of our COVID-19 study, is the prospective cohort design, in

which we compared assessments during COVID-19 to the same assessments conducted two years prior.

Limitations of the study are the change in assessment method from completion of MQ with technical assistance (baseline) to independent completion (during COVID-19). Furthermore, selective drop-out of participants, which was at least partly related to the change in assessment method, caused selection bias (better health and function, and proficiency of digital device use) and limited the sample size during COVID-19. Consequently, the prospective analyses results should be interpreted with caution and may only be generalizable to well-functioning and digitally literate older adults over the age of 75 years. Adequate testing and development of the self-completed MQ is needed to increase chances for successful completion. Furthermore, all study variables were based on self-reports and thus prone to reporting bias. We have no way to confirm that our postal and MQ questionnaires were completed by our participants and not by others in the household or that questions were understood correctly. Finally, study data were collected in one city in Central Finland. Whether results apply to different cultural and societal settings remains to be explored.

5. Conclusions

The results of this study show that Finnish older adults reported a variety of activity destinations pre-COVID-19. However, when COVID-19-related regulations were in place, activity destinations reported were predominantly related to physical exercise. Furthermore, overall the number of activity destinations reported reduced by half and destinations were typically located closer to home and visited more frequently during COVID-19. Older participants in this rather small and well-functioning COVID-19 sample seemed to have diligently implemented the guidelines to refrain from out-of-home activities other than physical exercise in the outdoors, limiting other activities to those necessary for daily life, e.g. grocery shopping. Whether the COVID-19-related decline and changes in activity behavior have any long-term health or functional consequences warrants further study. Based on the study findings, MQ seems to be a meaningful addition to research on older adults' activity behavior, providing more detail and enabling definition of actual activity locations and environments. In future, when older adults' skills in using digital devices improve, it is likely that increasingly less technical support is needed and thus, use of these study methods will become increasingly relevant.

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Data availability statement

After completion of the study, data will be stored at the Finnish Social Science Data Archive without potential identifiers (open access). Until then, pseudonymized datasets are available to external collaborators upon agreement on the terms of data use and publication of results. To request the data please contact Professor Taina Rantanen (taina.rantanen@jyu.fi).

Declaration of competing interest

None.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.healthplace.2021.102533.

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