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## PREVENTION (NONPHARMACOLOGICAL)

## Feasibility and acceptability of a continuous remote activity monitoring protocol in older adult dyads: A mixed methods pilot study

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## Abstract

**Background:** Walking is a key facilitator of healthy ageing and may reduce risk of cognitive decline in older adults. To develop suitable, accessible interventions, we must objectively consider the socio-ecological factors which influence participation in walking activities. For example, walking may be influenced by the volume and type of activities one's partner participates in (i.e., dyadic interactions), or the walkability of their local area. Wearable technologies can continuously and remotely capture digital walking outcomes, such as volume, pattern, variability and location of activities. This pilot study aimed to explore the feasibility and acceptability of deploying a continuous remote activity monitoring toolkit in older adult dyads (i.e., couples).

**Methods:** Participants were asked to engage with three forms of remote activity monitoring over a period of seven days: (1). Wearing an inertial measurement unit (IMU; AX6, Axivity) on their lower backs, (2). Carrying a smartphone installed with a GPS app on excursions outside the home, and (3). Completing an activity diary (e.g., daily journeys, motivations/perceptions of journeys) each night. Upon study completion, participants were asked to complete open-ended questionnaires regarding their experiences of the protocol. Feasibility was assessed by quantitatively calculating completion of each form of activity monitoring, while qualitative content analysis of the questionnaires was employed to understand the acceptability of the protocol.

**Results:** 21 dyads (n = 42) participated in the study (Age (median (range)): 69 (61-79)). 95% of participants wore the IMU for seven days (5% removed early for holidays). 100% completed their activity diaries. 77% (n = 226) of all data collection days (n =

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294) were captured from the GPS app; reasons for data loss (68 days) include possible technical error (69.12%), not leaving the house (29.41%), or forgetting the GPS device (1.47%). Most participants found all forms of activity monitoring acceptable; common themes are reported in Tables 1-3.

**Conclusion:** Results suggest that a protocol of continuous remote activity monitoring using digital devices and an activity diary is feasible and acceptable to older dyads. Further work will explore how data acquired can be used to identify socio-ecological predictors of walking and examine independence/interdependence in walking between members of each dyad.

**Table 1: Qualitative content analysis regarding acceptability of a lumbar-based inertial measurement unit in older adults.**

Theme	% of participant mentions	Subtheme	Examples of Related quotes
Impact of wearing monitor on daily activities	80%	No Impact	"not at all"
Wearability	55	Comfort	"Never gave it much thought, it was really comfortable"
	15	Discomfort	"Uncomfortable after two days"
	35	Unobtrusive	"Surprisingly I never noticed it."
	25 = easy 20 = help from others	Removal and reattachment	"It came off. Was easy enough to put back on."  "It fell off once after I showered and was easy to put back on, with a little help from my husband."
	65 = fine	Size	"Didn't notice the size of it so quite happy about the size"

Note: % of participant mentions refers to the number of participants mentioning activity divided by total diaries.

Table 2: Qualitative content analysis regarding acceptability of a GPS smartphone app in older adults

Theme	% of participant mentions	Subtheme	Examples of Related quotes
Experience	50	Unobtrusive	"No problem"
	55	Burdensome	"It was a bit of a pain as I already carry my personal phone."
	10	Forgotten	"Only problem was remembering it."
Future Use			"I forgot it on Thursday morning: I'm not good a.m. I never chose to leave it behind."
	70	Interest in feedback	"Definitely yes. I'd find that motivational- which I'm assuming is a major part of the study."
			"Yes that would be useful and perhaps spur me on to more activity"
Impact	25 overall	Comparison to similar devices	"Yes, I sometimes refer to my Fitbit app so it would be interesting to compare."
	10 = yes feedback and compare		"Receiving more feedback on your physical activity is a good thing however my Fitbit gives me all I need."
	15 = no because already have a comparative device		
Impact	10	Digital incompatibility	"I have a Nokia phone!"
			"No because I don't routinely use/carry a phone."
	60	Own device preference	"Probably yes. Because your phone is heavy and bulkier than mine and I don't like carrying more than I need when out and about."
Impact	20	Independent device preference	"No, I would be uncomfortable with it being on my own phone. I like the fact I am handing it all back."
			"No, transfer of data issues"

Note: % of participant mentions refers to the number of participants mentioning activity divided by total diaries.

Table 3: Qualitative content analysis regarding acceptability of a daily activity diary for older adults

Theme	% of participant mentions	Subtheme	Examples of Related quotes
Diary Construction	60	Well constructed features	"Good clear print and attractive layout. The information and guidance on the first three pages was clear and well written. Nice quality papers."
			"Instructions were good"
	50	Poorly constructed features	"The distinction between 'general' and 'specific' physical activity is slightly confusing and suggests an element of duplication."  "My major criticism is that the individual days were 'out of sync'..."
Activity encouragement	45	Changes to diary	"General and specific physical activities should not be separate."  "At the end of each day, why not rate how you felt & an achievement level 1-10"  "I wonder if it would be easier to complete a diary that had time laid out and spaces against them to record activities /non activities. 8pm 9pm 10pm..."
	60	No Encouragement	"Not really, although did make me think about what I do."
	30	Encouraged activity	"No not really, we would be active without the diary." "It has made me think about how much I move around each day, and going forward, I am going to make more of an effort to be more active."
Enjoyment	20	Reflection	"I wanted to think about and enjoy the experience. Particularly enjoyed reflecting on exercise I took and how I could improve this"
	10	Shared interest	"Taking part in the study and the writing up of the diary became a topic of shared interest with my husband."

Note: % of participant mentions refers to the number of participants mentioning activity divided by total diaries.