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Activity Tracking Behavior and Engagement in Consistent Physical Activity Among Older Adults and Care Partners

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Abstract

Background: Activity trackers support physical activity, yet evidence on their effectiveness among older adults and care partners is limited. This study assesses the relationship between activity-tracking frequency and engagement in consistent physical activity among older adults and care partners. Methods: For this cross-sectional study, 615 older adults and care partners completed online surveys assessing the frequency of activity tracking (predictor) and the regularity in physical activity engagement (outcome). Using multivariable logistic regression, we assessed the association between the predictors and the outcome across the entire population and separately among older adults (n = 310) and care partners (n = 305), adjusting for sociodemographic, mobility, and health-related covariates. We reported the adjusted odds ratio (aOR) and 95% confidence intervals (CI). Results: Older adult (OA) and care partner (CP) respondents were predominantly female (OA: 57%, CP: 53%) and non-Hispanic White (OA: 51%, CP: 43%). Across the entire population, frequent tracking of physical activity was associated with a 2.4-fold increase in the odds of engaging in consistent physical activity (aOR: 2.40; 95% CI: 1.45–3.96). Older adults who frequently track their physical activity were 2.5 times more likely to engage in consistent physical activity (aOR: 2.47; 95% CI: 1.08–5.64). Care partners who occasionally tracked their physical activity were 3.5 times more likely to engage in consistent physical activity (aOR: 3.54; 95% CI: 1.54–8.11). Conclusions: Physical activity tracking is associated with greater physical activity engagement among older adults and care partners. These findings contribute to understanding factors associated with physical activity behavior in this population.

Keywords: physical activity; activity tracking; older adults; care partners; exercise

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1. Introduction

Physical activity is a critical determinant of healthy aging [1,2], promoting mobility [3,4], cardiovascular function [5,6], cognitive health [7,8], and overall quality of life in older adults [9–12]. Despite these substantial benefits [13–15], fewer than one in four older adults in the United States [16] meet recommended physical activity guidelines, with participation declining further in the presence of chronic disease, mobility limitations, or advancing age [17,18]. Lack of physical activity often extends to care partners, defined as family members or friends who provide physical, emotional, or logistical support to an

older adult [19], who may face similar or even heightened barriers to maintaining regular activity [20–22]. Time constraints, caregiving responsibilities, stress, and competing daily demands can limit opportunities for both older adults and their care partners to engage in consistent physical activity [20–24]. In addition, health- and mobility-related factors such as prior falls, functional limitations, frailty, and comorbid conditions can shape the ability to be active [25–30], influencing how older adults and care partners engage with physical activity and tracking technologies.

As interest grows in practical approaches to increase physical activity, digital activity trackers, including smartphones, pedometers, and wearable devices, have emerged as widely accessible tools that encourage self-monitoring and behavior change [31,32]. These devices provide real-time feedback, reinforce progress, promote awareness of daily movement, and facilitate long-term adherence to physical activity [32]. For older adults and care partners, who often navigate fluctuating schedules and complex health-related demands, activity tracking may offer a simple and adaptable strategy to support consistent engagement in physical activity [33,34].

Existing research indicates that older adults adopt wearable activity trackers at lower rates than younger populations [35–37]. Also, randomized trials have demonstrated short-term increases in daily step counts and moderate-to-vigorous physical activity among older adults using activity trackers [38–46]. While some observational studies have examined associations between wearable use and activity levels among older adults [47–49], the evidence base characterizing the naturally occurring frequency of wearable use and its relationship to consistent physical activity behavior in real-world settings remains limited. Care partners are rarely examined as a distinct group in experimental and observational studies [50]. A recent scoping review of technology use among female caregivers identified only two studies specifically examining activity tracking in this population [50], both of which reported benefits of tracking for physical activity behavior [51,52]. Despite these potential benefits, little is known about how wearable activity trackers may affect caregiving burden or influence downstream health and physical activity outcomes among care partners. In addition, examining care partners and older adult care recipients in parallel allows determination of whether the association between activity tracking frequency and physical activity engagement differs by caregiving role, informing whether interventions should be tailored separately or applied broadly across caregiving roles.

The aim of this study, therefore, is to evaluate the association between the frequency of activity tracking and consistent physical activity engagement among older adults and care partners. We hypothesized that more frequent tracking would be associated with higher odds of engaging in regular physical activity, with potentially distinct patterns between older adults and care partners. Understanding how tracking behaviors relate to physical activity engagement can inform low-cost, scalable strategies to promote health and mobility in aging populations and their support networks.

2. Materials and Methods

2.1. Study Design and Setting

We conducted a cross-sectional online survey to examine the relationship between activity-tracking behaviors and consistent physical activity among older adults and their care partners. The survey was administered as part of the pilot and survey validation of the Activity Tracking, Care Partner Co-Participation, Text Reminders, Instructional Education, Virtual Physical Therapy, and Exercise (ACTIVE) project (IRB: i25-01158; ClinicalTrials.gov registration: NCT07321587) [53,54].

2.2. Participant Recruitment

Participants were recruited nationwide through ResearchMatch, a National Institutes of Health-supported volunteer registry that connects researchers with individuals interested in participating in health studies [55]. Recruitment messages were distributed to eligible platform members, and individuals who responded were directed to an electronic consent form and the study survey. Data were collected and stored using Research Electronic Data Capture (REDCap), a secure, web-based platform for research data management [56].

2.3. Eligibility Criteria

Two groups were eligible for participation: older adults and care partners. Older adults were eligible if they were aged 65 years or older, could read English, and had internet access to complete the online survey. Care partners were eligible if they were aged 18 years or older, provided ongoing unpaid support to an older adult, and met the same language and internet-access requirements. Individuals providing paid or formal caregiving services and respondents who indicated substantial difficulty completing an online survey due to cognitive limitations were excluded.

2.4. Outcome Measure

The primary outcome was engagement in consistent physical activity. Respondents were asked, "In the past week, how many days did you engage in physical activity, such as walking or light exercise?" Response was measured on an ordinal scale: 0 days, 1–2 days, 3–4 days, 5 or more days. We defined consistent physical activity as engagement in physical activity for 3 or more days per week.

2.5. Primary Predictor Variable

The main predictor, frequency of activity tracking, was measured using a single item from a previously validated survey—Physical Activity Practice Scale [57]. The specific item selected was: "I track my physical activity levels using a device or app." While the full scale includes six additional items assessing physical activity practices, we selected only this item to specifically capture tracking behavior rather than physical activity itself. The original scale has excellent content validity (CVI = 0.95) and reliability (α) = 0.91, supporting the validity of using this item as a focused measure of tracking frequency. Response to this survey item was measured using a five-item ordinal scale: never, rarely, sometimes, often, always. We defined frequency of activity tracking as either rarely ("never" or "rarely"), occasionally ("sometimes"), or frequently ("often" or "always").

2.6. Potential Confounders

We selected sociodemographic, mobility, and health characteristics as potential confounders of the association between frequency of activity tracking and consistent physical activity, based on prior literature [15,52,58–61]. Sociodemographic characteristics included age, sex, race and ethnicity, educational attainment, marital status, and living situation (living alone versus with others). Mobility-related factors included a history of a fall in the past year and functional limitations. For the mobility characteristic, respondents were asked whether they had fallen in the past 12 months (yes or no) and whether they had any health conditions that limit their ability to be physically active (yes or no). Health characteristics included the Charlson Comorbidity Index and the Clinical Frailty Scale score. The Charlson comorbidity index is a measure of the comorbidities and a predictor of 10-year mortality, computed from 16 chronic diseases [62,63]. The score is a weighted sum of the 16 chronic diseases and age, ranging from 0 to 24 [64,65]. We measured the Charlson comorbidity index as a continuous variable, excluding age. The Clinical Frailty

Scale, a measure of frailty, is a 9-item scale (Cronbach alpha: 0.76–0.91) that assesses an individual's vulnerability to stressors [66–68]. We defined the Clinical Frailty Scale score as a three-level categorical variable—fit (scores 1–3), vulnerable (score of 4), and frail (score of 5–9), consistent with prior studies [69,70].

2.7. Missing Data

A total of 698 eligible persons consented to participate in the survey. However, 83 of them did not complete any survey questions and were excluded. We received complete survey responses from the remaining 615 (88.1%) respondents.

2.8. Statistical Analysis

We reported the frequency distributions of all categorical variables. Continuous variables were summarized using means and standard deviations or medians and interquartile ranges, depending on their distribution. Bivariate associations between participant characteristics and consistent physical activity were examined using chi-square tests, independent-samples t-tests, and Mann–Whitney U tests, as appropriate. To evaluate the association between activity-tracking behavior and consistent physical activity, we first assessed variance inflation factors and correlation coefficients among the covariates, ensuring that no covariate exhibited a correlation greater than 0.3 and that the model's variance inflation factor did not exceed 3.0 [71]. All the variables in the model met these criteria. Next, we performed a multivariable logistic regression for three analytic groups: the combined sample of older adults and care partners (n = 615), older adults only (n = 310), and care partners only (n = 305). We reported the adjusted odds ratios (aORs) with corresponding 95% confidence intervals. As a sensitivity analysis, we conducted multivariable ordinal logistic regression treating physical activity engagement as a four-level ordinal outcome (0, 1–2, 3–4, and 5 or more days per week). Predicted probabilities were estimated for each activity-tracking category to estimate the likelihood of engaging in each physical activity category.

Model fit was evaluated using multiple complementary statistics. The likelihood ratio (LR) chi-square test compares the full model to an intercept-only model; a p-value < 0.05 indicates that the predictors jointly improve model fit over the null model [72]. Pseudo R^2 was reported as an index of explanatory strength, with values of 0.10 and higher generally acceptable in behavioral and epidemiologic research [73]. Goodness-of-fit statistics (Hosmer–Lemeshow test) were used to assess calibration by comparing observed and predicted outcome frequencies [72]. A non-significant p-value ($p > 0.05$) suggests no evidence of lack of fit [72]. Akaike information criteria (AIC) and Bayesian information criteria (BIC) were reported to allow comparison of relative model fit and parsimony between logistic and ordinal logistic regression models, with lower values indicating better fit [74]. All analyses were performed using Stata version 16 [75].

2.9. Ethical Considerations

This study was approved by the New York University Langone Health Institutional Review Board (IRB# i25-00450). All study participants provided electronic informed consent before access to the survey. Study procedures adhered to institutional and federal ethical guidelines for research involving human participants.

3. Results

The mean age was 52.8 years (SD 19.0) for the overall sample, 70.1 years (SD 4.3) for older adults, and 35.3 years (SD 10.1) for care partners (Table 1). Overall, 55.0% of participants were female (older adults 57.1%, care partners 52.8%). By race and ethnicity, 42.9% were non-Hispanic White (older adults 50.7%, care partners 35.1%), 30.6% non-

Hispanic Black (older adults 31.6%, care partners 29.5%), 20.7% Hispanic (older adults 11.3%, care partners 30.2%), and 5.8% other races (older adults 6.5%, care partners 5.3%). Regarding mobility and health characteristics, 22.1% of participants reported a fall in the prior year (older adults 24.5%, care partners 19.7%), and functional limitations were more common among older adults (13.5%) than care partners (3.0%). Most participants had no comorbidity (79.3%) and were categorized as fit on the clinical frailty scale (90.9%), though frailty was more prevalent among older adults (7.1% vs. 5.2%). Also, 59.2% of participants reported frequent activity tracking (older adults 61.9%, care partners 56.4%). Overall, 70.1% engaged in consistent physical activity, with higher participation among older adults (78.4%) compared with care partners (61.6%).

Table 1. Sociodemographic, mobility, and health characteristics of the study population (n = 615), including older adults (n = 310) and care partners (n = 305).

Variables	All Population n = 615 (%)	Older Adults n = 310 (%)	Care Partners n = 305 (%)
Sociodemographic Characteristics			
Age in years (Mean, SD)	52.8 (19.0)	70.1 (4.3)	35.3 (10.1)
Sex			
Male	277 (45.0)	133 (42.9)	144 (47.2)
Female	338 (55.0)	177 (57.1)	161 (52.8)
Race/Ethnicity			
Non-Hispanic White	264 (42.9)	157 (50.7)	107 (35.1)
Non-Hispanic Black	188 (30.6)	98 (31.6)	90 (29.5)
Hispanic	127 (20.7)	35 (11.3)	92 (30.2)
Other Races	36 (5.8)	20 (6.5)	16 (5.3)
Highest Educational Degree			
High School Diploma	117 (19.0)	53 (17.1)	64 (21.0)
College Degree	277 (45.1)	107 (34.5)	170 (55.7)
Graduate Degree	221 (35.9)	150 (48.4)	71 (23.3)
Marital Status			
Married	453 (73.7)	214 (69.0)	239 (78.4)
Never Married	49 (8.0)	14 (4.5)	35 (11.5)
Widow/Separated/Divorced	113 (18.4)	82 (26.5)	31 (10.1)
Living Situation			
Living alone	305 (49.6)	62 (20.0)	243 (79.7)
Living with others	310 (50.4)	248 (80.0)	62 (20.3)
Mobility Characteristics			
Fall in the last year			
Yes	136 (22.1)	76 (24.5)	60 (19.7)
No	479 (77.9)	234 (75.5)	245 (80.3)
Functional Limitations			
Yes	51 (8.3)	42 (13.5)	9 (3.0)
No	564 (91.7)	268 (86.5)	296 (97.0)
Health Characteristics			
Charlson Comorbidity Index *			
Median Score (IQR)	0.0 (0.0–0.0)	0.0 (0.0–1.0)	0.0 (0.0–0.0)
None	488 (79.3)	231 (74.5)	257 (84.3)
1	73 (11.9)	43 (13.9)	30 (9.8)
2	54 (8.8)	36 (11.6)	18 (5.9)
Clinical Frailty Scale Category			
Fit	559 (90.9)	276 (89.0)	283 (92.8)
Vulnerable	18 (2.9)	12 (3.9)	6 (2.0)
Frail	38 (6.2)	22 (7.1)	16 (5.2)

Table 1. *Cont.*

Variables	All Population n = 615 (%)	Older Adults n = 310 (%)	Care Partners n = 305 (%)
Predictor and Outcome Measures			
Activity Tracking Behavior			
Rarely	151 (24.5)	82 (26.5)	69 (22.6)
Occasional	100 (16.3)	36 (11.6)	64 (21.0)
Frequently	364 (59.2)	192 (61.9)	172 (56.4)
Physical Activity Engagement			
Inconsistent	184 (29.9)	67 (21.6)	117 (38.4)
Consistent	431 (70.1)	243 (78.4)	188 (61.6)

* Charlson comorbidity index calculated while excluding age.

Consistent physical activity was associated with several sociodemographic characteristics (Table 2). Older adults were more likely to report consistent physical activity engagement than care partners (OR 0.44; 95% CI: 0.31–0.63). Across the overall sample, increasing age was associated with consistent physical activity engagement (OR 1.02; 95% CI: 1.01–1.03). Males had lower odds of consistent physical activity engagement than females (OR 0.60; 95% CI: 0.43–0.86). Compared with Non-Hispanic White participants, non-Hispanic Black (OR 0.31; 95% CI: 0.20–0.48), Hispanic (OR 0.37; 95% CI: 0.23–0.61), and other racial groups (OR 0.18; 95% CI: 0.09–0.38) had lower odds of consistent physical activity engagement. Participants living alone were less likely to be active than those living with others (OR 0.59; 95% CI: 0.42–0.84). Mobility and health characteristics, including prior falls, functional limitations, comorbidity burden, and frailty, were not significantly associated with consistent physical activity engagement.

Table 2. Bivariate association and unadjusted odds ratio between engagement in physical activity and activity tracking behavior, sociodemographic, mobility, and health characteristics among the study population (n = 615).

Variables	Physical Activity Engagement			Unadjusted Odds Ratio
	Consistent (n = 431 (%))	Inconsistent (n = 184 (%))	p-Value	(95% CI)
Sociodemographic Characteristics				
Participant Status				
Older Adult	243 (56.4)	67 (36.4)	<0.001	Ref
Care Partner	188 (43.6)	117 (63.6)		0.44 (0.31–0.63)
Age in years (Mean, SD) #	55.1 (18.8)	47.5 (18.7)	<0.001	1.02 (1.01–1.03)
Sex				
Male	178 (41.3)	99 (53.8)	0.004	0.60 (0.43–0.86)
Female	253 (58.7)	85 (46.2)		Ref
Race/Ethnicity				
Non-Hispanic White	219 (50.8)	45 (24.5)	<0.001	Ref
Non-Hispanic Black	113 (26.2)	75 (40.7)		0.31 (0.20–0.48)
Hispanic	82 (19.0)	45 (24.5)		0.37 (0.23–0.61)
Other Races	17 (4.0)	19 (10.3)		0.18 (0.09–0.38)
Highest Educational Degree				
High School Diploma	77 (17.8)	40 (21.7)	0.335	Ref
College Degree	192 (44.6)	85 (46.2)		1.17 (0.74–1.86)
Graduate Degree	162 (37.6)	59 (32.1)		1.43 (0.88–2.32)
Marital Status				
Married	310 (71.9)	143 (77.7)	0.324	Ref
Never Married	37 (8.6)	12 (6.5)		1.42 (0.72–2.81)
Widow/Separated/Divorced	84 (19.5)	29 (15.8)		1.34 (0.84–2.13)

Table 2. *Cont.*

Variables	Physical Activity Engagement			Unadjusted Odds Ratio
Living Situation				
Living alone	197 (45.7)	108 (58.7)	0.003	0.59 (0.42–0.84)
Living with others	234 (54.3)	76 (41.3)		Ref
Mobility Characteristics				
Fall in the last year				
Yes	103 (23.9)	33 (17.9)	0.103	1.44 (0.93–2.22)
No	328 (76.1)	151 (82.1)		Ref
Functional Limitations				
Yes	39 (9.0)	12 (6.5)	0.298	1.43 (0.73–2.79)
No	392 (91.0)	172 (93.5)		Ref
Health Characteristics				
Charlson Comorbidity Index *				
Median Score (IQR) ##	0.0 (0.0–0.0)	0.0 (0.0–0.0)	0.880	1.08 (0.90–1.30)
None	342 (79.4)	146 (79.3)	0.465	Ref
1	48 (11.1)	25 (13.6)		0.82 (0.49–1.38)
2	41 (9.5)	13 (7.1)		1.35 (0.70–2.59)
Clinical Frailty Scale Category				
Fit	396 (91.9)	163 (88.5)	0.385	Ref
Vulnerable	12 (2.8)	6 (3.3)		0.82 (0.30–2.23)
Frail	23 (5.3)	15 (8.2)		0.63 (0.32–1.24)
Predictor Measure				
Activity Tracking Behavior				
Rarely	97 (22.5)	54 (29.4)	0.190	Ref
Occasional	71 (16.5)	29 (15.7)		1.36 (0.79–2.35)
Frequently	263 (61.0)	101 (54.9)		1.45 (0.97–2.17)

* Charlson comorbidity index calculated while excluding age. Outcome coding: Consistent (1) vs. Inconsistent (0) physical activity engagement. Chi-square tests were performed unless otherwise stated: # Independent-samples t-test performed; ## Mann–Whitney U test performed.

In the unadjusted analysis, activity-tracking behavior was not significantly associated with consistent physical activity (Table 2). After adjusting for demographic, social, mobility, and health characteristics, activity-tracking behavior was associated with consistent activity (Table 3). In the overall population, both occasional (aOR 2.18, 95% CI 1.19–4.01) and frequent tracking (aOR 2.40, 95% CI 1.45–3.96) were associated with higher odds of consistent physical activity. Among older adults, frequent tracking, but not occasional tracking, was associated with consistent physical activity (aOR 2.47, 95% CI 1.08–5.64). In contrast, among care partners, occasional tracking, but not frequent tracking, was associated with consistent physical activity (aOR 3.54, 95% CI 1.54–8.11).

Table 3. Multivariable logistic regression result of the association between engagement in physical activity and activity tracking behavior among the study population and separately among older adults and care partners.

Variables	Physical Activity Engagement (Adjusted Odds Ratio (95% CI))		
	All Population	**Older Adults**	**Care Partners**
Activity Tracking Behavior			
Rarely	Ref	Ref	Ref
Occasional	**2.18 (1.19–4.01)**	0.86 (0.32–2.28)	**3.54 (1.54–8.11)**
Frequently	**2.40 (1.45–3.96)**	**2.47 (1.08–5.64)**	1.99 (0.98–4.02)
Age in years *	**1.02 (1.01–1.03)**	1.03 (0.95–1.12)	0.99 (0.96–1.02)

Table 3. *Cont.*

Variables	Physical Activity Engagement (Adjusted Odds Ratio (95% CI))		
Sex			
Male	0.71 (0.48–1.04)	1.46 (0.78–2.73)	0.50 (0.29–0.87)
Female	Ref	Ref	Ref
Race/Ethnicity			
Non-Hispanic White	Ref	Ref	Ref
Non-Hispanic Black	**0.29 (0.17–0.49)**	**0.37 (0.15–0.94)**	**0.15 (0.07–0.34)**
Hispanic	**0.56 (0.31–0.99)**	0.50 (0.16–1.53)	0.50 (0.23–1.08)
Other Races	**0.19 (0.09–0.42)**	**0.13 (0.04–0.41)**	**0.20 (0.06–0.67)**
Highest Educational Degree			
High School Diploma	Ref	Ref	Ref
College Degree	1.43 (0.82–2.48)	1.68 (0.67–4.23)	1.91 (0.86–4.26)
Graduate Degree	1.37 (0.74–2.57)	1.50 (0.61–3.67)	1.59 (0.59–4.34)
Marital Status			
Married	Ref	Ref	Ref
Never Married	2.08 (0.91–4.76)	0.61 (0.13–2.79)	2.85 (0.91–8.88)
Widow/Separated/Divorced	0.98 (0.55–1.73)	0.96 (0.40–2.27)	1.23 (0.46–3.31)
Living Situation			
Living alone	0.77 (0.48–1.23)	0.95 (0.37–2.41)	1.13 (0.57–2.27)
Living with others	Ref	Ref	Ref
Fall in the last year			
Yes	1.43 (0.84–2.42)	1.07 (0.50–2.31)	**2.68 (1.14–6.34)**
No	Ref	Ref	Ref
Functional Limitations			
Yes	0.79 (0.35–1.76)	1.10 (0.42–2.88)	0.57 (0.10–3.14)
No	Ref	Ref	Ref
Charlson Comorbidity Index *	1.00 (0.81–1.25)	0.79 (0.59–1.05)	1.11 (0.79–1.57)
Clinical Frailty Scale			
Fit	Ref	Ref	Ref
Vulnerable	0.59 (0.19–1.81)	0.41 (0.10–1.68)	0.95 (0.12–7.52)
Frail	0.56 (0.26–1.24)	0.36 (0.11–1.14)	1.07 (0.28–4.11)
	Model Fit		
Pseudo-R^2	0.1058	0.1106	0.1743
LR chi2 (*p*-value)	79.41 (<0.001)	35.80 (0.005)	70.81 (<0.001)
HL Goodness of fit *p*-value	0.657	0.326	0.223
AIC	707.11	323.82	371.33
BIC	786.70	391.08	438.30
Mean VIF	1.50	1.57	1.52
Range of VIF	1.11–2.54	1.11–2.69	1.11–2.47

Outcome coding: Consistent (1) vs. Inconsistent (0) physical activity engagement. Adjusted odds ratio interpretation: significant values above 1 imply increased likelihood of being associated with the outcome, while significant values below 1 imply reduced likelihood of being associated with the outcome; Significant relationship in bold; Significance determined if the confidence interval does not cross 1; * Measured as a continuous variable. LR: Likelihood Ratio; AIC: Akaike Information Criteria; BIC: Bayesian Information Criteria; VIF: Variance Inflation Factor. Goodness of fit test performed: HL: Homer Lemeshow.

For the sensitivity analysis, all odds ratios were relative to the lowest activity category (1–2 days, 3–4 days, and 5 or more days per week vs. 0 days per week), and we similarly adjusted for demographic, social, mobility, and health characteristics (Table 4). In the overall population, both occasional (aOR 2.53; 95% CI 1.51–4.25) and frequent activity tracking (aOR 2.49; 95% CI 1.64–3.76) were associated with higher odds of engaging in more days of physical activity. Among older adults, frequent activity tracking, but not occasional activity tracking, was associated with higher odds of engaging in more days of physical activity (aOR 1.91; 95% CI 1.03–3.54). In contrast, among care partners, both

occasional (aOR 3.44; 95% CI 1.73–6.86) and frequent activity tracking (aOR 3.29, 95% CI 1.79–6.05) were associated with higher odds of engaging in more days of physical activity.

Table 4. Multivariable ordinal logistic regression result of the association between engagement in physical activity and activity tracking behavior among the study population and separately among older adults and care partners.

Variables	Physical Activity Engagement (Adjusted Odds Ratio (95% CI)) 4-Level Ordinal Category with Reference = 0 Days		
	All Population	**Older Adults**	**Care Partners**
Activity Tracking Behavior			
Rarely	Ref	Ref	Ref
Occasional	**2.53 (1.51–4.25)**	1.52 (0.64–3.62)	**3.44 (1.73–6.86)**
Frequently	**2.49 (1.64–3.76)**	**1.91 (1.03–3.54)**	**3.29 (1.79–6.05)**
		Cut-offs	
/cut 1	−2.25 (−3.21, −1.30)	0.47 (−3.90, 4.85)	−3.07 (−4.56, −1.57)
/cut 2	0.03 (−0.88, 0.94)	2.45 (−1.89, 6.79)	−0.44 (−1.88, 0.99)
/cut 3	2.26 (1.33, 3.19)	4.74 (0.38, 9.10)	1.94 (0.48, 3.40)
		Model Fit	
Pseudo-R^2	0.1009	0.0925	0.1261
LR chi2 (*p*-value)	150.51 (<0.001)	6.01 (<0.001)	93.35 (<0.001)
AIC	1380.49	697.10	686.73
BIC	1468.92	771.83	761.14

Outcome coding: Levels 1–2 days, 3–4 days, and 5+ days compared to 0 days. Cut-offs indicate the estimated thresholds on the underlying latent scale that separate the ordinal physical activity categories; Adjusted ordinal logistic regression models accounting for age, sex, race/ethnicity, education, marital status, living situation, fall history, functional limitation, Charlson comorbidity index, and frailty status. Adjusted odds ratio interpretation: significant values above 1 imply increased likelihood of being associated with the outcome while significant values below 1 imply reduced likelihood of being associated with the outcome; Significant relationship in bold; Significance determined if the confidence interval does not cross 1.

We computed the predicted probabilities from the ordinal logistic regression models. In the overall population, those with occasional (predicted odds: 31.3%; 95% CI: 26.9–35.2%) and frequent activity tracking behavior (predicted odds: 31.0%; 95% CI: 17.6–34.1%) had higher probabilities of engaging in five or more days of physical activity per week compared to rare activity trackers (predicted odds: 17.2%; 95% CI: 12.8–21.6%) (Figure 1). Those with rare activity tracking behavior were more likely to engage in 1–2 days of physical activity per week (predicted odds: 33.8%; 95% CI: 28.3–39.4%) compared to those with occasional (predicted odds: 21.8%; 95% CI: 16.4–27.2%) and frequent activity tracking behavior (predicted odds: 22.0%; 95% CI: 18.6–25.4%). Due to sparse cell counts in some activity tracking–physical activity categories, predicted probabilities were not calculated for subgroups of older adults and care partners.

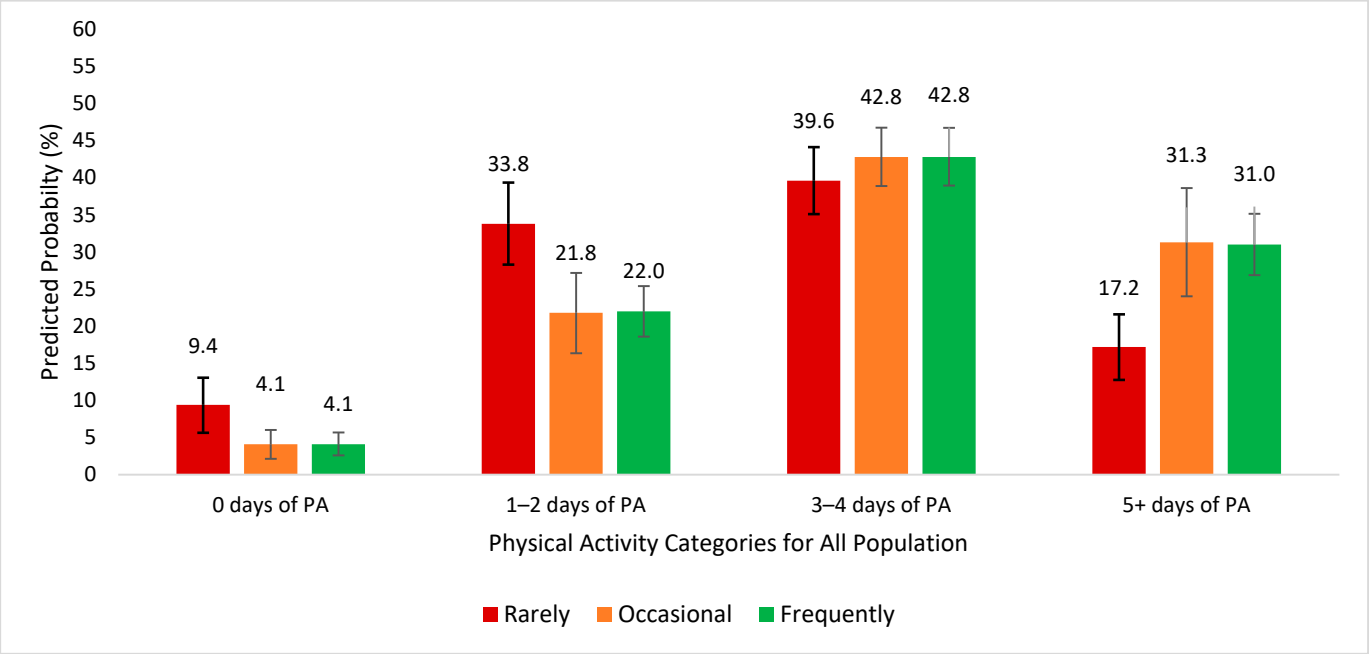


Figure 1. Predicted probabilities of physical activities across the entire study population. PA: Physical Activity. Vertical lines represent 95% confidence intervals. Predicted estimates generated from adjusted ordinal logistic regression models after accounting for age, sex, race/ethnicity, education, marital status, living situation, fall history, functional limitation, Charlson comorbidity index, and frailty status.

4. Discussion

In this cross-sectional study of 615 older adults and care partners, we found that more frequent activity tracking was associated with significantly greater engagement in consistent physical activity. Specifically, older adults who frequently tracked their activity were more likely to engage in consistent physical activity, whereas those who tracked occasionally did not show a similar effect. Among care partners, occasional tracking—rather than frequent tracking—was significantly associated with consistent physical activity.

Activity tracking has been consistently linked to higher physical activity levels through mechanisms rooted in self-regulation and behavior-change theories [76–79]. Self-monitoring increases awareness of daily movement, strengthens accountability, and enables individuals to set and evaluate progress toward personalized goals [80]. Prior studies have shown that tracking reinforces positive feedback loops that motivate continued activity and can reduce sedentary time [78,81]. For older adults in particular, tracking may provide a compensatory structure that supports habit formation and offers real-time validation of effort [33,82]. Among care partners, activity tracking may also serve as a self-care tool, providing a structured way to maintain health behaviors amid caregiving responsibilities [22,52].

We report that older adults who frequently tracked their activity had substantially higher odds of engaging in consistent physical activity, consistent with earlier studies [31,83]. A plausible explanation may be that older adults who track frequently may have integrated activity tracking into their daily routines, using feedback to maintain accountability and motivation [33,84,85]. However, older adults' adoption and continued use of physical activity trackers may be influenced by personal and social factors, as well as smartphone quality. Jin et al. [84] reported factors that inform activity self-tracking behavior, including self-efficacy, technology affinity, device quality and design, perceived ease of use, perceived usefulness, perceived device value, social influence, and financial

incentive. Hence, interventions aimed at improving physical activity through the use of physical activity trackers should be designed to minimize user burden, leverage intuitive and reliable technologies, and incorporate behavioral and social supports, such as goal setting, feedback, and caregiver or peer involvement, to promote sustained engagement and maximize potential benefits among older adults.

In contrast to older adults, care partners who occasionally tracked their physical activity had higher odds of engaging in consistent physical activity. One possible explanation is that caregiving responsibilities impose substantial cognitive and time demands, limiting capacity for sustained daily self-monitoring. Care partners often balance multiple responsibilities, including work, caregiving, and household tasks [86–88], leaving less time for structured self-monitoring. Occasional tracking, therefore, may represent a strategic and goal-oriented use of the device, deployed selectively when physical activity is feasible and when feedback is most likely to reinforce behavior. In contrast, frequent tracking may reflect routine monitoring behavior that becomes cognitively burdensome or normalized within competing caregiving demands. When monitoring becomes habitual without sufficient opportunity to act on feedback, tracking frequency may not translate into increased physical activity. Thus, among care partners, the effectiveness of tracking may depend less on frequency and more on whether feedback can be meaningfully processed and translated into action amid competing caregiving responsibilities [88,89].

This study also presents a classic case of negative confounding, defined as a true observed effect that is underestimated and biased toward the null [90]. Notably, the association between tracking behavior and physical activity engagement was not significant in bivariate analysis but emerged after multivariable adjustment. This suggests negative confounding, which, in our study, age and race/ethnicity suppressed the underlying relationship between tracking behavior and physical activity engagement. The adjusted models show that tracking frequency is independently associated with physical activity, even after accounting for these demographic and health factors. This methodological finding underscores epidemiological principles and observational research guidelines that emphasize evaluating observed associations in the context of potential confounders when examining behavioral patterns in heterogeneous populations [91,92]. Our results highlight why carefully selecting confounders based on prior evidence, guided by the existing literature and confirmed through multicollinearity diagnostics, is critical. Our methodological steps enabled us to account for complex demographic and health-related confounding structures that would otherwise obscure the true association between activity-tracking behavior and physical activity engagement.

Our findings have several implications for practice, program development, and future research. Activity tracking is a low-cost, accessible tool that may support consistent physical activity among both older adults and care partners [33,83,85]. Our findings suggest that interventions aimed at increasing physical activity could consider using activity tracking as a supportive tool, recognizing that older adults and care partners may differ in how frequently or consistently they track their activity. Prior studies indicate that the effectiveness of wearables is enhanced when devices are paired with structured goal-setting, actionable feedback, prompts, and periodic performance summaries, rather than passive data collection alone [93,94]. For older adults, encouraging consistent daily wear, simple progress visualization, and reinforcement of goal attainment may maximize benefit by supporting behavioral awareness and habit formation. For care partners, periodic check-ins, adjustable reminders, and achievable weekly activity targets rather than strict daily tracking expectations may more align with their competing caregiving responsibilities [95,96]. In addition, providers may consider encouraging coordinated, mutually reinforcing physical activity-tracking behaviors among older adults and their care partners to strengthen

motivation and promote shared participation. At the community and organizational levels, senior centers, caregiving programs, and health-promotion initiatives could explore the feasibility of integrating easy-to-use physical activity-tracking devices into existing wellness activities and chronic disease management. Policy initiatives that expand access to digital activity-tracking devices through insurance coverage, community-based aging services, or fall-prevention programs may support broader device adoption and reduce sedentary behavior. Finally, these results underscore the need for further research examining longitudinal patterns of activity tracking, dyadic influences on health behaviors, and the mechanisms underlying the association between tracking frequency and physical activity among older adults and care partners.

This study has several limitations. First, its cross-sectional design precludes causal inference. Second, the observed association between physical activity tracking and engagement in consistent physical activity may be bidirectional, as individuals who are already more active may be more likely to track their activity. Third, although individuals who did not respond to any survey items were excluded from the analysis, non-response bias cannot be ruled out, as these individuals may systematically differ from respondents, potentially affecting the representativeness of the study sample. Fourth, physical activity and tracking behaviors were self-reported, which may introduce recall or social desirability bias [97,98]. Future studies that incorporate objective device data could validate self-reported tracking patterns and provide a more granular assessment of activity-tracking behavior and physical activity engagement. Fifth, our study participants were recruited online, which may have overrepresented individuals with higher digital literacy or greater interest in health research, potentially limiting generalizability to the broader population of older adults and care partners. Sixth, our definition of consistent physical activity was based solely on frequency (3 or more days per week) and did not account for activity duration or intensity. This differs from WHO guidelines, which emphasize duration and intensity [99], limiting comparability with studies using WHO-aligned measures. We did not measure caregiver burden, which precluded us from examining its potential role in the relationship between tracking frequency and physical activity engagement among care partners. Finally, although we controlled for sociodemographic and health characteristics, unmeasured factors may influence engagement in physical activity or activity-tracking behaviors. These may include baseline motivation, habitual energy expenditure, dietary patterns, mental health status (e.g., depression or anxiety), work schedules and time constraints, strength of social networks, environmental supports, access to caregiving resources, availability of activity-tracking devices, and digital literacy. Future studies incorporating these behavioral and psychosocial factors would provide a more comprehensive understanding of determinants of physical activity in this population. Despite these limitations, this study is among the few to examine both US older adults' and care partners' activity tracking and physical activity behaviors, providing insights into how tracking frequency relates to engagement in physical activities within this population. Our findings highlight practical, low-cost strategies that promote physical activity and provide information to inform interventions, programs, and policies aimed at improving physical activity among older adults and care partners.

5. Conclusions

Activity tracking is a low-cost, accessible tool that is associated with consistent physical activity among both older adults and their care partners. Our study shows that tracking frequency is associated with higher physical activity engagement, though patterns differ between the two groups. These results generate testable hypotheses for future longitudinal and intervention research examining whether activity-tracking devices can promote physi-

cal activity in both populations and whether, in particular, care partners may benefit from interventions emphasizing weekly targets rather than strict daily adherence.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The original data presented in the study are openly available in FigShare at https://doi.org/10.6084/m9.figshare.30929594.

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Abbreviations

The following abbreviations are used in this manuscript:

ACTIVE	Activity Tracking, Care Partner Co-Participation, Text Reminders, Instructional Education, Virtual Physical Therapy, and Exercise
REDCap	Research Electronic Data Capture

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