



Weekend Warrior vs Regularly Active: Long-Term Fitbit-Measured Physical Activity Patterns and Risk of MCI and Dementia

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Introduction

- Physical activity (PA) has been associated with reduced risk of mild cognitive impairment (MCI) and dementia,¹ yet most prior evidence relies on short-term assessments that may not capture stable PA patterns over time.²
- It remains unclear whether different long-term PA patterns – particularly “weekend warrior” vs “regularly active” – are similarly associated with risk of MCI or dementia in older adults.³
- We leveraged multi-year Fitbit data from the All of Us (AoU) Research Program, to examine associations between sustained PA patterns and incident MCI and dementia among adults aged ≥50 years.

Methods

- We studied 13,467 adults aged ≥50 years with ≥180 days of Fitbit data and no MCI or dementia at baseline. Moderate-to-vigorous physical activity (MVPA) was derived from Fitbit intensity data and used to classify participants as inactive, “weekend warrior”, or “regularly active.”
- Participants were followed from first Fitbit record through 2025 for incident MCI or dementia, ascertained via electronic health records and surveys.
- Cox proportional hazards models were used to estimate hazard ratios for MCI and dementia by PA pattern, adjusting for demographic, socioeconomic, lifestyle and clinical factors, as well as device wear time. Sensitivity analyses were performed to test the robustness of results.

Results

- At baseline, the PA groups differed by age, sex, and body mass index (BMI; Table 1).
- Cumulative incidence curves (Figure 1) showed lower rates of MCI and dementia in both active groups compared to inactive.
- Cox models (Figure 2) indicated that “weekend warrior” and “regularly active” patterns were each associated with a significantly lower hazard of MCI and dementia relative to inactivity, with no significant difference between the two active patterns.
- All sensitivity analyses showed similar findings.

Figure 1. Cumulative incidence of MCI and dementia by PA patterns

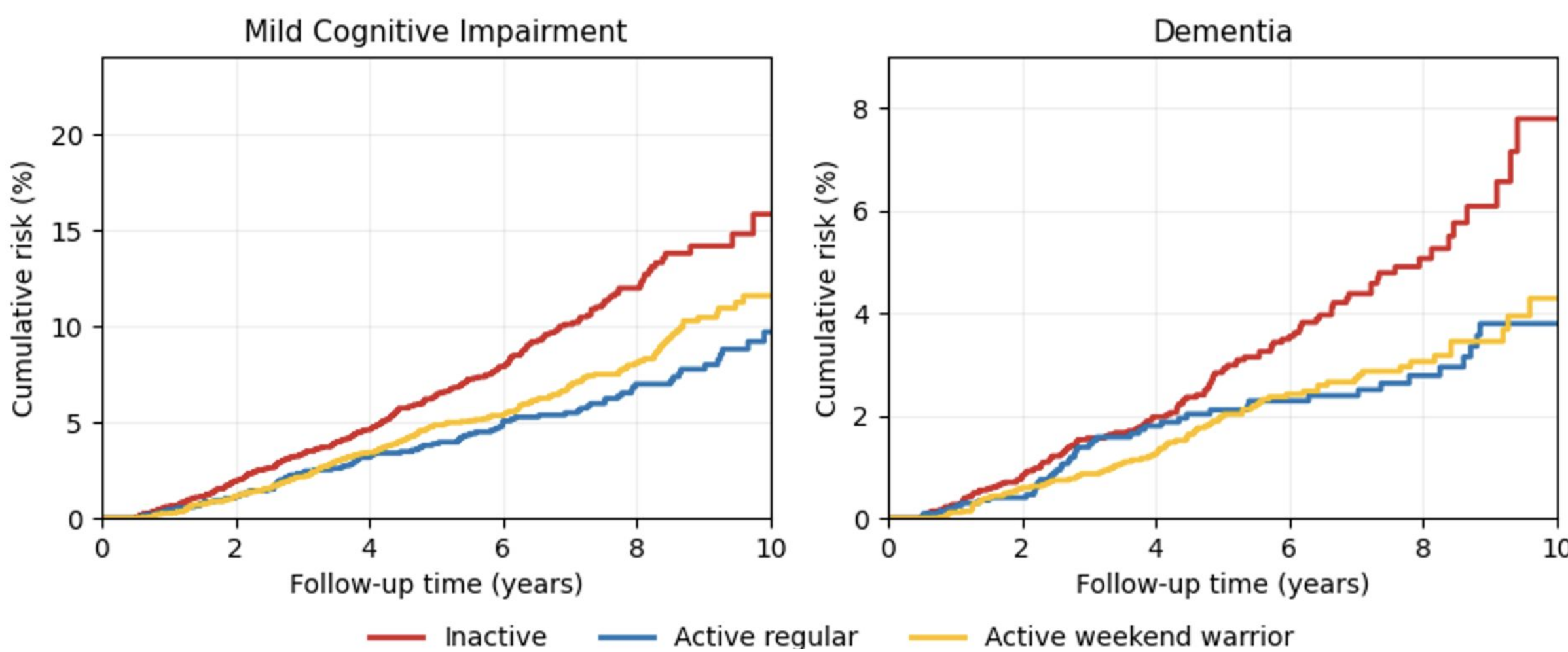
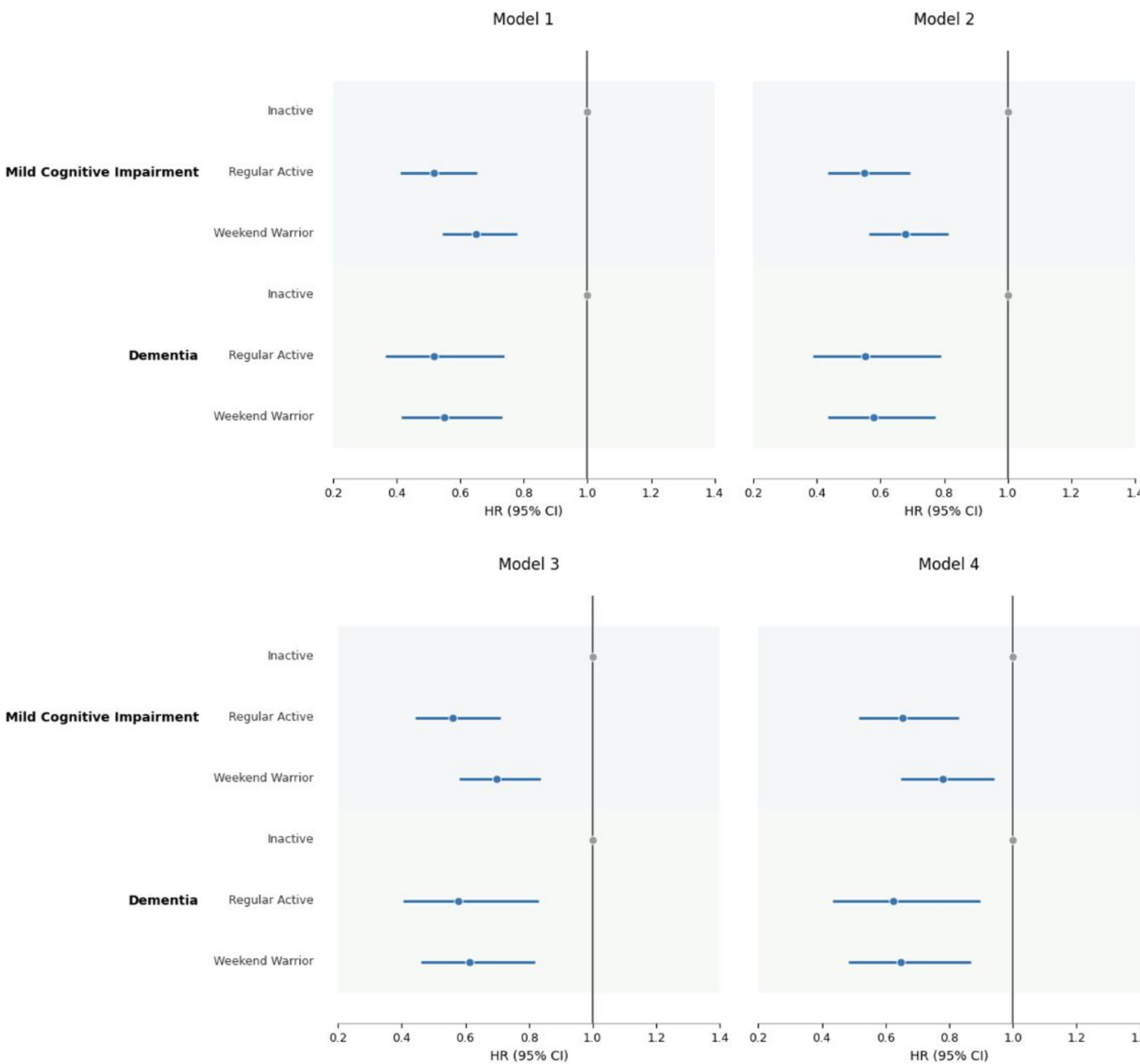


Figure 2. Association of PA patterns with incident MCI and dementia (Cox proportional hazards models)



Conclusion

- Sustained “Weekend Warrior” PA patterns conferred a reduction in the risk of MCI or dementia comparable to that of a regularly active pattern in the diverse, real-world cohort of older adults.
- These findings underscore the value of long-term wearable monitoring and highlight that meeting PA guidelines, even if concentrated in fewer days, may provide protection against cognitive decline.
- The results support more flexible physical activity guidelines for older adults.

Table 1. Baseline characteristics by physical activity patterns

Baseline Characteristics	Level	Total	P-value
Age (years)		66.0 (58.0 – 72.0)	< 0.001
BMI (kg/m ²)		28.8 (25.1 – 33.6)	< 0.001
Average daily steps		6876.9 (4860.7 – 9250.0)	< 0.001
Average daily active minutes		28.1 (13.8 – 49.4)	< 0.001
Wearing duration (years)		2.6 (1.2 – 4.8)	< 0.001
Sex at birth	Female	9186 (68.2%)	< 0.001
	Male	4219 (31.3%)	
	Other	62 (0.5%)	
Race	White	11061 (82.1%)	< 0.001
	Black or African American	834 (6.2%)	
	Other	1572 (11.7%)	
Ethnicity	Hispanic or Latino	644 (4.8%)	< 0.001
	Not Hispanic or Latino	12823 (95.2%)	
Education	College Degree	9164 (68.0%)	< 0.001
	No College	883 (6.6%)	
	Other	78 (0.6%)	
	Some College	3342 (24.8%)	
Annual Income	High: > \$100k	5500 (40.8%)	< 0.001
	Low: < \$35k	1870 (13.9%)	
	Middle: 35k–100k	5258 (39.0%)	
	Other	839 (6.2%)	
Employment	Retired or Unable to Work	6245 (46.4%)	< 0.001
	Other	7222 (53.6%)	
Alcohol (How often do you have a drink containing alcohol?)	Never	2027 (15.1%)	< 0.001
	Monthly or less	3872 (28.8%)	
	2–4 times per month	2706 (20.1%)	
	2–3 times per week	2038 (15.1%)	
	≥4 times per week	2370 (17.6%)	
	Unknown	454 (3.4%)	
Smoking	Never	8059 (59.8%)	< 0.001
	Ever (≥100 cigarettes)	5164 (38.3%)	
	Unknown	244 (1.8%)	
Cancer	Yes	765 (5.7%)	0.018
	No	12702 (94.3%)	
Coronary artery disease	Yes	1916 (14.2%)	0.028
	No	11551 (85.8%)	
Diabetes	Yes	2185 (16.2%)	< 0.001
	No	11282 (83.8%)	
Hypertension	Yes	5924 (44.0%)	< 0.001
	No	7543 (56.0%)	

References

- Livingston G, Huntley J, Liu KY, et al. Dementia prevention, intervention, and care: 2024 report of the Lancet standing Commission. *Lancet*. 2024;404(10452):572-628. doi:10.1016/S0140-6736(24)01296-0
- Strain T, Wijndaele K, Dempsey PC, et al. Wearable-device-measured physical activity and future health risk. *Nat Med*. 2020;26(9):1385-1391. doi:10.1038/s41591-020-1012-3
- Zhang X, Tang P, Zhu Y, et al. The weekend warrior phenomenon: comparable mortality reduction to regular exercise with enhanced neuroprotective effects-a systematic review and meta-analysis. *BMC Public Health*. 2025;25(1):3873. Published 2025 Nov 10. doi:10.1186/s12889-025-25062-4

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