Aging with HIV: The Interplay of Neighborhood Level Social Vulnerability, Social Support, and Physical Activity

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Abstract

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Introduction: As the population of people living with HIV (PLHIV) ages, maintaining physical activity (PA) levels—particularly moderate-to-vigorous physical activity (MVPA)—is critical to preserving health and quality of life. However, social determinants of health, such as neighborhood disadvantage and limited social support, may pose barriers to engaging in PA. This study examined the associations between social vulnerability, social support, and MVPA in PLHIV aged 50 and older.

Methods: We conducted a cross-sectional analysis of 198 PLHIV aged ≥50 from the PROSPER-HIV study. PROSPER-HIV participants were recruited from HIV clinics at four sites: University of Washington (Seattle, WA), University of Alabama at Birmingham (Birmingham, AL), Case Western Reserve University (Cleveland, OH), and The Fenway Institute (Boston, MA). MVPA was measured objectively via ActiGraph accelerometers. Social vulnerability was assessed using the Social Vulnerability Index (SVI), a geospatial measure derived from census data. Social support was measured using the Multifactorial Assessment of Perceived Social Support–Short Form (MAPSS-SF). Linear regression models estimated associations between

SVI and minutes of MVPA per week, as well as between social support and minutes of MVPA per week, controlling for age, sex at birth, and site in both models. The analysis also examined whether social support moderated the relationship between SVI and MVPA.

Results: Participants had a median of 110 minutes/week of MVPA (IQR: 48.03, 237.05). Higher SVI scores were marginally associated with lower MVPA in unadjusted models (β = -1.77; CI: -3.56, 0.02; p = 0.053), but this association was attenuated and not statistically significant after adjustment (β = -1.14; CI: -2.88, 0.61; p = 0.20). Social support was not significantly associated with MVPA in either unadjusted or adjusted or models (adjusted β = 0.22; CI: -1.41, 1.85; p = 0.79). There was no evidence of interaction between SVI and social support (p = 0.53). Age was inversely associated with MVPA, and MVPA varied significantly by study site.

Conclusion: These findings suggest that socially vulnerable individuals may be less likely to be physically active, although the small sample size warrants caution in interpretation. Future research with larger samples is needed to better understand these relationships and the potential role of structural or contextual factors.

BACKGROUND

HIV incidence rates have been steadily declining in the U.S. and around the globe,[1] yet the proportion of older people living with HIV (PLHIV) is increasing.[2] This shift is primarily due to the widespread availability of antiretroviral therapy (ART), which has significantly extended the lives of PLHIV.[2] As of 2024, nearly 50% of PLHIV in the U.S. are aged 50 or older,[2] 6/9/25 4:05:00 PMand by 2030, this proportion is expected to rise to 73%.[3] This aging population of PLHIV faces an elevated risk of disability and chronic conditions compared to their HIV-negative peers[3–6] and a disproportionate burden of adverse social determinants of health (SDOH), such as housing instability,[7] financial insecurity,[8] and limited social support.[9–11] These intersecting challenges heighten their vulnerability and impact their ability to maintain health and quality of life.

Engaging in regular physical activity (PA) is critical for maintaining health and quality of life, especially as individuals age.[12,13] Although physical mobility issues are common in any aging population, they are especially prevalent among aging PLHIV, who often face premature frailty and HIV-related accelerated aging.[4] 6/9/25 4:05:00 PMMaintaining regular or high levels of PA is essential for aging PLHIV, as it can help offset the high prevalence of mobility limitations and comorbidity burden in this population.[14,15] However, PLHIV often present higher levels of sedentary behavior and lower PA compared to the general population: in one study, 68% of PLHIV reported very low or low activity compared to 49.8% of the general population.[16]

To achieve optimal benefits, PA should be performed above a certain intensity threshold. Research has demonstrated that moderate-to-vigorous physical activity (MVPA) is associated with improvements in brain health, cognition, quality of life, anxiety, depression, sleep, and many other health outcomes.[13] MVPA is characterized by aerobic or muscle-strengthening activities, such as walking at a fast pace or running, swimming, biking at a sufficient effort level, or resistance training.[13] Based on recommendations from the U.S. Department of Health and Human Services, older adults are advised to participate in at least 150 minutes of MVPA per

week.[13] Considering that MVPA is a modifiable factor that could improve health outcomes in aging PLHIV, identifying the factors influencing engagement in PA is essential for confronting the challenges that this population faces in being physically active.

PLHIV are often affected by multiple adverse SDOH. Some of these may include financial instability,[8] housing insecurity,[7] and social isolation,[9–11] each of which introduces barriers to engaging in PA.[9] Financial instability, potentially due to precarious jobs or disability benefits, heightens challenges in accessing healthcare or securing stable housing: approximately 50% of PLHIV in the U.S. require housing assistance.[7] Limited access to safe and accessible exercise spaces in neighborhoods characterized by housing insecurity or low socioeconomic status (SES) further restricts PA opportunities.[9] These barriers are amplified by social factors such as stigma, discrimination, and lack of social cohesion, which could lead to reduced community engagement, weakened trust in institutions, and feelings of exclusion, all of which may discourage participation in PA or the use of community exercise resources. As this group often faces compounded stigma related to HIV status, aging, and, in some cases, sexual orientation,[7,10] aging PLHIV are also more likely to be single, live alone, and report a greater sense of social isolation compared to younger PLHIV (38% vs. 25%, respectively).[11]

The Centers for Disease Control and Prevention (CDC) developed the Social Vulnerability Index (SVI), a geospatial measure that assesses social disadvantage using 16 census-tract characteristics from the 5-year American Community Survey.[17] These include socioeconomic status, housing characteristics, and minority status, among others.[17] Higher SVI scores reflect greater social disadvantage and have been associated with limited healthcare access and poorer viral suppression among PLHIV.[18] Understanding the interplay between social disadvantage and PA may inform initiatives to reduce barriers for PLHIV to engage in PA.[18,19]

Social support has been shown to reduce stress and encourage health-promoting behaviors, regardless of demographic or socioeconomic factors.[9,10,20,21] Social support not only alleviates the effects of stigma and isolation but may also address obstacles to PA created by adverse SDOH, such as financial strain or lack of safe spaces for exercise.[9] While previous research highlights social support as a key facilitator promoting PA among PLHIV, its specific role in older U.S. adults with HIV remains underexplored, presenting an important gap for further investigation. The Multifactorial Assessment of Perceived Social Support–Short Form (MAPSS-SF) was designed to quantify the social support among PLHIV by capturing the unique social needs and challenges they face.[22] Although the benefits of PA are well-documented,[13] there is a significant gap in research exploring how neighborhood level social disadvantage (SVI) and social support interact to shape PA behaviors in aging PLHIV.

To address these gaps, we conducted a cross-sectional study aiming to examine the association between social disadvantage, as defined by the Social Vulnerability Index (SVI) and physical activity (PA), as defined by minutes per week of moderate-to-vigorous physical activity (MVPA), among PLHIV aged 50 and older. We also aimed to examine the association between social support, as measured by the Multifactoral Assessment of Perceived Social Support-Short Form (MAPSS-SF), and PA. As it is possible that social support may buffer the negative effects of social disadvantage on PA, we also evaluated the potential interaction of SVI and social support and its effect on MVPA.

METHODS

Study Setting and the Parent Study

This study analyzed previously collected baseline visit data from the Impact of Physical Activity Routines and Dietary Intake on the Longitudinal Symptom Experience of People Living with HIV (PROSPER-HIV) Study.[23] The PROSPER-HIV Study leveraged the structure of the

Centers for AIDS Research (CFAR) Network of Integrated Clinical Systems (CNICS), a clinical network of PLHIV composed of 10 sites across the United States. PROSPER-HIV participants were recruited from HIV clinics at four of these 10 sites: University of Washington (Seattle, WA), University of Alabama at Birmingham (Birmingham, AL), Case Western Reserve University (Cleveland, OH), and The Fenway Institute (Boston, MA). Each PROSPER-HIV participant was engaged in routine HIV care.[23]

The PROSPER-HIV study included 731 participants, each completing three study visits spaced one year apart, within the framework of a four-year, prospective, observational study. Data collection occurred between 2019 and 2024. Enrolled PROSPER-HIV participants were: (1) aged ≥18 years, (2) CNICS participants, (3) prescribed HIV antiretroviral therapy, and (4) had an undetectable viral load. Participants were excluded if they: (1) did not complete the *HIV Symptom Index* questionnaire, (2) were pregnant, breast-feeding, or planning a pregnancy during the study period, (3) did not have telephone or internet access, or (4) planned to move out of the area in the 36 months after starting the study.[23] Beyond the outcomes used in this analysis, the parent PROSPER-HIV Study collected data on BMI, muscle strength, physical function, and diet intake. The primary aims of PROSPER-HIV were to: (1) characterize longitudinal patterns of objectively measured PA and diet among PLHIV; (2) examine how aspects of PA (e.g., intensity, frequency, duration) and diet quality are associated with symptom burden and intensity, including potential moderating effects of age and sex; and (3) explore whether anthropometric and physical fitness variables, such as waist-hip ratio, body mass index (BMI), hand-grip strength, and Short Physical Performance Battery scores (SPPB), mediate the relationships between PA, diet, and symptom burden in PLHIV.[23]

Study Participants

For this sub-study, PROSPER-HIV participants were included if they: (1) were aged ≥50 years and (2) had consented to share geographic information. Participants with missing or incomplete data on minutes of MVPA per week were excluded from the analysis.

Exposures

Social Vulnerability/Disadvantage: We used the Social Vulnerability Index (SVI), calculated by the University of Washington Data Monitoring Committee, to measure social disadvantage. Originally developed to identify geographic populations who may be disproportionately affected by disasters, the SVI has since been used to explore the relationship between social disadvantage and health outcomes in populations with[18,19] and without HIV.[24] The SVI was constructed in 2011 and uses 16 census-tract characteristics to quantify social vulnerability across four domains: 1) socioeconomic status (e.g. below 150% poverty; unemployment; housing cost burden; no high school diploma; no health insurance), 2) household characteristics (age groups >65 or <17; disability; single-parent households; English language proficiency), 3) racial and ethnic minority status (individuals who are not White, non-Hispanic), and 4) housing type and transportation (multi-unit structures; mobile homes; crowding; lack of vehicles; group quarters).[17] Each characteristic is ranked as a percentile, and these rankings are summed within domains to create domain-level scores. The overall SVI score is derived from a sum of the four domain scores, ranging from 0 (lowest social disadvantage) to 1 (highest social disadvantage).[25] We analyzed SVI scores in two ways. In contingency tables, SVI scores were categorized into quartiles (Q1-Q4). Individuals with SVI scores between 0 and 0.25 were assigned Q1 (least disadvantaged), scores >0.25 to 0.5 were assigned to Q2, scores >0.5 to 0.75 were assigned to Q3, and scores >0.75 to 1.0 were assigned to Q4 (most disadvantaged). In regression models, SVI was evaluated as a continuous score.

Social Support: The Multifactoral Assessment of Perceived Social Support-Short Form (MAPSS-SF), developed in 2019, is a 3-item measure used to quantify social support specifically in PLHIV.[22] Items ask participants whether they: (1) feel listened to by those in their personal life; (2) feel there are people in their life who understand their problems; and (3) are satisfied with the relationships they have with family and friends. Each item was coded as 0 ("not enough") or 1 ("enough or more than enough").[22]

Per MAPSS-SF coding guidelines, if a participant responded "enough or more than enough" to item 1, they were automatically classified as having high social support, and the remaining items were skipped. If they answered "not enough" to item 1, they proceeded to answer items 2 and 3. If the sum of responses across items 2 and 3 was 2 (both marked as "enough or more than enough"), they were also categorized as having high social support. Participants with a sum of 0 or 1 across all answered items were categorized as having low social support.[22]

Outcome

Physical Activity: We measured PA as minutes per week (min/week) spent in MVPA. MVPA was quantitatively measured using the wGT3X-BT ActiGraph accelerometer (ActiGraph, LLC, Fort Walton Beach, Florida, USA) worn over the nondominant hip for 7-10 consecutive days.[6] For their data to be valid, participants had to wear the ActiGraph for at least 10 hours per day for a minimum of 4 days, including one weekend day. There was no minimum level of PA to be included in the analysis. Activity "counts" represent the intensity and frequency of movement of the ActiGraph accelerometer and are used to estimate PA levels (e.g., sedentary, light, moderate, vigorous) based on established cut-points. The more vigorous or frequent the movement, the higher the "count" value during a given time interval. For our study, data were sampled at 30 Hz using 60-second epochs.[6] MVPA was defined as ≥ 2690 counts per minute. Actigraphy data were analyzed using the ActiLife software (ActiGraph, LLC).[6]

Statistical Analyses

Data analysis was conducted using R Studio. Demographic and clinical characteristics were reported overall and by quartiles of SVI. The total n and percentage were calculated for each category, as well as the median minutes per week and interquartile range (IQR) of MVPA. The Kruskal-Wallis and Wilcoxon Rank-Sum tests were used to determine any statistically significant differences between groups.

MVPA was right-skewed and transformed using a Box-Cox transformation with an optimal λ of 0.26 to meet normality assumptions for linear regression. All analyses using continuous MVPA as an outcome were conducted on the transformed scale. We used linear regression to estimate beta coefficients and 95% confidence intervals (CIs) for the associations between SVI score and minutes of MVPA per and between minutes of MVPA per week and social support measured by the MAPSS (high support served as the reference group). All adjusted models controlled for sex assigned at birth (Male/Female), site (UAB, CWRU, UW), and age (years). These covariates were selected a priori due to their theorized influence on both the exposures and the outcome and on prior analyses conducted within this cohort.[6,26] Age and sex are known to impact patterns of PA in adults and may also shape social and structural determinants of disadvantage.[16,27] Study site was included to account for potential regional differences in socioeconomic conditions, healthcare access, and infrastructure that could confound the observed relationships. Given the geographic nature of the SVI and of each site, we conducted a sensitivity analysis of the association between minutes of MVPA per week and SVI score adjusting only for sex at birth and age. We also assessed whether social support modified the relationship between SVI and minutes of MVPA per week by including an interaction term between SVI and support level (low vs. high) in a multivariable linear regression model, controlling for sex, site, and age.

RESULTS

Participant Characteristics

Of the original 731 participants in the PROSPER-HIV study, 533 (72.9%) were aged 50 years and older. Among those aged 50 and older, 54 (10.1%) were missing data on MVPA, 201 (37.7%) were missing data on the SVI, and 80 (15.0%) were missing both MVPA and SVI data. These exclusions resulted in an analytic sample of 198 participants above the age of 50 with complete data on MVPA and SVI. Most participants were assigned male at birth (73.7%), and the largest age group was 60–69 years (53.5%), followed by 50–59 years (36.4%) and 70–79 years (10.1%) (**Table 1**). Most participants identified as Black (58.1%), followed by White (38.9%) and another race or unknown race (3.0%). Few participants were Hispanic or Latino (5.1%). Across study sites, 52.5% of participants were from the University of Alabama at Birmingham (UAB), with 32.3% from Case Western Reserve University (CWRU) and 15.2% from the University of Washington (UW).

MVPA

The overall median weekly minutes of MVPA was 110.22 (IQR: 48.03–237.05); it was highest among participants aged 50–59 (median: 133.00 minutes; IQR: 69.03–242.20) and declined with increasing age, with those aged 70–79 reporting the lowest minutes of MVPA per week (median: 48.55; IQR: 19.06–110.25) ($p = 0.015$). Frequency of MVPA also varied by sex, with males engaging in more weekly MVPA compared to females (median: 126.58 minutes/week; IQR: 50.65–272.59 versus 91.00; IQR: 36.88–174.22), though this difference was of borderline significance ($p = 0.055$). MVPA levels differed significantly by site, with the highest MVPA observed among participants at UW (median: 210.99 minutes; IQR: 64.06–392.29) and the lowest at UAB (median: 90.92 minutes; IQR: 46.72–186.16) ($p = 0.030$). Most participants reported high levels of social support (88.2%), and MVPA levels were similar

between those with high and low support (p = 0.46). There were no statistically significant associations between MVPA and race (p = 0.65), ethnicity (p = 0.50), or BMI (p = 0.17).

SVI

When stratified by SVI quartiles, 17.2% of participants lived in Q1 (least disadvantaged) areas, and 40.9% in Q4 (most disadvantaged). Sociodemographic characteristics varied across quartiles of the Social Vulnerability Index (SVI) (**Table 2**). Black participants were disproportionately represented in the most disadvantaged areas (Q4), with 54.0% of all Black participants residing in Q4 compared to only 7.0% residing in Q1 (least disadvantaged). White participants were more likely to reside in less disadvantaged neighborhoods, with 32.5% living in Q1 and only 24.7% in Q4 (p < 0.001). A greater proportion of female participants lived in the most disadvantaged neighborhoods (Q4) compared to male participants (48.1% vs. 38.4%), though this difference did not reach statistical significance (p = 0.057). There were no statistically significant associations between SVI quartile and age (p = 0.55), recruitment site (p = 0.25), BMI (p = 0.56), or level of social support (p = 0.77).

Social Vulnerability Index and Minutes of MVPA per Week

Median minutes of MVPA per week tended to be lower in more disadvantaged quartiles, although these differences were not statistically significant (p = 0.22). For example, participants in the least disadvantaged quartile (Q1) had a median of 123.20 minutes per week (IQR: 69.49–341.03), compared to 104.00 minutes (IQR: 35.00–200.67) in the most disadvantaged quartile (Q4). In the unadjusted linear regression model, higher social vulnerability was moderately associated with decreased MVPA on the transformed scale (β = -1.77; CI: -3.56, 0.02; p = 0.053) (**Table 3**). However, after adjusting for age, sex assigned at birth, and site, the association was attenuated and no longer statistically significant (β = -1.14 minutes per week; CI: -2.88, 0.61; p = 0.20) (**Table 4**). In the adjusted model, higher age remained strongly

associated with fewer minutes of transformed MVPA per week (β = -0.18; CI: -0.26, -0.09; p < 0.001). Compared to participants at UAB, those at UW had significantly higher minutes per week of MVPA on the transformed scale (β = 2.24; CI: 0.66, 3.82; p = 0.006), while no significant differences were observed between participants at CWRU and UAB.

In the sensitivity analysis adjusting only for age and sex at birth, the association between SVI score and MVPA was similar to that observed after adjusting for age, sex at birth, and site and not statistically significant (p = 0.096).

Social Support and MVPA

In both unadjusted and adjusted models, social support was not significantly associated with minutes of MVPA per week on the transformed scale (**Table 5 and Table 6**). In the unadjusted model, participants with low social support engaged in slightly more minutes of MVPA per week than those with high support, but this relationship was not significant (β = 0.26; CI: -1.44, 1.97; p = 0.76). This association was unchanged after adjusting for age, sex, and site (β = 0.22; CI: -1.41, 1.85; p = 0.79). As observed in the SVI models, increased age was inversely associated with minutes of MVPA per week on the transformed scale and participants at UW reported significantly higher MVPA than those at UAB (p < 0.001).

Social Support and SVI Interaction

There was no evidence of effect modification of SVI by social support in the relationship with MVPA. The interaction term was not statistically significant (p = 0.53).

DISCUSSION

In this population of older PLHIV, we found that higher SVI scores (indicating higher disadvantage) were marginally associated with fewer minutes per week of MVPA in the

unadjusted analyses. Once we adjusted for age, sex assigned at birth, and site, this association was attenuated and no longer statistically significant. No significant relationships were observed between social support and MVPA, and no significant interaction was found between social support and SVI score in the relationship with frequency of MVPA.

Existing literature on the general population supports a link between social vulnerability and PA, thus it was surprising that we did not observe an effect among older PLHIV. For example, Arena et al.[28] reported a significant correlation ($p < .001$) between higher SVI scores and increased physical inactivity. Similarly, An et al.[29] found that individuals living in counties with higher social disadvantage had significantly greater odds of being physically inactive during leisure time compared to those in the least vulnerable quartile—ranging from 7.2% to 18.3% increased odds across SVI quartiles. These studies did not focus specifically on PLHIV and relied on self-reported PA, which may be prone to bias. To our knowledge, this study is among the first to explore the relationship between SVI and objectively measured MVPA in aging PLHIV, highlighting the need for further research in this understudied population characterized by socioeconomic disadvantage and high comorbidity burden.

SVI has been used in studies of PLHIV to examine outcomes ranging from mental health to mortality. Previous research has linked higher SVI to worse HIV care outcomes,[18] higher rates of anxiety, depression, and recent drug use,[30] and older age.[31] One study found no association between SVI and race, whereas in our study, SVI was significantly associated with race. One potential reason for the null finding between SVI and MVPA is that the SVI may not fully capture the structural barriers that are most relevant to PA among older PLHIV. Although SVI is a validated measure of neighborhood-level social vulnerability, it does not directly assess factors such as walkability, access to green space/parks, or perceived neighborhood safety—elements that prior research has shown to be strongly associated with PA levels.[32] A 2022 nationally representative study reported that, compared to those in low-walkability neighborhoods,

individuals in highly walkable neighborhoods had higher odds of meeting the PA guidelines of 150 min/week (OR = 1.48; CI: 1.30, 1.69).[32] These factors were not measured in the PROSPER-HIV study and may play a larger role in shaping PA behavior in this population than the factors included in the SVI measure.

We found no association between social support and MVPA. This finding differs from prior research, which has consistently emphasized the role of social support in affecting PA behavior among PLHIV. A qualitative study by Kitilya et al.[33] identified emotional and physiological social support and social interaction as key facilitators of PA in PLHIV, while a lack of encouragement from family and limited availability of supportive social programs were reported as barriers. Although these findings were among a similar population, they were based on qualitative interviews and did not use standardized, quantitative measures like MAPSS. Similarly, a systematic review concluded that social support is a critical factor in promoting PA among PLHIV, particularly those with low socioeconomic status.[34] However, this review did not include any studies using MAPSS to quantify social support. To our knowledge, this study is among the first to explore the relationship between MAPSS scores and objectively measured MVPA in aging PLHIV, suggesting that researchers could benefit by focusing on using standardized, validated measures of social support in PA research.

The lack of an association between social support and MVPA in our study may reflect limitations in the measurement tool. The MAPSS-SF captures general perceptions of support but may not address the specific types of support most relevant to PA engagement, such as support for transportation, access to social exercise programs, or motivational encouragement from peers or family members.[33] Another limitation of the MAPSS-SF was the binary categorization of social support into “low” or “high”. This may have misclassified individuals with moderate support, limiting our ability to detect meaningful differences between individuals with actual low support vs. moderate social support.

This study had several strengths. PA was measured objectively using the wGT3X-BT ActiGraph accelerometer to quantify minutes per week of MVPA rather than relying on potentially biased self-reports. The use of geocoded SVI data provided a neighborhood-level measure of social disadvantage, allowing for a precise assessment of census-level influences. The study also leveraged a diverse, multi-site cohort of PLHIV, which enhances the generalizability of findings across different geographic and demographic contexts. However, several limitations should be considered. Due to the cross-sectional study design, we are not able to draw any conclusions about the causal influence of social disadvantage or social support on MVPA. Additionally, our study was limited by a smaller sample size than originally anticipated: of the 731 participants in the PROSPER-HIV cohort, only 198 were included in our final analytic sample due to missing geographic data (necessary for SVI calculation), missing PA data, and our focus on individuals aged 50 and older. This resulted in limited statistical power. Due to the small number of participants identifying as races other than Black or White, race categories had to be collapsed for regression analysis. Therefore, our ability to examine subgroup differences was constrained by the variability of data on race. Finally, unmeasured variables such as multimorbidity and chronic pain, both highly prevalent in aging PLHIV populations, were not measured here and may have confounded the observed relationships, potentially obscuring associations between SVI and MVPA or between social support and MVPA.

This study provides an initial evaluation of the relationship between social vulnerability, social support, and objectively measured physical activity among aging PLHIV—a topic that, to our knowledge, has not been previously investigated. Since this was a secondary analysis of data not originally designed to assess these associations, our ability to fully capture the most relevant variables was limited. Future research should prioritize studies intentionally designed to explore these associations, incorporating larger and more diverse samples and using more

targeted measures of both neighborhood-level barriers (walkability, park access) and specific types of social support relevant to PA. These findings lay the foundation for future investigations into the social determinants of PA in aging PLHIV populations and eventually may inform tailored targeted interventions to improve health outcomes in this vulnerable group.

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Table 1: Sociodemographic Characteristics of People with HIV aged Fifty Years and Older, Overall and by Minutes of Moderate to Vigorous Physical Activity (MVPA) per week, PROSPER-HIV Study Baseline Visits, from 2019-2024 (n = 198)

Sociodemographic Characteristics	Overall (n = 198)	MVPA[1]	p-value[2]
	N (%)	Median (IQR)	
Age Category			0.015
50-59	72 (36.4)	133.00 (69.03 - 242.20)	
60-69	106 (53.5)	108.90 (48.15 - 256.16)	
70-79	20 (10.1)	48.55 (19.06 - 110.25)	
Sex			0.055[3]
Female	52 (26.3)	91.00 (36.88 - 174.22)	
Male	146 (73.7)	126.58 (50.65 - 272.59)	
Race[4]			0.65
Another Race or Unknown	6 (3.0)	153.74 (68.78 - 254.22)	
Black	115 (58.1)	110.00 (40.12 - 232.82)	
White	77 (38.9)	107.80 (57.56 - 254.80)	
Ethnicity			0.50[3]
Hispanic or Latino	10 (5.1)	94.00 (55.21 - 130.90)	
Not Hispanic or Latino	187 (94.9)	110.44 (47.62 - 247.40)	
Site			0.030
CWRU (Cleveland, OH)	64 (32.3)	120.14 (45.89 - 235.64)	
UAB (Birmingham, AL)	104 (52.5)	90.92 (46.72 - 186.16)	
UW (Seattle, WA)	30 (15.2)	210.99 (64.06 - 392.29)	
BMI[5] (kg/m^2)			0.17
Underweight (<18.5)	2 (1.0)	28.15 (26.76 - 29.53)	
Healthy Weight (18.5-24.9)	54 (27.3)	89.08 (44.62 - 238.33)	
Overweight (25-29.9)	75 (37.9)	113.56 (49.58 - 277.08)	
Obese (>30)	67 (33.8)	127.17 (54.98 - 213.32)	
SVI Quartile[6]			0.22
Q1 (least disadvantaged)	34 (17.2)	123.20 (69.49 - 341.03)	
Q2	35 (17.7)	141.40 (53.52 - 338.19)	
Q3	48 (24.2)	97.71 (42.88 - 214.33)	
Q4 (most disadvantaged)	81 (40.9)	104.00 (35.00 - 200.67)	
Social Support[7]			0.46[3]
Low	22 (11.8)	163.54 (94.81 - 222.59)	
High	165 (88.2)	107.80 (49.00 - 240.00)	

1 MVPA is characterized as minutes per week spent in moderate-to-vigorous physical activity, as objectively measured by the ActiGraph accelerometer

2 Test for statistically significant differences assessed with a Kruskal-Wallis test unless otherwise indicated

3 Test for statistically significant differences assessed with a Wilcoxon Rank-Sum test

4 For analysis, race categories American Indian or Alaksa Native (n = 1), Asian or Pacific Islander (n = 2), and Unknown (n = 3) were collapsed into Another Race or Unknown

5 BMI refers to Body Mass Index, a measure used to indicate an individual's weight relative to their height

[6] SVI refers to Social Vulnerability Index, a measure created by the Centers for Disease Control (CDC) to quantify social disadvantage at a census-tract level

[7] Social support refers to the levels provided by the Multifactoral Assessment of Perceived Social Support Short Form (MAPSS-SF), a measure created to capture the unique social needs and challenges faced by PLHIV

Table 2: Sociodemographic Characteristics of People with HIV aged Fifty Years and Older, Overall and by Quartile of the Social Vulnerability Index (SVI), PROSPER-HIV Study Baseline Visits, from 2019-2024 (n = 198)

		SVI Quartile[1]				
Sociodemographic Characteristics	**Overall (n = 198)**	**Q1 (n = 34)**	**Q2 (n = 35)**	**Q3 (n = 48)**	**Q4 (n = 81)**	**p-value[2]**
	N (%)	**N (%)**	**N (%)**	**N (%)**	**N (%)**	
Age Category						0.55
50-59	72 (36.4)	15 (20.8)	9 (12.5)	17 (23.6)	31 (43.1)	
60-69	106 (53.5)	17 (16.0)	21 (19.8)	24 (22.6)	44 (41.5)	
70-79	20 (10.1)	2 (10.0)	5 (25.0)	7 (35.0)	6 (30.0)	
Sex						0.057
Female	52 (26.3)	3 (5.8)	9 (17.3)	15 (28.8)	25 (48.1)	
Male	146 (73.7)	31 (21.2)	26 (17.8)	33 (22.6)	56 (38.4)	
Race[3]						< 0.001
Another Race or Unknown	6 (3.0)	1 (16.7)	2 (33.3)	2 (33.3)	1 (16.7)	
Black	115 (58.1)	8 (7.0)	13 (11.3)	33 (28.7)	61 (53.0)	
White	77 (38.9)	25 (32.5)	20 (26.0)	13 (16.9)	19 (24.7)	
Ethnicity						0.71
Hispanic or Latino	10 (5.1)	2 (20.0)	3 (30.0)	2 (20.0)	3 (30.0)	
Not Hispanic or Latino	187 (94.5)	32 (17.1)	32 (17.1)	46 (24.6)	77 (41.2)	
Site						0.25[4]
CWRU (Cleveland, OH)	64 (32.3)	10 (15.6)	11 (17.19)	19 (29.7)	24 (37.5)	
UAB (Birmingham, AL)	104 (52.5)	16 (15.4)	17 (16.3)	21 (20.2)	50 (48.1)	
UW (Seattle, WA)	30 (15.2)	8 (26.7)	7 (23.3)	8 (26.7)	7 (23.3)	
BMI[5] (kg/m^2)						0.56
Underweight (<18.5)	2 (1.0)	0 (0.0)	0 (0.0)	1 (50.0)	1 (50.0)	
Healthy Weight (18.5-24.9)	54 (27.3)	8 (14.8)	10 (18.5)	12 (22.2)	24 (44.4)	
Overweight (25-29.9)	75 (37.9)	16 (21.3)	16 (21.3)	20 (26.7)	23 (30.7)	
Obese (>30)	67 (33.8)	10 (14.9)	9 (13.4)	15 (22.4)	33 (49.3)	
Social Support[6]						0.77
Low	22 (11.8)	4 (18.2)	3 (13.6)	7 (31.8)	8 (36.4)	
High	165 (88.2)	28 (17.0)	32 (19.4)	37 (22.4)	68 (41.2)	

[1] SVI refers to Social Vulnerability Index, a measure created by the Centers for Disease Control (CDC) to quantify social disadvantage at a census-tract level

[2] Test for statistically significant differences assessed with a Fisher's exact test unless otherwise noted

[3] For analysis, race categories American Indian or Alaksa Native (n = 1), Asian or Pacific Islander (n = 2), and Unknown (n = 3) were collapsed into Another Race or Unknown

[4] Test for statistically significant differences assessed with a Chi-squared test

[5] BMI refers to Body Mass Index, a measure used to indicate an individual's weight relative to their height

[6] Social support refers to the levels provided by the Multifactoral Assessment of Perceived Social Support Short Form (MAPSS-SF), a measure created to capture the unique social needs and challenges faced by PLHIV

Table 3: Bivariable Linear Regression Assessing the Association of SVI Score and Box-Cox Transformed MVPA (Minutes/Week)

Variable	β (SE)	95% CI	p-value
Social Vulnerability Index (SVI) Score	-1.77 (0.91)	(-3.56, 0.02)	0.053

Table 4: Multivariable Linear Regression Assessing the Association of SVI Score and Box-Cox Transformed MVPA (Minutes/Week), Adjusted for Age, Sex Assigned at Birth, and Site

Variable	β (SE)	95% CI	p-value
Social Vulnerability Index (SVI) Score	-1.14 (0.88)	(-2.88, 0.61)	0.20
Age (per year)	-0.18 (0.04)	(-0.26, -0.09)	< 0.001
Sex			
Male	Ref	-	
Female	-0.63 (0.61)	(-1.84, 0.57)	0.30
Site			
UAB	Ref	-	
CWRU	0.26 (0.58)	(-0.88, 1.41)	0.65
UW	2.24 (0.80)	(0.66, 3.82)	< 0.01

Table 5: Bivariable Linear Regression Assessing the Association of Social Support measured by the MAPSS-SF and Box-Cox Transformed MVPA (Minutes/Week)

Variable	β (SE)	95% CI	p-value
Social Support Levels			
High	Ref	-	
Low	0.26 (0.86)	(-1.44, 1.97)	0.76

Table 6: Multivariable Linear Regression Assessing the Association of Social Support measured by the MAPSS-SF and Box-Cox Transformed MVPA (Minutes/Week), Adjusted for Age, Sex Assigned at Birth, and Site

Variable	β (SE)	95% CI	p-value
Social Support Levels			
High	Ref	-	
Low	0.22 (0.83)	(-1.41, 1.85)	0.79

Age (per year)	-0.18 (0.04)	(-0.27, -0.10)	< 0.001
Sex			
Male	Ref	-	
Female	-0.71 (0.62)	(-1.94, 0.52)	0.26
Site			
UAB	Ref	-	
CWRU	0.26 (0.60)	(-0.93, 1.44)	0.67
UW	2.06 (0.81)	(0.46, 3.66)	0.012