Research Article

Who Has Active Lifestyles? Sociodemographic and Personality Correlates of Activity Diversity in Two Samples of Adults

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Abstract

Objectives: Activity diversity—an index of active lifestyles that captures variety (number) and evenness (consistency) in activity engagement—is known to support health in adulthood. However, less is known who has higher or lower activity diversity, information that helps identify individuals who may be at greater risk for poor health. This article examined sociodemographic characteristics and Big Five personality traits that may be associated with activity diversity.
Methods: We used 2 independent project samples ($n_{sample1}$ = 2,699; $n_{sample2}$ = 301). Sample 1 included U.S. national adults in a wide age range (25–84). Sample 2 included U.S. community-dwelling older adults (age = 65–89). Each study asked about different types of activity engagement using surveys. The activity diversity index was calculated in each sample, using Shannon's entropy method.
Results: In Sample 1, older adults, women, non-Hispanic White individuals, married/partnered individuals, and those with higher education and fewer functional limitations had higher activity diversity. Additionally, higher conscientiousness, higher extraversion, and lower neuroticism were each associated with higher activity diversity after controlling for sociodemographic factors. Extraversion and neuroticism remained significant in the younger group (age < 65) of Sample 1, but only extraversion was a significant factor associated with activity diversity in the older group (age ≥ 65). The results in the older group were generally replicated in Sample 2, such that higher extraversion in older adults was consistently associated with higher activity diversity independent of the strong correlates of sex, education, and functional limitations.
Discussion: Findings were discussed in terms of age-specific associations between sociodemographic and personality characteristics and activity diversity.

Keywords: Activity variety, Daily Experiences and Well-being Study, Midlife in the United States Study, Personality, Sociodemographic determinants

Individuals with active lifestyles are generally happier and healthier than their less active peers. An active lifestyle—engaging in a matrix of diverse daily activities—provides individuals with cognitive stimulation, more physical activity, and greater social embeddedness in society (Beadle, 2019; Chan et al., 2019; Cohen et al., 2000; Fingerman

et al., 2020; Molesworth et al., 2015; Moored et al., 2020). Studies have focused on whether active lifestyles are associated with health outcomes (Bielak et al., 2019; Carlson et al., 2012; Lee et al., 2018, 2021), but less so on determining who is more likely to engage in active lifestyles. Sociodemographic characteristics and personality traits (i.e., the Big Five) may provide some insight, as they characterize individual patterns of health behaviors (Daw et al., 2017; Laaksonen et al., 2003; McCrae & Costa, 2003).

Lifestyle Activities and Health

Early studies of activity engagement often focused on specific activities (e.g., volunteering) as a proxy measure of active lifestyles (e.g., Musick et al., 1999). Yet, high engagement in one activity domain may not necessarily mean an active and integrated lifestyle that promotes health. Recent studies emphasize the role of activity diversity—engaging in a variety of activities in daily life—in predicting health. Activity diversity simultaneously assesses two key features of an active lifestyle—variety (i.e., greater number of different types) and evenness (i.e., consistency or less polarization in frequency) in daily activity engagement within an individual (Lee et al., 2018). Activity diversity has predictive validity for health, as it has been associated with better psychological well-being, higher cognitive functioning, larger hippocampal volume, and richer and balanced emotional experiences, beyond total activity frequency (Bielak et al., 2019; Carlson et al., 2012; Jeon et al., 2022; Lee et al., 2018, 2021, 2022; Urban-Wojcik et al., 2022).

Sociodemographic Characteristics and Possible Links to Active Lifestyles

The literature on sociodemographic determinants of health suggests that engaging in unhealthy behaviors is more common in certain demographic groups. For example, younger age, less education, and unpartnered status are associated with a higher likelihood of engaging in unhealthy behaviors, such as smoking, frequent alcohol use, physical inactivity, and poor diet (Laaksonen et al., 2003). Being male is associated with less healthy trajectories of smoking, binge drinking, obesity, and sedentary behaviors (Daw et al., 2017). Moreover, compared to White individuals, racial minorities have higher rates of obesity and sedentary behavior (Nguyen et al., 2014). There are also social disparities in health, such that lower socioeconomic (SES) position is associated with poorer health across an array of health outcomes (Mackenbach et al., 2008). Poor health and functional limitations, in turn, can be barriers to engaging in a diversity of daily activities (Shandra, 2018). All these suggest possible links between sociodemographic characteristics and activity diversity.

Given these sociodemographic differences in health behaviors, we examine differences in activity diversity by age, sex, race, married/partnered status, education (a proxy of SES), and functional limitations. Although lack of research on this topic limits our ability to formulate specific hypotheses, our general expectation is that women, non-Hispanic White individuals, married/partnered individuals, those with higher education, and those with fewer functional limitations have higher activity diversity. In terms of age, it may be possible that activity diversity decreases with age; older adults tend to reduce their social networks to maximize their emotional well-being (Carstensen et al., 2003), and experience high levels of chronic health problems and functional limitations that may impede activity engagement. Yet, with the exception of one study examining the variety of activity in daily life (Jeon et al., 2022), it is unclear whether this phenomenon is similar for engagement in voluntary daily activities. A recent perspective suggests that today's older adults are often acting younger and feeling younger than those in earlier cohorts (Gerstorf et al., 2020). Younger adults may also have less time for voluntary or leisure activities due to high demands from work and family (Bennett et al., 2017). These competing perspectives motivate us to carefully explore the role of age in activity diversity.

Personality and Possible Links to Active Lifestyles

Buss and Craik (1983) suggested that the fundamental goal of personality theories is to describe individuals' actions and behaviors in daily life, yet relatively few studies have linked personality to daily life. In one notable study, Mehl et al. (2006) found that the Big Five personality traits (arguably the most widely studied personality traits studied in relation to health outcomes) are manifested in daily activities. Specifically, openness to experience is associated with spending more time in restaurants, bars, or coffee shops, whereas conscientiousness is associated with spending more time in public places outside the home (other than restaurants, bars, or coffee shops). Extraverted individuals engage in more conversations and spend less time alone, and agreeable individuals tend towards behaviors that benefit others (doing chores and less time spent in self-development activities like studying/reading). Neuroticism is associated with more time spent arguing. Another study based on a German panel reports that higher extraversion is positively associated with time in social activities, and higher openness to experience is negatively associated with watching TV (Rohrer & Lucas, 2018).

These studies link personality traits to specific daily activities, but not how personality traits may be related to the diversity of activities that people experience. This is an important gap in the literature because daily activities often do not occur in isolation, and recent studies have found that engagement across a variety of different activities may be more important for health (e.g., Jeon et al., 2022; Lee et al., 2018; Lee et al., 2021). To the best of our knowledge, only one study shows a positive association between openness to experience and activity diversity (Jackson et al., 2020).

Given that activity diversity is a concept related to health, studies on personality and health may give us additional insight. Among the Big Five, higher levels of conscientious and extraversion and lower neuroticism are especially strong predictors of positive outcomes of health and well-being (Atherton et al., 2014; Leger et al., 2016, 2021; Steel et al., 2008). Agreeableness, however, has smaller and less consistent associations with health-promoting activities (Atherton et al., 2014; Hakulinen et al., 2015; Turiano et al., 2012). Overall, these studies suggest that higher conscientiousness, higher extraversion, higher openness to experience, and lower neuroticism may be related to greater diversity in daily activities.

Present Study

The current study examined sociodemographic and personality correlates of activity diversity in two samples of U.S. adults to test the validity and replicability of the associations across samples and across age groups. Based on previous research, we expected that women, non-Hispanic White individuals, married/partnered individuals, those with higher education, and those with fewer functional limitations would have higher activity diversity. We explored differences in activity diversity by age and carefully examined the associations of other sociodemographic characteristics with activity diversity between younger (age < 65) and older adults (age ≥ 65). Independent of these sociodemographic differences, we also expected that those with higher conscientiousness, higher extraversion, higher openness to experience, and lower neuroticism would have higher activity diversity.

Method

Participants and Procedure

We used samples from the Midlife in the United States Study (MIDUS) and Daily Experiences and Well-being Study (DEWS) for the current investigation. See Ryff and Krueger (2018) for comprehensive details of the MIDUS design and sample and Fingerman et al. (2020) for details of the DEWS design and sample.

MIDUS participants included people who completed the 8-day diary substudy of MIDUS, or the National Study of Daily Experiences (NSDE), after they had completed either the MIDUS II survey (M2; collected between 2004 and 2009) or the MIDUS Refresher (MR; collected between 2012 and 2016), yielding 2,022 from M2 and 782 from MR. The main survey consisted of a 30-min phone interview and self-administered questionnaire (SAQ). As questions on personality were included in the SAQ, we restricted our sample to those who completed the SAQ of the main survey and NSDE. After combining the M2 and MR, n = 2,736 had completed both SAQ and NSDE. After further excluding those with missing data in

daily activities (n = 1) and all the Big 5 personality traits (n = 36), 2,699 had full data in our main study variables. The percentage of incompleteness was small (<2%), so we used those with full data in the analyses without imputing missing data (Bennett, 2001). To account for potential differences between M2 and MR, we controlled for the subsample identifier in our main analyses. The MIDUS studies were approved by the University of Wisconsin–Madison Institutional Review Board (IRB). Written informed consent was received for all MIDUS participants. The current study was exempt from an IRB review due to our use of publicly available, deidentifiable data.

The DEWS sample (n = 333) was collected between 2016 and 2017 and included community-dwelling older adults aged 65 or older. All participants were invited to a global survey that included questions on personality and 313 participants also engaged in 5–6 day ecological momentary assessments (EMA). EMA included questions on daily activities every 3 hours throughout the day and included at least two weekends and two weekdays. After excluding those with missing data in daily activities (n = 25) and all the Big 5 personality traits (n = 7), 301 had full data in our main study variables. As the percentage of incompleteness was less than 10%, we used those with full data in the analyses without imputing missing data (Bennett, 2001). The DEWS study protocol was approved by the UT Austin Institutional Review Board (IRB). Written informed consent was received from all DEWS participants.

Our G*Power analysis showed that a minimum sample size of n = 123 is needed to achieve 80% power at α = 0.05 with 11 predictors in linear regression when the effect size of the predictors is assumed to be medium (f^2 = 0.15). The size of each sample met this minimum sample size requirement.

Measures

Predictors: Sociodemographic characteristics and personality traits

Basic sociodemographic characteristics known to be related to health (Daw et al., 2017; Laaksonen et al., 2003; Mackenbach et al., 2008; Nguyen et al., 2014) were assessed in both samples. These included age (in years), sex (0 = female, 1 = male), race/ethnicity (0 = Person of Color, 1 = non-Hispanic White), marital status (0 = unmarried, 1 = married/partnered), and education level (1 = no school to 12 = PhD or other professional degree in MIDUS; 1 = no formal education to 8 = advanced degree in DEWS). We also considered functional limitations given its potential influence on the extent of activity engagement. Participants indicated the extent to which their health limited their ability to do each of the following ten tasks: bathing or dressing; walking one block; climbing one flight of stairs; lifting or carrying groceries; climbing several flights of stairs; bending, kneeling, or stooping; walking more than a mile; walking several blocks; engaging in moderate activity;

and engaging in vigorous activity. Responses were coded on a four-point scale (1 = a lot to 4 = not at all), and scores were reverse-coded and averaged across each of the 10 items, with higher scores indicating more functional limitations. Internal consistencies for these items were high in MIDUS (α = 0.95) as well as in DEWS (α = 0.94).

Both the MIDUS and DEWS studies assessed the Big 5 personality traits—openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism from personality items constructed for the MIDUS survey (see Turiano et al., 2011, 2013 for a description of these measures). Participants responded how much each of the following adjectives described themselves: creative, imaginative, intelligent, curious, broad-minded, sophisticated, adventurous (openness to experience); responsible, hardworking, organized, thorough, and careless (reverse coded; conscientiousness); outgoing, friendly, lively, active, and talkative (extraversion), helpful, warm, caring, softhearted, sympathetic (agreeableness), and moody, worrying, nervous, and calm (reserve coded; neuroticism). In MIDUS, all personality trait scores ranged from 1 (not at all) to 4 (a lot). In DEWS, openness and agreeableness scores ranged from 1 to 4, but conscientiousness, extraversion, and neuroticism scores ranged from 1 (not at all) to 5 (a great deal). The mean was calculated from the adjectives for each trait in each sample, with higher scores indicating

higher the trait. Internal consistencies for these items were high (α = 0.69 to 0.77) in both samples.

Outcome: Activity diversity

We selected daily activities that may be related to active lifestyles. This resulted in omitting routine self-care, passive, and work and caregiving-related activities. Table 1 shows the total list of daily activities measured and a subset of selected activities used in the calculation of activity diversity in each sample. In MIDUS, during each of the eight daily interviews, individuals reported daily activities, answering, "Since this time yesterday, how much time did you spend _____," with the hours and minutes they spent in daily activities. In DEWS, a list of daily activities was measured every 3 hours throughout the day. In MIDUS, broader types of five activities—doing chores, leisure activities, physical activities, formal volunteering, and giving informal help to people who do not live with the respondents (e.g., friends, neighbor, parent, other relatives, etc.)—were used. In DEWS, 10 more specific activities—reading/puzzles/music, visiting with someone, doing chores, using a computer or electronics, physical exercise, formal volunteering, shopping or errands, religious activities, driving vehicle, and riding a vehicle—were used. Using different activities between the two samples was not a concern, because our measure of activity diversity captured the

Table 1. All Daily Activities Measured in Each Project Data Set and Activities Used in the Calculation of Activity Diversity

Sample 1: MIDUS	Sample 2: DEWS
During each of the eight nightly interviews, participants reported how much time they spent in the following activities on that day:	Every 3 hours throughout each day during 5–6 days, participants reported whether they engaged in the following activities or not:
Sleeping	Sleeping
	Bathing/dressing/self-care
	Eating
Doing chores	**Doing chores**
Leisure activities	**Using computer or electronics**
	Reading/puzzles/music
Physical activities	**Physical exercise**
	Driving vehicle
	Riding a vehicle
Formal volunteering	**Formal volunteering**
Giving informal help	**Visiting someone**
	Shopping or errands
	Religious activities
Receiving informal help	
Exchanging emotional support	
Watching television	Watching television
	Medical appointment
Paid work	
Time with children	
Providing disability assistance	

Notes: DEWS = Daily Experiences and Well-being Study; MIDUS = Midlife in the United States Study. Gray-shaded areas indicate activities that are commonly measured across the two samples. Bolded text indicates activities used in the calculation of activity diversity in each sample. In MIDUS, broader types of five activities were used. In DEWS, 10 activities were used.

variety and evenness of engagement across different activities, rather than levels of engagement in specific activities.

To gauge whether individuals had (=1) or had not (= 0) participated in an activity on a given day, times were converted to a set of binary variables. After this, the number (i.e., variety) and proportion (i.e., evenness) of each binary variable across all days were calculated and then used to measure *activity diversity*, calculated as Shannon's (1948) entropy (Lee et al., 2018, 2021, 2022)

$$\text{Activity Diversity}_i = -\left(\frac{1}{\ln(m)}\right) \sum_{j=1}^{m} p_{ij}\ln p_{ij}$$

where m = 5 or 10 is the number of activity types, and p_{ij} is the proportion of individual i's engagement of each activity type to their total activity engagement, j = 1 to m across days. Shannon's (1948) entropy binds variety ($\sum_{j=1}^{m} i$) and evenness (p_i) together in a single equation, although deriving evenness from the equation is not as obvious as deriving variety (i.e., sum of engaged activities). As someone with uneven activity engagement may have greater variability across p_{ij}, the intra-individual standard deviation (iSD) of p_{ij} can be used as a proxy for unevenness. The ln-transformation of p_{ij} narrows the range and impact of extreme values. The original entropy score ($-\sum_{j=1}^{m} p_{ij}\ln p_{ij}$) was multiplied by $1/\ln(m)$ to have the same metric (0 to 100) for both of the samples; note that this metric has a perfect correlation ($r = 1$) with the original entropy score, thus does not change our inference. Activity diversity scores (transformed to %) could range from 0 (no diversity) to 100 (complete diversity). Figure 1 shows examples of low and high activity diversity in each sample. Although the two samples used different activities, high activity diversity examples in both samples showed that daily activities were spread evenly across all the given categories, whereas low activity diversity examples showed polarized engagement in limited categories.

Statistical Analysis

Following the calculation of descriptive statistics and correlations, we used several General Linear Models (PROC GLM) in SAS version 9.4 to determine whether sociodemographic characteristics and personality traits are associated with activity diversity. In Model 1, sociodemographic characteristics were entered as predictors of activity diversity. In Model 2, each of the Big Five personality traits were added in separate models after controlling for sociodemographic characteristics. This approach was used to fully describe the association of each personality trait with activity diversity by avoiding potential multicollinearity between the traits. Analyses were conducted separately in each sample. Additionally, we conducted age-stratified analyses (age < 65, age ≥ 65) in MIDUS. To adjust for multiple statistical tests, the Benjamini–Hochberg procedure was used (Benjamini & Hochberg, 1995). Using a false discovery rate of 0.05, a critical p value was computed. Thus, associations with $p ≤ .045$ were considered statistically significant.
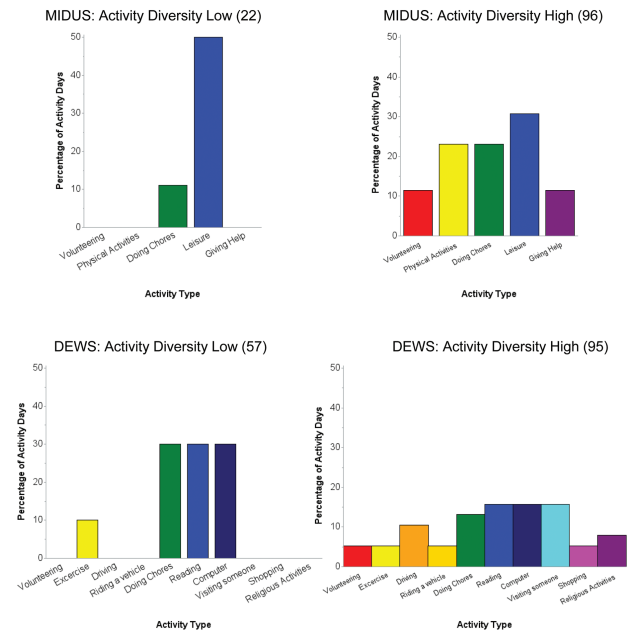

Figure 1. Examples of low and high activity diversity in each sample. DEWS = Daily Experiences and Well-being Study; MIDUS = Midlife in the United States Study.

Results

Descriptive Statistics

Table 2 shows the characteristics of the MIDUS and DEWS samples. MIDUS participants (n = 2,699; 43% men) ranged in age from 25 to 84 (M = 53.89, SD = 12.89). Eighty-three percent were non-Hispanic White, 2% were Hispanic White, 10% were Black, and 5% were Asian or other races. The majority (72%) were married or cohabiting. The sample average level of education corresponded to some college/vocation or trade school (M = 7.48 on a 12-level scale, SD = 2.52). The mean level of functional limitations was 1.54 (SD = .73). DEWS participants (n = 301; 45% men) ranged in age from 65 to 89 (M = 73.80, SD = 6.31). Seventy-one percent were non-Hispanic White, 12% were Hispanic White, 14% were Black, and 3% were Asian or other races. More than half (59%) were married or cohabiting. On average, they had some college/vocation or trade school education (M = 5.96 on an eight-level scale, SD = 1.55). The mean level of functional limitations was 1.82 (SD = 0.90). Compared to DEWS participants, MIDUS older adults (age ≥ 65) were more likely to be non-Hispanic White and married/partnered and had lower neuroticism. Although activity diversity cannot be directly compared between the samples due to differences in the number and types of activities, the average level for DEWS was higher than that for MIDUS (78.75 vs 67.70, on the same 0–100 scale). This difference might have been attributed to greater possible variety in DEWS (10) than in MIDUS (5), as Shannon (1948)'s diversity index puts more weight on variety than on evenness. Personality traits were correlated with each other (Table 3). The strongest correlations included those between extraversion and agreeableness (rs = 0.51 in MIDUS and 0.36 in DEWS, ps < .001) and

Table 2. Characteristics of the Two Samples

	Sample 1: MIDUS			Sample 2: DEWS
	All 25 ≤ Age ≤ 84 (*n* = 2,699)	Younger adults Age < 65 (*n* = 2,085)	Older adults Age ≥ 65 (*n* = 614)	All Age ≥ 65 (*n* = 301)
	M (*SD*) or %	*M* (*SD*) or %	*M* (*SD*) or %	*M* (*SD*) or %
Demographic and health covariates				
Age	53.89 (12.89)	48.80 (9.37)	71.54 (5.14)	73.80 (6.31)
Sex				
Male	43%	43%	42%	45%
Female	57%	57%	58%	55%
Race				
Non-Hispanic White	83%	81.6%	88%	71%
Hispanic White	2%	1.9%	2%	12%
Black	10%	10.6%	7%	14%
Asian	0.5%	0.6%	0%	1%
All other races	4.5%	5.3%	3%	2%
Marital/partnered status				
Married/partnered	72%	73%	67%	59%
Unpartnered	28%	27%	33%	41%
Education[a]	7.48 (2.52)	7.62 (2.48)	7.01 (2.60)	5.96 (1.55)
Did not graduate high school	7%	6%	10%	5%
High school degree	21%	19%	26%	9%
Some college/Vocation or trade school	30%	31%	29%	28%
College degree	21%	22%	17%	24%
>Bachelor's degree	21%	22%	18%	34%
Functional limitations	1.54 (0.73)	1.48 (0.72)	1.76 (0.74)	1.82 (0.90)
Main variables				
Personality[b]				
Openness (O)	2.93 (0.53)	2.93 (0.53)	2.93 (0.52)	3.08 (0.48)
Conscientiousness (C)	3.37 (0.46)	3.37 (0.46)	3.37 (0.47)	4.05 (0.57)
Extraversion (E)	3.12 (0.58)	3.10 (0.59)	3.18 (0.54)	3.68 (0.80)
Agreeableness (A)	3.43 (0.50)	3.40 (0.51)	3.51 (0.45)	3.46 (0.47)
Neuroticism (N)	2.07 (0.65)	2.13 (0.66)	1.89 (0.57)	2.41 (0.67)
Activity diversity (0–100)	67.70 (16.51)	67.42 (16.10)	68.65 (17.83)	78.75 (12.31)

Notes: DEWS = Daily Experiences and Well-being Study; *M*, mean; MIDUS = Midlife in the United States Study; *SD* = standard deviation.

[a]Education was coded on a 12-point scale in MIDUS (1 = no school to 12 = PhD or other professional degree) and on an eight-point scale in DEWS (1 = no school to 8 = advanced degree). The mean value of education in each sample corresponded to some college/vocation or trade school education.

[b]In MIDUS, all personality trait scores ranged from 1 (not at all) to 4 (a lot). In DEWS, O and A scores ranged from 1 to 4, but C, E, and N scores ranged from 1 (not at all) to 5 (a great deal). For both samples, higher scores indicated higher the trait.

between extraversion and openness (*r*s = 0.50 in MIDUS and 0.33 in DEWS, *p*s < .001).

Associations of Sociodemographics and Personality With Activity Diversity

Table 4 shows the results of general linear models examining the associations of sociodemographic characteristics and the Big Five personality traits with activity diversity. In the full sample of MIDUS (Model 1), older adults, women, non-Hispanic White individuals, married/partnered individuals, and those with higher education and fewer functional limitations had higher activity diversity. Additionally, in Model 2, higher conscientiousness, higher extraversion, and lower neuroticism were each associated with higher activity diversity after controlling for sociodemographic characteristics. While extraversion and neuroticism remained significant in the younger group (age < 65) of the MIDUS, only extraversion was a significant personality trait in the older group (age ≥ 65). The results in the older group of MIDUS were replicated in DEWS sample, such that higher extraversion in older adults was consistently associated with higher activity diversity independent of sociodemographic characteristics. Across these two samples, female, married/partnered status, higher education, fewer functional limitations, and higher extraversion were significant correlates of higher activity diversity. In older adults only (age ≥ 65), female, higher education, fewer functional limitations, and higher extraversion were significant correlates of higher activity diversity.

Table 3. Correlations Among the Variables in MIDUS and DEWS

	1	2	3	4	5	6	7	8	9	10	11	12
1. Age		0.02	**0.13**	**−0.21**	−0.03	**0.16**	**−0.16**	−0.09	−0.10	−0.04	**−0.11**	−0.09
2. Sex, male (vs female)	0.01		−0.07	**0.41**	**0.19**	−0.07	**0.15**	0.00	0.05	**−0.24**	0.03	−0.09
3. Race, White (vs non-White)	**0.07**	0.06		0.05	**0.21**	−0.10	**−0.17**	0.05	−0.09	**−0.14**	0.01	0.11
4. Partnered (vs unpartnered)	−0.07	**0.17**	**0.20**		**0.13**	−0.05	**0.11**	−0.01	0.04	**−0.13**	**0.15**	**0.13**
5. Educational level	**−0.14**	**0.11**	**0.12**	**0.10**		−0.11	**0.19**	**0.13**	0.01	−0.06	−0.09	**0.18**
6. Functional limitations	**0.24**	**−0.16**	**−0.09**	**−0.18**	**−0.27**		−0.09	**−0.18**	**−0.18**	0.05	**0.13**	**−0.17**
7. Openness	0.02	0.07	−0.05	−0.05	**0.18**	−0.10		**0.28**	**0.33**	**0.26**	**−0.15**	0.02
8. Conscientiousness	0.01	−0.10	0.04	0.05	0.06	**−0.16**	**0.31**		**0.31**	**0.18**	**−0.23**	0.02
9. Extraversion	**0.08**	−0.08	−0.06	−0.02	−0.05	−0.09	**0.50**	**0.28**		**0.36**	**−0.14**	**0.14**
10. Agreeableness	**0.13**	**−0.27**	−0.01	−0.03	−0.09	0.05	**0.33**	**0.29**	**0.51**		−0.10	0.09
11. Neuroticism	**−0.21**	**−0.12**	−0.01	−0.05	−0.10	**0.18**	**−0.22**	**−0.21**	**−0.23**	**−0.15**		0.07
12. Activity diversity	0.04	**−0.10**	0.09	0.07	**0.13**	**−0.16**	0.03	0.09	0.11	0.04	−0.09	

Notes: Numbers below diagonal indicate correlation coefficients for MIDUS sample (*n* = 2,699). Numbers above diagonal indicate correlation coefficients for DEWS sample (*n* = 301). Bolded numbers indicate significant correlations at *p* < .05. DEWS = Daily Experiences and Well-being Study; MIDUS = Midlife in the United States Study.

Table 4. Results of General Linear Models Predicting Activity Diversity in Two Project Samples of Adults

	Activity diversity											
	Sample 1: MIDUS									Sample 2: DEWS		
	All 25 ≤ Age ≤ 84 (*n* = 2,699)			Younger adults Age < 65 (*n* = 2,085)			Older adults Age ≥ 65 (*n* = 614)			All Age ≥ 65 (*n* = 301)		
	B	*SE*	*p* Value	*B*	*SE*	*p* Value	*B*	*SE*	*p* Value	*B*	*SE*	*p* Value
Model 1: Sociodemographic characteristics												
Intercept	66.37	0.92	<.001	65.80	1.01	<.001	72.46	3.34	<.001	75.13	2.21	<.001
Age	**0.12**	0.03	**<.001**	**0.13**	0.04	**<.001**	−0.12	0.14	.411	−0.05	0.13	.686
Sex, male (vs female)	**−5.03**	0.64	**<.001**	**−4.09**	0.71	**<.001**	**−7.94**	1.51	**<.001**	**−3.99**	1.73	.022
Race, White (vs non-White)	**2.82**	0.88	**.001**	**2.50**	0.95	**.009**	3.77	2.29	.100	2.57	2.16	.235
Partnered (vs unpartnered)	**1.69**	0.72	.018	**2.47**	0.81	**.002**	0.01	1.57	.996	**4.27**	**1.76**	.016
Educational level	**0.65**	0.13	**<.001**	**0.58**	0.15	**<.001**	**0.97**	0.28	**<.001**	**1.38**	0.51	**.008**
Functional limitations	**−3.64**	0.46	**<.001**	**−3.17**	0.52	**<.001**	**−4.93**	0.97	**<.001**	**−2.56**	0.85	**.003**
Refresher (MIDUS only covariate)	−0.30	0.72	.676	−0.28	0.78	.714	−0.82	1.90	.665	—	—	—
Model 2: Adding each of the Big 5 personality traits in five separated models												
Openness	0.37	0.59	.529	0.75	0.66	.257	−1.85	1.38	.178	−0.49	1.49	.741
Conscientiousness	**1.45**	0.68	.034	1.39	0.77	.070	1.31	1.52	.388	−0.91	1.37	.504
Extraversion	**2.44**	0.54	**<.001**	**2.29**	0.59	**<.001**	**2.64**	1.32	**.045**	**2.02**	0.96	**.037**
Agreeableness	0.28	0.64	.664	0.87	0.70	.213	−1.88	1.57	.231	2.53	1.50	.092
Neuroticism	**−1.23**	0.51	.015	**−1.15**	0.55	.036	−1.16	1.25	.354	1.09	1.16	.348

Notes: Two thousand six hundred seventy-eight observations in MIDUS (2,070 in younger adults and 608 in older adults) were used in the final analyses due to missingness in sociodemographic characteristics. All 301 observations were used in DEWS. Significant associations (at adjusted *p* ≤ .045) are bolded. Gray-shaded areas show results consistent between the two project samples. *B*, beta; DEWS = Daily Experiences and Well-being Study; MIDUS = Midlife in the United States Study; *SE* = standard error.

Supplemental Analyses

We conducted a series of sensitivity analyses. First, we included all of the Big Five personality traits simultaneously in one model that controlled for sociodemographic characteristics and compared changes in parameters. The associations of extraversion and sociodemographic characteristics with activity diversity found in the previous models remained consistent for both samples (Supplementary Table 1). In this model, the associations of openness and agreeableness became significant in MIDUS. Yet, the direction of the associations was contrary to our hypothesis, reflecting possible collinearity between the traits.

Second, given that more personality traits were associated with activity diversity in the MIDUS sample that were younger than the DEWS sample, we carefully examined the role of age in MIDUS. There were age-related patterns in personality, such that conscientiousness was highest around middle age and lower in younger and older ages. Extraversion and agreeableness increased, and neuroticism decreased with age (Supplementary Figure 1). There was no age-related difference in openness to experience. We also tested interactions between age and each personality trait in MIDUS in these models, but none were significant (Supplementary Table 5).

Finally, applying parsimony principle of Ockham's razor (also spelled "Occam's razor"; Jefferys & Berger, 1992), we explored whether one component of the activity diversity metric (i.e., variety or evenness) can just as efficiently replicate the associations of activity diversity with personality traits. Results showed that variety alone was associated with extraversion in both samples, although this association was not replicated in the MIDUS older adult subsample (Supplementary Tables 2 and 3). We further explored whether the observed associations of personality traits with activity diversity were driven by total activity frequency (i.e., each participant's mean of daily time spent in all the given activities). In both MIDUS and DEWS, those with higher conscientiousness reported they spent more time in the assessed daily activities overall (Supplementary Table 4).

Discussion

This study provides novel insight into who is more likely to engage in active and diverse lifestyles. Across age groups, there were common sociodemographic and personality correlates of activity diversity. One of the main strengths of this study is the replication between two independent samples of U.S. adults, showing the validity and reproducibility of the findings. Our calculation of the activity diversity index allowed us to compare the patterns of findings from both samples despite differences in the logged activities between the samples. Summarizing results across two independent samples when matched on age, women, those with higher education, fewer functional limitations, and higher extraversion appeared to have higher activity diversity. Overall, findings from the current study contribute to the literature

on active lifestyles by identifying specific sociodemographic and personality factors that may be more vulnerable to restricted lifestyles and poor health.

Building on the literature on sociodemographic determinants of health (Daw et al., 2017; Laaksonen et al., 2003; Mackenbach et al., 2008; Nguyen et al., 2014), we found that older adults, women, non-Hispanic White individuals, married/partnered individuals, and those with higher education and fewer functional limitations have higher activity diversity in the MIDUS sample. Yet, not all associations (with age and race/ethnicity) were replicated in the regional sample of DEWS older adults. When examining only the older adults (over 65) in MIDUS, results were similar to those from the DEWS older adult sample. Those who were women, highly educated, and less functionally impaired were more likely to engage in a broader and more even range of daily activities. This information could be used as selecting target groups for future activity interventions. There is evidence that activity interventions (e.g., Experience Corps®) can improve cognitive and physical functions in older adults (Carlson et al., 2008; Varma et al., 2016). Previous observational studies have also found the strong associations of activity diversity with better psychological well-being, higher cognitive functioning, healthier brain, and more rich and balanced emotions (Bielak et al., 2019; Jeon et al., 2022; (Lee et al., 2018; 2021; 2022); Urban-Wojcik et al., 2022). Together, our findings suggest that targeting adults who are men, have lower education, and start experiencing functional limitations, and helping them engage in more diverse activities may have the potential to promote their health and well-being.

Based on the personality literature (Atherton et al., 2014; Jackson et al., 2020; Leger et al., 2016; Mehl et al., 2006; Rohrer & Lucas, 2018; Steel et al., 2008), we had expected that adults with higher conscientiousness, higher extraversion, higher openness to experience, and lower neuroticism would have higher activity diversity. We found significant associations of conscientiousness, extraversion, and neuroticism—but not openness to experience—with activity diversity when examining the entire MIDUS sample. Overall, the links between personality traits and activity diversity may exist because people often engage in behaviors that correspond to their needs and preferences (e.g., "niche picking"; Bowes et al., 2018). The personality characteristics associated with activity diversity—higher levels of conscientiousness and extraversion and lower neuroticism—may indicate more proneness to active and healthier lifestyles. For example, higher conscientiousness may relate to deliberately choosing daily activities and better organization and planning, which allows people to attend a greater number of activities in their day. Not surprisingly, those with higher neuroticism engaged in less diverse daily activities, and this may relate to their tendency to have stronger emotional responses to interpersonal experiences and to rely on close (and narrower) relationships to regulate their emotions (Zhaoyang et al., 2022). In addition, higher levels of neuroticism are also related to

higher levels of self-consciousness, feelings of vulnerability, and higher levels of anxiety, and these factors may also decrease the likelihood of engaging in diverse daily activities.

Across the two samples, only higher extraversion was consistently associated with greater diversity in daily activities. With age-related increases in extraversion along with decreases in other personality traits important for health (e.g., conscientiousness and neuroticism; Supplementary Figure 1), the role of extraversion in active lifestyles might be more important in older ages. It is worth noting, however, that the association between extraversion and activity diversity was also found in the younger group (age < 65) and after adjusting for age, sex, marital status, race, education, and functional limitations. Thus, extraversion may be an important personality trait for activity diversity, across age groups and independent of sociodemographic differences. Some may argue that this association may be potentially due to extraverted individuals being more social and engaging in more conversations (Mehl et al., 2006; Rohrer & Lucas, 2018) and thus perhaps spending more time in any activities. Our supplemental analyses ruled out this speculation, as extraversion was not associated with more time spent in the activities in either sample as a whole (Supplementary Table 4). Unlike Jackson et al. (2020), who found a significant association between openness to experience and activity diversity, this link was not supported in either sample in our study. Jackson et al. (2020) used 25 activities that may elicit cognitive stimulation (e.g., finances, lectures, artistic, puzzle, card games, and board games), whereas we used common daily activities that may be more frequently occurred in day-to-day lives (see Table 1). Future studies may want to examine how diversity in different activities (e.g., cognitive, social, and physical) relate to openness to experience and other personality traits.

Overall, our findings add to the literature by showing how an active lifestyle relates to sociodemographic characteristics and personality traits. Moving beyond examining individual daily activities (Mehl et al., 2006; Rohrer & Lucas, 2018), we examined activity diversity which takes into consideration the co-occurrences nature of daily activities (more realistic in real life) through combines two key features of an active lifestyle—variety and evenness. We found that activity diversity was associated with a fairly consistent set of sociodemographics and personality traits across the two different samples of adults, showing the validity and replicability of our findings. Our supplemental analyses showed that the observed associations with personality traits were mostly driven by variety rather than by evenness (Supplementary Tables 2 and 3). This may suggest that personality traits could be used to identify who is more likely to have a restricted lifestyle (i.e., less variety). The weaker associations between personality and evenness may mean that balanced activity engagement may be more related to external factors (e.g., stressors, responsibilities, and neighborhood environment) rather than internal traits like personality. Future studies could examine factors associated with the evenness component of activity diversity.

The study's strengths, including replication across the two independent samples and the use of an advanced measure of activity diversity, must be considered along with its limitations. First, our cross-sectional design prevented us from assessing the directionality between sociodemographic characteristics and personality and activity diversity. Future analyses need to include longitudinal data to test bidirectional or reverse associations. Second, the list of daily activities assessed in each sample could be expanded or enriched to capture more daily activities. Especially, only five broader types of daily activities were used in MIDUS, which might not capture diversity within an activity category. Future studies could measure a more extensive list of daily activities, including virtual (online) activities and different types of activities within one category (e.g., different types of volunteer activities). Finally, both the MIDUS and DEWS samples were primarily White, thus not sufficiently powered to examine potential differences by race. Future research needs to replicate the findings among more racially diverse samples and test differences by race/ethnicity status.

Conclusion

This study provides insights into the types of adults who are more likely to engage in diverse and active lifestyles. Among the sociodemographic characteristics and personality traits we examined, female, higher education, fewer functional limitations, and higher extraversion were significant correlates of higher activity diversity, especially among older adults. These factors may help identify who is at greater risk for restricted lifestyles with fewer activities. Some of these factors may be modifiable (e.g., extraversion and functional limitations), offering important information for future interventions. Promoting activity diversity among adults of all ages may help improve their health and well-being, as lower activity diversity is an early risk factor for psychological, physical, and cognitive morbidities.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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