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Leisure activities are associated with physical and mental health

Casey K. Brown [a,*], Dana A. Glei [b], Chioun Lee [c], Maxine Weinstein [b]

[a] Department of Psychology, Georgetown University, Washington, DC, USA
[b] Center for Population and Health, Georgetown University, Washington, DC, USA
[c] Department of Sociology, University of California, Riverside, USA

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ABSTRACT

Engagement in leisure activities has been linked to improved mental and physical health. However, the extent to which different aspects of these activities (i.e., frequency, diversity, type) are associated with health in large-scale studies remains unclear. Drawing on comprehensive nationwide pandemic-era data, this study examined associations between the frequency and diversity of leisure activities and self-perceived health, and whether specific activity domains have stronger associations with physical or mental health. Data were drawn from the Midlife in the United States (MIDUS) study, including responses from 2037 adults. Activity frequency and diversity were assessed across six domains: physical, social, cognitive, mindfulness, volunteer, and other activities. Ordered logistic regression was used to model associations between activities and self-perceived physical and mental health, adjusting for sociodemographic and health factors. Overall activity frequency was positively associated with physical and mental health. Social and mindfulness activities were more strongly associated with mental health, while physical activities were more strongly correlated with physical health. Other, more sedentary activities, were inversely associated with physical health. Activity diversity was not associated with health beyond frequency. Findings highlight the importance of active pursuits and suggest type and frequency of activities, rather than diversity, are associated with health.

Introduction

Prior research suggests that leisure activities generally benefit health, [Adams et al., 2011, Fancourt et al., 2021] but the direction and magnitude of the relationship may vary by type of activity. Leisure activities are non-obligatory pursuits undertaken during free time and can encompass a wide range of behaviors like physical activities (sports, walking) or social activities (spending time with friends or family) [Fancourt et al., 2021, Sala et al., 2019]. The benefits of leisure activities for mental and physical health may depend on the frequency and diversity of activities that people engage in [Mock and Smale, 2023, Lee et al., 2018, Lee et al., 2020].

During the COVID-19 pandemic, opportunities for leisure were substantially altered [Takiguchi et al., 2023]. Activities like travel and in-person social gatherings were restricted, while solitary or home-based activities became more common. Such changes have been linked to declines in health [Shen et al., 2022, Bone et al., 2022]. Understanding how different frequencies, types, and combinations of leisure activities relate to health in such constrained contexts advances our understanding of the role of leisure in maintaining health and could provide valuable insight for designing public health guidance during periods of widespread, externally imposed social isolation.

Frequency and diversity of leisure activities and their benefits

A foundational early theory on aging and leisure, referred to as Activity Theory, suggests that staying active and busy can help maintain mental and physical health as individuals age [Havighurst, 1961]. Following from this theory, a body of research has emerged supporting the idea that greater frequency of certain leisure activities is associated with better health and quality of life [Sala et al., 2019, Tkach and Lyubomirsky, 2006, Ku et al., 2016, Wang and Wong, 2014, Silverstein and Parker, 2002, Chun et al., 2016]. However, less attention has been paid to leisure activity diversity [Lee et al., 2020]. Leisure diversity (also referred to as leisure repertoire) has been defined as the variety of different activities that individuals regularly engage in during their free time [Mobily et al., 1991, Iso-Ahola, 1980]. Engaging in a wide variety of leisure activities—across different domains such as physical, social,

* Corresponding author at: Georgetown University, Department of Psychology, 308 White-Gravenor Hall, 3700 O Street, NW, Washington, DC 94704, USA.
E-mail addresses: casey.brown@georgetown.edu (C.K. Brown), dag77@georgetown.edu (D.A. Glei), chiounl@ucr.edu (C. Lee), weinstma@georgetown.edu (M. Weinstein).

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mindfulness, cognitive, and volunteer activities—might have a more profound impact on health than engaging solely in one type of activity frequently [Lee et al., 2020, Loy et al., 2003].

Scholars have argued that diversity in the repertoire of leisure activities is an indicator of cultural capital: the knowledge, skills, education, and social assets that provide individuals with social ties and good quality of life [Stalker, 2011]. People with a broader range of leisure activities have more choices for their free time. This flexibility could make it easier to switch to a different activity if their current one no longer provides satisfaction or enjoyment, or if it becomes unavailable (e.g., due to COVID-19 restrictions) [Iso-Ahola, 1980, Iso-Ahola and Weissinger, 1987]. In this way, diversity of leisure activities across domains may help people avoid boredom or isolation that is aversive and associated with lower quality of life [Granzin and Haggard, 2000, Wilson et al., 2014]. Engaging in a diverse set of leisure activities across various domains may promote better health through multiple pathways, for example, cardiovascular health through exercise, [Rao et al., 2022] brain health via cognitive engagement when reading, [Stanovich and Cunningham, 1992] and emotional health through social interactions [Brown et al., 2017, Cacioppo et al., 2006]. Thus, the importance of leisure diversity may also lie in distinct benefits that come from different types of leisure activities. Although many leisure activities span multiple domains (e.g., an activity may be both social and physical), categorizing them by the predominant dimension (e.g., social versus cognitive) can guide public health recommendations for promoting healthy use of free time.

Different types of leisure activities for different facets of health

Evidence links several domains of leisure activities to both mental and physical health, including physical activities (e.g., exercise, sports [Hillman et al., 2008, Elsden et al., 2022, Dinas et al., 2011, Rebar et al., 2015]), social activities (e.g., spending time with family, engaging in conversation [Santini et al., 2020]), cognitive activities (e.g., reading, engaging in arts [Jensen and Bonde, 2018, Morse et al., 2021, Weziak-Bialowolska et al., 2023]), mindfulness activities (e.g., meditation and appreciating nature [Grossman et al., 2004, Bratman et al., 2019, Jamil et al., 2023]), and volunteer activities (e.g., unpaid work that may benefit various causes such as education, community health, the arts, or politics [Lum and Lightfoot, 2005, Casiday et al., 2008]). Research indicates that these different domains of leisure activities are not equally linked to various health outcomes [Chun et al., 2023].

Psychological theories focusing on individual's characteristics, such as personality and attitudes provide insights into why certain domains of leisure activities may be more strongly associated with either mental or physical health. According to Identity-Based Motivation Theory, [Oyserman, 2015] people are motivated to engage in activities that reinforce their self-concept. For example, someone who views themselves as physically healthy may be more motivated to engage in physical activities, which in turn supports their physical health, while someone who views themselves as mentally healthy may be more motivated to engage in mindfulness activities like meditation. Similarly, self-perception theory [Bem, 1972] proposes that individuals infer their self-attitudes and beliefs based on their own behavior. Based on this theory, individuals who regularly engage in mindfulness activities may develop a self-concept as emotionally stable, which could promote their mental health.

Different domains of leisure activities may stimulate different facets of health because of distinct psychophysical demands and repercussions of each domain. For instance, bodily activities may have stronger associations with physical than mental health because movement-based activities can directly improve cardiovascular function, muscle strength, and endurance, [Warburton et al., 2006] which are key components of physical health, whereas the mental benefits of physical activity may be more secondary effects of stress reduction [Chun et al., 2023, Salmon, 2001]. In contrast, social activities are known to preserve vital cognitive functions necessary for mental health, [Glei et al., 2005, Nsor et al., 2024] and can lead to feelings of connectedness that combat loneliness and depression, thereby directly enhancing mental health [Adams et al., 2011, Dahlberg et al., 2022, Choi et al., 2021]. Indeed, a few studies suggest that social activities may be more strongly associated with mental health than physical health [Millard, 2017, Thraen-Borowski et al., 2013]. Similarly, engaging in cognitive or mindfulness activities may be more strongly linked to mental health than physical health because of the mental stimulation driven by these activities [Edwards and Loprinzi, 2018, Geda et al., 2011]. Finally, some studies suggest volunteerism is more strongly associated with mental health than physical health, [Jenkinson et al., 2013] but others yield mixed results [Elsden et al., 2022].

The current study

This analysis uses data from the Midlife in the United States study (MIDUS), a large, publicly accessible dataset created to understand aging during midlife and beyond. Specifically, we used data from the MIDUS Arts Survey to examine the associations between leisure activities and physical and mental health during the pandemic. Prior studies have categorized leisure activities in various ways, with researchers dividing them into anywhere from one to 14 distinct domains [Adams et al., 2011, Tomioka et al., 2019]. In this study, we grouped 77 items from the MIDUS Arts Survey into five distinct and well-established domains: physical, social, cognitive, mindfulness, and volunteer activities; We also included a miscellaneous category with leisure activities from the survey that did not fit cleanly into any of the five domains that have been linked to physical and mental health, but that may have stronger associations with either mental or physical health.

We address a series of hypotheses. First, we expected that more frequent leisure activities, both within a given type of activity and across all activity domains, would be associated with better mental and physical health. Second, we anticipated that the frequency of certain types of activities would have stronger associations with different facets of health (mental vs. physical). Specifically, we hypothesized that social, mindfulness, cognitive, and volunteer activities would be more strongly associated with mental health than physical health, whereas physical activities would have stronger associations with physical health than mental health. Third and finally, we hypothesized that greater diversity (i.e., across six types of leisure activities) would be associated with better mental and physical health, beyond the effects of activity frequency.

Methods

Data

The data came from the refresher cohort of the MIDUS study, including both the national [Ryff et al., 2017] and Milwaukee samples [Ryff et al., 2022] that was conducted between 2011 and 14. The refresher cohort was a national probability sample of non-institutionalized, English-speaking adults aged 25–74 in the contiguous United States drawn using a sampling frame that included both landlines and cell phones [Palit et al., 2016]. The initial phone interview was completed by 3577 individuals (59 % response rate); 2598 also completed the mail-in self-administered questionnaire (SAQ). In addition, MIDUS used stratified area probability sampling to recruit an oversample of African Americans aged 25–64 in Milwaukee. In 2012–13, 507 individuals (48 % response rate) completed an in-person interview via computer-assisted personal interviewing (CAPI); 294 also completed the SAQ.

In 2021–22, during the COVID-19 pandemic, the refresher cohort, including both the national and Milwaukee samples, was re-contacted for a supplemental project focusing on participation in cultural, leisure, and hobby activities during the previous 12-month period. The

mail-in SAQ was completed by 2444 respondents (response rate 64 %) between May 2021 and February 2022 [Lein, 2022]. The vast majority (98 %) of respondents returned the SAQ in May (60 %), June (32 %), or July (6 %) of 2021. We excluded 24 of the respondents because someone else appeared to have completed the SAQ (i.e., in 21 of those cases neither the sex nor the date of birth matched the information from 2011 to 14; in 3 other cases, the year of birth differed by >5 years). Among the remainder, we restricted our analytic sample to the 2037 respondents who also completed the SAQ at baseline (2011–14).

Informed written consent was obtained from all MIDUS participants, and all procedures were approved by the Education and Social/Behavioral Science Institutional Review Board at the University of Madison, Wisconsin (IRB #2016–1051 for the main survey and #2021–0382 for the Arts survey) and the Institutional Review Board at Georgetown University (IRB # CR00004702). All methods were performed in accordance with the relevant guidelines and regulations.

Measures

Self-Perceived health status

We included two measures of current self-perceived health status from the 2021–22 SAQ. The first referred to "physical health" and the second referred to "mental or emotional health." The response categories for each question comprised a 5-point ordinal scale, which we recoded such that the lowest score (1) represented "poor" health and the highest (5) denoted "excellent" health.

Activity frequency

Respondents were asked about their participation in various activities during the 12 months prior to the 2021–22 SAQ. We grouped these activities (77 items) into six types: 1) social (7 items); 2) mindfulness, all of which were solitary (6 items); 3) physical (5 items); 4) cognitive (38 items); 5) volunteer (6 items); and 6) other (15 items), see Appendix A1 for more details. The first two groups were the only items for which the survey questions explicitly specified whether the activity involved a social or solitary experience. For the remaining four groups, the survey questions did not provide information to indicate the social nature of the activities. Finally, the "other" group comprises a somewhat disparate set of items (e.g., watching movies or sports events, hunting/fishing, playing computer games, remote viewing of cultural performances/programs), most of which are passive and more sedentary.

Given variation in the response categories (binary, 3-point vs. 5-point scales) across activity measures, we rescaled all items to range from 0 to 100 to facilitate interpretation and ensure the items were equally-weighted. Items with five response categories were recoded as follows: Never (0), once or twice a year (25), 3–11 times per year (50), at least once a month (75), at least once a week (100). Items with three response categories were rescaled as: Never (0), Sometimes (50), and Often (100). Binary responses were recoded to: No (0), Yes (100).

The summary scores for the six types of activities were computed by averaging across the relevant items. Thus, someone who reported no participation in any activity of that type would be assigned a summary score of 0, whereas a person who reported the maximum frequency for all activities of that type would score 100. However, activities of the same type were likely to be substitutes (i.e., we did not expect strong inter-item correlations; Table A1 shows the Cronbach's alpha for each activity type). We also constructed an overall score for all activities by averaging responses across all 77 items.

Activity diversity

To measure diversity across types of activities, we dichotomized the summary measures for each of the 6 activity types to indicate whether the respondent's participation in that domain exceeded the average among the full sample. Then, we counted the number of activity types (0–6) for which the respondent reported above average participation. Thus, the resulting diversity score ranged from 0 (lowest diversity: below average participation in all 6 activity types) to 6 (highest diversity: above average participation in all 6 activity types).

Potential confounders

We adjusted for potential confounders that were likely to affect both activity levels and self-perceived health status, including age, sex, race/ethnicity, marital status, socioeconomic status (SES), and baseline measures of health conditions [Kaleta et al., 2009, Peng et al., 2024]. All control variables were measured at baseline (2011–14) except for age, which was measured in 2021–22.

Sociodemographic confounders included age, sex, race/ethnicity, a binary indicator for whether the respondent was married/partnered, and a composite measure of SES (see Appendix A2 for details). Age was a continuous variable ranging from 32 to 83. Race and ethnicity were based on self-identification and coded into the following categories: non-Hispanic White, non-Hispanic Black, non-Hispanic other races, and Hispanic.

We also adjusted for baseline measures of health because pre-existing health problems could affect levels of activity (e.g., people with physical impairments may be unable to exercise, those with mental health problems may use mindfulness practices to mitigate psychological issues) as well as subsequent perceptions of health. We controlled for two major health conditions: ever had heart trouble and diabetes in the past 12 months. Physical function was measured by an index of physical limitations (see Appendix A3 for details). Mental health was represented by indexes of positive and negative affect (see Appendix A4 for details).

Analytic strategy

All analyses were conducted in Stata 18.0 [StataCorp, 2023]. We used multiple imputation to handle missing data; [Rubin, 1996, Schafer, 1999] see Appendix B for details on multiple imputation. We used ordered logistic regression to model the cross-sectional relationship between activities and self-perceived health (physical and mental) in 2021–22 (the conceptual model is shown in Figure D1). All models adjusted for sociodemographic characteristics and the measures of prior health status at baseline (2011–14). Model 1 included the overall summary score for all leisure activities. Model 2 substituted the six summary scores representing the frequency of each activity type. Model 3 added the measure of diversity across activity types.

Results

Descriptive statistics for all the analysis variables are shown in Table 1. In terms of the frequency of each activity type, mindfulness activities had the highest average score (75.5), followed by social activities (66.7). Mean scores were lower for physical activities (45.5). Cognitive activities had the lowest mean (13.7), which was not surprising because that category comprised 38 items, most of which were likely to be substitutes for one another (e.g., someone might play a musical instrument, paint, do photography, woodworking, or quilting, but it is unlikely they would engage in all those activities). A participant who reported doing 5 of those 38 activities at least once a week would score 13.2.

The average score for the diversity across activity types was 2.8. <10 % of the sample scored zero (i.e., below average participation for all six types of activities). About one-third reported above average participation in one (17 %) or two (19 %) types of activities. Another 36 % showed moderate diversity (scoring 3–4). Only 19 % exhibited high diversity (5–6).

Table 2 shows the results from the ordered logit models that adjusted for potential confounders. As hypothesized, Model 1 showed that all leisure activities (i.e., the average of all items across domains) were positively associated with both self-perceived physical health (OR=1.30 per SD, 95 % CI 1.19–1.42) and mental health (OR=1.36 per SD, 95 % CI 1.25–1.48).

Table 1
Descriptive statistics for analysis variables ($N = 2037$).

Variable	Value
Measured in 2011–14	
Male, %	44.9
Non-Hispanic White, %	76.5
Non-Hispanic Black, %	13.5
Non-Hispanic other race, %	6.0
Hispanic, %	4.1
Married/partnered, %	67.7
Socioeconomic status (−2.4–4.4), M (SD)	0.0 (1.0)
Ever had heart trouble, %	14.1
Diabetes in the past 12 months, %	10.7
Physical limitations (0–100), M (SD)	21.6 (27.4)
Negative affect (0–4), M (SD)	0.5 (0.6)
Positive affect (0–4), M (SD)	2.4 (0.8)
Measured in 2021–22	
Age (32–83), M (SD)	60.6 (13.1)
All activities (0–100), M (SD)	30.1 (9.8)
Social activities (0–100), M (SD)	66.7 (19.6)
Mindfulness activities (0–100), M (SD)	75.5 (19.6)
Physical activities (0–100), M (SD)	45.5 (22.0)
Cognitive activities (0–97.4), M (SD)	13.7 (10.2)
Volunteer work (0–100), M (SD)	29.5 (23.9)
Other activities (0–100), M (SD)	31.6 (14.5)
Activity diversity (0–6), M (SD)	2.8 (1.7)
Zero, %	9.8
One, %	16.5
Two, %	18.8
Three, %	18.7
Four, %	17.0
Five, %	13.0
Six, %	6.2
Self-perceived physical health (1–5), M (SD)	3.3 (1.0)
Self-perceived mental health (1–5), M (SD)	3.5 (1.0)

Note. M = mean SD = Standard Deviation.

However, Model 2 revealed that the association varied by type of activity and differed for physical versus mental health. Physical activities were more strongly associated with self-perceived physical health (OR=1.51 per SD, 95 % CI 1.36–1.67) than mental health (OR=1.14 per SD, 95 % CI 1.03–1.27). Social activity was more strongly associated with self-perceived mental health (OR=1.31 per SD, 95 % CI 1.19–1.44) than with physical health (OR=1.07 per SD, 95 % CI 0.98–1.18). The association with mindfulness activities was only slightly stronger for mental health (OR=1.15 per SD, 95 % CI 1.04–1.27) than physical health (OR=1.06 per SD, 95 % CI 0.96–1.17), and that difference was likely not significant as the 95 % confidence interval for the former includes the point estimate for the latter. However, in the case of cognitive activities and volunteer work, there was no evidence that the association was stronger for mental than physical health. In fact, neither cognitive activities nor volunteer work was significantly associated with either measure of self-perceived health. In addition, there was an unexpected inverse association between other activities and physical health (OR=0.87 per SD, 95 % CI 0.79–0.97). The inverse association appeared to be driven primarily by watching/attending sports events and hunting/fishing, although the effects of watching or listening to musical, dance, theatre, literary, or other programs/performances and watching movies/films were in the same direction (albeit slightly weaker and not statistically significant). See Appendix C for additional details.

Finally, Model 3 showed no significant association between activity diversity and self-perceived physical or mental health. That is, once we accounted for the frequency of different types of activity, the additional measure of diversity across those activities yielded no incremental effect. We explored an alternative measure of activity diversity that counted the number of activities for which the respondent scored above the 25th percentile. It resulted in fewer than 3 % of respondents scoring 0–1 and more than half scoring 5–6 (25 % scored 5, 35 % scored 6). When we substituted that measure of diversity in place of the one used in Table 2, diversity was still not significant.

Discussion

This study examined the frequency and diversity of leisure activities and their associations with physical and mental health during the COVID-19 pandemic. Additionally, the study examined whether specific types of leisure activities were more strongly correlated with one health facet (mental vs. physical) than the other. The findings contribute to the growing body of research on leisure activities and health, providing nuanced insights into whether activity type, frequency, and diversity relate to self-perceived physical and mental health.

Consistent with previous research, [Adams et al., 2011, Fancourt et al., 2021] our results supported the hypothesis that frequent leisure activity is associated with mental and physical health. While the magnitude of associations was modest, findings reinforce the idea that leisure is not a trivial part of life but a significant correlate of health. Notably, associations held when controlling for sociodemographic variables and prior health conditions, underscoring the robustness of the association.

We found partial support for our second hypothesis, observing that some domains of leisure activities have stronger associations with particular aspects of health. Specifically, social activities and mindfulness activities were more strongly associated with mental health, while physical activities were more strongly correlated with physical health. These results align with Identity-Based Motivation and Self-Perception Theories, which suggest that individuals engage in activities that reinforce their self-concept, and that these activities, in turn, shape self-perceptions of health. Findings may also reflect the specific psychological and physical demands of each activity domain. For instance, social activities might primarily enhance mental health by fostering a sense of connectedness and belonging, [Fancourt et al., 2021] while physical activities may contribute more to physical health by enhancing heart health and muscular function [Warburton et al., 2006]. In contrast, the benefits of physical activity on mental health and the impact of social activities on physical health could be considered secondary benefits [Salmon, 2001, Millard, 2017].

Our counter-intuitive finding—the inverse association between "other" activities and physical health—suggests potential differences in how individuals engage in leisure activities. The “other” activities primarily comprise passive and sedentary pursuits (e.g., watching movies, listening to music, watching or attending sports events, playing video/computer games). Frequent participation in more sedentary activities may have a negative impact on physical health [Owen et al., 2010]. Alternatively, this finding could stem from reverse-causality (i.e., individuals with physical limitations may be more likely to engage in passive activities because they are unable to participate in more physically-demanding experiences). This finding may have been exacerbated during the pandemic, when restrictions on public movement and social gatherings led many individuals to substitute active pursuits with more sedentary "other" activities, potentially contributing to the inverse association with physical health. These nuances highlight the need for public health initiatives to encourage a balanced approach to leisure, emphasizing active and engaging pursuits tailored to individual health needs and capabilities.

Contrary to our third hypothesis, the diversity of leisure activities across domains was not significantly associated with better physical or mental health beyond the effects of activity frequency. This finding suggests that the combination of different domains of activities does not have a multiplicative effect above and beyond the individual contributions of each activity type. However, diversity of activities within domains may still offer other advantages not captured in the current study. For example, prior research has shown that a greater diversity of sports activities in adolescence predicts higher levels of physical activity in later adulthood, [Mäkelä et al., 2017] diverse exercise modalities may improve cardiovascular health, [Rao et al., 2022] and varied social network profiles enhance well-being [Collins et al., 2022]. Therefore, certain types of activity diversity may support sustained leisure

Table 2
Odds ratios (and 95 % confidence intervals) from ordered logit models for physical and mental health ($N = 2037$).

	Physical Health			**Mental Health**		
	(1)	(2)	(3)	(1)	(2)	(3)
All activities[a]	1.30***			1.36***		
	(1.19 - 1.42)			(1.25 - 1.48)		
Social activities[a]		1.07	1.08		1.31***	1.30***
		(0.98 - 1.18)	(0.97 - 1.19)		(1.19 - 1.44)	(1.17 - 1.44)
Mindfulness activities[a]		1.06	1.06		1.15**	1.14*
		(0.96 - 1.17)	(0.95 - 1.18)		(1.04 - 1.27)	(1.03 - 1.27)
Physical activities[a]		1.51***	1.51***		1.14*	1.13*
		(1.36 - 1.67)	(1.35 - 1.69)		(1.03 - 1.27)	(1.01 - 1.27)
Cognitive activities[a]		1.10	1.11		1.08	1.07
		(0.99 - 1.23)	(0.99 - 1.24)		(0.97 - 1.20)	(0.96 - 1.20)
Volunteer work[a]		0.99	0.99		0.98	0.97
		(0.90 - 1.08)	(0.89 - 1.10)		(0.89 - 1.07)	(0.87 - 1.07)
Other activities[a]		0.87**	0.87*		0.98	0.97
		(0.79 - 0.97)	(0.78 - 0.98)		(0.88 - 1.08)	(0.87 - 1.08)
Activity diversity[a]			0.99			1.03
			(0.82 - 1.20)			(0.86 - 1.25)
Age − 50	1.01**	1.01***	1.01***	1.02***	1.02***	1.02***
	(1.00 - 1.02)	(1.01 - 1.02)	(1.01 - 1.02)	(1.02 - 1.03)	(1.02 - 1.03)	(1.02 - 1.03)
Male	1.02	1.12	1.12	1.37***	1.48***	1.48***
	(0.86 - 1.21)	(0.94 - 1.34)	(0.94 - 1.34)	(1.15 - 1.62)	(1.24 - 1.76)	(1.24 - 1.77)
(Non-Hispanic White)	1.00	1.00	1.00	1.00	1.00	1.00
Non-Hispanic Black	0.90	1.00	1.00	1.02	1.10	1.10
	(0.69 - 1.17)	(0.77 - 1.30)	(0.77 - 1.30)	(0.79 - 1.33)	(0.84 - 1.43)	(0.84 - 1.43)
Non-Hispanic other race	1.33	1.32	1.32	1.22	1.23	1.23
	(0.94 - 1.88)	(0.93 - 1.88)	(0.93 - 1.88)	(0.86 - 1.71)	(0.87 - 1.73)	(0.87 - 1.74)
Hispanic	1.05	1.11	1.11	0.79	0.77	0.77
	(0.68 - 1.63)	(0.71 - 1.72)	(0.72 - 1.72)	(0.51 - 1.21)	(0.50 - 1.19)	(0.50 - 1.19)
Married/partnered	1.24*	1.18	1.18	1.06	1.03	1.03
	(1.03 - 1.50)	(0.97 - 1.42)	(0.97 - 1.42)	(0.88 - 1.28)	(0.85 - 1.24)	(0.85 - 1.24)
Socioeconomic status[a]	1.25***	1.25***	1.25***	1.16**	1.20***	1.20***
	(1.14 - 1.37)	(1.14 - 1.38)	(1.14 - 1.38)	(1.05 - 1.27)	(1.09 - 1.33)	(1.08 - 1.32)
Heart trouble	0.58***	0.59***	0.59***	0.73*	0.76*	0.76*
	(0.45 - 0.74)	(0.46 - 0.76)	(0.46 - 0.76)	(0.58 - 0.93)	(0.60 - 0.96)	(0.60 - 0.96)
Diabetes	0.57***	0.62***	0.62***	0.91	0.95	0.95
	(0.44 - 0.76)	(0.47 - 0.82)	(0.47 - 0.82)	(0.69 - 1.19)	(0.73 - 1.25)	(0.73 - 1.25)
Physical limitations[a]	0.53***	0.57***	0.57***	0.86**	0.88*	0.88*
	(0.48 - 0.59)	(0.52 - 0.64)	(0.52 - 0.64)	(0.78 - 0.95)	(0.80 - 0.98)	(0.80 - 0.98)
Negative affect[a]	0.97	0.97	0.97	0.75***	0.75***	0.75***
	(0.87 - 1.08)	(0.87 - 1.08)	(0.87 - 1.08)	(0.67 - 0.83)	(0.67 - 0.83)	(0.67 - 0.83)
Positive affect[a]	1.42***	1.39***	1.39***	1.61***	1.56***	1.56***
	(1.28 - 1.57)	(1.25 - 1.54)	(1.25 - 1.54)	(1.44 - 1.78)	(1.41 - 1.74)	(1.40 - 1.74)

* $p < 0.05$;.
** $p < 0.01$;.
*** $p < 0.001$.
[a] Standardized (mean=0, SD=1) such that the odds ratios represent the effect per SD.

engagement throughout the lifespan, especially as preferences or abilities evolve. High activity diversity may reflect higher levels of self-efficacy, with more confident individuals engaging in a broader range of pursuits, which could have diverse health benefits. Importantly, we quantified diversity as participation across multiple domains at a level that was above the average frequency for that activity type. It is possible that the benefits of activity diversity arise from even more minimal engagement across multiple domains. However, we did not find associations between activity diversity and health even when using an alternative measure that captured participation above the 25th percentile in each activity domain.

In addition, the null association between diversity and health may be specifically attributable to the pandemic context. Public health restrictions significantly limited the range of available activities. During periods of constrained options for activities, it may be difficult to maintain a diverse repertoire of activities. Moreover, pandemic-related constraints may have reduced the extent to which certain activities were non-obligatory (e.g., individuals may have been forced to spend more time at home with family), perhaps contributing to the null finding for diversity.

Importantly, three types of activities (i.e., physical, social, and mindfulness) were independently associated with either physical or mental health. Mindfulness activities, all of which were solitary, were associated with better mental health even after accounting for social activities, implying that both social and solitary (mindfulness) activities may have independent positive benefits. Furthermore, physical activity was positively associated with self-perceived mental health, although this relationship was weaker than the association with physical health. Thus, these three types of activities (social, mindfulness, and physical) appeared to be beneficial for either physical or mental health.

Strengths, limitations, and future directions

Strengths of the study include the use of a large, national dataset, the incorporation of multiple domains of leisure activities to provide a nuanced analysis of activity frequency and diversity, and the adjustment for a range of sociodemographic and health confounders.

However, the study has several limitations. First, the observed

associations between leisure activity and self-perceived health occurred in the context of a global pandemic that resulted in restrictions on social interaction, travel, and in-person engagement. The results may not be generalizable to other contexts, where there are no imposed constraints on leisure activity. Nonetheless, this study provides useful information for future longitudinal studies and natural experiments seeking to understand the long-term impact of leisure disruptions on population health. Second, self-reported health and activity measures, while widely used, are subjective and may not accurately capture objective health outcomes or activity engagement. Third, the diversity measure may oversimplify the complex nature of leisure activity engagement by treating different activity types as equally salient. Fourth, the amount of free-time individuals have for leisure activities varies, and the nature of activities may vary across individuals and contexts (e.g., being with friends and family could be more or less social depending on whether one is engaged in conversation versus watching television) [Janssen and Voelcker-Rehage, 2023]. Fifth, this set of activities is not exhaustive. We lack information about some potentially maladaptive leisure activities, such as substance use, that could influence results [Chan et al., 2023]. Finally, the cross-sectional, observational design prevents us from determining the direction of causality in the relationships between leisure activities and health. The strength of associations was modest and may be bidirectional. For example, while physical activity may improve physical health, individuals with physical health impairments may also be less able to engage in exercise. Similarly, social activity may promote mental health, but individuals experiencing mental health challenges might withdraw from social interactions. We cannot make any causal inferences. Future longitudinal or experimental data are needed to disentangle these effects and identify the underlying mechanisms. For example, prospective analyses could evaluate whether the frequency and diversity of leisure activities predicts subsequent changes in health, and the physiological or psychological factors that mediate such changes. Future research could also use experimental designs to test whether interventions that shift health-related self-concepts (e.g., by changing health beliefs or mindsets), or that encourage specific leisure activities (e.g., increasing physical activity or social engagement), influence how people choose to spend their leisure time [Tol et al., 2023].

Conclusions

In conclusion, this study provides evidence that leisure activities—particularly physical, social, and mindfulness activities—have positive associations with self-perceived mental and physical health even after adjusting for sociodemographic characteristics and prior measures of health. The lack of a significant additional effects of activity diversity across domains suggests that the association with health is primarily driven by the frequency and type of activities rather than their diversity. These findings offer potential guidance for public health initiatives: they suggest that interventions could focus on ensuring the frequency and accessibility of active engagement across key domains (social, physical, mindfulness) to support health during periods of social isolation or restricted movement.

Additional information

Author contributions

CKB and DAG drafted the paper, and DAG conducted analyses. CL and MW provided critical revisions. All authors were involved in the conception and design of the study, interpretation of data, revised the manuscript critically for intellectual content, and approved the final version of the manuscript. All authors agree to be accountable for the work.

Data availability statement

Data for MIDUS Refresher cohort in 2011–14 are available from https://midus.colectica.org/ and https://www.icpsr.umich.edu/web/ICPSR/series/203. We used public-use data for the main cohort (https://doi.org/10.3886/ICPSR36532.v3) and restricted-use data for the Milwaukee African American sample (https://doi.org/10.3886/ICPSR36722.v5). Users must request and complete ICPSR's Restricted Data Use Agreement for access to restricted-use data. We obtained 2021–22 Arts Survey data from MIDUS project staff. Access guidelines are provided at: https://midus.wisc.edu/data/ARTS/Guidelines%20for%20Requesting%20ARTS%20Data.pdf.

Declaration of competing interest

The authors declare no competing interests.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.crbeha.2026.100206.

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