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ORIGINAL RESEARCH

Association Between Physical Activity and Psychosocial Resilience Among Middle-Aged and Aging Men Living With or Without HIV in the Multicenter AIDS Cohort Study

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Introduction

Increased resilience has been consistently linked to improved mental and physical health outcomes. Because individuals with HIV have a longer life expectancy than ever before, it is imperative to identify mechanisms to promote resilience in this population. Physical activity has significant potential to strengthen resilience and improve overall well-being in individuals with HIV. The goal of this study was to investigate whether increased physical activity is positively associated with increased individual-level psychosocial resilience, and whether this association varied by HIV status.

Methods

Data for this analysis were obtained from the Multicenter AIDS Cohort Study (MACS), a longitudinal observational cohort study following men living with and without HIV in the United States. Specifically, cross-sectional data collected between October 2016 and March 2017 from 1118 MACS participants enrolled in the Understanding Patterns of Healthy Aging Among Men Who Have Sex With Men sub-study were used. Odds ratios were determined using logistic regression to examine the association of physical activity with psychosocial resilience (measured using the 14-item Resilience Scale).

Results

Among all MACS participants enrolled in the sub-study, both sufficient physical activity and health-enhancing physical activity were positively associated with high resiliency (odds ratio, 2.20 [95% CI, 1.36-3.56] and odds ratio, 3.72 [95% CI, 2.30-6.03], respectively). Among the participants with HIV, only health-enhancing physical activity was positively associated with high resiliency (odds ratio, 3.07 [95% CI, 1.54-6.14]).

Conclusions

At the level of individual patient care, physical activity has significant potential to improve health outcomes and strengthen resilience in individuals living with HIV.

Introduction

Due in large part to the increasing accessibility of effective antiretroviral therapy, individuals with HIV have an increasingly long life expectancy, nearly equal to that of the general population.[1] What was once considered a death sentence is now viewed as a chronic condition and, as a result, it is imperative to identify the most effective ways to manage symptoms and improve quality of life in individuals with HIV.[2] Strengthening psychosocial resilience through physical activity may be a promising mechanism through which this aging population with HIV can be supported.

Psychosocial resilience is broadly defined as the ability to use one's inner strengths and external resources to adapt and overcome adversity.[3] Because resilience is thought to be a multifaceted and dynamic process that can evolve over the course of one's life, there are numerous conceptualizations of resilience and a large body of research seeking to identify factors that shape resilience.[4] For instance, social support, self-awareness, and overall health are all positive personal attributes that promote the development of resilience.[3]

In addition to enhancing one's ability to overcome adversity and psychosocial stress, higher levels of individual-level resilience have been shown to improve physical and mental health in the general population.[5] Furthermore, while aging is often associated with the onset of chronic illnesses and subsequent disability, resilience can protect against the deleterious impact of chronic conditions and reduce the risk of disability.[6] Because of these findings, identifying concrete methods to promote resilience will likely be beneficial in improving health and quality of life in both the general population and in individuals managing chronic conditions.

Physical fitness is a key factor in promoting resilience, improving overall health, and preventing the development of stress-related conditions.[7] While the mechanisms underlying the relationship between resilience and physical fitness are still being investigated, there are several proposed biological mechanisms that are well-understood. First, physical fitness appears to blunt, and thereby optimizes, the response of the hypothalamic-pituitary-adrenal axis and sympathetic nervous system to physical and psychosocial stressors, leading to "physiologic toughening."[7] Exercise also reduces inflammation by downregulating the expression of proinflammatory cytokines and inducing expression of anti-inflammatory cytokines including IL-6.[7] Further, physical activity is thought to improve resiliency and brain health by promoting neuroplasticity and upregulating production of brain-derived neurotrophic factor, a growth factor that regulates the stress response.[7]

This positive association between resilience and physical activity can also contribute to overall mental and physical health. Because exercise promotes self-esteem and self-efficacy, regular physical activity can likewise improve mood and depressive symptoms, thereby preventing the development of stress-related disorders.[8] As for physical health, in individuals with existing fibromyalgia and chronic fatigue syndrome, low physical activity levels were associated with increased levels of serum C-reactive protein, which emphasizes the beneficial role that exercise may play in individuals with chronic conditions.[8] Similarly, in patients with cancer, resilience was strongly associated both with lower levels of psychological distress and higher levels of physical activity.[9]

The role of physical activity in the management of HIV has been extensively studied, with some studies specifically focusing on the impact of exercise on both overall well-being and psychological well-being. For example, an exercise intervention consisting of aerobic and resistance training was shown to improve overall mood state and decrease self-reported depression in people living with HIV.[10] Furthermore, higher levels of physical activity have been significantly associated with improved quality of life in individuals with HIV.[1] These findings suggest that exercise could be an appropriate intervention with the power to benefit individuals with HIV both psychologically and physically.[1,10]

Resilience is a particularly important trait to foster in individuals with HIV given their long-term survival due to increased efficacy of antiretroviral therapy. For example, resilience has been shown to lower rates of depression, anxiety, and problems with activities of daily living in HIV-positive individuals.[5] Likewise, in older adults living with HIV, resilience appears to improve health-related quality of life and reduce the negative effects of life stress.[2]

Based on the existing evidence on the relationship among resilience, physical activity, and overall health, exercise has significant potential as a mechanism to build resilience and improve physical and mental well-being in individuals with HIV. However, to our knowledge, there is little existing literature exploring the intersection of resilience and physical activity in this population. Therefore, the goal of this study was to investigate whether increased physical activity was positively associated with increased individual-level psychosocial resilience, and whether this association varied by HIV status. Specifically, this study addressed the relationship between physical activity and psychosocial resilience in sexual minority men (SMM), a population that faces unique psychosocial health disparities and represents approximately 1 in 4 new HIV infections globally.[11,12]

Methods and Materials

Population

The Multicenter AIDS Cohort Study (MACS) investigates the natural and treated history of HIV among gay and bisexual men, also known as sexual minority men (SMM). More than 7000 SSM living with and without HIV have been enrolled since 1984 in the following 4 university-affiliated US sites: Baltimore, MD/Washington, DC; Chicago, Illinois; Los Angeles, California; and Pittsburgh, Pennsylvania/Columbus, Ohio. Participants attended semiannual clinic visits that used audio computer-assisted self-interview and a standardized clinical examination to collect demographic information, medical history, behavioral assessments, and biospecimens. Ongoing details of the MACS study design have been described elsewhere, including on the MACS website.[13-15]

Analytic Sample

The Understanding Patterns of Healthy Aging Among Men Who Have Sex With Men sub-study of the MACS seeks to understand psychosocial resiliencies that promote healthy aging among middle-aged and older SMM living with and without HIV.[16] Eligible MACS participants for this sub-study had to be at least 40 years old on or before April 2016, reported at least 1 incident of sexual intercourse with another man since enrolling in the MACS, and completed 2 consecutive MACS visits prior to April 2016. Current analyses included 1118 participants with information on physical activity and resiliency at visit 66 (October 2016-March 2017).

Outcome

The Resilience Scale is a 14-item 7-likert scale that assessed the participants' attitudes about life.[17] The response choices ranged from strongly disagree to strongly agree. Participants reported how much they agreed (or disagreed) with the following statements: (1) "My belief in myself gets me through hard times"; (2) "I am determined"; (3) "I can get through difficult times because I've experienced difficulty before"; (4) "I have self-discipline"; (5) "When I'm in a difficult situation, I can usually find my way out of it"; (6) "I am friends with myself"; (7) "I feel that I can handle many things at a time"; (8) "I keep interested in things"; (9) "I can usually find something to laugh about"; (10) "I usually manage one way or another"; (11) "My life has meaning"; (12) "I feel proud that I have accomplished things in life"; (13) "In an emergency, I'm someone people can generally rely on"; and (14) "I usually take things in stride." Responses to these statements were summed and categorized into the following: low resilience (scores <65); moderate resilience (scores 65-81); and high resilience (scores >81).[17]

Primary Predictor

The International Physical Activity Questionnaire was used to estimate the frequency and type of physical activity performed by participants. Participants reported the number of minutes or hours per day and days per week spent walking or doing moderate and vigorous activities. Metabolic Equivalent of Task (MET) minutes per week were calculated for each activity and overall.[18] MET minutes are calculated based on estimated resting energy expenditure, with 1 MET minute equal to the energy expended at rest. When scoring the International Physical Activity Questionnaire, moderate physical activity was considered to be 4 METS, while vigorous physical activity was 8 METS.[18] Participants were categorized as "sufficiently physically active" if they (1) had 3 or more days of vigorous activity for at least 20 minutes; (2) had 5 or more days of moderate activity for at least 30 minutes; or (3) had 5 or more days of any combination of walking or moderate or vigorous activity achieving a minimum of at least 600 MET minutes per week. Participants with vigorous activity had at least 3 days a week with a minimum of at least 1500 MET minutes per week or 7 or more days of any combination of walking or moderate and

vigorous activity achieving a minimum of 3000 MET minutes per week; they were categorized as health-enhancing physically active (HEPA). Participants not meeting the 2 aforementioned categories were categorized as not physically active.

Covariates

Participants' chronological age was calculated from self-reported date of birth and date of their visit. Race and ethnicity were categorized as Hispanic, non-Hispanic Black, non-Hispanic White, and other. Education was categorized as less than a high school diploma, high school diploma, at least some college, and at least some graduate school. The presence of the following comorbid conditions were summed and categorized as no comorbid conditions, 1 comorbid condition, and 2 or more comorbid conditions: (1) high blood pressure (systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mm Hg or diagnosis and use of medication); (2) high fasting glucose level (≥126 mg/dL); (3) liver disease (serum glutamic pyruvic transaminase or serum glutamic oxaloacetic transaminase >150 U/L); (4) kidney disease (estimated glomerular filtration rate <60 mL/min/1.73 m^2 or urine protein-to-creatinine ratio ≥200); (5) dyslipidemia (total cholesterol ≥200 mg/dL or low-density lipoprotein cholesterol ≥130 mg/dL or high-density lipoprotein cholesterol <40 mg/dL or triglycerides ≥150 mg/dL); and (6) current Hepatitis C infection.[19] Frailty was defined as the presence of 3 of more of the following: (1) weakness; (2) slowness; (3) unintentional weight loss of at least 10 LBS; (4) reported exhaustion during work or other activities; and (5) low physical activity due to health limitation.[19-21]

HIV-Related Factors

HIV status (person living with HIV [PLWH]/person living without HIV [PLWOH]) was assessed using enzyme-linked immunosorbent assay with confirmatory Western blot on all MACS participants. PLWH included all participants with confirmed positive western blot at their baseline MACS visit and those who seroconverted at any time during follow-up in the MACS. Among PLWH, we assessed CD4 cell count (cells/mm^3) and HIV viral load detection. CD4 cell count was categorized into 200 cells/mm^3 or greater and less than 200 cells/mm^3. Detectable viral load was defined as having plasma HIV RNA levels of more than 20 copies/mL.

Statistical Analysis

We generated descriptive statistics of the outcome, primary predictor, and covariates overall and by HIV status using counts and percentages or medians and IQRs where appropriate. We used multinomial logistic regression to examine the adjusted relationship between resiliency and physical activity among the full sample and separately among PLWH. Covariates in the final model included age, HIV status, race and ethnicity, education, and the presence of comorbid conditions. Models were also generated among PLWH

only and included CD4 count and viral load detection. We reported adjusted odds ratios (aORs) and 95% CIs. Analyses were performed in SAS version 9.4 (Statistical Analysis Software Inc).

Results

Descriptive Statistics

The overall median age of participants was 60 years (IQR, 54-66) (Table 1). Most participants were non-Hispanic White (68.8%), had at least some college education (85.6%), and had 2 or more comorbid conditions (63.2%); 9.5% were frail. Most participants were at least sufficiently physically active (73.4%), with 43.0% categorized as HEPA. Most participants also had high resiliency (63.8%).

Among PLWOH (n = 561), the median age was 62 years (IQR, 56-68), 80.6% were non-Hispanic White, 89.2% had at least some college education, 58.3% had 2 or more comorbid conditions, and 8.4% were frail. Most PLWOH were at least sufficiently physically active (74.7%), with 41.5% categorized as HEPA. Most PLWOH also had high resiliency (66.1%).

Among PLWH (n = 557), the median age was 57 years (IQR, 52-63), 56.9% were non-Hispanic White, 82.0% had at least some college education, 68.2% had 2 or more comorbid conditions, and 10.6% were frail. Nearly 20% had detectable viral load and 2.0% had CD4 cell count less than 200 cells/mm^3. Most PLWH were at least sufficiently physically active (72.2%), with 44.5% categorized as HEPA. Most PLWH also had high resiliency (61.4%) (Table 1).

Adjusted Association of Resiliency and Physical Activity in Full Sample

In adjusted analysis, being sufficiently physically active (vs physically inactive; aOR, 2.20 [95% CI, 1.36-3.56]) and HEPA (vs physically inactive; aOR, 3.72 [95% CI, 2.30-6.03]) was associated with increased odds of high resiliency (vs low resiliency) (Table 2). Additionally, increasing age (1-unit increase; aOR, 1.07 [95% CI, 1.04-1.10]), identifying as non-Hispanic Black (vs non-Hispanic White; aOR, 1.82 [95% CI, 1.08-3.05]), and having at least some graduate education (vs less than high school education; aOR, 3.51 [95% CI, 1.09-11.36]) were also associated with increased odds of high resiliency (vs low resiliency). Having 2 or more comorbid conditions (vs none; aOR, 0.30 [95% CI, 0.13-0.70]) and being frail (vs not frail; aOR, 0.44 [95% CI, 0.25-0.79]) were associated with decreased odds of high resiliency (vs low resiliency). Increasing age (1-unit increase; aOR, 1.04 [95% CI, 1.01-1.07]) was associated with increased odds of moderate resiliency (vs low resiliency) (Table 2).

Adjusted Association of Resiliency and Physical Activity Among PLWH

In adjusted analysis among PLWH only, HEPA (vs physically inactive; aOR, 3.07 [95% CI, 1.54-6.14]) was associated with increased odds of high resiliency (vs low resiliency) (Table 3). Increasing age (1-unit increase; aOR, 1.12 [95%

Table 1. Sample Characteristics by HIV Status

	No. (%)		
	PLWOH (n = 561)	PLWH (n = 557)	Overall (n = 1118)
Age, median IQR, y	62 (56 - 68)	57 (52 - 63)	60 (54 - 66)
Race and ethnicity			
Black non-Hispanic	69 (12.3)	162 (29.1)	231 (20.7)
Hispanic	28 (5.0)	66 (11.9)	94 (8.4)
White non-Hispanic	452 (80.6)	317 (56.9)	769 (68.8)
Other	12 (2.1)	12 (2.2)	24 (2.2)
Education			
Less than high school	10 (1.8)	19 (3.4)	29 (2.6)
High school diploma	42 (7.5)	70 (12.6)	112 (10.0)
At least some college	232 (41.4)	272 (48.8)	504 (45.1)
At least some graduate school	268 (47.8)	185 (33.2)	453 (40.5)
Missing	9 (1.6)	11 (2.0)	20 (1.8)
HIV-related markers			
Detectable viral load	NA	104 (18.7)	104 (18.7)
CD4 <200 cells/mm^3	NA	11 (2.0)	11 (2.0)
Presence of comorbidities			
None	58 (10.3)	46 (8.3)	104 (9.3)
1	176 (31.4)	131 (23.5)	307 (27.5)
≥2	327 (58.3)	380 (68.2)	707 (63.2)
Frailty			
Not Frail	487 (86.8)	477 (85.6)	964 (86.2)
Frail	47 (8.4)	59 (10.6)	106 (9.5)
Missing	27 (4.8)	21 (3.8)	48 (4.3)
Physical activity			
Physically inactive	141 (25.1)	146 (26.2)	287 (25.7)
Sufficiently physically active	186 (33.2)	154 (27.7)	340 (30.4)
Health-enhancing physically active	233 (41.5)	248 (44.5)	481 (43.0)
Missing	1 (0.2)	9 (1.6)	10 (0.9)
Resiliency category			
Low	60 (10.7)	93 (16.7)	153 (13.7)
Moderate	127 (22.6)	112 (20.1)	239 (21.4)
High	371 (66.1)	342 (61.4)	713 (63.8)
Missing	3 (0.5)	10 (1.8)	13 (1.2)

Abbreviations: NA, not applicable; PLWH, people living with HIV; PLWOH, people living without HIV.

CI, 1.07-1.17]) was also associated with increased odds of high resiliency (vs low resiliency). Having detectable viral load (vs undetectable viral load; aOR, 0.48 [95% CI, 0.25-0.91]) was associated with decreased odds of high resiliency (vs low resiliency). Increasing age (1-unit increase; aOR, 1.08 [95% CI, 1.03-1.13]) was associated with increased odds of moderate resiliency (vs low resiliency), while detectable viral load (vs undetectable viral load; aOR, 0.44 [95% CI, 0.20-0.96]) was associated with decreased odds of moderate resiliency (vs low resiliency) (Table 3).

Table 2. Multivariable Association Between Physical Activity and Resiliency

	High resiliency (vs low resiliency)	Moderate resiliency (vs low resiliency)
	Adjusted OR (95% CI); *P* value	Adjusted OR (95% CI); *P* value
Physical activity		
Sufficiently physically activity (vs physically inactive)	*2.20 (1.36-3.56)*; .001	1.13 (0.66-1.91); .65
HEPA vs (physically inactive)	*3.72 (2.30-6.03)*; <.001	1.39 (0.81-2.38); .23
Age (per unit increase)	*1.07 (1.04-1.10)*; <.001	*1.04 (1.01-1.07)*; .008
HIV status		
Positive (vs negative)	0.88 (0.59-1.33); .55	0.76 (0.48-1.20); .24
Race and ethnicity		
Black non-Hispanic (vs White non-Hispanic)	*1.82 (1.08-3.05)*; .02	0.58 (0.30-1.09); .09
Hispanic (vs White non-Hispanic)	1.81 (0.88-3.73); .11	1.16 (0.52-2.59); .72
Other (vs White non-Hispanic)	1.48 (0.40-5.46); .56	0.80 (0.17-3.74); .78
Education		
High school diploma (vs less than high school)	0.96 (0.30-3.08); .94	0.43 (0.12-1.54); .19
At least some college (vs less than high school)	2.03 (0.66-6.25); .22	0.78 (0.23-2.61); .68
At least some graduate school (vs less than high school)	*3.51 (1.09-11.36)*; .04	0.96 (0.27-3.41); .95
Presence of comorbid conditions		
1 (vs none)	0.56 (0.23-1.40); .22	1.05 (0.37-2.96); .93
≥2 (vs none)	*0.30 (0.13-0.70)*; .005	0.68 (0.26-1.81); .44
Frailty		
Frail (vs not frail)	*0.44 (0.25-0.79)*; .006)	0.74 (0.40-1.38); .34

Abbreviations: HEPA, health-enhancing physically active; OR, odds ratio. Italicized adjusted Odds Ratio and associated Confidence Intervals signify statistical significance at p <0.05.

Discussion

Findings from this study demonstrated a statistical significance of the association between being sufficiently physically active and having high resiliency. Likewise, HEPA was positively associated with high resiliency. In SMM living with HIV, only HEPA was positively associated with high resiliency, while being sufficiently physically active was not. This suggests that the relationship between physical activity and resilience differs by HIV status. These findings are consistent with previous studies that investigated the association between physical activity and resilience.[9,22,23] Both in patients with chronic medical conditions (eg, cancer) and in the general population, there was a positive association between resiliency and physical activity.[9,22,23]

While past studies have examined the relationship between physical activity and resilience, as well as the positive impact of physical activity in individuals living with HIV, there has been little work exploring resilience and physical activity in people living with HIV. For example, Jaggers et al[10] found that exercise interventions improved mood state and decreased self-reported depression in individuals with HIV, and Martin et al[1] found that physical activity was associated with improved quality of life in this population. Because of the known positive impact of resilience on mental and physical well-being,

Table 3. Multivariable Association Between Physical Activity and Resiliency Among PLWH Only

	High resiliency (vs low resiliency)	Moderate resiliency (vs low resiliency)
	Adjusted OR (95% CI); *P* value	**Adjusted OR (95% CI); *P* value**
Physical activity		
Sufficiently physically activity (vs physically inactive)	1.26 (0.63-2.54); .52	0.48 (0.22-1.05); .07
HEPA vs (physically inactive)	*3.07 (1.54-6.14)*; .002	0.75 (0.34-1.64); .47
Age (per unit increase)	*1.12 (1.07-1.17)*; <.001	*1.08 (1.03-1.13)*; .003
Race and ethnicity		
Black non-Hispanic (vs White non-Hispanic)	1.84 (0.94-3.60); .08	0.64 (0.28-1.45); .29
Hispanic (vs White non-Hispanic)	1.65 (0.68-4.03); .27	0.95 (0.34-2.68); .92
Other (vs White non-Hispanic)	3.46 (0.41-29.49); .26	No est.
Education		
High school diploma (vs less than high school)	0.85 (0.18-3.94); .83	0.23 (0.05-1.17); .08
At least some college (vs less than high school)	2.46 (0.57-10.69); .23	0.67 (0.15-2.99); .60
At least some graduate school (vs less than high school)	3.07 (0.65-14.52); .16	0.56 (0.11-2.79); .48
HIV-related markers		
Detectable viral load (vs undetectable)	*0.48 (0.25-0.91)*; .03	*0.44 (0.20-0.96)*; .04
CD4 <200 cells/mm^3 (vs ≥200 cells/mm^3)	0.76 (0.13-4.63); .77	1.54 (0.18-12.85); .69
Presence of comorbid conditions		
1 (vs none)	0.51 (0.13-2.00); .34	0.77 (0.15-3.85); .75
≥2 (vs none)	0.31 (0.09-1.13); .08	0.62 (0.14-2.85); .54
Frailty		
Frail (vs not frail)	0.63 (0.27-1.48); .29	1.01 (0.40-2.55); .98

Abbreviations: HEPA, health-enhancing physically active; OR, odds ratio; PLWH, people living with HIV.

particularly in populations managing chronic conditions, this study suggests that resilience may be part of the mechanism underlying the positive impact of physical activity in individuals living with HIV.[6]

As previously mentioned, this study found that only HEPA was positively associated with high resilience in SMM living with HIV, while both HEPA and sufficient physical activity were associated with high resilience among all of the MACS participants enrolled in the Healthy Aging sub-study. This variation based on HIV status is also consistent with past studies investigating resilience in individuals with HIV. Folayan et al[24] found that HIV-positive individuals had significantly lower resilience and self-esteem than their HIV-negative counterparts. Thus, because the SMM living with HIV in this analysis may have had a lower baseline level of resiliency, possibly due to the long-term physical and emotional challenges of managing a chronic condition, they may require a more vigorous physical activity regimen to achieve an appreciable change in resiliency. Furthermore, there are many potential physical and mental health challenges that may occasionally and unpredictably limit the extent to which individuals living with HIV can engage in health-seeking behaviors, including exercise.[25] This, coupled with the heightened risk for muscle wasting and reduced cardiovascular fitness in this population, further underscores the need to recommend thoughtfully designed and rigorous exercise regimens to individuals living with HIV.[25]

This study has several limitations. One major limitation is that the MACS cohort used for this analysis is predominantly composed of White men with college- and graduate-level education. As a result, the findings of this study may not be generalizable to other populations of individuals living with and without HIV. Ideally, future studies would include data from individuals outside of the SMM population used in this study to establish whether the findings from this analysis can be extrapolated. Additionally, while the Healthy Aging sub-study did not collect data on financial status, this is a potentially important moderating variable to consider. Financial stability could not only provide individuals with the time and means to exercise more often, but it could also contribute to heightened psychosocial resilience and reduced stress, and thus, should be investigated in future studies. Finally, the cross-sectional nature of this analysis limits the conclusions that can be drawn about the association between resilience and physical activity. Because we cannot establish a causal relationship from a cross-sectional analysis, we cannot say with certainty whether physical activity promoted higher resiliency or whether individuals with higher resilience were simply more likely to exercise. Based on the findings of this study, future studies could investigate whether resilience improves in response to an exercise intervention in individuals living with and without HIV, as this would help elucidate the direction of the association between resilience and physical activity.

Conclusions

The findings of this study have implications for the long-term care of individuals living with HIV. Given the significant association between physical activity and resilience, as well as the evidence demonstrating that resilience can protect against the deleterious effects of chronic conditions such as HIV, physicians should encourage their patients to exercise on a regular basis.[6] These findings also have implications for how HIV is managed at a public health level. Previously, campaigns and interventions related to preexposure prophylaxis, safe sex practices, and the use of antiretroviral medications have had positive implications for the treatment and, ultimately, the quality of life of those living with HIV.[26] Sharing the benefits of physical activity among individuals living with HIV will likely have a similarly positive impact on health outcomes and overall mental and physical health.

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Disclaimers

None.

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Conflicts of Interest

None.

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