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Original Research Article

Association between self-rated health and physical activity among physician assistants in Ghana: a cross-sectional study

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ABSTRACT

Background: Self-rated health (SRH) has been a subjective measure of health, yet its association with physical activity (PA) among healthcare workers in sub-Saharan Africa remains underexplored. This study examined the association between SRH and PA [leisure-time physical activity (LTPA) and active transportation (AT)] among Physician Assistants in Ghana.
Methods: A cross-sectional study involving 439 licensed Physician Assistants was conducted between October and December 2024 using an online survey. Multivariate logistic regressions modelled the association between SRH and PA, using adjusted odds ratios (aOR) and 95% confidence intervals (CIs) and controlling for sociodemographic, work-related, environmental and psychological factors.
Results: Overall, 18.7% of PAs reported poor SRH. Participants in the third quartile of LTPA had the highest odds of good SRH (aOR=3.36, 95% CI: 1.58–7.16), though a plateau effect was observed at higher activity levels. AT to and from work was significantly associated with good SRH (aOR=2.32 and 2.16, respectively). Anxiety, older age, lower income, lower rank and poor environmental conditions were associated with reduced odds of good SRH. The availability of sidewalks showed a strong positive association with good SRH. Gender differences in PA domains were also observed, with males being significantly more active than females.
Conclusions: Engagement in moderate LTPA and active commuting is associated with good SRH among Ghanaian Physician Assistants. Interventions to increase physical activity may enhance health outcomes in this vital health workforce. Longitudinal studies are needed to establish causal relationships and inform policy.

Keywords: Active transportation, Ghana, Healthcare, Physician assistants, Physical activity, Self-rated health, Workers

INTRODUCTION

Self-rated health (SRH) is a widely used and validated measure of overall health status in the general population.[1,2] It serves as a robust predictor of morbidity and mortality by integrating biological, psychological, social and functional health dimensions of the individual, alongside their cultural and behavioural factors.[1,3] Healthcare Workers (HCWs) often encounter occupational stressors such as heavy workloads, shift work and emotionally demanding patient interactions, which contribute to psychosocial work stress and adversely affect their SRH.[4,5] An unhealthy workforce negatively affects the quality of healthcare delivery.[4,6] However, there is limited research on SRH among HCWs in sub-Saharan Africa (SSA). Physical activity (PA) is a potential strategy for improving SRH. The World Health Organization (WHO) defines PA as any bodily movement

produced by skeletal muscles that requires energy expenditure.[7] PA spans various domains, including leisure, occupational, transportation and household activities. Globally, PA levels have been declining.[8] The lack of physical activity has been associated with poorer SRH outcomes. For example, a study among 2,547 European adults aged 64 and above found that physical inactivity increased the odds of poor SRH by 70% (OR: 1.7, 95% CI: 1.2–2.5).[9] Similarly, among 1,786 adults aged 45–75 in Sweden, physical inactivity was linked to 42% higher odds of poor SRH (OR: 1.42, 95% CI: 1.06–1.91).[10]

Active transportation (AT), involving non-motorized travel modes such as walking and cycling, is an accessible cost-effective form of PA positively linked to good SRH. In a longitudinal study across seven European cities (n=8,218), walking (OR: 1.02, 95% CI: 1.00–1.03) and cycling (OR: 1.07, 95% CI: 1.05–1.08) were associated with increased odds of good SRH.[11] Likewise, among 3,663 Dutch adults, walking (OR: 1.35, 95% CI: 1.09–1.69) and cycling (OR: 1.52, 95% CI: 1.28–1.79) significantly correlated with good SRH.[12]

Leisure-time physical activity (LTPA) is another vital component of PA, involving structured and purposeful exercise performed during free time, such as jogging, swimming, cycling, playing sports, dancing or gym workouts.[13] Studies have demonstrated a positive association between LTPA and SRH. In Australia, a prospective cohort study of 7485 adults across three age cohorts (20-24, 40-44 and 60-64) found that increasing LPTA levels led to at least a 0.07 increase in SRH scores across all cohorts.[14] Conversely, in the SENECA cohort study of older Europeans, the lowest tertile of LTPA was associated with 2.8-fold increased odds (OR: 2.8, 90% CI: 1.3–6.2) of poor SRH.[15]

Despite the established link between PA and SRH, research in SSA has not explored this association among HCWs.[4,16] Furthermore, studies on SRH in the general population have not examined its relationship with PA.[17,18] A systematic review on transport-related PA and wellness in SSA found no studies on SRH and PA.[19]

This study seeks to bridge the gap by investigating the association between SRH and PA among Physician Assistants in Ghana. Physician Assistants are mid-level clinicians licensed to provide medical, dental and anesthetic care in Ghana.[20] Their clinical responsibilities include conducting physical examinations, diagnosing and treating illnesses, prescribing medications and performing minor surgeries.

At the health centre (sub-district) level, they perform administrative and public health roles in addition to clinical care. Understanding the relationship between SRH and PA among this critical cadre of HCWs is key to providing insights for further studies and interventions to improve the wellbeing of HCWs. We hypothesize that in this study, higher LTPA levels and using AT trips to and from work will be significantly associated with good SRH.

METHODS

Study design

The study adhered to Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[21] A cross-sectional design examined the association between SRH and PA among Physician Assistants in Ghana.

Participants and data collection

Physician Assistants in Ghana were eligible to participate in this study. In 2023, the Medical and Dental Council (MDC) of Ghana reported 3506 licensed Physician Assistants.[22] Participants were recruited through email invitations and official WhatsApp platforms of the Ghana Physician Assistant Association (GPAA), which included a link to the study questionnaire. Additionally, posters with QR codes linking to the study questionnaire were displayed at the annual GPAA conference in October 2024.

To ensure data integrity, each participant was restricted to a single submission per email. Before the main data collection, the survey was pre-tested with 35 physician assistant interns to enhance its clarity and reliability. Data were collected between October and December 2024, yielding responses from 439 PAs.

Ethical considerations

The study received ethical approval from the Metropolitan Research and Education Bureau (MREB) with protocol number MREB/RERC/19/24. All collected data were anonymized and securely stored, adhering to ethical guidelines and data protection regulations.

Outcome variable

SRH was assessed by asking participants to rate their overall health over the past month on a five-point scale: poor, fair, good, very good and excellent. Responses were dichotomized into poor ("poor" and "fair") and good ("good," "very good," and "excellent") for analysis.

Exposure variables (physical activity)

LTPA was measured using a modified version of the Global Physical Activity Questionnaire (GPAQ), which has been validated for assessing moderate-to-vigorous physical activity (MVPA).[23] MVPA minutes were generated from the number of days and the duration of activities per week reported by participants. MVPA quartiles were created and used as an ordinal variable in analyses. AT was assessed through a structured

questionnaire. Participants reported their primary modes of transportation to and from work from the following options: walking, cycling, private car, trotro/bus or uber/taxi. For analysis, AT was dichotomized into active transportation (walking and cycling) and motorized transportation (private car, trotro/bus and uber/taxi) for this study.

Potential confounders

Potential confounders were identified according to the literature, which included sociodemographic, work-related and environmental factors, as well as anxiety levels.[10-12,24-27]

Sociodemographic variables

This included age, gender, income, education level, urbanization, duration of sleep and marital status. Age was initially recorded as a continuous variable and later categorized into two groups: 24–40 years and 41–67 years. Marital status was classified as "married" or "not married."

Gender was classified as male and female and income was grouped into two categories equal to or above Gh¢5000 or below Gh¢5000. Urbanization was defined as either rural or urban. Education level was categorized into three groups: advanced diploma, bachelor's degree and master's degree or higher. Participants were also asked to report their average sleep hours each day.

Work-related variables

Years of service were recorded as a continuous variable. The rank of participants was grouped into two categories: physician assistant/senior physician assistant and principal-chief physician assistant.

Environmental factors

Two questions assessed environmental factors. They were: "Does poor air quality (e.g., smoke, odour from gutters/industries, etc.) and adverse weather conditions (rains or extreme heat) make you hesitant to walk or cycle as a mode of transportation?" and "Are there sufficient sidewalks and bike lanes on your route to/from work to make walking or cycling a viable option?". Responses were binary: yes or no.

Anxiety measurement

Anxiety was assessed using the Hospital Anxiety and Depression Scale (HADS) anxiety subscale, a validated tool with 80% sensitivity and specificity. The subscale consists of seven items, each scored from 0 to 3, producing a total anxiety score ranging from 0 to 21. A score of 8 or higher was used to define anxiety, as this threshold is known for its good specificity and sensitivity.[28] In this study, the HADS anxiety subscale demonstrated good internal consistency with a Cronbach's alpha of 0.84.

Analysis strategy

The required sample size of 381 was estimated using a correlation coefficient approach, ensuring 80% power to detect a weak association (r=0.15) at a 95% confidence level (α=0.05), with a 10% non-response allowance.[29] Descriptive statistics were used to summarize participant characteristics. Continuous variables were presented as means and standard deviations, while categorical variables were reported as frequencies and percentages. Gender differences in LTPA and AT were analyzed using chi-square tests to compare categorical distributions. To examine the association between SRH and PA domains (LTPA and AT), multivariate logistic regression models adjusting for potential confounders were used to estimate adjusted odds ratios and 95% confidence intervals. For AT, separate logistic regression models were constructed for commuting to work and returning home, with motorized transport as the reference group. All analyses were conducted using STATA version 18.0.

RESULTS

Participant characteristics

The study included 439 participants, with a mean daily sleep duration of 6.11±1.08 hours. The majority were male (65.8%) and 78.8% of participants resided in urban areas. Over half of the participants (52.6%) had a monthly income of GH¢5,000 or more and 76.1% were married. Most participants held a bachelor's degree (69.5%), while 51.7% had the rank of principal PA or above. Anxiety was reported by 23.5% of participants and 63.1% perceived their environmental conditions as poor. Additionally, 66.5% reported the absence of sidewalks in their area, while 18.7% reported poor SRH.

Gender differences in physical activity domains

Figures 1, 2 and 3 illustrate gender-based differences across PA domains. The percentage of males engaging in LTPA was higher than females in all quartiles except the third (65-180 minutes per week) suggesting that females engaged in moderate levels of activity (Figure 1). The percentage of males using AT was consistently higher across both commuting directions, indicating that men may have greater engagement in utilitarian PA compared to women (Figures 2 and 3).

Non-linear association between self-rated health and leisure-time physical activity

Table 2 presents result on the non-linear dose-response relationship between SRH and LTPA. Compared to the lowest quartile (0-20 minutes per week), participants in the third quartile (65-180 minutes per week) had the highest odds of reporting good SRH (aOR=3.36, 95% CI:

1.58-7.16). However, in the fourth quartile (183-4385 minutes per week), the odds were slightly lower (aOR=2.26, 95% CI: 1.08 - 4.72), suggesting a plateau or diminishing returns at very high activity levels. Additionally, participants with anxiety (aOR=0.49, 95% CI: 0.27-0.89), a lower PA rank (aOR=0.47, 95% CI: 0.28-0.81), aged 41-67 years (aOR=0.32, 95% CI: 0.17-0.63) or earning below GH₵5,000 (aOR=0.41, 95% CI: 0.23-0.75) had significantly lower odds of reporting good SRH. Conversely, the availability of sidewalks was associated with higher odds of reporting good SRH (aOR=2.38, 95% CI: 1.28-4.45).

Association between self-rated health and active transportation

Tables 3 and 4 present the association between SRH and AT, considering both commuting to work and returning home. Participants who actively commuted to work had 2.32 times higher odds of reporting good SRH compared to those using motorized transportation (aOR=2.32, 95% CI: 1.25-4.34). Similarly, those who actively commuted back home had 2.16 times higher odds of reporting good SRH (aOR=2.16, 95% CI: 1.18-3.95).

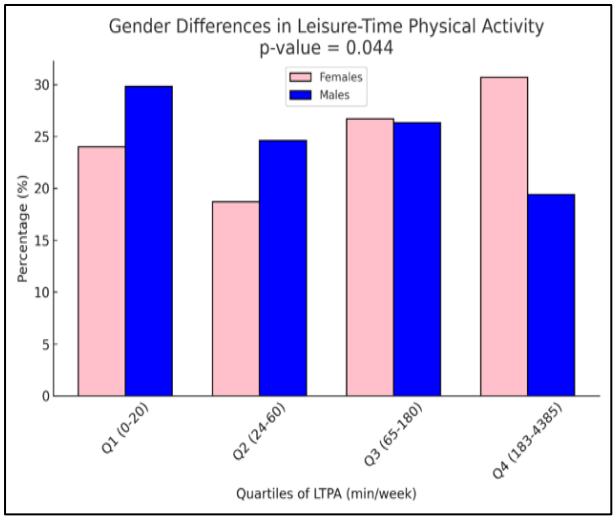

Figure 1: Differences in leisure-time physical activity by gender.

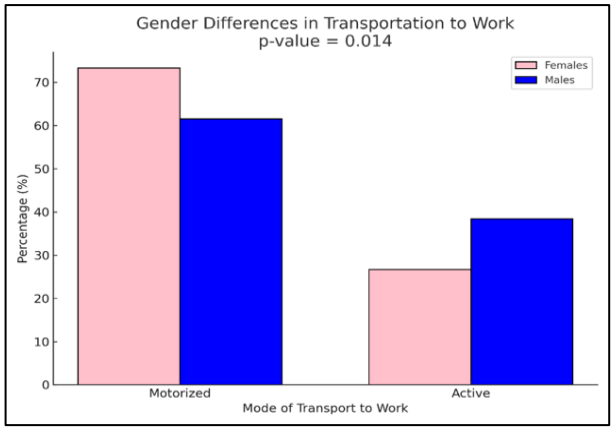

Figure 2: Differences in active transportation to work by gender.

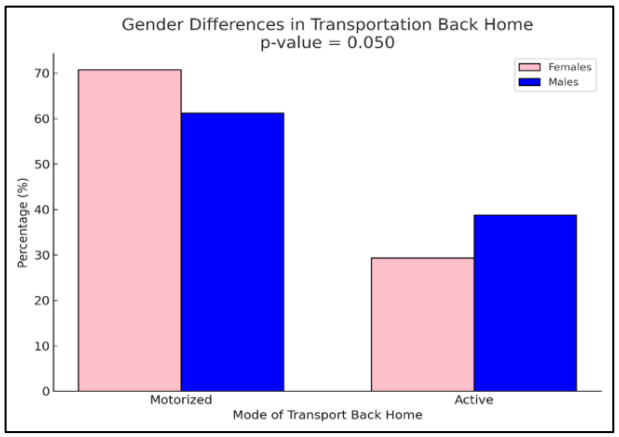

Figure 3: Differences in active transportation back home by gender.

Consistent patterns were observed across both commuting directions. Anxiety, lower professional rank, older age and lower income were all associated with decreased odds of reporting good SRH. The presence of sidewalks remained a significant predictor of good SRH (aOR=2.11, 95% CI: 1.14-3.90 for commuting to work; aOR=2.15, 95% CI: 1.16-3.98 for returning home). Poor environmental conditions were negatively associated with good SRH in both commuting models.

Table 1: Characteristics of participants (n=439).

Variable	M (SD) / N (%)
Average daily sleep hours	6.11±1.08
Anxiety	
No	336 (76.5)
Yes	103 (23.5)
Rank	
Principal PA and above	227 (51.7)
PA and Senior PA	212 (48.3)
Education level	
Advanced Diploma	42 (9.6)
Bachelors	305 (69.5)

Continued.

Variable	M (SD) / N (%)
Master's and above	92 (21.0)
Marital status	
Not married	105 (23.9)
Married	334 (76.1)
Age group (in years)	
24-40	324 (73.8)
41-67	115 (26.2)
Total monthly income	
Gh¢5,000 and above	231 (52.6)
Below Gh¢5,000	208 (47.4)
Gender	
Female	150 (34.2)
Male	289 (65.8)
Urbanization	
Rural	93 (21.2)
Urban	346 (78.8)
Availability of sidewalks	
No	292 (66.5)
Yes	147 (33.5)
Poor environmental conditions	
No	162 (36.9)
Yes	277 (63.1)
Self-rated health	
Poor	82 (18.7)
Good	357 (81.3)

Table 2: Association between self-rated health and leisure-time physical activity.

Variable	aOR	95% CI
Quartiles of LTPA (minutes/week)		
ref: Q1 (0-20)	1	1
Q2 (24-60)	1.43	0.73-2.83
Q3 (65-180)	3.36*	1.58-7.16
Q4 (183-4385)	2.26**	1.08-4.72
Anxiety (ref: No)	1	1
Yes	0.49*	0.27-0.89
Average daily sleep duration	1.2	0.93-1.53
Rank (ref: Principal PA and above)	1	1
PA or Senior PA	0.47**	0.28-0.81
Education (ref: Advanced Diploma)	1	1
Bachelors	0.74	0.27–2.02
Master's and above	1.54	0.48–4.98
Marital status (ref: Not Married)	1	1
Married	1.45	0.78–2.70
Age (ref: 24-40 years)	1	1
41-67 years	0.32**	0.17–0.63
Income (ref: ≥GH¢ 5000)	1	1
Below 5000	0.41**	0.23-0.75
Gender (ref: female)	1	1
Male	1.34	0.77-2.34
Availability of sidewalks (ref: no)	1	1
Yes	2.38**	1.28–4.45

aOR: Adjusted Odds Ratio. CI: Confidence Interval. **p value ≤ 0.007 *p ≤ 0.03.

Table 3: Association between self-rated health and active transportation to work.

Variable	aOR	95% CI
Trip to work (ref: motorized)	1	1
Active	2.32**	1.25–4.34
Anxiety (ref: No)	1	1
Yes	0.55*	0.31–0.96
Rank (ref: Principal PA and above)	1	1
PA or Senior PA	0.41**	0.24-0.70
Education (ref: Advanced Diploma)	1	1
Bachelors	0.53	0.23–1.74
Master's and above	1.69	0.52–5.50
Urbanization (ref: Rural)	1	1
Urban	0.73	0.38–1.42
Age (ref: 24-40 years)	1	1
41-67 years	0.35**	0.18–0.68
Income (ref: ≥ GH₵ 5000)	1	1
Below 5000	0.37**	0.21-0.67
Gender (ref: female)	1	1
Male	1.13	0.64–1.96
Availability of sidewalks (ref: no)	1	1
Yes	2.11*	1.14–3.90
Poor environment (ref: no)	1	1
Yes	0.52*	0.29–0.93

aOR: Adjusted Odds Ratio. CI: Confidence Interval. **p value≤0.007 *p≤0.03.

Table 4: Association between self-rated health and active transportation back home.

Variable	aOR	95% CI
Trip back home (ref: motorized)	1	1
Active	2.16*	1.18-3.95
Anxiety (ref: No)	1	1
Yes	0.55*	0.31–0.98
Rank (ref: Principal PA and above)	1	1
PA or Senior PA	0.40**	0.23-0.69
Education (ref: Advanced Diploma)	1	1
Bachelors	0.63	0.23–1.73
Master's and above	1.69	0.52–5.51
Urbanization (ref: Rural)	1	1
Urban	0.7	0.36–1.37
Age (ref: 24-40 years)	1	1
41-67 years	0.36**	0.19–0.69
Income (ref: ≥ GH₵ 5000)	1	1
Below 5000	0.37**	0.21-0.66
Gender (ref: female)	1	1
Male	1.17	0.67–2.04
Availability of sidewalks (ref: no)	1	1
Yes	2.15*	1.16–3.98
Poor environment (ref: no)	1	1
Yes	0.52*	0.29–0.92

aOR: Adjusted Odds Ratio. CI: Confidence Interval. **p value≤0.007 *p≤0.03.

DISCUSSION

This study aimed to examine the association between SRH and PA (LPTA and AT) among Physician Assistants in Ghana. We also explored gender differences in PA domains. We hypothesized that higher LTPA levels and use AT to and from work would be significantly associated with good SRH. Our results indicated that about one-fifth of the participants rated their health as poor. Engaging in moderate-to-vigorous LTPA, actively

commuting to work and back home, and availability of sidewalks significantly increased the odds of good SRH. Alternatively, anxiety, older age, lower professional rank and income, and poor perceived environmental conditions negatively affected the odds of good SRH. We found that 18.7% of Physician Assistants in Ghana reported poor SRH. This prevalence is higher than reported among nurses in The Gambia (13.8%) but lower than that reported in Greece (58%).[4,26] These differences may be due to context-specific factors such as workload, work-related stress and general workplace conditions. The observed prevalence in our study underscores the need for interventions aimed at improving the psychosocial well-being of Physician Assistants, which is essential for sustaining quality healthcare delivery.

Significant gender-based differences in PA domains were also observed. Consistent with previous studies, males were more likely to engage in very high levels of LTPA, whereas females were more likely to report moderate levels.[30] Males also reported higher engagement in AT compared to females. These disparities, which reflect gender inequalities in PA, may be influenced by sociocultural norms, occupational roles and safety concerns that limit women's participation in physical activities.

Our findings show that Physician Assistants who use AT to commute to work or back home had significantly increased odds of reporting good SRH. This finding is in line with previous studies in the general population. For instance, in Sweden, a cross-sectional study found that passive transportation was associated with increased odds of poor SRH compared to active modes.[10] Similarly, studies from multiple European cities and the Netherlands reported positive associations between active commuting and good SRH.[11,12] The benefits of AT may be due to its potential to reduce psychosomatic symptoms and increase daily physical activity levels.[31]

We also observed a non-linear dose-response association between SRH and LTPA. Specifically, those in the third quartile (65-180 mins per week) of LTPA had the highest odds of reporting good SRH, while those in the highest quartile showed a slightly reduced benefit. This suggests a potential plateau effect, where the health benefits of PA diminish at very high levels. Similar patterns have been observed in a pooled analysis where optimal health benefits were achieved at approximately three to five times the recommended minimum level of LTPA, with limited additional gains beyond this point.[32]

Furthermore, moderate to vigorous PA has consistently been associated with increased odds of good SRH and decreased odds of poor SRH.[12,24-27] The beneficial effects observed in our study may be explained by the role of PA in enhancing the functioning of the hypothalamus-pituitary-adrenal (HPA) axis, the body's central stress response system.[33] Additionally, PA has been linked to improved mood and quality of life.[33] These findings emphasize the value of achieving and maintaining moderate levels of PA for optimal health outcomes.

Environmental factors also played a significant role in predicting SRH. The presence of sidewalks was associated with higher odds of good SRH, while poor environmental conditions such as air pollution and adverse weather were linked to poorer SRH. Previous research has demonstrated that negative perceptions of the built environment are associated with poor SRH and that the physical environment significantly influences PA participation.[34,35] These findings highlight the need for policies that support walkable, safe and accessible neighborhoods and sidewalks to promote both physical activity and mental well-being.

Older age was associated with decreased odds of good SRH, consistent with findings from studies among healthcare workers and the general population.[16,18,26] This association may be partly explained by internalized aging stereotypes, where individuals attribute emerging health problems to the natural aging process, which in turn affects their health perception.[36]

Lower rank and income levels were also associated with decreased odds of good SRH. These results reflect socioeconomic health disparities. Previous population health studies have shown that income inequalities significantly contribute to variations in SRH.[17,24] Physician Assistants in Ghana often face limited career advancement opportunities and minimal improvements in working conditions. Previous studies have shown that low job control, high workload and poor working conditions contribute to poor SRH among HCWs.[37] This could potentially explain the observed findings in our study, underscoring the need for improved remuneration structures and well-defined career pathways to promote the well-being of this critical health workforce.

Finally, participants reporting symptoms of anxiety had significantly lower odds of good SRH, aligning with previous studies.[38] Providing mental health support services, including stress management programs and access to counseling, can be beneficial for promoting the overall health and job performance of Physician Assistants in Ghana.

This study has several limitations. First, selection bias may have occurred due to the voluntary nature of participation via online platforms, which may have attracted individuals with greater interest in PA or health-related topics. Additionally, the reliance on self-reported data introduces the possibility of response and recall biases, as participants may have overestimated their PA levels or provided socially desirable responses. The cross-sectional design further limits the ability to draw causal inferences, as temporality between SRH and PA cannot be established.

Despite these limitations, the study has notable strengths. It offers valuable insights into the association between SRH and PA among Physician Assistants, a group often overlooked in public health research. The strength of association using adjusted odds ratios, along with the identification of a non-linear dose-response relationship, strengthens the validity of the findings. Moreover, this study addresses a critical gap in the literature by examining these associations in a low- and middle-income country context, providing a foundation for future longitudinal and intervention-based research.

CONCLUSION

This study highlights the important role of physical activity, particularly active transportation and moderate leisure-time activity, in promoting good self-rated health among Physician Assistants in Ghana. The findings reveal a complex interplay between physical activity, sociodemographic factors, work environment and mental well-being. Given the high prevalence of poor self-rated health and its increased odds among older, lower-ranked and lower-income participants, targeted interventions are urgently needed. Providing socio-environmental conditions that promote active living and improving workplace conditions can help enhance the health and resilience of this essential health workforce. Future longitudinal studies are recommended to explore causal relationships and inform sustainable policy action.

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