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Research Article

Health Metrics of P.E. Teachers from Direct and Smart Phones App Measurements: Their Relationship with Gender, Age, and Areas Handled

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ABSTRACT

This study investigated the relationship between demographic and professional factors—specifically gender, age, and physical education (P.E.) areas handled—and health and sleep metrics among P.E. teachers. A quantitative cross-sectional design was employed among 374 P.E. teachers. Data were collected using validated instruments, including the Pittsburgh Sleep Quality Index (PSQI) and International Physical Activity Questionnaire (IPAQ), along with direct and smart app health measurements. Statistical analyses included independent t-tests, Pearson correlations, ANOVA, and chi-square tests. The sample comprised 58.8% males with a mean age of 38.9 years. Gender showed minimal relationships with health metrics except for daily steps (females higher, $p = 0.05$). Age was significantly associated with sleep quality ($r = 0.15$, $p = 0.03$), sleep disorder prevalence ($\chi2 = 10.5$, $p = 0.03$), BMI category ($\chi2 = 12.3$, $p = 0.02$), and blood pressure (systolic: $r = 0.20$, $p = 0.01$; diastolic: $r = 0.18$, $p = 0.02$). Most notably, P.E. areas handled showed the strongest associations with health metrics, particularly physical activity levels, daily steps, sleep quality, and BMI categories (all $p < 0.05$). Professional specialization within P.E. teaching emerged as the most significant predictor of health and sleep outcomes, surpassing demographic factors. These findings inform institution for targeted wellness interventions to revisit and review institutional policies for P.E. educators.

Keywords: *Health metrics, Direct measurements, Smart app measurements, Occupational health, Physical activity, Wellness*

Introduction

Physical Education (P.E.) Teachers occupy a unique position within the educational system, serving as both educators and health promotion advocates. Their professional roles inherently demand high levels of physical activity while simultaneously requiring them to model healthy behaviors for students. Despite

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this expectation, limited research has examined how personal and professional characteristics relate to the actual health and sleep outcomes of P.E. educators themselves.

The relationship between occupational demands and personal health outcomes has gained increased attention in educational research, particularly following the pandemic, which highlighted the vulnerability of educators to stress-related health issues. However, most studies have focused on general teacher populations, leaving a significant gap in understanding the specific health profiles of P.E. teachers who face unique physical and scheduling demands.

Understanding how demographic factors such as gender and age, along with professional specializations within P.E., relate to health and sleep metrics is crucial for developing targeted interventions and informing institutional wellness policies. This study addresses this gap by examining comprehensive health profiles that encompass sleep patterns, physical activity levels, and key physiological metrics among P.E. teachers.

Literature Review

Recent research (2020-2024) has documented elevated levels of poor sleep quality among educators, with many teachers scoring above clinical cutoffs for sleep disturbances. A study reported that poor sleep quality was prevalent alongside elevated perceived stress among teachers, indicating a concerning trend in educator wellness that may have been exacerbated by pandemic-related changes in work arrangements (Mancone, 2024). Occupational stress and burnout have emerged as significant predictors of sleep disturbance in educators (Sanchez, 2019). Elevated stress levels are consistently associated with worse sleep quality scores, higher prevalence of sleep disturbances, and greater daytime dysfunction. The literature suggests that stress serves as both a correlate and potential mediator of relationships between work conditions and sleep health.

Moreover, the relationship between physical activity and sleep quality has been consistently demonstrated across various populations. Multiple studies have shown that higher levels of regular physical activity are associated with better sleep quality and reduced risk of insomnia (Ahlamadi, 2021). Among teacher-specific samples, higher physical activity was linked to improved sleep quality and mediated reductions in perceived stress, suggesting that physical activity may operate both directly and indirectly through stress reduction to improve sleep outcomes.

In terms of cardio vascular metrics, research has indicated that adiposity and metabolic indicators are linked to sleep quality. Higher BMI and poorer cardiorespiratory markers, including elevated resting heart rate and higher blood pressure, have been associated with shorter or more fragmented sleep and greater risk of sleep disorders such as sleep apnea.

When it comes to demographics on gender and age differences in sleep and physical activity patterns, there are documented, however findings are sometimes inconsistent. Several studies report that female teachers often experience higher stress and poorer subjective sleep quality, while males sometimes report higher measured physical activity (Harder 2018). Age trends have been mixed, with some studies showing younger teachers reporting higher stress and sleep disturbance, particularly in pandemic contexts, while other studies indicate sleep quality may decline with older age due to comorbidities (Barnes, 2017).

Similarly, a notable gap in the literature is the scarcity of studies examining teacher subgroups by subject specialization, particularly P.E. teachers. Given the unique physical demands, scheduling patterns, and possible differences in workload across P.E. specializations, this represents a clear research need that the present study addresses.

Methods

Study Design and Participants

This study employed a quantitative, cross-sectional research design to explore relationships between demographic factors, professional specializations, and health outcomes among P.E. teachers. The target population consisted of P.E. teachers from various educational institutions, with participants selected through

stratified random sampling to ensure representation across different age groups, genders, and P.E. areas handled. The final sample comprised 374 P.E. teachers.

Data Collection Instruments

Data collection involved a comprehensive survey instrument including: (1) demographic questions covering gender, age, and P.E. areas handled; (2) the Pittsburgh Sleep Quality Index (PSQI) for sleep metrics; (3) the International Physical Activity Questionnaire (IPAQ) for physical activity levels; and (4) standardized measures for stress levels. Health metrics including BMI, blood pressure, and heart rate were collected through direct measurements. Daily steps and sleep metrics were recorded using pedometers and screening tools on smartphone applications over a specified period specifically Apple Health, Samsung Health, Huawei Health and other health app tied to vendor specific smartwatches. Sleep disorder prevalence was assessed using validated screening tools.

Statistical Analysis

Statistical analysis included descriptive statistics to profile respondents and inferential statistics to examine relationships between variables. Independent t-tests were used to analyze gender-based differences, while Pearson correlation analyses were employed to investigate age-related relationships. One-way ANOVA was utilized to examine differences based on P.E. areas handled, with chi-square tests for categorical variables. All statistical tests were performed using SPSS software, with significance level set at $p < 0.05$.

Ethical Considerations

Ethical considerations including informed consent and data confidentiality were strictly adhered to throughout the research process. All participants provided written informed consent before data collection.

Results

Participant Characteristics

The study sample consisted of 374 P.E. teachers, with 220 males (58.8%) and 154 females (41.2%). The mean age was 38.9 years (SD = ±8.3, range 27-59 years). Dance was the most common P.E. area handled (31.3%, n=117), followed by team sports (20.6%, n=77), fitness and conditioning (12.6%, n=47), health education (11.2%, n=42), individual sports (11.0%, n=41), specialized courses (7.8%, n=29), unique P.E. courses (4.0%, n=15), cultural and traditional games (1.3%, n=5), and recreational activities (0.3%, n=1).

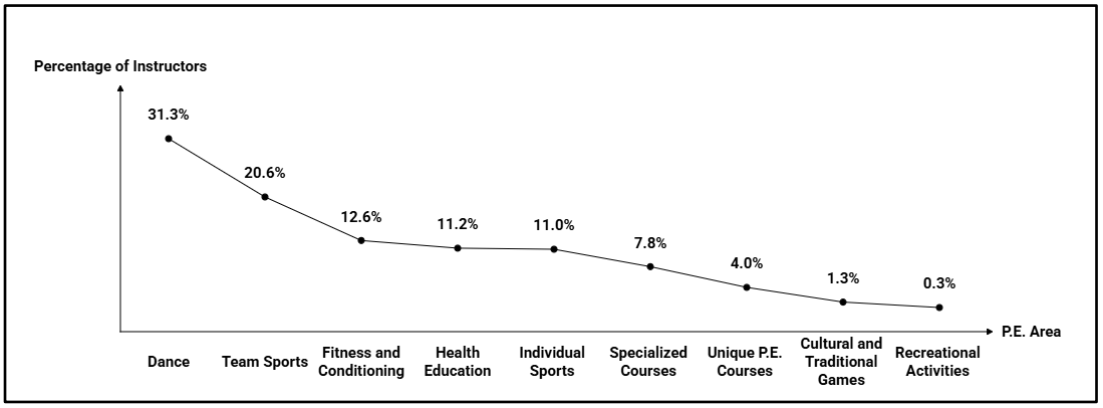

Fig. 1. Distribution of P.E. Teachers by Areas Handled

Sleep metrics showed a mean duration of 7.1 hours (range 5.8-8.5 hours) and mean quality rating of 7.2/10 (range 4-9/10). Health metrics indicated a mean physical activity level of 57.6 (range 30-90), mean stress level of 5.6/10 (range 3-8/10), mean BMI distribution of 51.9% normal weight, 33.4% overweight, and 14.7% obese, mean blood pressure of approximately 126/82 mmHg (range 115-142/75-95 mmHg), mean heart rate of 71.2 bpm (range 65-86 bpm), and mean daily steps of 6,847 (range 3,000-10,000).

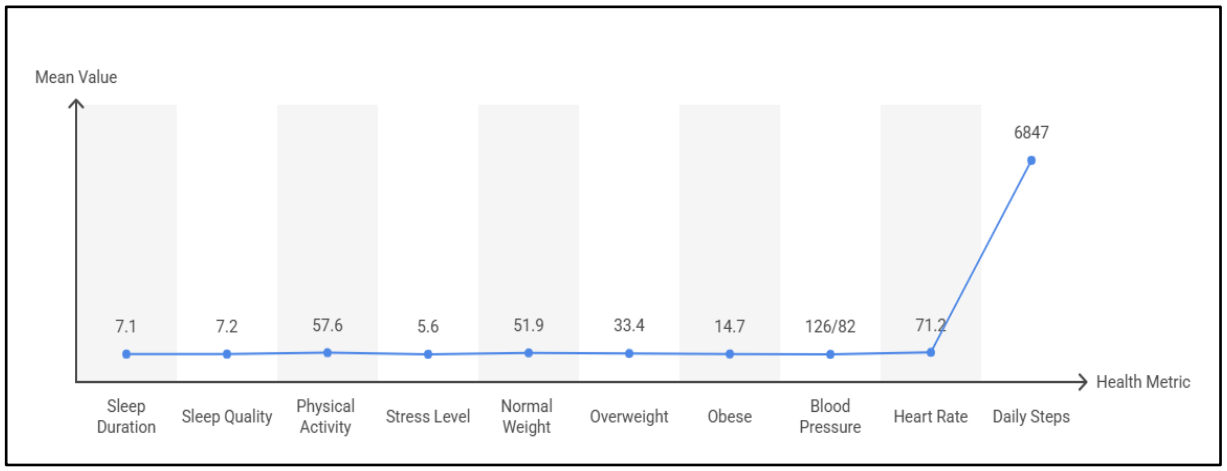

Fig. 2. Health Metrics of P.E. Teachers

Gender and Health Profile Relationships

Gender significantly shapes health profiles and outcomes (Gorman, Harder). Statistical analysis revealed limited significant relationships between gender and the comprehensive health profile. Only daily steps showed a statistically significant difference, with females averaging 7,200 steps compared to males' 6,500 steps ($p = 0.05$). No significant differences were found for sleep duration, sleep quality, sleep disorder prevalence, physical activity level, BMI category, blood pressure, or heart rate (all p-values > 0.05).

Table 1. Comparison of Health Metrics Between Genders

Health Metric	Male (Mean)	Female (Mean)	p-value	Significant?
Sleep Duration (hours)	7.0	7.2	0.15	No
Sleep Quality (score/10)	7.1	7.3	0.20	No
Daily Steps	6,500	7,200	0.05	Yes
Physical Activity Level	55	60	0.10	No
Systolic BP (mmHg)	125	123	0.25	No
Heart Rate (bpm)	70	72	0.18	No

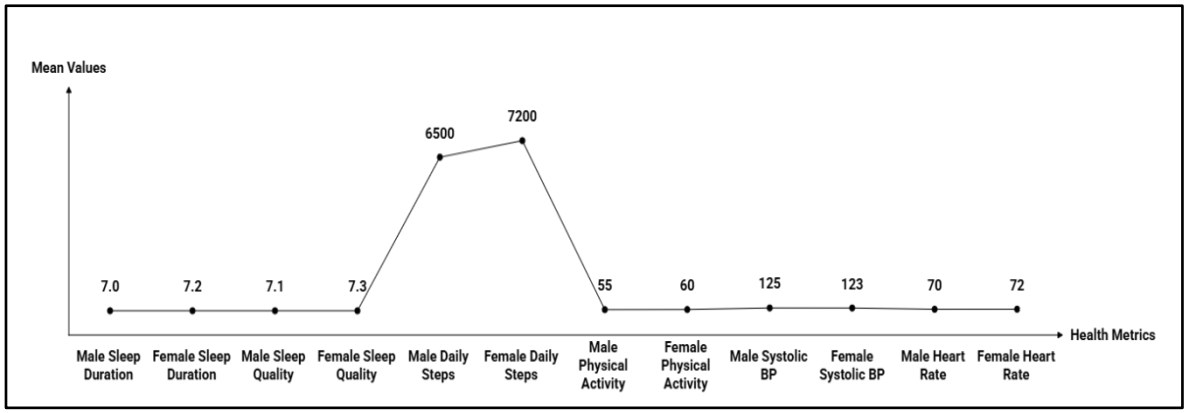

Fig. 3. Comparison of Health Metrics Between Genders

Age and Health Profile Relationships

Age showed partial significant relationships with the comprehensive health profile. Significant positive correlations were found between age and sleep quality ($r = 0.15$, $p = 0.03$), indicating that sleep quality tends to

improve slightly with age. Age was also significantly associated with sleep disorder prevalence ($\chi 2 = 10.5$, $p = 0.03$), BMI category ($\chi 2 = 12.3$, $p = 0.02$), and both systolic ($r = 0.20$, $p = 0.01$) and diastolic blood pressure ($r = 0.18$, $p = 0.02$). No significant relationships were found between age and sleep duration, physical activity level, daily steps, or heart rate (all p-values > 0.05).

Table 2. Statistical Significance of Health Metrics

Health Metric	Statistical Measure	Value	p-value	Significant?
Sleep Duration	Pearson Correlation (r)	0.08	0.12	No
Sleep Quality	Pearson Correlation (r)	0.15	0.03	Yes
Sleep Disorder Prevalence	Chi-Square Test	$\chi 2 = 10.5$	0.03	Yes
BMI Category	Chi-Square Test	$\chi 2 = 12.3$	0.02	Yes
Systolic BP	Pearson Correlation (r)	0.20	0.01	Yes
Diastolic BP	Pearson Correlation (r)	0.18	0.02	Yes

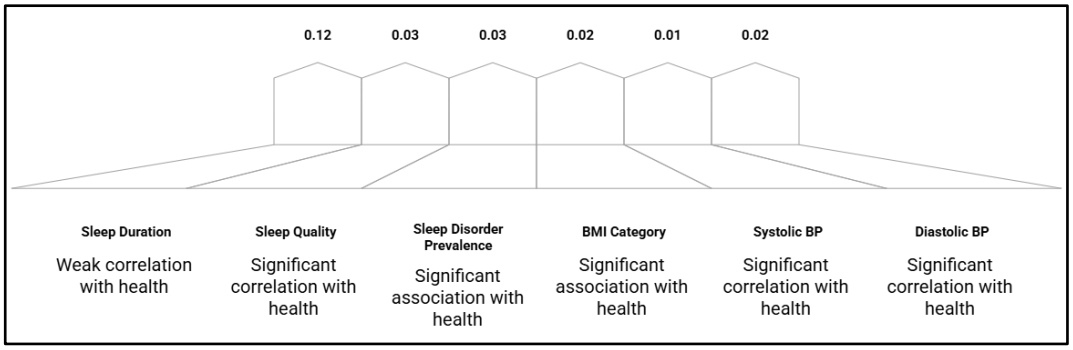

Fig. 4. Statistical Significance of Health Metrics

Health Metrics and Gender/Age Differences

Research indicates that Physical Education (PE) teachers face a complex health paradox, where despite their active profession, they are not immune to modern lifestyle risks, as evidenced by a study finding that 98% of Saudi female PE teachers exceeded 2 hours per day of screen-based sedentary activity (Alahmadi, 2021). This is compounded by significant mental health strains, with 24% of teachers showing high burnout and 40% moderate burnout (Chizhenok et al., 2023). These occupational hazards appear to manifest physiologically, with female teachers showing lower cardiovascular and respiratory function than males and both genders demonstrating low adaptation capabilities (Chizhenok et al., 2023). The overall quality of life for teachers is significantly influenced by modifiable behaviors, where physical activity and good sleep are linked to better outcomes, while medication use, poor diet, and lack of leisure lower them (Sanchez et al., 2019). Furthermore, the relationship between health and perception is complex, with older teachers reporting a slightly better quality of life and the causal direction between psychological age and health depending on gender and employment status (Sanchez et al., 2019), highlighting the need for a holistic approach to well-being in this professional group.

Sleep Duration and Quality

A large proportion of Physical Education teachers report insufficient and poor-quality sleep, with a study of Saudi female PE teachers revealing that 52% slept less than 7 hours per night on weekdays, a figure that improved to 20% on weekends as most compensated for weekday sleep loss (Alahmadi, 2021). Furthermore, the quality of their sleep is significantly compromised by environmental and lifestyle factors, with research attributing poor sleep quality among teachers to noise exposure, financial stress, and high screen time from TV

and internet use (Silva & Da Penha Carnevali, 2020).

P.E. Areas and Health Profile Relationships

The most compelling findings emerged from the analysis of P.E. areas handled and health profiles. Significant relationships were found for multiple health metrics, including physical activity level, daily steps, sleep quality, and BMI category (all $p < 0.05$). Post-hoc analyses revealed distinct patterns: Team Sports and Fitness & Conditioning teachers showed the highest physical activity levels and daily steps; Fitness & Conditioning teachers reported the best sleep quality; Health Education teachers showed the lowest sleep quality and highest prevalence of insomnia; and Dance teachers demonstrated lower average physical activity levels compared to more physically demanding specializations. Significant relationships exist between students' health-related problems, physical activity participation, and performance in physical education. (Hernandez, 2021)

Table 3. Impact of Physical Activity on Sleep Quality and BMI

P.E. Area	Key Characteristics
Dance	Lower physical activity level and daily steps
Team Sports	Higher daily steps and physical activity; higher sleep apnea prevalence
Fitness & Conditioning	Best sleep quality; high physical activity; favorable BMI profile
Health Education	Lowest sleep quality; higher stress; higher insomnia prevalence
Individual Sports	High activity but variable sleep disorder prevalence
Specialized Courses	Highest insomnia prevalence; predominantly overweight BMI

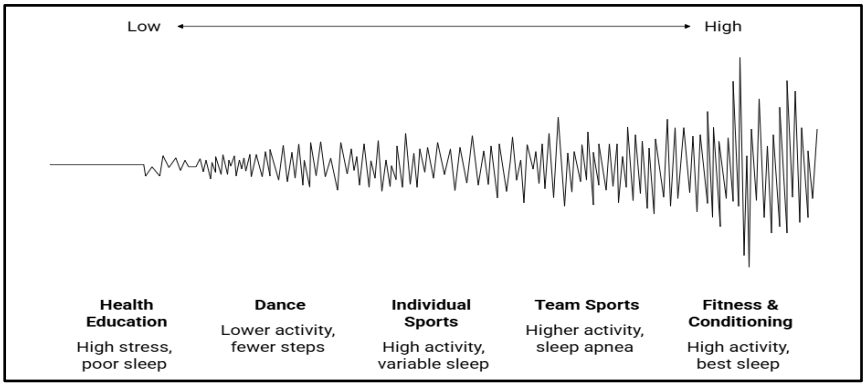

Fig. 5. Impact of Physical Activity on Sleep Quality and BMI

Discussion

This study provides the first comprehensive examination of how demographic and professional factors relate to sleep and health metrics among P.E. teachers. The findings reveal a complex pattern of relationships that has important implications for understanding occupational health in physical education.

Gender Effects

The minimal gender differences observed in this study contrast with some previous research that has reported more pronounced gender disparities in teacher health outcomes. The finding that females showed higher daily step counts aligns with some literature suggesting greater engagement in health-promoting behaviors among female educators. However, the absence of significant gender differences in sleep quality, stress levels, and most physiological measures suggests that within the P.E. teaching population, occupational demands may override typical gender-based health patterns.

Age-Related Patterns

The age-related findings present an interesting paradox: while cardiovascular indicators (blood pressure) and BMI showed expected age-related increases, sleep quality

actually improved with age. This counterintuitive finding may reflect adaptation strategies developed by more experienced P.E. teachers or could indicate survival bias, where those who continue in the profession develop better coping mechanisms. The increased prevalence of sleep disorders with age, despite better subjective sleep quality, suggests that objective sleep health may decline while subjective satisfaction improves, possibly due to adjusted expectations or adaptation.

Professional Specialization as a Primary Determinant

The most significant finding of this study is the strong relationship between P.E. specialization areas and health outcomes. This relationship was more pronounced than either gender or age effects, suggesting that the specific physical and cognitive demands of different P.E. specializations create distinct health profiles. The superior health metrics observed among Fitness & Conditioning teachers may reflect both the physical demands of their teaching specialty and their specialized knowledge of exercise science principles. Conversely, the poorer sleep and higher stress levels among Health Education teachers may reflect the cognitive demands and potentially sedentary nature of their teaching responsibilities.

The finding that Team Sports teachers showed high physical activity but also higher sleep apnea prevalence warrants further investigation. This could reflect the irregular scheduling demands of coaching responsibilities or other factors specific to team sport instruction.

Implications for Practice

These findings have several practical implications. First, wellness interventions for P.E. teachers should be tailored to specific teaching specializations rather than applying one-size-fits-all approaches. Health Education teachers may benefit from stress management and sleep hygiene interventions, while Dance teachers might benefit from programs designed to increase overall physical activity levels.

Second, the age-related cardiovascular changes observed in this relatively young professional population (mean age 38.9 years) suggest the need for early intervention and regular health monitoring. The improvement in sleep quality with age, while encouraging, should not overshadow the need for objective sleep health assessment and intervention for sleep disorders.

Limitations

Several limitations should be acknowledged. The cross-sectional design limits causal inferences about the relationships observed. The reliance on self-reported measures for some variables introduces potential bias, although this was mitigated by the inclusion of objective measurements where possible. The study was limited to P.E. teachers and findings may not generalize to other educator populations or geographic regions.

Conclusion

This study demonstrates that professional specialization within physical education teaching is a more significant predictor of health and sleep outcomes than traditional demographic factors such as gender and age. The distinct health profiles associated with different P.E. specializations suggest that targeted, specialty-specific wellness interventions may be more effective than generic approaches. These findings provide a foundation for developing evidence-based policies and interventions to support the health and well-being of P.E. educators.

Future research should employ longitudinal designs to better understand causal relationships and investigate the mechanisms underlying the observed specialization-specific health patterns. Additionally, intervention studies targeting the specific needs identified for each P.E. specialization could provide valuable insights for improving educator wellness programs.

The health and well-being of P.E. teachers is not only important for their personal quality of life but also for their effectiveness as health educators and role models for students. Understanding and addressing the unique health challenges faced by different P.E. specializations is therefore both a professional and public health imperative.

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