

ORIGINAL ARTICLE

Physical Literacy, Fitness, and Multidimensional Health Outcomes among MPhil Scholars in Sports Sciences: A Comparative Cross-Sectional Study of Cohorts at Health Services Academy, Islamabad

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This article may be cited as:

Luqman MS, Abbas SA, Rauf A, Razzaq FA; Physical Literacy, Fitness, and Multidimensional Health Outcomes among MPhil Scholars in Sports Sciences: A Comparative Cross-Sectional Study of Cohorts at Health Services Academy, Islamabad. Pak J Med Health Sci, 2025; 19(12): 9-15.

Received: 02-07-2025

Accepted: 26-12-2025

Published: 30-12-2025



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INTRODUCTION

Physical literacy in graduate education whose future heavily depends on data streams and looming deadlines, overwhelmingly in the dark months of the year, is establishing itself as something than an ideal idea in pedagogy, as it is a lifeline¹. Physical literacy is defined as

ABSTRACT

Background: Physical literacy has been widely acknowledged as the determinant of physical fitness and multidimensional health outcomes, which are usually among the students undertaking sports sciences programs. Nevertheless, there are a few studies on the impact of academic advancement on such parameters among postgraduate scholars.

Objective: To describe differences between first-year and second-year MPhil students in sports sciences in physical literacy, physical fitness, and multidimensional health outcomes, and to investigate predictive ability of physical literacy in all health-related outcomes.

Methods: The study was a comparative cross-sectional study carried out on 52 MPhil students of sports sciences in the Health Services Academy, Islamabad. The participants were separated into two groups, the first year (n = 28) and the second year (n = 24). The PLAY-self questionnaire was taken to measure physical literacy, field-based tests (aerobic capacity, flexibility, and muscular endurance) to measure physical fitness and the Duke Health Profile and the Spiritual Well-Being Scale to measure health outcomes. The difference between the group was compared with the independent t-tests, and regression analyses were achieved to determine the predictive associations between the physical literacy and health domains.

Results: Population On average, physical literacy (M = 76.1 vs. 68.2, p =.014, d=0.72), aerobic capacity (2,450 m vs. 2,210 m, p =.006, d=0.81), flexibility (28.4 cm vs. 24.7 cm, p =.012, d=0.74), physical health (78.5 vs. 70.2, p=.018, d=0) There were no significant differences in the muscular endurance, social health or spiritual health. Physical literacy turned out to be a precursor to all the health areas (= 33- 42, p <. 01), with the higher association between first-year scholars especially with psychological health (= .041).

Conclusion: The advancement of academics can be linked to physical literacy, choice of fitness elements and psychological health deterioration among scholars in sports sciences. The implementation of early-stage, curriculum-based wellness interventions would allow preserving embodied and psychological wellness among students during postgraduate training.

Keywords: Physical literacy, physical fitness, post graduate students, Health outcomes, sports sciences, psychological health, South Asia.

motivation, confidence, physical competence, knowledge and understanding to appreciate and engage in physical activity throughout life² whereas athletic performance is intended to influence cognitive resilience, emotional balance and affiliation in social relationships³⁻⁴. This construct could impose well among MPhil scholars of

sports sciences, as those individuals are well versed in the theory of human movement. But the facts in the institutions such as the Academy of Health Services in Islamabad indicate otherwise. The expenses of hours spent in seminar rooms and laboratories, as well as the cultural pressures supporting academic output and practice in health promotion do create a defining paradox; future health promotion leaders are becoming disenchanted by the same behaviors they study. In this cross-sectional comparison, the authors analyze the intersection of physical literacy with fitness and multidimensional health outcomes physical, psychological, social, and spiritual in two MPhil cohorts and find out that there is a crisis of tension in terms of expertise and enactment.

Ideally, researchers in sports sciences ought to be good physical examples: big aerobic capacity muscle endurance, quality mind due to constant movement and social energy due to joint action⁶. Rather, research requirements lead to numerous sedentary habits causing quantifiable losses in terms of lower VO₂ max, decreased flexibility, increased stress reactivity], which diminishes individual health and career integrity⁷⁻⁸. This gap is not trivial. Whenever individuals who are trained to preach it do not exemplify it, its consequences do not end with personal burnout to the further undermined health promotion messages among the general population.

The outcomes are short and long term. Speaking strictly, reduced physical competence raises the risk of injuries and chronic diseases susceptibility ironical given that it is a population specialist on preventing injuries. Is indirectly detrimental to mental health: students who are more sedentary have reported that they experience more anxiety and that their self-efficacy is diminished, which negatively affects research productivity⁹⁻¹¹. The gap in knowledge to be filled in this study is clear: the lack of cohort-comparative, context-specific data of physical literacy of scholars of advanced sports sciences in developing regions. Whereas international frameworks make physical literacy a health determinant throughout the lifespan empirical studies have focused on youth of Western settings. We take a controlled but ecologically valid approach showing intra-program variation not shown by larger surveys by designing a study that compares first and second years of MPhil and studies at only one institution. Inspired by the conceptual model of Cairney et al.¹¹ combining the affective, cognitive, and the physical domains, we find out whether physical literacy will mediate between fitness and multidimensional health even in the case of academic stress.

Objectives

1. To assess and compare levels of physical literacy, physical fitness, and multidimensional health outcomes between first- and second-year MPhil Sports Sciences cohorts at the Health Services Academy, Islamabad.
2. To examine associations between physical literacy, fitness indicators, and health outcomes across physical, psychological, social, and spiritual domains.

MATERIAL AND METHOD

Study Design and Setting: A comparative cross-sectional study design was adopted in this study and was used to assess physical literacy, physical fitness, and multidimensional health outcomes of MPhil scholars within the sports sciences. The research was carried out on the Health Services Academy, Islamabad, Pakistan, which has one of the most prominent curriculums offering high-level studies and training regarding the fields of public health and other related sciences, including sports sciences. The data collection took place in seven months, between September 2023 and March 2024 to follow the academic calendar and sample the participants at an enrolled stage and reduce the possibility of season effects on physical activity patterns based on weather or examinations.

The cross-sectional design also allowed a comparison of scholars in different phases of the MPhil program to be done time efficiently without following them over time. This strategy was suitable to measure prevalence, relationship and differences between cohorts in physical literacy and health-related results in a steady academic group. The research reduced this possible risk by delaying the attrition rate associated with graduate cohorts with extended follow-up due to program completion and relocation; therefore, increasing the feasibility and response rates and maintaining the methodological adequacy.

Ethical Considerations

A Department at the Health Services Academy, the Department of Health, Physical Education, and Sports Sciences, gave ethical consent to the study (Approval No. DRSC-HPSS-2023-08; dated August 10, 2023). The research was conducted in line with the institutional and national ethical guidelines that guaranteed that the participants were safe, confidential, and volunteered.

All participants were informed using written consent before beginning their participation. The study objectives, procedures, the possible risks (including short-term fatigue caused by the fitness testing), the foreseen benefits, and the fact that the participants were free to withdraw at any time with no penalty were presented to

the participants in a detailed information sheet. Consent forms were given both in English and Urdu to meet the language needs. The privacy of research participants was also ensured through the allocation of research participants with unique identification codes and placement of data over passworded systems, which were only accessible by the research team. Referral to institutional health services in case of discomfort during assessment was also provided but there were no such cases reported.

Population and Sampling of the study

The population used in the research was MPhil students undertaking Sports Sciences course at the Health Services Academy. There was a convenience sampling method of recruiting the eligible participants in both academic cohorts, with the aim of capturing most of the enrolled scholars, owing to the rather small group size of the program. In this special academic population the strategy permitted almost census representation and subgroup comparison statistical power.

Participants with recent enrollment in the MPhil program were included in criteria, age of 22-35 years and self-reported physical activity competence to engage in moderate exercise with no medical limitations. The exclusion criteria included acute musculoskeletal injuries, chronic medical conditions that impaired physical functioning or had recently experienced major life stressors that may have a significant impact on health outcomes. The last sample consisted of scholars of different academic and athletic backgrounds to represent the demographic structure of the sports science's postgraduate students in Pakistan.

Instruments and Measures

The validated and reliable tools were chosen to fully evaluate the physical literacy, physical fitness, and multidimensional health outcomes and guarantee the cultural appropriateness and practicality in an academic setting.

The measure of physical literacy involved the Physical Literacy in Adults (PLAYself), which is a multidimensional, self-report scale of measuring motivation, confidence, competence, and knowledge on physical activity. The contextual adaptation was also done at minor levels to add culture without changing the conceptual framework.

The physical fitness was measured with standardized field-based tests such as the Cooper 12-minute run as an aerobic capacity, a sit-and-reach test as a measure of flexibility, and protocols that measured the muscular endurance and strength such as push-ups and sit-ups. These tests were performed with simple gymnasium

equipment which could be accessed at the academy and were chosen because they were practical, reliable and their validity was proved in an adult population.

The Duke Health Profile that was used to assess multidimensional health outcomes by measuring physical, mental, and social health domains and to supplement Spiritual Well-Being Scale to assess spiritual health were determined. Such tools were chosen because of their conciseness, psychometric validity, and use in a wide variety of cultural settings.

Study Procedures

Recruitment of participants: They started in September 2023 and was conducted by announcing it during academic classes and departmental contacts. Informed consent was provided, interested scholars were taken through briefing sessions on the procedures of the study. After consent, the questionnaires were completed in a distraction-free supervised setting, and it took participants 20-30 minutes on average. The use of questionnaires before the actual physical testing reduced the chances of the response bias due to fatigue.

The physical fitness tests were to be conducted at the non-academic time at the indoor gymnasium of the academy. The normal warm up was used to minimize the risk of injury at the beginning of each session, which was then followed by increased cycle of aerobic, flexibility and muscular endurance tests that had sufficient rest time between them. The testing of all the assessments was controlled by a qualified sports trainer in order to be safe and with the standard testing procedures. The process of data collection was completed by March 2024, and the participants received appreciation messages and received an opportunity to request the aggregated study outcomes.

Outcome Measures

The physical literacy scores, physical fitness indicators, and multidimensional health domain scores, in the two academic cohorts, were the primary outputs. Physical literacy was measured as a compound mark of overall engagement at cognitive, affective as well as behavioral level. The aerobic capacity (distance covered), flexibility (centimeters reached) and muscular endurance (number of repetitions) were the physical fitness outcomes. Health outcomes entailed physical, psychological, social and spiritual well-being scores that were measured by taking validated measures.

Along with this, the secondary outcomes were the correlations between physical literacy and health domains which the research had the opportunity to investigate the predictive associations and potential mediating influences among the population of the study.

Data Analysis

IBM SPSS Statistics version 28.0 was utilised in the data analysis. The characteristics and outcomes measures of the participants were summarised using descriptive statistics, such as standard deviations, means, and frequencies. A check on the level of data distribution was done before the inferential tests were conducted. Independent samples t-tests or non-parametric tests where further necessary were used to run group comparisons between first-year and second-year scholars.

Correlation tests were conducted to determine the relationship between physical literacy and health outcomes, and finally, multiple linear regression software were used to determine the predictors by controlled population factors like age and gender. The level of statistical significance was considered to be $p < 0.05$ although multiple comparisons were adjusted accordingly where deemed necessary. The lack in data was negligible and was addressed with the proper statistics in order to provide the strength of analysis. Diagnostic testing was done to establish the regression assumptions so as to ensure the methodological validity and reliability of the results.

RESULTS

Objective 1: To Assess and Compare Levels of Physical Literacy, Physical Fitness, and Multidimensional Health Outcomes Between First- and Second-Year MPhil Cohorts

Hypothesis 1: Second-year MPhil scholars will exhibit lower physical literacy, fitness, and multidimensional health outcomes compared to first-year scholars due to increased academic burden and reduced time for physical engagement.

Of the 60 eligible scholars, 52 participated (86.7% response rate), yielding 28 first-year and 24 second-year respondents. Table 1 confirms cohort equivalence on demographics, enabling unbiased comparison.

Table 2 presents between-cohort comparisons. Hypothesis 1 was largely supported. First-year scholars scored significantly higher on physical literacy ($d = 0.72$), aerobic capacity ($d = 0.81$), flexibility ($d = 0.74$), physical health ($d = 0.69$), and psychological health ($d = 0.57$). Muscular endurance, social health, and spiritual well-being showed no significant differences ($p > .05$).

Hypothesis Test Summary:

- **Supported:** Physical literacy, aerobic fitness, flexibility, physical and psychological health decline from first to second year.

- **Not supported:** Muscular endurance, social, and spiritual health remain stable.
- **Implication:** Academic progression selectively erodes embodied and mental domains suggesting a critical intervention window in the first year.

Objective 2

To Examine Associations Between Physical Literacy, Fitness Indicators, and Health Outcomes Across Physical, Psychological, Social, and Spiritual Domains

Hypothesis 2

Higher physical literacy will be positively and significantly associated with better fitness and all four health domains, with associations stronger in the first-year cohort due to preserved motivation and engagement.

Bivariate correlations (Table 3) fully supported the first part of Hypothesis 2. Physical literacy correlated positively and significantly with all fitness indicators ($r = .39$ to $.62$, $p < .01$) and all health domains ($r = .37$ to $.56$, $p < .01$). Aerobic capacity showed the strongest links to physical and psychological health, while flexibility tied most to social health.

Multiple regression (Table 4) confirmed physical literacy as the dominant predictor across health domains ($\beta = .33$ to $.42$, $p < .01$), even after adjusting for fitness and cohort. A significant cohort \times physical literacy interaction ($p = .041$) in the psychological health model supported the second part of Hypothesis 2: the literacy–psych health link was stronger in first-years ($\beta = .45$) than second-years ($\beta = .30$).

Hypothesis Test Summary:

- **Fully supported:** Physical literacy predicts fitness and all health domains.
- **Partially supported:** Associations are stronger in first-year (interaction significant for psychological health; trend in others).
- **Implication:** Physical literacy is a modifiable upstream determinant early preservation yields amplified health returns.

Supplementary Analyses

Gender subgroup: Associations were stronger in males (PL \rightarrow fitness $r = .65$ – $.72$) than females ($r = .45$ – $.58$), though not significantly different (Fisher's z $p > .10$) suggesting cultural or access barriers may mute benefits in women.

Prior athletic experience: Experienced scholars ($n = 21$) had higher baseline literacy ($M = 79.3$ vs. 67.8 , $p = .003$) and stronger PL health links ($r = .60$ – $.68$ vs. $.40$ – $.52$) indicating experience amplifies literacy's protective role.

Sensitivity: Multiple imputation ($n = 3$ missing fitness values) preserved all significance patterns.

Table 1: Demographic Equivalence Between Cohorts

Variable	First-Year (n = 28)	Second-Year (n = 24)	Test Statistic	p
Age, M (SD)	26.2 (2.8)	28.7 (3.5)	t(50) = 1.62	.112
Male, n (%)	17 (60.7)	17 (70.8)	$\chi^2(1) = 0.57$.678
Prior athletic experience, n (%)	12 (42.9)	9 (37.5)	$\chi^2(1) = 0.15$.698
Urban residence, n (%)	22 (78.6)	18 (75.0)	$\chi^2(1) = 0.09$.765

Note. No significant differences; cohorts comparable.

Table 2: Cohort Comparisons: Objective 1 Outcomes

Outcome	First-Year M (SD)	Second-Year M (SD)	t(50)	p	Cohen's d	95% CI Diff
Physical Literacy (0–100)	76.1 (10.9)	68.2 (11.4)	2.54	.014	0.72	[1.8, 14.0]
Aerobic Capacity (m)	2,450 (320)	2,210 (290)	2.88	.006	0.81	[76, 404]
Flexibility (cm)	28.4 (5.2)	24.7 (4.9)	2.61	.012	0.74	[1.0, 6.4]
Muscular Endurance (reps)	22.6 (6.1)	20.9 (5.8)	1.02	.313	0.29	[-1.7, 5.1]
Physical Health (0–100)	78.5 (12.3)	70.2 (11.8)	2.45	.018	0.69	[1.5, 15.1]
Psychological Health (0–100)	75.6 (13.1)	68.4 (12.7)	2.01	.050	0.57	[0.0, 14.4]
Social Health (0–100)	72.1 (10.4)	67.3 (9.9)	1.72	.092	0.48	[-0.8, 10.4]
Spiritual Well-Being (20–120)	85.2 (14.6)	82.9 (13.8)	0.58	.565	0.16	[-5.9, 10.5]

Note. significant differences ($p < .05$).

Table 3: Correlations Supporting Hypothesis 2 (N = 52)

Variable	PL	Aero	Flex	ME	PhysH	PsychH	SochH	SpirWB
Physical Literacy (PL)	—	.62***	.48**	.39**	.56***	.51***	.44**	.37**
Aerobic Capacity (Aero)		—	.52***	.41**	.59***	.46**	.38*	.33*
Flexibility (Flex)			—	.36*	.44**	.40**	.41**	.29
Muscular Endurance (ME)				—	.38*	.34*	.32*	.30

Note. $p < .05$, * $p < .01$, ** $p < .001$.

Table 4 Regression Models: Physical Literacy as Predictor (Adjusted)

Outcome →	Physical Health	Psychological Health	Social Health	Spiritual Well-Being
Physical Literacy (β)	.42***	.38**	.35**	.33**
Cohort Interaction (p)	—	.041*	.089	.127
R ²	.48	.42	.36	.28

Note. All models control age, gender, fitness. $p < .05$ for interaction = stronger effect in first-year.

DISCUSSION

The results obtained in the current comparative cross-sectional study demonstrate that there is a significant decrease in physical literacy, chosen physical fitness areas, and attributes of multidimensional health as MPhil students in the fields of sports sciences advance through their first and second year of study. The levels of physical literacy, aerobic capacity, flexibility, physical health and psychological health of first-year participants were found to have a significant difference with second-year participants with medium to large effect sizing the practical importance of this difference. Moreover, physical literacy became a significant predictor of both fitness and health domains, and higher correlations were found between first-year scholars. Such trends indicate

that the academic advancement could be linked with the declines in the sense of embodied competence and mental health, even in those students who are in a program devoted to health and physical activity¹³.

The witnessed drop in cohorts can be attributed to growing academic workload, research performances, and time limitations that are associated with advanced levels of postgraduate learning. Even though the scholars of the field of sports sciences have theoretical background about the importance of physical activity and health promotion, there is a lack of time to engage in physical activity due to academic obligations competing with each other^{14,16}. This observation shows that there might be a mismatch between knowledge and practice, whereby the main focus should not be on the expertise itself but rather on its continued use to ensure lasting health behaviors. The

results also indicate that aspects of physical literacy that bring about motivational and confidence issues can be more susceptible to the effects of academic stresses in the long run.

The rich links that have been observed between physical literacy and health outcomes are supporting the idea of the multidimensional construct with physical, cognitive, and affective dimensions, which can be applied to physical literacy to determine an individual health condition. The positive associations between aerobic fitness and psychological health suggest that the more literate individuals can be prepared to stay active in their lives and overcome stresses. In spite of lower spiritual well-being correlations, it was found to have something to do with it, which demonstrates that the dimensions of holistic health are still related despite cultural differences that in this context, the role of spiritual coping mechanisms in coping with stress cannot be overlooked¹⁶⁻¹⁸.

Noteworthy, these theoretical implications of the findings are that the stronger predictive results were found to exist among first-year scholars, suggesting potential benefits of the postgraduate education beginning in early years as a time of creating sustainable health behaviours. With the increased pressure on academic performance, the safeguarding effect of physical literacy might be eroded, unless it is actively affirmed by the supportive institutional conditions. The latter results assist in the idea that physical literacy is not a static concept, as it is influenced by environmental requirements and contextual forces in academic institutions¹⁷⁻²⁰.

Theoretically, the findings add to the knowledge of physical literacy because they prove that it is a predictive tool in a niche academic group. The results indicate that the intellectual and physical realms cannot be considered as independent of each other; instead, both of them work together in educational settings. Such viewpoint advocates a combined approach of embodied scholarship where cognitive functions, physical and mental active lives are the mutually supporting sections of the student development^{9,15,21}.

Practical implications and policy implications of the study are also present. Studies that are taught in sport sciences and subjects related to health should contemplate introducing a well-designed wellness program in the curriculum that will also guarantee physical literacy and health of the pupils throughout the course of the study. The deterioration reported in the later stages of the program can be averted by applying early intervention measures, mentorship sessions, and physical activity flexibility measures. The future professionals can also be prepared to model the healthy

behaviors in their respective fields through such efforts. The overall social and spiritual welfare is a good sign that the specified kind of intervention can prove to be the most effective in terms of covering the physical and mental components of well-being²¹⁻²³.

It does have a number of limitations however which must be mentioned despite its contributions. The cross-sectional design does not permit the understanding of causation because the differences between cohorts could be attributed to some factors that occurred previously but not the program. The potential of recall and social desirability bias arises as a result of the self-reported measures of physical literacy, but the aspect of the objective approach to the fitness measure somewhat eliminates the point of concern. One of the convenience samples adopted in this research was a sample of one institution and the samples size was quite limited thus, this might limit the generalizability of the study results to other academic settings or populations. There are other unquantifiable variables, such as dieting, sleeping habits and external stressful demands, which may have worked out as well.

In order to make more assertive conclusions, future researches must introduce longitudinal designs that will follow up on the physical literacy and health advancements throughout the postgraduate studies. The evidence of an effective strategy to sustain student health may be supported with the help of research, which is based on intervention to intervene and evaluate the curriculum-based wellness programs. The research would be more likely to reach the external validity by increasing the sample to different institutions and distinct demographics, but incorporating the qualitative approach to the research could assist in comprehending more situational barriers and enabling mechanisms influencing physical literacy. More elucidation on the two way relationship on literacy, fitness and health outcome can be achieved by employing sophisticated forms of analysis that may ultimately lead to scalable intervention in order to develop healthier academic settings.

CONCLUSION

To sum it up, this inquiry is an important step towards the realization of the impact of special academic training on the same health constructs, that it is supposed to promote. It questions the institutions to live by the principle they preach in opening up more healthy and sustainable ways of educating in the sciences of physical activity, and thus, indirectly, in the contemporary knowledge economy where physical and intellectual well-being are becoming more and more inseparable.

DECLARATION

The authors thank the participants from the Health Services Academy, Islamabad, for their time and involvement. Special appreciation to the Departmental Research Supervisory Committee and the sports sciences faculty for facilitating recruitment.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contributions: Conceptualization: Muhammad Safdar Luqman; Methodology: Muhammad Safdar Luqman; Data Curation: Muhammad Safdar Luqman; Formal Analysis: Muhammad Safdar Luqman; Writing Original Draft: Muhammad Safdar Luqman; Writing Review & Editing: Muhammad Safdar Luqman.

Conflicts of Interest: The authors declare no conflicts of interest.

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