P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (RJIF): 5.93
IJPESH 2025; 12(4): 445-448

https://www.kheljournal.com
Received: 12-06-2025
Accepted: 15-07-2025

Tashi Yangzom
Physical Training Instructor, Govt Degree College Nubra, Ladakh, India

Corresponding Author:
Tashi Yangzom
Physical Training Instructor, Govt Degree College Nubra, Ladakh, India

Physical activity levels among college-going students in Ladakh: Insights from the Healthy Lifestyle Scale (HLS)

Tashi Yangzom

DOI: https://www.doi.org/10.22271/kheljournal.2025.v12.i4g.3934

Abstract
This study assesses physical activity (PA) levels among college-going students in Ladakh using the Physical Activity subdomain of the Healthy Lifestyle Scale (HLS), a validated tool tailored for regions with extreme climates. Data were collected via self-reported yes/no responses to five HLS items focusing on moderate, vigorous, flexibility, muscle-strengthening activities, and adaptation to weather conditions. Results indicate a mean PA score of 2.65 (SD=1.20) out of 5, with 11.76% of participants classified as low (scores 0-1), 64.05% as moderate (scores 2-3), and 24.18% as high (scores 4-5). Item-level analysis showed high engagement in moderate PA (81.70%) and weather adaptation (83.66%) but lower rates in vigorous (28.76%), flexibility (42.48%), and muscle-strengthening activities (28.10%). These findings highlight climate-related barriers in Ladakh, such as harsh winters, which may limit diverse PA despite strong adaptive intentions. Implications include the need for targeted interventions like indoor exercise programs to promote health among youth in the Himalayan regions.

Keywords: Ladakh, physical activity, college students, healthy lifestyle scale, extreme climates

Introduction
Physical activity (PA) is widely recognized as a fundamental component of health promotion, playing a critical role in reducing the risk of chronic diseases such as obesity, cardiovascular conditions, and diabetes, while also enhancing mental well-being, cognitive function, and overall quality of life (Bernard *et al*., 2021) [4]. For college students, a demographic often characterized by transitional lifestyles involving increased academic pressures, irregular schedules, and reduced structured physical opportunities, maintaining sufficient PA levels becomes particularly challenging (Baviskar *et al*., 2023) [3]. In the Indian context, research has revealed significant variability in PA patterns among university students, with many reporting low to moderate engagement that falls short of recommended guidelines (Gupta *et al*., 2021) [9]. For example, one study among medical students found that 41.3% reported high PA, 43.2% moderate, and 15.4% low, indicating inconsistencies influenced by factors such as academic demands and environmental constraints (Singh *et al*., 2015) [16]. Another investigation highlighted even more concerning trends, with 63.2% of students exhibiting low PA levels, 27.8% moderate, and only 9% high, underscoring the urgent need for region-specific interventions to address these disparities (Gupta *et al*., 2021) [9].
In remote and high-altitude Himalayan regions like Ladakh, these challenges are compounded by extreme climatic conditions, including prolonged icy winters with temperatures dropping below freezing, dry summers with intense UV exposure, high altitudes exceeding 3,000 meters, and limited sunlight during certain seasons, all of which can severely restrict opportunities for outdoor PA (Bhat & Bashir, 2022; Bhat & Rather, 2024) [5, 6]. Climate change further intensifies these issues, manifesting through rising global temperatures, accelerated glacier retreat, erratic precipitation patterns, and an increase in extreme weather events such as floods, droughts, and landslides, which collectively lead to habitat fragmentation and diminished accessibility to natural spaces for physical recreation (Anzorov & Moryakina, 2024; Steiger *et al*., 2019; Scott *et al*., 2007) [1, 17, 15].

Such environmental shifts not only promote sedentary behaviors, especially during extended winter isolation, but also heighten vulnerabilities to both infectious diseases and non-communicable diseases, including respiratory issues and mental health disorders exacerbated by seasonal affective disorder (Demmler & Qaim, 2022; Demmler *et al*., 2017) [7, 8]. Moreover, adverse weather conditions, such as extreme cold or heat, have been consistently identified as significant barriers to PA, often resulting in reduced participation in outdoor exercises and increased time spent indoors in sedentary pursuits (Katapally *et al*., 2015; Mohan *et al*., 2006; Schneider *et al*., 2022) [11, 13, 14].

Despite these pressing concerns, there remains a notable gap in empirical research focusing on PA among Ladakh's youth population, a group that is particularly vulnerable due to the region's historically limited higher education infrastructure and unique socio-cultural adaptations to high-altitude living (Babu, 2023) [2]. Ladakh's youth, often navigating the intersection of traditional nomadic lifestyles and modern educational demands, face additional hurdles such as limited access to sports facilities and cultural shifts toward more urbanized, less active routines (Bhat & Rather, 2024) [6]. Addressing this gap is essential, as promoting PA in such contexts can foster resilience against climate-induced health risks and support sustainable community well-being (Winter *et al*., 2020) [19].

The Healthy Lifestyle Scale (HLS) emerges as a particularly apt instrument for this investigation, as it is a 29-item tool specifically developed and validated for populations residing in extreme climates like those in Jammu, Kashmir, and Ladakh (Wani *et al*., 2025) [18]. Drawing from a validation study involving 517 adults, the HLS demonstrates robust psychometric properties, including high test-retest reliability (r=0.855) and strong convergent validity through positive correlations with established measures such as the Health-Promoting Lifestyle Profile-II (HPLP-II), (Wani *et al*., 2025) [18]. The Physical Activity domain of the HLS, which consists of five items scored on a binary yes/no basis (range: 0-5), comprehensively evaluates key aspects of PA, including moderate and vigorous activities, flexibility and muscle-strengthening exercises, and crucially, adaptations to adverse weather conditions, with normative categories defined as low (0-1), moderate (2-3), or high (4-5), (Wani *et al*., 2025) [18].

This study leverages the whole Physical Activity subdomain of the HLS to examine PA levels among college students in Ladakh, aiming to delineate engagement patterns, benchmark against established norms, and propose tailored interventions that account for the region's climatic and cultural specificities. Doing so contributes to a deeper understanding of health-promoting behaviors in underserved Himalayan youth and informs public health strategies amid ongoing environmental changes.

Methods

Participants

The study sample comprised 153 college-going students from various institutions in Ladakh, India. Participants were selected through convenience sampling, a practical approach given the region's remote geography and logistical challenges. Inclusion criteria required participants to be aged 18 years or older and currently enrolled in higher education programs. Notably, no additional demographic variables, such as gender, specific age brackets, socioeconomic status, or academic discipline, were collected, which limits the potential for stratified analyses but aligns with the exploratory nature of this research focused primarily on aggregate PA patterns.

Instrument

The Physical Activity subdomain of the HLS was employed in its entirety, encompassing five items designed to capture a holistic view of PA behaviors in extreme climates (Wani *et al*., 2025) [18]:

- **Item 1:** Most days, I engage in at least 30 minutes of moderate physical activity (e.g., brisk walking, household chores). (YES/NO)
- **Item 2:** I participate in vigorous physical activities (e.g., jogging, cycling) for at least 20 minutes three days a week. (YES/NO)
- **Item 3:** I include flexibility exercises (e.g., stretching, yoga) at least three times a week in my routine. (YES/NO)
- **Item 4:** I perform muscle-strengthening exercises (e.g., bodyweight, resistance training) at least twice a week. (YES/NO)
- **Item 5:** I take steps to stay active regardless of weather conditions (e.g., snow, extreme heat). (YES/NO)

Each affirmative "YES" response was scored as 1 point, while "NO" was scored as 0, resulting in a total possible score range of 0-5. The categorization adhered to the original HLS norms: low (0-1), moderate (2-3), and high (4-5), which are based on empirical data from similar populations and reflect degrees of adherence to health-promoting PA (Wani *et al*., 2025) [18].

Procedure

Data collection involved self-administered questionnaires distributed in person or via digital platforms, in line with HLS administration guidelines emphasizing flexibility for low-literacy or remote populations (Wani *et al*., 2025) [18]. Ethical protocols were followed, including obtaining informed consent from all participants and ensuring anonymity to protect privacy, particularly in a close-knit community like Ladakh.

Data Analysis

Descriptive statistical analyses were conducted using SPSS version 25 to compute means, standard deviations, frequency distributions, and percentages. Total scores were calculated by summing item responses, and participants were categorized according to HLS norms. Item-level analyses focused on the proportion of "YES" responses to identify specific strengths and weaknesses in PA engagement. No inferential statistics were applied due to the absence of demographic variables for comparative testing.

Results

The overall mean PA score for the sample was 2.65 (SD=1.20), with individual scores spanning the full range from 0 to 5. This average suggests a moderate level of PA engagement across the group, positioned roughly at the midpoint of the scale's possible range.

Table 1: Presents the distribution of total PA scores, illustrating the frequency and percentage of participants at each score level

Score	Count	Percentage (%)
0	4	2.61
1	14	9.15
2	66	43.14
3	32	20.92
4	22	14.38
5	15	9.80

Interpretation of Table 1: The score distribution reveals a pronounced clustering in the moderate range, with the highest frequency at score 2 (43.14%), followed by score 3 (20.92%). This pattern indicates that most students (64.05% in moderate categories) engage in some but not comprehensive PA, potentially reflecting partial adaptation to academic and climatic demands. Lower scores (0-1) account for only 11.76%, suggesting that outright inactivity is relatively rare, while higher scores (4-5) represent 24.18%, highlighting a subset of highly active individuals who may serve as models for peers. Overall, this distribution aligns with moderate predominance as per HLS norms but underscores opportunities for elevating more students to high levels through targeted support (Wani *et al*., 2025) [18].

Categorization based on HLS norms further elucidates the sample's PA profile: 11.76% (N=18) classified as low, 64.05% (N=98) as moderate, and 24.18% (N=37) as high.

Table 2: Details the item-level engagement, showing the count and percentage of "YES" responses for each of the five items

Item	Description	Yes Count	Yes Percentage (%)
1	Moderate PA	125	81.70
2	Vigorous PA	44	28.76
3	Flexibility exercises	65	42.48
4	Muscle-strengthening	43	28.10
5	Weather adaptation	128	83.66

Interpretation of Table 2: Item-level data highlight clear disparities in PA types, with exceptionally high endorsement for weather adaptation (83.66%) and moderate PA (81.70%), indicating strong resilience and integration of everyday activities like walking or chores into routines despite Ladakh's harsh environment. In contrast, vigorous PA (28.76%) and muscle-strengthening exercises (28.10%) show markedly lower engagement, possibly due to barriers like limited access to facilities or energy demands at high altitudes. Flexibility exercises fare moderately (42.48%), suggesting some cultural affinity for practices like yoga, but room for enhancement. This granular view emphasizes the need for interventions that build on strengths (e.g., adaptation) while addressing gaps in more intense activities to achieve balanced PA profiles (Bernard *et al*., 2021; Wani *et al*., 2025) [4, 18].

Discussion

The results portray a predominantly moderate PA landscape among Ladakh college students, with a mean score of 2.65 out of 5 representing approximately 53% of the maximum achievable, indicative of inconsistent yet not negligible engagement in health-promoting behaviors (Wani *et al*., 2025) [18]. The low prevalence of low-category scores (11.76%) is encouraging when compared to broader Indian student samples, where low PA rates can exceed 15-63% (Singh *et al*., 2015; Gupta *et al*., 2021) [16, 9], potentially reflecting inherent adaptations in Ladakh's population to high-altitude demands that incorporate moderate movement into daily life (Bhat & Rather, 2024) [6]. However, the 24.18% high-category rate falls short of ideal benchmarks, suggesting that while a quarter of students demonstrate robust PA, the majority could benefit from enhanced support to transition from moderate to high adherence.

High engagement in moderate PA and weather adaptation aligns with socio-cultural norms in rural Himalayan settings, where household chores and adaptive strategies (e.g., indoor alternatives during snow) serve as natural PA outlets (Manhas, 2011) [12]. Conversely, the low rates in vigorous and muscle-strengthening activities may stem from structural barriers, including scarce gym facilities, high-altitude hypoxia reducing exercise capacity, and climate-induced restrictions that discourage intense outdoor efforts (Bernard *et al*., 2021; Jayawardena *et al*., 2013; Schneider *et al*., 2022) [4, 14]. Flexibility exercises, moderately endorsed, could leverage local traditions like yoga, which has deep roots in Indian culture and offers low-barrier options for extreme environments (Bhat & Bashir, 2022) [5].

Benchmarking against HLS norms, the sample's moderate skew with higher adaptation rates suggests greater resilience than anticipated in the validation cohort, yet persistent gaps in structured PA echo global trends where climate change disrupts recreational opportunities (Steiger *et al*., 2019; Anzorov & Moryakina, 2024) [17, 1]. In the Himalayas, phenomena like increased snowfall and temperature variability limit access and amplify health risks, necessitating adaptive public health responses (Scott *et al*., 2007; Demmler & Qaim, 2022) [15, 7].

These findings have multifaceted implications. Educationally, universities in Ladakh could integrate PA programs, such as indoor yoga sessions or community sports, to boost vigorous and strength components (Winter *et al*., 2020; Manhas, 2011) [19, 12]. Policy-wise, investments in climate-resilient infrastructure, like heated gyms, could mitigate barriers (Bhat & Bashir, 2022) [5]. Culturally, promoting traditional activities (e.g., trekking) as modern health practices may enhance engagement (Babu, 2023) [2]. Limitations include the lack of demographics for nuanced analyses, self-report biases potentially inflating scores, and the cross-sectional design precluding causality inferences. Future studies should employ objective measures like accelerometers, include full HLS domains for holistic lifestyle assessment, and adopt longitudinal approaches to track PA changes amid climate shifts (Bernard *et al*., 2021) [4].

Conclusion

In summary, Ladakh college students display moderate PA

levels, excelling in moderate activities and weather adaptation but lagging in vigorous and strength-based exercises, likely due to extreme climatic influences. The HLS framework (Wani *et al*., 2025) [18] proves invaluable for culturally sensitive assessment, revealing actionable insights for health promotion. Stakeholders must prioritize resilient, community-driven interventions to cultivate active lifestyles, safeguarding Himalayan youth against environmental and health challenges.

References

1. Anzorov V, Moryakina S. Climate change in mountainous regions and its impact. Reliability: Theory & Applications. 2024;SI(6). Available from: https://www.gnedenko.net/Journal/2024/SI_062024/RTA_SI062024-115_59_Svetlana%20Moryakina%20Vakha%20Anzorov%20Climate%20change%20in%20mountainous%20regions%20and%20its%20impact.pdf
2. Babu GSS. Mobilisation of Ladakhi youth in Himalaya, India. Sociol Bull. 2023;72(4):456-72. https://doi.org/10.1177/00380229231212885
3. Baviskar MP, Hajare ST, Dongre AR. Patterns of physical activity among university students and their perceptions about the curricular content concerned with health: Cross-sectional study. JMIR Form Res. 2023;7:e31552. https://doi.org/10.2196/31552
4. Bernard P, Chevance G, Kingsbury C, Baillot A, Romain AJ, Molinier V, *et al*. Climate change, physical activity and sport: A systematic review. Sports Med. 2021;51(5):1041-1059. https://doi.org/10.1007/s40279-021-01439-4
5. Bhat SA, Bashir M. Impact of climate change in physical activity and competitive sports: Adaptive measures and evaluating future impacts in Arunachal Pradesh, India. ResearchGate; 2022. https://doi.org/10.13140/RG.2.2.24938.95689
6. Bhat SA, Rather RA. Understanding health trends in Ladakh region: Insights into disease burden and healthcare utilization. BMC Res Notes. 2024;17(1):99. https://doi.org/10.1186/s13104-024-06765-0
7. Demmler KM, Qaim M. Intention to engage in mountain sport during the summer season in climate-changing Alps: Investigating socioeconomic and lifestyle determinants for active and passive mountain sports. Front Public Health. 2022;10:930094. https://doi.org/10.3389/fpubh.2022.930094
8. Demmler KM, Klasen S, Nzuma JM, Qaim M. Supermarket purchase contributes to nutrition-related non-communicable diseases in urban Kenya. PLoS One. 2017;12(9):e0185148. https://doi.org/10.1371/journal.pone.0185148
9. Gupta R, Sharma A, Swaminathan S. Patterns of physical activity and its association with gender and overweight among college students: A cross-sectional study. J Health Allied Sci NU. 2021;11(3):123-8. https://doi.org/10.1055/s-0041-1729470
10. Jayawardena R, Byrne NM, Soares MJ, Katulanda P, Yadav B, Hills AP. High dietary diversity is associated with obesity in Sri Lankan adults: An evaluation of three dietary scores. BMC Public Health. 2013;13:314. https://doi.org/10.1186/1471-2458-13-314
11. Katapally TR, Rainham D, Muhajarine N. Factoring in weather variation to capture the influence of urban design on active transport: A temporal analysis of rainfall effects. Landsc Urban Plan. 2015;138:1-5. https://doi.org/10.1016/j.landurbplan.2014.12.012
12. Manhas S. Holistic approach to wellness: A case study of Himalayas. J Hosp Tour Cases. 2011;3(2):1-10. Available from: https://www.chrie.org/assets/docs/JHTC-case-notes/JHTC-vol-3/JHTC_Vol3Issue2_Manhas-Case.pdf
13. Mohan V, Shanthirani CS, Deepa M, Datta M, Williams OD, Deepa R. Community empowerment: a successful model for diabetes control in India. Diabetes Res Clin Pract. 2006;74(1):51-57. https://doi.org/10.1016/j.diabres.2006.03.006
14. Schneider S, Momi S, Popovich ML. Climate change: Impacts on outdoor activities in the summer and winter. Weather Clim Soc. 2022;14(1):85-99. https://doi.org/10.1175/WCAS-D-21-0032.1
15. Scott D, Jones B, Konopek J. Implications of climate and environmental change for nature-based tourism in the Canadian Rocky Mountains: A case study of Waterton Lakes National Park. Tour Manag. 2007;28(2):570-9. https://doi.org/10.1016/j.tourman.2006.04.020
16. Singh H, Merchant AM, Singla P. Prevalence and patterns of physical activity among medical students in Bangalore, India. Electron Physician. 2015;7(1):933-937. https://doi.org/10.14661/2015.933-937
17. Steiger R, Scott D, Abegg B, Pons M, Aall C. A critical review of climate change risk for ski tourism. Curr Issues Tour. 2019;22(11):1343-1379. https://doi.org/10.1080/13683500.2017.1410110
18. Wani IA, Choudhary S, Awan AM, Ganaie MUD, Nissa B, Shah MM, *et al*. Development and validation of the Healthy Lifestyle Scale (HLS) for regions with icy winters and dry summers. Univ J Public Health. 2025;13(3):726-745. https://doi.org/10.13189/ujph.2025.130321
19. Winter PL, Selin S, Cerveny L, Bricker K. Outdoor recreation, nature-based tourism, and sustainability. Sustainability. 2020;12(1):81. https://doi.org/10.3390/su12010081