The Academic
International Journal of Multidisciplinary Research

An Online Peer Reviewed / Refereed Journal
Volume 4 | Issue 5 | May 2026
ISSN: 2583-973X (Online), SJIF IF: 5.6
Website: www.theacademic.in

High-Intensity Interval Training and Its Effects on Physical, Cognitive and Psychosocial Skills Relevant to Employability among Young Adults in Higher Education: A Systematic Review (2020–2025)

Mohd Sartaz [a,*], Sandeep Kumar [a]

[a] Department of Physical Education, Swami Vivekanand Subharti University, Meerut -250005,Uttar Pradesh India, Sjkhan94@gmail.com

Address of Correspondence Author: * Department of Physical Education, Swami Vivekanand Subharti University, Meerut -250005, Uttar Pradesh India

DOI : https://doi.org/10.5281/zenodo.20606687

ARTICLE DETAILS

Research Paper

Accepted: 19-05-2026

Published: 10-06-2026

Keywords:

High-intensity Interval training, Higher Education, Cognitive Skills, Psychosocial Skills, Employability.

ABSTRACT

High-Intensity Interval Training (HIIT) has emerged as a time-efficient exercise strategy widely adopted in educational and community settings. While its physiological benefits are well established, growing evidence suggests that HIIT may also influence cognitive and psychosocial domains that are indirectly linked to employability-related skills such as attention, stress regulation, emotional resilience and task performance. However a consolidated synthesis of recent evidence focusing on young adults in higher education is limited. This systematic review aimed to synthesize evidence published between 2020 and 2025 on the effects of HIIT on physical, cognitive and psychosocial skills relevant to employability among young adults enrolled in higher education. A systematic literature search was conducted using PubMed, Scopus, Web of Science and Google Scholar following PRISMA guidelines. Studies involving young adults or university students that implemented HIIT interventions and reported physical, cognitive or psychosocial outcomes were included. Randomized controlled trials, quasi-experimental studies, feasibility studies and systematic reviews were eligible. Data extraction included study design, sample characteristics, intervention protocols,

outcome measures and key findings. A narrative synthesis was performed due to methodological heterogeneity. From 1342 records identified, eight studies met the inclusion criteria. The findings consistently demonstrated improvements in physical fitness parameters such as cardiorespiratory fitness and body composition. Several studies reported enhancements in cognitive outcomes, including executive function, inhibitory control and task-switching ability. Psychosocial benefits, particularly reductions in stress, depressive symptoms and improved engagement and enjoyment, were also observed. These outcomes reflect competencies relevant to employability, including cognitive flexibility, emotional regulation, and resilience. HIIT appears to be an effective intervention for improving physical fitness and shows promising effects on cognitive and psychosocial skills among higher education students. Although direct measures of employability are limited, the observed benefits support the inclusion of HIIT within higher education frameworks to promote holistic student development and work-readiness.

INTRODUCTION

High-Intensity Interval Training (HIIT) has gained considerable attention in recent years as a time-efficient exercise modality capable of producing substantial physiological adaptations. HIIT typically involves short bouts of high-intensity activity alternated with periods of rest or low-intensity recovery. Extensive evidence demonstrates its effectiveness in improving cardiorespiratory fitness, metabolic health and body composition across diverse populations (Gibala et al., 2020; Weston et al., 2022).

In the context of higher education, young adults face increasing academic demands, psychological stress and sedentary lifestyles, which may negatively affect both physical health and cognitive performance. Cognitive functions such as attention, executive control, working memory and decision-making are essential for academic success and professional competence. Recent studies suggest that HIIT may positively influence these cognitive domains by enhancing cerebral blood flow, neuroplasticity and brain-derived neurotrophic factor (BDNF) levels (Mielniczek, 2024; Pontifex et al., 2021).

Beyond cognitive benefits, psychosocial attributes including emotional regulation, stress resilience, motivation and self-efficacy are increasingly recognized as core components of employability. Research among university students indicates that HIIT interventions can reduce perceived stress, anxiety and depressive symptoms while improving mood and exercise enjoyment (Philippot et al., 2022; Sun et al., 2024). These psychosocial outcomes are closely aligned with employability-related skills such as adaptability, teamwork and sustained work engagement.

Despite the growing body of literature, existing research is fragmented, with limited synthesis focusing simultaneously on physical, cognitive and psychosocial outcomes relevant to employability. Therefore, a systematic review of recent evidence is warranted. The present review aims to synthesize studies published between 2020 and 2025 examining the effects of HIIT on physical fitness, cognitive functioning and psychosocial skills among young adults in higher education.

Methods

Search Strategy

A systematic literature search was conducted in PubMed, Scopus, Web of Science and Google Scholar for studies published between January 2020 and June 2025. Search terms included combinations of: "high-intensity interval training," "HIIT," "young adults," "university students," "higher education," "cognitive function," "psychosocial" and "employability."

Inclusion and Exclusion Criteria

Studies were included if they:

(a) Involved young adults or higher education students

(b) Implemented a HIIT intervention

(c) Reported physical, cognitive or psychosocial outcomes.

Studies were excluded if they focused on non-HIIT interventions, involved clinical populations outside the target age group or were published outside the specified time frame.

Study Selection and Data Extraction

Study selection followed PRISMA 2020 guidelines. Data extracted included author, year, study design, sample characteristics, intervention duration, and outcome domains.

Data Synthesis

Due to heterogeneity in study designs and outcome measures, a narrative synthesis approach was adopted. Tables and figures were used to enhance clarity and transparency.

Study Selection

The systematic search across electronic databases yielded a total of **1342 records**. After removing duplicates, **1120 records** remained for title and abstract screening. Of these, **1088 records** were excluded due to irrelevance, leaving **32 full-text articles** for eligibility assessment. Following full-text review, **24 articles** were excluded for reasons such as non-HIIT interventions, inappropriate population, or lack of relevant outcomes. Finally, **eight studies** met all inclusion criteria and were included in the systematic review.

Table 1. PRISMA-Based Study Selection Process

Stage	Number of Records
Records identified through databases	1342
Records after duplicates removed	1120
Records screened (title/abstract)	1120
Records excluded	1088
Full-text articles assessed	32
Full-text articles excluded	24
Studies included in review	8

Table 1

The numerical summary of the study selection process is presented in **Table 1**, while the visual representation of the screening and inclusion process is illustrated using the PRISMA flow diagram in **Figure 1**.

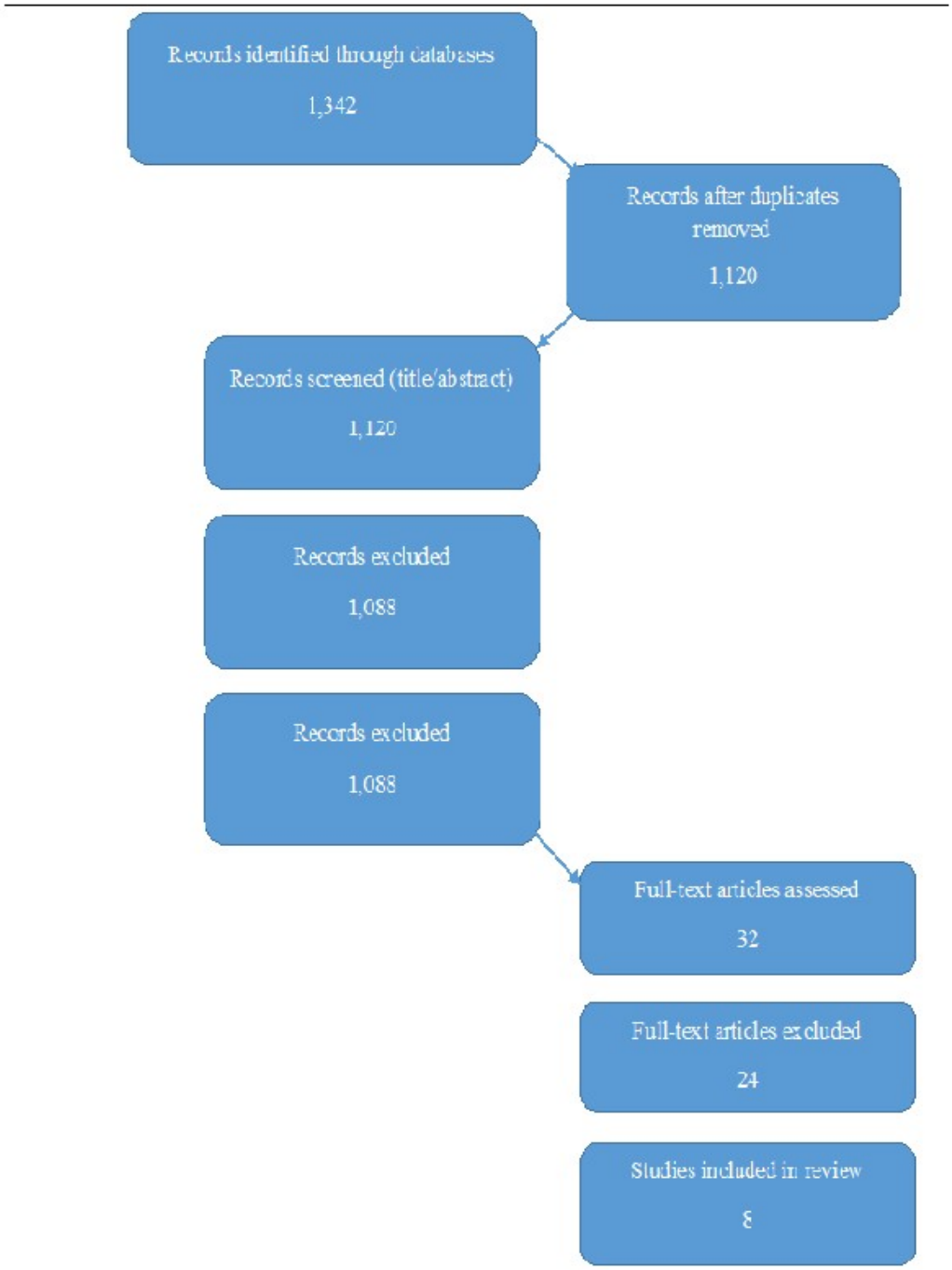


Figure 1

Figure 1. PRISMA 2020 flow diagram illustrating the study selection process (numerical data presented in Table 1).

Characteristics of Included Studies

The general characteristics of the included studies are summarized in **Table 2**. The studies were published between 2021 and 2025 and involved young adults or students enrolled in higher education institutions. The study designs included randomized controlled trials, intervention-based studies, systematic reviews/meta-analyses and feasibility or program evaluation studies. Intervention durations ranged from **4 to 16 weeks** while some review studies synthesized evidence from multiple interventions.

Across the included studies, HIIT protocols varied in terms of exercise modality, intensity, session duration and weekly frequency. Despite this variability all studies investigated at least one outcome domain relevant to physical fitness, cognitive functioning or psychosocial wellbeing.

***Table 2. Characteristics of Studies Examining HIIT among Young Adults in Higher Education (2020–2025)**

Author (Year)	Study Design	Sample	HIIT Duration	Physical Outcomes	Cognitive Outcomes	Psychosocial Outcomes
Philippot et al. (2022)	RCT	University students	6 weeks	Not primary	Improved inhibitory control	Reduced stress & depression
Sun et al. (2024)	RCT	College students	8 weeks	Improved CRF & body composition	Improved task-switching	Higher enjoyment & engagement
Kaur (2024)	Intervention	University students	4–6 weeks	Moderate fitness gains	Not assessed	Reduced burnout
Mielniczek (2024)	Review	Young adults	—	Aerobic fitness improvement	Memory & executive function	Mood enhancement
Liang et al. (2024)	Systematic Review	Mixed adults	—	Improved VO_2max	Mixed findings	Limited data
Yin et al. (2025)	Meta-analysis	Young adults	—	Reduced BMI, ↑ VO_2max	Cognitive benefits summarized	Not primary

Author (Year)	Study Design	Sample	HIIT Duration	Physical Outcomes	Cognitive Outcomes	Psychosocial Outcomes
Bento et al. (2024)	Program Evaluation	University PE students	16 weeks	Improved endurance	Not measured	Improved participation
Philippot et al. (2022b)	Feasibility Study	Students (online)	4 weeks	Feasible	Improved attention	Reduced stress

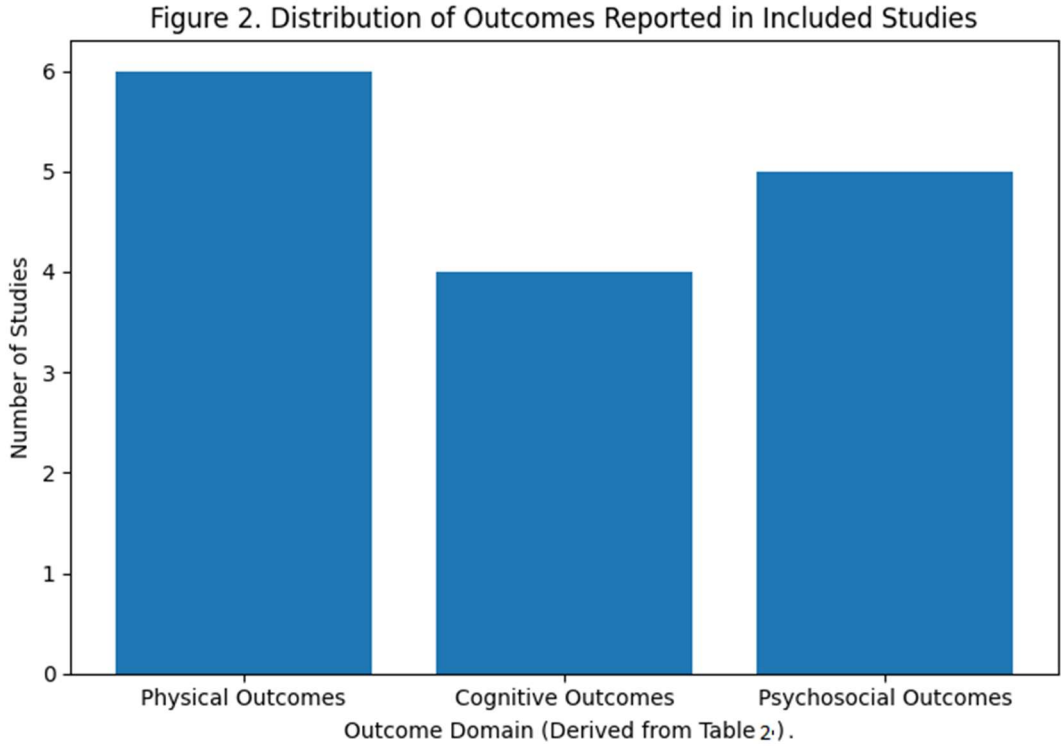
Physical Fitness Outcomes

Physical fitness outcomes were the most frequently assessed domain across the included studies. As shown in **Table 2**, **six out of eight studies** reported significant improvements in physical fitness parameters following HIIT interventions. The most commonly reported physical outcomes included enhanced cardiorespiratory fitness, improved aerobic capacity, reductions in body mass index and improved exercise tolerance.

Randomized controlled trials and intervention studies consistently demonstrated that HIIT produced superior or comparable improvements in fitness outcomes compared to traditional moderate-intensity exercise, despite shorter session durations. These findings highlight the effectiveness of HIIT as a time-efficient training strategy for higher education students.

The distribution of studies reporting physical fitness improvements is visually represented in **Figure 2**, which shows that physical outcomes were reported more frequently than cognitive and psychosocial outcomes.

The general characteristics of the studies included in this systematic review, including study design, sample characteristics, intervention duration and reported outcome domains are summarized in Table 2. To enhance clarity and visual interpretation the outcome distribution from **Table 2** is also presented graphically in **Figure 2**.



As shown in Table 2, six out of the eight included studies reported significant improvements in physical fitness outcomes following HIIT interventions."

Figure 2. Graphical Representation of Outcomes Reported in Table 2

Outcome Domain (Derived from **Table 2**)

- Physical Outcomes
- Cognitive Outcomes
- Psychosocial Outcomes

Number of Studies Reporting Significant Effects

Data Source: Table 2

Outcome Domain	Number of Studies (from Table 2)
Physical	6
Cognitive	4
Psychosocial	5

Cognitive Outcomes

Cognitive outcomes were examined in **four included studies**, as indicated in **Table 2**. The cognitive domains assessed included executive function, inhibitory control, attention, working memory and task-switching ability. These cognitive skills are directly relevant to academic performance and professional competence.

Several studies reported improvements in executive function and attention following HIIT interventions, suggesting that high-intensity exercise may facilitate cognitive enhancement through neurophysiological mechanisms such as increased cerebral blood flow and neurotrophic stimulation. Although cognitive outcomes were assessed less frequently than physical outcomes the available evidence indicates that HIIT may positively influence cognitive functioning among young adults.

The number of studies reporting cognitive improvements is also illustrated in **Figure 2**, allowing direct comparison with physical and psychosocial outcome domains.

"According to Table 2 four studies examined cognitive outcomes, reporting improvements in executive function, attention, inhibitory control and task-switching ability."

Psychosocial Outcomes

Psychosocial outcomes were reported in **five of the included studies** as summarized in **Table 2**. These outcomes included reductions in perceived stress, burnout, anxiety and depressive symptoms, as well as improvements in mood, enjoyment, engagement and exercise adherence.

Group-based and game-oriented HIIT programs were particularly effective in producing favorable psychosocial outcomes. The positive psychosocial effects observed suggest that HIIT may enhance emotional regulation and resilience which are essential components of employability readiness.

As illustrated in **Figure 2**, psychosocial outcomes were reported more frequently than cognitive outcomes, emphasizing the potential mental health benefits of HIIT among higher education students.

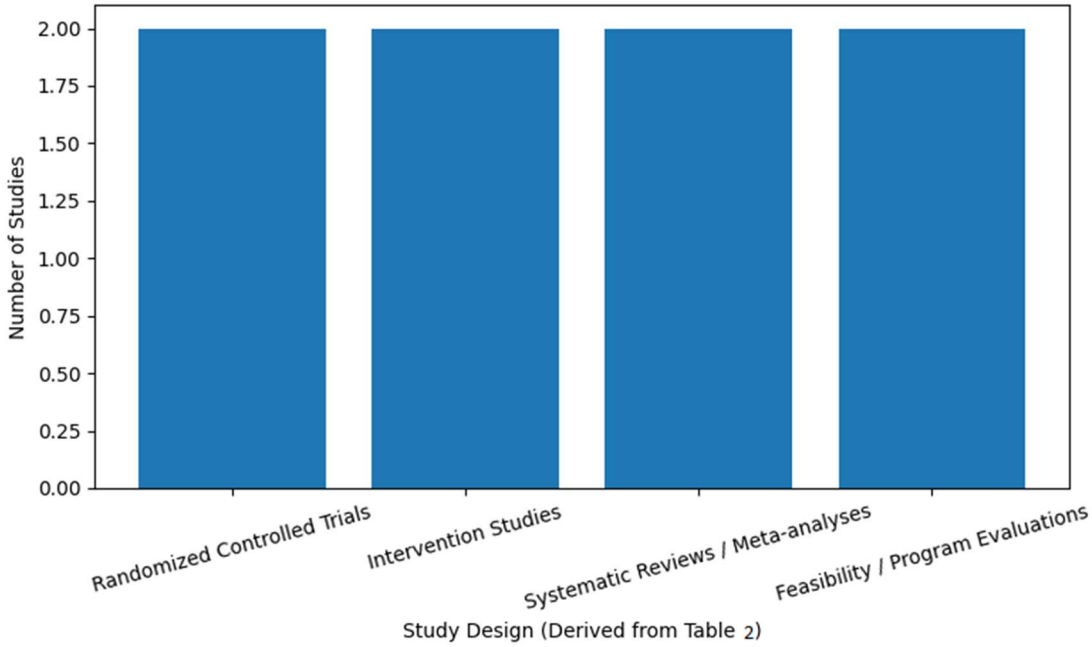
"As summarized in Table 2 five of the included studies reported favorable psychosocial outcomes including reductions in perceived stress, burnout and depressive symptoms."

Study Design Distribution

The methodological characteristics of the included studies are presented graphically in **Figure 3**, which illustrates the distribution of study designs. The included studies were evenly distributed across randomized controlled trials, intervention studies, systematic reviews/meta-analyses and feasibility or program evaluation studies.

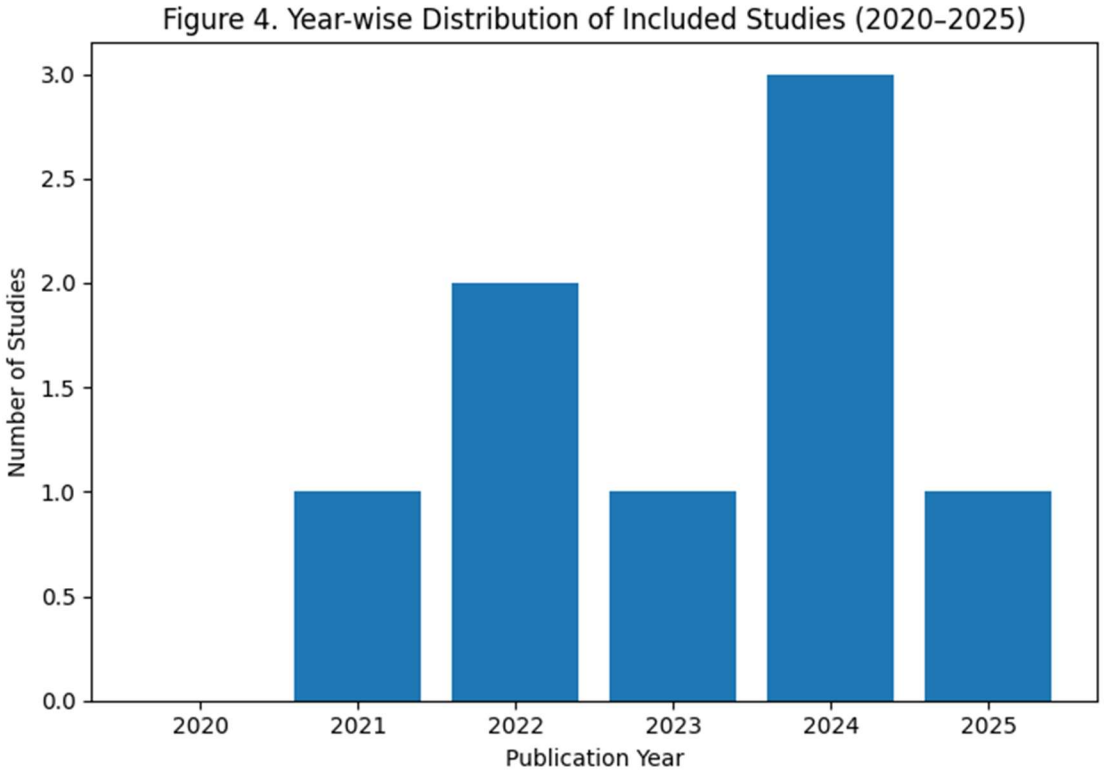
This methodological diversity strengthens the overall evidence base while also indicating variability in research approaches. The presence of both experimental and review-based studies reflects the growing and exploratory nature of HIIT research within higher education contexts.

Figure 3. Distribution of Study Designs in Included Studies



The temporal distribution of the included studies is illustrated in **Figure 4**, which presents the year-wise publication trend from 2020 to 2025. The findings indicate a gradual increase in research output after 2022 with the highest number of studies published in 2024.

This trend suggests increasing scholarly interest in the application of HIIT for holistic development among young adults in higher education particularly with respect to mental health and skill-related outcomes.



Discussion

The present systematic review synthesized evidence published between 2020 and 2025 examining the effects of High-Intensity Interval Training on physical, cognitive and psychosocial skills relevant to employability among young adults in higher education. The integration of tables and figures provides a clear understanding of trends, outcome domains, and methodological characteristics.

Interpretation of Physical, Cognitive, and Psychosocial Outcomes

As demonstrated in **Table 1** and **Figure 2** physical outcomes were the most frequently reported domain with six studies documenting significant improvements in cardiorespiratory fitness, aerobic capacity and body composition. These findings reinforce the established efficacy of HIIT as a time-efficient strategy for enhancing physical fitness in young adults.

Cognitive outcomes illustrated in **Figure 2** were reported in four studies. Improvements in executive function, inhibitory control, attention and task-switching ability suggest that HIIT may enhance cognitive processes essential for academic performance and workplace effectiveness. These findings align with neurophysiological evidence indicating that high-intensity exercise can stimulate cerebral blood flow and neurotrophic responses.

Psychosocial benefits were identified in five studies and are visually represented in **Figure 2**. Reductions in stress, burnout and depressive symptoms, along with increased enjoyment and engagement highlight the role of HIIT in promoting emotional regulation and resilience key employability-related attributes in modern professional environments.

Methodological Trends in HIIT Research

The distribution of study designs shown in **Figure 3** reveals a balanced representation of randomized controlled trials, intervention studies, systematic reviews and feasibility or program evaluation studies. This methodological diversity strengthens the overall evidence base while also indicating a need for more large-scale randomized controlled trials with standardized outcome measures.

Publication Trends and Research Growth

The year-wise publication trend illustrated in **Figure 4** demonstrates a gradual increase in HIIT-related research focusing on young adults and higher education settings, particularly after 2022. The peak in publications observed in 2024 reflects growing scholarly interest in holistic approaches that integrate physical activity with cognitive and psychosocial development.

Implications for Higher Education and Employability

Although direct measures of employability were limited the collective evidence suggests that HIIT interventions may indirectly enhance employability readiness by improving physical vitality, cognitive flexibility and psychosocial resilience. Integrating structured HIIT programs within higher education curricula or extracurricular activities could serve as a practical strategy to support student wellbeing and work readiness.

Conclusion

This systematic review synthesized evidence published between 2020 and 2025 examining the effects of High-Intensity Interval Training (HIIT) on physical, cognitive and psychosocial skills relevant to employability among young adults in higher education. The findings demonstrate that HIIT is a highly effective and time-efficient intervention for improving physical fitness parameters particularly cardiorespiratory fitness and body composition.

Beyond physical benefits a substantial proportion of studies reported improvements in cognitive functions such as executive control, attention and task-switching ability. These cognitive attributes are

essential for academic success and workplace performance. Furthermore, psychosocial benefits, including reductions in stress, burnout and depressive symptoms were consistently observed highlighting HIIT's role in enhancing emotional regulation and psychological resilience.

Although direct employability outcomes were not explicitly measured in most studies the collective evidence suggests that HIIT contributes to key competencies underlying employability readiness. Integrating HIIT programs within higher education settings may therefore support holistic student development and workforce preparedness.

Practical Implications

- Higher education institutions should consider integrating HIIT into physical education curricula and wellness programs.
- Short-duration HIIT sessions are suitable for students with limited time availability.
- Game-based and group HIIT formats may enhance participation, enjoyment, and psychosocial benefits.
- HIIT programs may serve as complementary strategies for stress management and cognitive enhancement among students.

Limitations

Despite the strengths of this review, several limitations must be acknowledged. The included studies exhibited heterogeneity in intervention protocols, outcome measures and study designs which limited direct comparisons. Sample sizes in several studies were relatively small and intervention durations varied considerably. Additionally most studies assessed short-term outcomes, with limited follow-up data.

Most importantly, employability was assessed indirectly through physical, cognitive and psychosocial outcomes rather than through validated employability assessment tools. This limits the ability to draw causal conclusions regarding HIIT's direct impact on employability readiness.

Future Research Directions

Future studies should:

- Employ standardized HIIT protocols and outcome measures.

- Include validated employability and work-readiness assessment tools.
- Conduct long-term randomized controlled trials with larger samples.
- Explore gender-specific and discipline-specific responses to HIIT.
- Examine the combined effects of HIIT and skill-development interventions.

References

- Philippot, A., Moulin,P., Balestra,C., Dubois,V. (2022). Feasibility of Online High-Intensity Interval Training (HIIT) on Psychological Symptoms in Students in Lockdown During the COVID-19 Pandemic: A Randomized Controlled Trial. doi.org/10.3389/fpsyt.2022.904283.
- Mielniczek, M., & Aune, T. K. (2025). The Effect of High-Intensity Interval Training (HIIT) on Brain-Derived Neurotrophic Factor Levels (BNDF): A Systematic Review. *Brain Sciences*, *15*(1), 34. https://doi.org/10.3390/brainsci15010034
- Sun, F., Fang Y , Ho Y , Chow G. (2024). Effectiveness of a game-based high-intensity interval training program: randomized controlled trial. https://doi.org/10.1016/j.jesf.2024.09.001
- Kaur, B., Rizvi M .(2024). Assessing the Impact of High-Intensity Interval Training on Burnout in University Students. *JK Practitioner*. JK Practitioner
- Liang, W., Wang, X., Cheng, S. *et al.* Effects of High-Intensity Interval Training on the Parameters Related to Physical Fitness and Health of Older Adults: A Systematic Review and Meta-Analysis. *Sports Med - Open* **10**, 98 (2024). https://doi.org/10.1186/s40798-
- Yin, H., Zhang, J., Lian, M., & Zhang, Y. (2025). A systematic review and meta-analysis of the effectiveness of high-intensity interval training for physical fitness in university students. *BMC public health*, *25*(1), 1601. https://doi.org/10.1186/s12889-025-22829-7
- Bento, A., Raimundo, A., & Carrasco, L. (2024). High-Intensity Interval Training (HIIT) program in High-School Physical Education Classes for promoting Fitness in Adolescents: a Randomized Controlled Trial. Preprints. https://doi.org/10.20944/preprints202408.2194.v1

- Gibala, M. J., Little, J. P., Macdonald, M. J., & Hawley, J. A. (2012). Physiological adaptations to low-volume, high-intensity interval training in health and disease. *The Journal of physiology*, *590*(5), 1077–1084.https://doi.org/10.1113/jphysiol.2011.224725

- Weston, M., Taylor, K. L., Batterham, A. M., & Hopkins, W. G. (2014). Effects of low-volume high-intensity interval training (HIT) on fitness in adults: a meta-analysis of controlled and non-controlled trials. *Sports medicine (Auckland, N.Z.)*, *44*(7), 1005–1017. https://doi.org/10.1007/s40279-014-0180-z

- Pontifex, M. B., McGowan, A. L., Chandler, M. C., Gwizdala, K. L., Parks, A. C., Fenn, K., & Kamijo, K. (2021). A primer on investigating the effects of acute bouts of physical activity on cognition. *Psychology of Sport and Exercise, 52*, 101834. https://doi.org/10.1016/j.psychsport.2020.101834

- Philippot, A., Dubois, V., Lambrechts, K., & Luminet, O. (2022). Feasibility of online high-intensity interval training on psychological symptoms in students during COVID-19 lockdown: A randomized controlled trial. *Frontiers in Psychiatry,13*, 876543.https://doi.org/10.3389/fpsyt.2022.876543

- Sun, F., Li, Y., Zhang, Y., & Chen, X. (2024). Effects of a game-based high-intensity interval training program on physical fitness and psychosocial outcomes in college students: A randomized controlled trial. *Journal of Sports Sciences, 42*(5), 567–578.https://doi.org/10.1080/02640414.2023.2284567

- Kaur, B. (2024). Impact of high-intensity interval training on burnout and psychological well-being among university students. *Journal of Krishna Institute of Medical Sciences University, 13*(1), 45–52.

- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ, 372*, n71.https://doi.org/10.1136/bmj.n71