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The influence of college physical education on students' physical fitness and mental health development

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Abstract: College physical education (PE) occupies a distinctive position in higher education, serving as one of the few institutional settings in which young adults engage in structured, supervised, and regular movement. This review synthesizes contemporary evidence on how college PE shapes two interrelated developmental domains: physical fitness and mental health. Drawing on cross-sectional surveys, longitudinal panels, intervention trials, and meta-analytic syntheses, the discussion describes the pathways through which curricular physical activity experiences contribute to cardiorespiratory and muscular capacity while also supporting emotional regulation, psychological resilience, and subjective well-being. The evidence suggests that the value of PE extends beyond the accumulation of activity minutes, encompassing the cultivation of competence, social connection, and self-regulatory beliefs that relate to downstream mental health outcomes. Cardiorespiratory fitness, self-efficacy, and social support recur as candidate mechanisms linking participation to well-being, with several effects appearing conditional on gender, baseline activity, and the pedagogical model adopted. The review also considers documented declines in student fitness and the limits of the existing evidence base. A reading of the literature indicates that well-structured PE can function as a scalable platform for promoting holistic student development, provided that programs attend jointly to physiological adaptation and the psychological climate of the learning environment.

Keywords: college physical education; physical fitness; mental health; cardiorespiratory fitness; self-efficacy; higher education

1 Introduction

The transition into higher education coincides with a period of considerable developmental change, during which young adults negotiate academic demands, evolving social identities, and growing autonomy over their daily routines. Patterns of physical activity established or eroded during these years tend to carry forward into later adulthood, which lends the university setting particular significance for public health. Global guidance on movement underscores that regular activity confers wide-ranging benefits for physical and mental health across the life course, with adults encouraged to accumulate substantial weekly aerobic activity alongside muscle-strengthening work [1]. College physical education, as a structured component of the curriculum that reaches large and diverse student populations, offers an institutional lever for translating such guidance into sustained practice.

Concern about the trajectory of student fitness has grown in tandem with broader shifts toward sedentary living.

National survey analyses of Chinese college students indicate a decline in physical fitness alongside rising body mass over recent years, with marked regional disparities and a nonlinear relationship between adiposity and fitness performance [2]. These signals position PE as a setting with potential to counteract a documented erosion in young adults' physical capacity. Alongside the physical picture, the mental health of university students has become a pressing institutional priority, as elevated rates of stress, anxiety, and depressive symptoms intensify interest in accessible, non-stigmatizing supports that institutions can deploy at scale. A cross-sectional study of college students reports that higher physical fitness corresponds with more favorable mental health profiles, suggesting that the two domains develop in tandem rather than in isolation [3].

This review examines the influence of college PE on the joint development of physical fitness and mental health. The aim is to characterize the texture of the evidence, to articulate the mechanisms that plausibly connect curricular participation to outcomes in both domains, and to consider how pedagogical choices condition those outcomes. The discussion treats fitness and mental health as coupled rather than separable, reflecting a body of work in which physiological adaptation and psychological change appear to reinforce one another. Attention is also given to the boundaries of current knowledge, including the predominance of cross-sectional designs and the cultural concentration of available samples, so that claims remain proportionate to the evidence that supports them.

2 College physical education as a developmental context

Physical education at the tertiary level differs in important respects from its school-based counterpart. Enrollment patterns, elective structures, and the comparatively brief contact hours typical of university programs shape what such courses can realistically achieve. Even so, PE retains several features that make it a promising vehicle for development: it provides a recurring, scheduled occasion for movement within an academic life that otherwise tends toward sedentariness; it embeds activity within a social setting populated by peers; and it pairs practice with instruction, allowing students to build movement competence under guidance rather than through unsupervised trial.

The pedagogical model employed in PE conditions students' learning experiences, and a growing literature links instructional design to motivational outcomes. Reviews of the sport education model report gains in student motivation when curricula are organized around extended seasons, team affiliation, and authentic competition, core elements nurturing ownership of learning [4]. This implies that the developmental benefits of physical education depends in part on how movement is taught, with the motivational climate serving as a precursor factor sustaining consistent participation and facilitating subsequent developmental gains. Beyond conditioning the body, structured movement experiences cultivate competencies, beliefs, and relationships that bear on psychological functioning, a dual character that frames the remainder of the review.

3 Physical education and physical fitness development

The most direct outcome of regular participation in PE lies within the physiological domain, where structured activity drives adaptation in cardiorespiratory capacity, muscular strength, and body composition. Intervention work conducted within university settings illustrates the favourable responsiveness of young adults to programmed training. A trial of Tabata-style functional high-intensity interval training among female university students reports improvement in cardiometabolic markers alongside increases in habitual physical activity, indicating that time-efficient protocols can be embedded within course structures to produce measurable physiological change [5]. Such findings speak to the feasibility of generating fitness gains within the constraints of a typical academic timetable.

The significance of fitness developed during the college years extends well beyond the immediate period of study. Prospective cohort evidence indicates that cardiorespiratory fitness measured in young adulthood predicts long-term cardiovascular structure, function, and clinical outcome, with higher early-life fitness associating with reduced subsequent

risk [6]. This frames the fitness fostered through college PE as an investment with a long horizon, in which capacity accrued during a formative window relates to health trajectories decades later. Against this backdrop, the documented decline in student fitness assumes added weight, describing a population moving away from the very capacities that confer long-term protection. PE represents one of the few structured countermeasures available within school institutional environment, and its potential to mitigate such negative trends depends on dose, continuity, and engagement, which redirects focus toward core pedagogical considerations that govern whether students participate with sufficient regularity to realize adaptation.

4 Physical education and mental health development

The psychological dimension of PE has attracted intensive study, and the accumulated evidence describes a generally favorable relationship between movement participation and indicators of mental health. A systematic review and meta-analysis of physical exercise among university students concludes that exercise interventions relate to improvements in mental health outcomes, supporting the use of movement as a component of campus well-being strategies [7]. A three-level meta-analysis of long-term exercise interventions sharpens this picture for specific symptom domains, reporting reductions in depression and anxiety among college students and indicating that sustained engagement, rather than isolated bouts, associates with symptom relief [8].

The specific contribution of physical education as a curricular intervention, distinct from physical activity in general, has begun to receive direct attention. An analysis of how PE influences university students' psychological health frames social support and exercise behavior as dual perspectives through which course participation translates into psychological benefit, locating part of the effect in the relational and behavioral consequences of structured classes [9]. This study is notable for treating PE as the unit of analysis, which lends it particular relevance to institutional inquiries about the achievable outcomes. The temporal structure of the relationship has been probed through longitudinal designs that strengthen causal interpretation relative to cross-sectional snapshots. A two-wave panel study of university students finds that physical activity predicts later mental health, with self-efficacy mediating the association and peer support moderating its strength [10]. By demonstrating prospective prediction, longitudinal work lends credence to the proposition that participation contributes to subsequent psychological change rather than merely co-occurring with it.

5 Mechanisms and pedagogical considerations

Understanding why PE relates to mental health requires attention to the intervening processes that connect movement to psychological change, and the evidence increasingly favors models in which several mechanisms operate together rather than any single channel accounting for the whole effect. A physiological pathway runs through fitness itself, given that fitness and mental health appear to develop in tandem , which suggests that a portion of the psychological benefit may be grounded in measurable physiological adaptation. Psychological mechanisms feature prominently, with self-related beliefs occupying a central role: the longitudinal evidence positions self-efficacy as the conduit through which activity predicts later mental health. These beliefs plausibly develop within PE as students accumulate experiences of mastery, witness their own improvement, and recalibrate their sense of capability. Social mechanisms complete the picture, reflecting the relational character of PE, with social support framed as an active ingredient in its psychological benefit and peer support conditioning the strength of activity-mental health relationships.

The translation of these mechanisms into realized outcomes depends on how PE is designed and delivered. The motivational evidence indicates that instructional models shape engagement, with the Sport Education Model associating with heightened motivation. Because adherence governs whether students accumulate sufficient activity to drive adaptation, motivational design functions as a precondition for both fitness and mental health benefit, linking pedagogy to outcomes

through the intervening variable of sustained participation. The conditional nature of several effects, including the moderating role of peer support , indicates that uniform delivery may yield uneven benefit across student subgroups, which renders attention to the social climate of the class and to differing starting points a reasonable design orientation.

6 Limitations and conclusion

The evidence reviewed here, while converging, carries limitations that temper the strength of inference. A considerable portion of the work rests on cross-sectional designs, which establish association while leaving causal direction unresolved; the longitudinal panel evidence mitigates this concern in part, yet the field would benefit from a larger body of prospective and experimental work that manipulates PE participation and tracks both fitness and mental health over extended periods. A notable share of recent studies draws on Chinese and East Asian student populations, which raises questions about generalizability, and measurement heterogeneity across studies complicates the pooling of effects in syntheses. Research that disentangles the contribution of PE as a curricular intervention from physical activity in general, and that tests integrated mechanism models estimating physiological, psychological, and social pathways jointly, would advance understanding beyond the single-mediator studies that dominate the current evidence.

Taken together, the literature portrays college physical education as a setting with meaningful potential to advance two coupled domains of student development. Structured participation drives adaptations in cardiometabolic capacity, and the fitness cultivated during the college years carries lasting health benefits; against documented declines in student fitness, PE stands as one of the few institutional countermeasures positioned to reach students at scale. On the psychological side, participation associates with reduced depression and anxiety and with mental health benefits attributable in part to the relational and behavioral features of structured classes, conditioned by pedagogical design. Realizing this potential calls for programs that attend simultaneously to physiological adaptation and the psychological and social climate of the learning environment, that calibrate activity to individual capacity, and that sustain engagement through sound motivational design.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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