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· 综 述 ·

大学生体力活动与心理健康动态双向关联研究进展与展望

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【摘要】 为整合既有证据,明确大学生体力活动(PA)与心理健康之间的关联,本研究通过系统检索国内外文献,综述了大学生 PA 与情绪、抑郁、焦虑、睡眠、生活满意度之间的动态双向关系,并探讨其作用机制。结果显示,PA 可改善情绪、缓解抑郁焦虑、促进睡眠并提升生活满意度,而心理健康状态也会反向影响 PA 动机与行为模式,二者呈动态双向作用。未来研究应在测量、设计与方法上进一步完善,为高校心理健康促进提供依据。

【关键词】 体育运动;精神卫生;双向关系;学生

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Dynamic bidirectional association between physical activity and mental health among college students: research progress and future perspectives

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【Abstract】 To consolidate existing evidence and clarify the association between physical activity (PA) and mental health among college students, through a systematic review of domestic and foreign literature, the study summarizes the dynamic bidirectional relationship between college students' PA and mental health (including mood, depression, anxiety, sleep, and life satisfaction), and explores underlying mechanisms. The results indicate that PA could improve mood, alleviate depression and anxiety, promote better sleep, and improve life satisfaction, whereas mental health status can also have a reverse impact on PA motivation and behavioral patterns. In conclusion, a dynamic two-way relationship exists between the two, and future research should further refine measurement, design, and methodology to provide a basis for promoting mental health in colleges.

【Keywords】 Physical activity; Mental health; Bidirectional relationship; Students

大学生心理健康问题已成为全球公共卫生挑战。一项跨国调查显示,约 65.2%的大学生存在至少一种终身心理健康障碍,过去 12 个月患病率为 57.4%[1]。在中国,一项覆盖8 万名大学生的调查显示,抑郁检出率为 21.48%,焦虑达 45.28%[2]。系统综述表明,过去 10 年多类学生群体心理问题检出率持续偏高[3]。体力活动(physical activity,PA)作为低成本、非药物手段,在长期改善抑郁、焦虑、情绪及睡眠等心理健康方面的作用已被充分证实[4-6]。然而,现有研究仍较分散、结论不一,尚不足以为高校开展系统化干预提供充分依据。因此,有必要整合既有证据,明确大学生 PA 与心理健康之间的关联,并识别研究存在的不足,为高校心理健康促进与政策制定提供科学基础。

1 大学生 PA 与心理健康多方面关系的前沿研究证据

心理健康是涵盖情绪体验、认知评价与社会功能的多维概念[2]。在大学生群体中,情绪、抑郁、焦虑、睡眠和生活满意度被普遍视为核心维度[6],既反映当前心理状态,也与长期学业表现和社会功能密切相关。大量研究表明,PA 与上述指标之间存在稳定关联,如可提升积极情绪与生活满意度,缓解抑郁和焦虑,并通过改善睡眠促进整体心理健康[7];同时,心理健康状态也会反向影响 PA 的动机与行为维持[8]。

1.1 PA 与情绪

随机对照试验和荟萃分析显示,有氧及中高强度 PA 可提升积极情绪、降低负面情绪[9],低强度 PA 如步行亦具有可观益处[9],其机制涉及奖赏通路与内源性阿片系统等神经调节[10]。PA 能带来即时的情绪上升,使得情绪状态影响后续 PA 参与(积

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极情绪促进运动、负面情绪抑制参与)[8],还可通过减少屏幕时间、缓解压力间接改善情绪[11]。然而,不同研究在强度、类型和个体反应上的结果并不一致,PA 的异质性(强度、频次、持续时间、类型)是研究结果差异的重要原因[12]。如 Zhang 等[13]发现,中高强度 PA 与更高的积极情绪和更低的消极情绪相关,而较低强度的 PA(如步行)效应不明显。此外,样本特征、测量工具与研究设计差异亦会影响结论[14]。未来研究宜采用生态瞬时评估等密集追踪方法,结合可穿戴设备与标准化量表,跨日/周/学期刻画不同强度、类型与情境的效应,同时检验性别、基线心理状态等调节因素,以推进个体化干预策略。

1.2　*PA 与抑郁*　纵向与综述研究普遍表明 PA 在抑郁症状预防和辅助治疗中具有保护效应[15]。干预研究显示,中高强度的有氧及团体运动与抑郁减轻相关[16]。每周约 2.5 h 快走的 PA 量可降低约 25%抑郁风险,之后边际收益递减[17]。前瞻证据进一步指出,PA 与抑郁呈曲线关联,每周前 4~5 h 效果最明显,最佳区间约每周 15 h,且"周末战士"与日常分散式有氧及中高强度 PA 在降低抑郁风险方面效果相近[18]。网络荟萃分析表明,步行/慢跑、瑜伽和力量训练的抗抑郁效果较稳健[16]。未来应延长追踪周期并提高样本代表性,以优化个体化运动处方。

1.3　*PA 与焦虑*　综合证据显示,PA 对焦虑症状具有预防与缓解作用[19]。达到世界卫生组织 PA 建议者的焦虑发生/症状水平更低[20]。在干预与剂量方面,中等强度有氧及每周累计约 150 min 的中高强度 PA 有助缓解焦虑[21]。此外,每周运动 1~2 次者焦虑症状水平显著低于几乎不运动者[22]。焦虑与 PA 同样呈双向关系:PA 不足增加焦虑,而高焦虑又抑制运动动机[23]。未来应在大学生群体中结合动态追踪与异质性分析,探索不同类型和剂量 PA 在不同亚群体中的最优组合。

1.4　*PA 与睡眠*　PA 被视为改善睡眠的重要非药物手段,可缩短入睡潜伏、提高睡眠效率并增加深睡比例[24]。干预研究表明,持续≥3 个月的中等强度有氧运动对睡眠质量改善效果显著[25],中等强度往往优于高强度[26]。同时,良好睡眠可促进次日 PA,而睡眠不足或过长均会降低运动意愿[27]。未来应结合客观睡眠监测与纵向设计,进一步明确 PA 与睡眠关联的时间顺序与剂量阈值。

1.5　*PA 与生活满意度*　生活满意度作为主观幸福感的核心,反映个体对整体生活质量的认知评价[28]。研究发现,PA 与生活满意度呈正相关,且不同强度与类型均可获益[29]。休闲性、自主选择的体力活动(如伸展、有氧和平衡训练)在提升愉悦感和满意度方面尤为突出[30]。潜在机制包括心理需求满足、情绪改善与社会互动增强[31]。PA 通过促进自我效能感、社会支持以及心理韧性/自尊提升生活满意度;同时,PA 能增加社交互动频率,进一步增强归属感[14]。此外,PA 与生活满意度亦呈双向关系:PA 提升满意度,而较高满意度又增强运动动机与持续性,形成积极反馈[32]。现有研究多为横断面设计,未来应加强纵向和随机化研究。

总而言之,PA 在大学生情绪、抑郁、焦虑、睡眠和生活满意度等多维度上均展现出积极影响,心理健康状态也会反过来影响 PA 动机与行为模式,显示出双向动态特征。

2　大学生 PA 与心理健康双向动态关联的研究展望

2.1　*优化未来研究设计*　现有研究已验证大学生 PA 与心理健康间存在双向关联,但研究设计与方法仍存在不足,限制了结论的解释力与推广性[33]。未来研究可从以下几个方面改进。

第一,扩展 PA 与心理健康的测量维度。当前研究多聚焦单一 PA 指标(如频率或强度)与个别心理问题(如抑郁)[6],难以揭示 PA 在不同维度心理指标中的差异作用。未来应采用更系统的测量框架,将 PA 的频率、持续时间、强度、类型与情绪、抑郁、焦虑、睡眠和生活满意度等指标共同纳入,分析多维剂量—反应关系,以加深对整体作用机制的理解。

第二,增强时间设计的纵深性。多数研究采用横断面设计[33],即便纵向研究亦多局限于较短周期,难以反映延迟效应或长期变化。未来应以学期或年度为尺度进行追踪,结合考试、假期等关键时间节点,描绘短期波动与长期趋势的交互动力。

第三,强化密集追踪以刻画微观过程。大学生的 PA 与心理状态具有显著的日内与日间波动,传统测量方式难以捕捉即时效应。未来应结合生态瞬时评估与可穿戴设备,提高测量频率与生态效度,从而识别短期影响、反向预测路径及其累积过程[34]。

第四,提高样本多样性与文化敏感性。当前证据忽视了特定文化情境(如中国大学生)下的独特差异,且在性别、年级、社会经济地位等分层分析上不足[35]。未来研究应加强跨文化比较与本土化验证,以提升外部效度和干预适用性。

第五,采用能够区分个体间与个体内差异的模型。传统回归模型难以同时捕捉群体平均水平的跨时间关联与个体内部的动态变化,易混淆稳定特质效应与短期过程效应[36]。随机截距交叉滞后模型通过分离随机截距与时间残差,可区分稳定的个体间差异与随时间变化的个体内效应;动态结构方程模型结合多层框架与时间序列结构,可捕捉高度密集数据中的个体特异动态与即时反向作用[36]。这些方法为更加

精确地识别 PA 与心理健康的即时效应及其双向关系提供了关键技术基础。

综上，未来研究应在测量多维化、时间纵深化、方法精细化与样本多样化方面持续提升，以更准确刻画 PA 与心理健康关联的动态机制，为基于证据的校园干预提供更坚实的基础。

2.2 双向作用机制的深度挖掘 大学生在学业与社交压力交织的环境中，PA 与心理健康状态呈现跨层面的动态交互结构[33]。

在生理层面，PA 通过调节多巴胺与血清素系统、下丘脑－垂体－肾上腺轴及心率变异性改善情绪调节[37]；另一方面，抑郁与焦虑会削弱奖赏敏感性与执行功能，降低运动动机[38]，导致个体 PA 下降。在心理层面，PA 可通过提升自我效能、积极情绪改善心理健康[16]；而负性情绪或低自我效能则降低运动意愿[38]，最终削弱个体 PA 的发展。在社会层面，集体运动提升社交互动与归属感，可缓解心理压力[16]；而心理困扰可能导致社交退缩，从而减少 PA 行为[39]。更重要的是，这种双向机制无论在短期还是长期均稳定，表明短期效应具有累积性，而长期心理状态会反向塑造 PA 模式，形成双向作用的时间动力机制。

此外，性别、人格、运动史、社会经济地位与文化背景等均可能调节 PA 与心理健康的双向关系[14]。例如，社交型运动更有助于缓解因孤立引起的心理问题，而个性化处方更适合抑郁伴有动力缺失者[16,38]，未来应加强不同亚群体的分层机制研究。这些异质性与情境因素说明双向机制并非统一作用，而是在不同人群与环境中表现出差异化的路径强度与模式，进一步丰富了对双向关系的整体理解。

综上，多层次机制框架揭示了 PA 与心理健康在生理－心理－社会层面的双向通道，时间尺度阐明短期情绪变化与长期行为适应的交互，方法技术路径提供识别双向效应的实证工具，异质性与情境因素则揭示双向机制作用的差异。四者共同构成理解 PA 与心理健康双向作用的整体结构，并为干预设计奠定机制基础[40]。

2.3 实践转化 PA 与心理健康的动态关系为高校心理健康促进提供了可操作的干预路径，而有效的实践转化应根据前文所述的关键机制证据进行设计，包括基本心理需求满足、情绪改善、社会互动增强以及 PA 强度与频次的差异作用。

2.3.1 基于机制证据优化运动处方 对抑郁或焦虑水平较高的学生，可从 10～20 min 轻至中等强度 PA 开始（如快走、简易有氧），再逐步过渡到节奏稳定的有氧训练[41]。结合移动健康技术与即时反馈可增强依从性[42]。

2.3.2 推动“运动+心理”服务融合 集体型 PA（如团队为单位的球类项目、兴趣运动社团）能有效提高关系性需求满足、增强社会支持，并显著提升生活满意度。因此，心理咨询中心可与体育部门协作，构建双轨干预模式（如团辅结合团体瑜伽或户外活动、针对社交退缩学生设置“小规模、低压力”的社交运动小组等）。通过集体运动改善学生情绪，增强社会支持，缓解社交退缩[18]。

2.3.3 完善校园环境与政策 增加运动设施可及性、建立激励机制（如运动积分、课程学分）均有助提升大学生 PA 参与水平。多样化运动形式可避免弱势群体因能力焦虑进入“低运动－困扰－更低运动”循环。

2.3.4 发展跨学科与精准化干预 未来可整合多学科个性化干预框架，利用可穿戴设备收集每日 PA、情绪、社会互动数据，实现动态预测与个性化反馈；在干预评估中纳入生理、心理与社会指标，以优化策略与效果验证；构建基于机制的“人群细分模型”，提供差异化运动处方。

综上，个性化处方、体系融合、政策支持与跨学科协同是高校心理健康促进的关键方向。基于双向机制的综合性干预既能改善短期情绪，也有助于形成长期健康行为[8]，为校园心理健康建设提供可持续方案。

3 小结

大学生 PA 与心理健康呈稳健的动态双向关系：PA 可即时改善情绪，通过习惯累积降低长期心理问题风险；心理问题则可能削弱动机、减少社交参与，从而抑制运动并形成负向循环。在方法上，现有研究受限于测量维度单一、横断面研究占比高、微观时间尺度证据不足、样本代表性与跨文化比较有限，以及区分个体内/个体间效应的模型应用不足，影响对双向机制与干预策略的精准识别。在理论上，应将 PA 同时视为心理健康的保护因素与受心理状态影响的可变行为，纳入双向与多时间尺度框架。在实践上，高校可构建“短期情绪调节+长期行为养成”的并行路径，将分层运动处方嵌入课程与心理服务，并通过环境与制度支持提升可及性与持续性。未来需在多维测量、长期与密集追踪、先进模型及样本多样性方面协同推进，以推动双向机制证据向可推广、可持续的校园心理健康方案转化。

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