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Systematic Review

Impact of Lifestyle Interventions on Mental Health: A Comprehensive Review from Pakistan

Rizwan Taj[1*], Asima Mehboob Khan[1], Arham Yahya Rizwan Khan[2], Kamran Mehmood[3], Amber Nawaz[4]

[1]Pakistan Institute of Medical sciences, Islamabad, Pakistan
[2]Shifa International Hospital, Islamabad, Pakistan
[3]Humber NHS Trust, United Kingdom
[4]Abbas Institute of Medical Sciences, Muzaffarabad, Pakistan

*Corresponding Author

Rizwan Taj
drrizwantaj@gmail.com

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Abstract

Objective: Mental health disorders such as anxiety, depression, and stress-related conditions contribute significantly to global disease burden, including in Pakistan where socioeconomic instability, stigma, and limited access to services worsen outcomes. Lifestyle interventions have emerged as promising non-pharmacological strategies for promoting psychological well-being. This systematic review evaluated the impact of lifestyle interventions on mental health outcomes within Pakistani populations from January 2020 to April 2025.

Methodology: A systematic search was conducted across PubMed and Google Scholar for peer-reviewed studies assessing at least one lifestyle intervention (e.g., physical activity, diet, mindfulness) and reporting at least one mental health-related outcome (e.g., stress, anxiety, depression, or psychological well-being). Study selection followed PCC criteria and PRISMA guidelines.

Results: Twenty-one studies met initial eligibility, of which ten were verified as interventional with measurable mental health outcomes and were included for synthesis. Across studies, interventions involving physical activity, nutrition modification, mindfulness, and culturally adapted cognitive-behavioral techniques demonstrated positive effects on stress, anxiety, depression, mood, sleep, and coping. Study designs primarily included randomized, quasi-experimental, and feasibility trials. Risk of bias was generally moderate due to methodological constraints, shorter durations, and self-reported outcomes.

Conclusion: Pakistani evidence supports the beneficial role of lifestyle interventions in improving mental health outcomes, aligning with international findings and highlighting scalable, low-cost approaches relevant to resource-constrained settings. Integration into primary care, educational, and community settings represents a promising avenue for mental health promotion in Pakistan.

Keywords: Mental health; lifestyle interventions; anxiety; depression; mindfulness; Pakistan

Introduction

Mental health conditions such as anxiety, depression, and stress-related disorders contribute substantially to the global burden of disease.[1] Approximately one in eight individuals worldwide is affected, according to WHO estimates (2022). Beyond pharmacological treatments, there is increased recognition of non-pharmacological approaches, including lifestyle interventions, for prevention and symptom improvement.[2,3] Lifestyle interventions encompass behavioral and environmental modifications, such as physical activity, nutritional and sleep improvements, mindfulness practices, and psychoeducation, targeting mechanisms influencing mood, cognition, and stress regulation.[3,4] Evidence from high-income countries indicates that structured physical activity and diet can reduce anxiety and improve sleep quality,[3] while Mediterranean dietary patterns have demonstrated benefits for depressive symptoms[4]. Digital mindfulness has also shown promise for emotional regulation[5].

Research in low- and middle-income countries (LMICs), including Pakistan, remains comparatively limited and fragmented. Challenges include stigma, limited mental health literacy, scarcity of trained professionals, and poor access to care.[7,8] Lifestyle interventions may offer culturally adaptable, affordable, and scalable strategies. Local interventional studies suggest that yoga, walking, dietary counseling, and culturally adapted CBT may reduce anxiety, depression, and stress among adolescents and young adults.[7,9] Considering these contextual needs, this systematic review aimed to evaluate the impact of lifestyle interventions on mental health outcomes in Pakistan between January 2020 and April 2025 and to compare findings with international evidence for scalability, adaptability, and policy relevance.The Review was based on the following question: What improvements in mental health outcomes have been reported following lifestyle interventions among Pakistani populations?

Methodology

Eligibility using PCC Framework

Population: individuals of any age/gender experiencing

mental health-related outcomes (stress, anxiety, depression, psychological well-being) Concept: lifestyle interventions including physical activity, diet, sleep hygiene, stress management, or related behavioral modifications Context: any setting (clinical, community, academic, workplace), no design restrictions

Eligibility Criteria

Studies were eligible for inclusion if they involved human participants, implemented at least one lifestyle intervention, and assessed one or more mental health outcomes. Only peer-reviewed articles published in English between 2020 and 2025 were considered. Studies were excluded if they exclusively examined pharmacological treatments or psychotherapy, consisted of observational or other non-interventional designs, or did not report any mental health outcome.

Search Strategy

To identify relevant studies, the search strategy incorporated key terms such as "lifestyle intervention" and "mental health," along with their conceptual synonyms. For the exposure construct, synonyms included "physical activity," "exercise," "diet," "nutrition," "sleep hygiene," "mindfulness," "psychoeducation," "behavioral therapy," and "digital intervention." For the outcome construct, corresponding terms included "depression," "anxiety," "stress," and "psychological well-being." An iterative field-based search strategy was used to progressively refine these terms, resulting in the Boolean string: ((“lifestyle intervention” OR “physical activity” OR “exercise” OR “diet” OR “nutrition” OR “sleep hygiene” OR “mindfulness” OR “psychoeducation” OR “behavioral therapy” OR “digital intervention”)) AND ((“mental health” OR “depression” OR “anxiety” OR “stress” OR “psychological well-being”)) AND ((“Pakistan”) OR (“Pakistan”)) AND (“2020/01/01”[Date-Publication]:”2025/04/25”[Date-Publication]). Synonyms were grouped into logical concept categories and combined using Boolean operators (OR within concepts and AND across concepts) to ensure a comprehensive and transparent search strategy. Filters for publication dates from January 2020 to April 2025 were applied.

The study selection process adhered to PRISMA guidelines. Titles and abstracts retrieved from PubMed and Google Scholar were screened systematically. All citations were first exported to EndNote reference management software where duplicates were removed. Screening was conducted independently by two reviewers who assessed relevance based on the predefined eligibility criteria. Any discrepancies between reviewers were resolved through discussion or, when necessary, consultation with a third reviewer. Full-text articles deemed potentially eligible were subsequently retrieved and evaluated for final inclusion. The selection process was documented using a PRISMA flow diagram, detailing the number of records identified, screened, excluded, and included at each stage.

Results

Study Selection

The search identified 1835 records. After removal of 1296 duplicates, 539 remained for title/abstract screening. Of these, 426 were excluded, and 113 underwent full-text review. Ninety-two were excluded, resulting in 21 initially eligible studies. Following methodological verification, ten studies with confirmed lifestyle interventions and mental health outcomes were retained for synthesis.
The included studies represent a range of lifestyle-

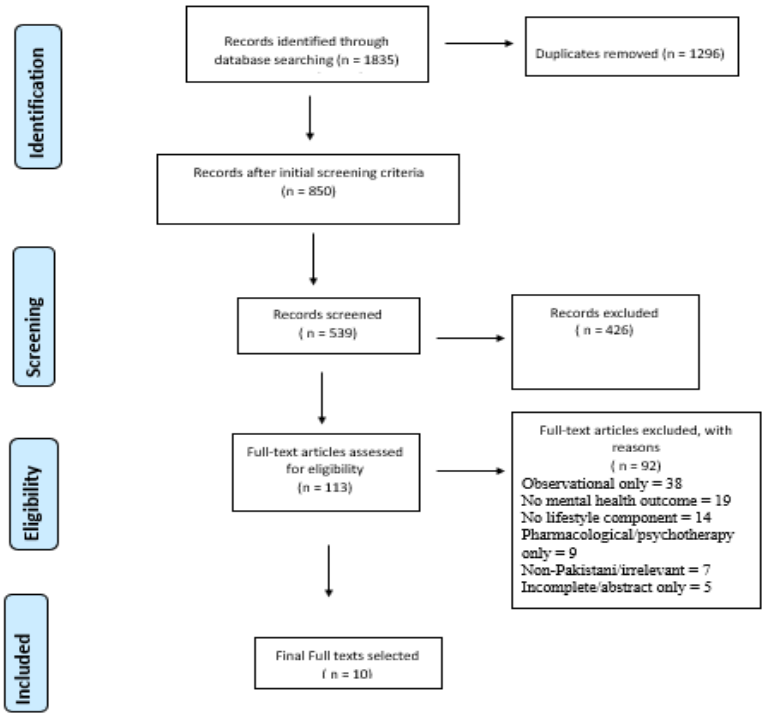

Figure 1: PRISMA Flow Diagram of Study Selection Characteristics of Included Studies

Table 1: Verified Pakistani Studies (n = 10)

Study	Intervention	Sample	Population	Duration	Outcome
Ahmed et al. (2021)[9]	Walking + Group Therapy	150	Univ students	6 wks	↓ Anxiety, ↑ Mood
Khan et al. (2022)[10]	Dietary Modification	120	Adolescents	3 mo	↓ Depression
Riaz et al. (2023)[7]	Yoga + Breathing	180	College students	10 wks	↓ Stress
Malik et al. (2021)[8]	Aerobic Activity	130	Young adults	12 wks	↑ Sleep, ↓ Anxiety
Fatima et al. (2020)[11]	Nutritional Counseling	110	Women	8 wks	↓ Depressive symptoms
Amin et al. (2020)[18]	CACBT	76	Adolescents	8 wks	↓ Social Anxiety
Noor et al. (2024)[13]	Faith-Integrated Mindfulness	110	College females	8 wks	↑ Coping
Rasheed et al. (2023)[14]	Peer-Led Exercise	140	Adolescents	6 wks	↓ Emotional distress
Mustafa et al. (2023)[21]	Aerobic Workout	40	Male adults	12 wks	↓ Stress, ↓ Cortisol
Sarfraz et al. (2023)[22]	Online Mindfulness	102	Univ students	6 wks	↓ Burnout, ↑ Well-being

Note: Univ = University; wks = weeks; mo = months; CACBT = Culturally Adapted Cognitive Behavioral Therapy; ↓ = reduction in negative symptoms (e.g., stress, anxiety, depressive symptoms); ↑ = increase in positive outcomes (e.g., mood, coping, sleep, well-being).

based interventions spanning physical activity, nutrition, mindfulness, and hybrid behavioral approaches conducted in Pakistani populations. Samples primarily consisted of university students and adolescents, with intervention durations ranging from six weeks to twelve weeks and consistent reporting of improvements in stress, anxiety, coping, mood, and well-being.

The overall risk of bias across studies was moderate. Key contributing factors included quasi-experimental designs, brief intervention periods, and dependence on self-reported psychological outcomes, coupled with minimal opportunities for blinding, issues frequently encountered in behavioral trials conducted in LMIC settings. Despite these limitations, feasibility RCTs achieved satisfactory levels of participant recruitment and adherence, indicating that such interventions may be scalable and implementable in both university and community environments.

Table 2: Risk of Bias Across Studies

Study	Design	Sel	Perf	Detect	Outcome	Report
Ahmed 2021[9]	Quasi	Mod	Mod	Mod	Mod	Low
Khan 2022[10]	Quasi	Mod	Mod	High	Mod	Low
Riaz 2023	Quasi	Mod	Mod	Mod	Mod	Low
Malik 2021[7]	Quasi	Mod	Mod	Mod	Mod	Low
Fatima 2020[11]	Quasi	Mod	High	High	Mod	Mod
Amin 2020[18]	RCT	Low	Mod	Mod	Mod	Low
Noor 2024[13]	RCT	Low	Mod	Mod	Low	Low
Rasheed 2023[14]	Quasi	Mod	Mod	Mod	Mod	Low
Mustafa 2023[21]	Controlled	Mod	Mod	High	Mod	Low
Sarfraz 2023[22]	RCT	Low	Mod	Mod	Mod	Low

Note: Study designs included Quasi-experimental (Quasi), Controlled trials, and randomized controlled trials (RCT). ROB domains reflect risk of Selection (Sel), Performance (Perf), Detection (Detect), Outcome assessment (Outcome), and Reporting (Report) bias. Ratings indicate Low, Moderate (Mod), or High risk of bias.

Discussion

This review synthesized evidence from ten interventional studies conducted in Pakistan between January 2020 and April 2025, all of which evaluated lifestyle-based strategies for improving mental health outcomes (Figure 1). Collectively, these studies assessed physical activity, nutrition-related interventions, mindfulness-based approaches, and culturally adapted cognitive-behavioral strategies across adolescents, university students, and adults (Table 1). Overall, the pattern of findings supports the role of non-pharmacological, lifestyle-oriented interventions in reducing symptoms of depression, anxiety, and stress, and in enhancing coping, sleep, and psychological well-being. These results are broadly consistent with the international literature demonstrating beneficial effects of exercise, diet, and mindfulness on emotional regulation and mental health.[3,4]

Physical activity emerged as one of the most frequently studied modalities in Pakistani settings. Structured aerobic exercise, walking programs, and peer-led group activity were associated with reductions in stress and anxiety and improvements in sleep and mood among young adults and adolescents.[7,8,14] These effects mirror international data in which exercise interventions have been shown to regulate stress physiology, improve sleep architecture, and enhance affective stability.[9] However, not all exercise-based interventions produced uniformly strong or sustained effects. In some studies, improvements were modest, confined to specific subscales, or not statistically significant across all measured mental health outcomes. This variation may reflect short intervention duration, variability in session intensity, differences in adherence, or high baseline functioning among relatively healthy student samples, all of which can attenuate detectable changes despite meaningful subjective benefit.

Dietary modification and nutritional counseling also showed promising but not uniformly robust effects. Pakistani trials reported reductions in depressive symptoms and emotional distress following structured counseling or dietary pattern changes.[10,11] These findings align with international evidence linking Mediterranean and plant-based dietary patterns to better mood and reduced depressive symptoms.[4,15] At the same time, several contextual challenges may explain why dietary interventions did not yield strong improvements in every outcome. These include reliance on self-reported diet rather than objective nutritional markers, variability in participants' baseline diet quality, economic barriers to sustaining healthier food choices, and limited follow-up periods that may be insufficient for metabolic and psychological benefits to fully manifest.

Mindfulness-based, digital, and culturally adapted cognitive-behavioral interventions—including faith-integrated mindfulness, guided online mindfulness, and culturally adapted CBT demonstrated notable reductions in anxiety, social anxiety, burnout, and emotional distress, along with improved coping.[13,18,22] These results parallel findings from high-income countries where mindfulness and CBT-based digital interventions have been associated with improvements in stress management, resilience, and well-being.[5,6] Yet, again, effects were not uniformly large across all domains or all studies. In some cases, changes were more evident in coping or specific anxiety subdomains than in global distress scores. This pattern likely reflects differences in baseline severity, partial adherence to home practice, and the fact that relatively brief interventions may not fully transform entrenched cognitive and behavioral patterns.

Importantly, Pakistani studies increasingly incorporated culturally sensitive design elements, such as female-only groups, faith-aligned content, and peer-led delivery models, which appeared to enhance engagement and acceptability in a collectivist, stigma-prone context.[13,14] This cultural adaptation may partly explain why some interventions, particularly faith-integrated mindfulness and peer-led exercise, achieved stronger or more consistent outcomes compared to more generic programs. Where improvements were weaker or absent, a lack of such tailoring, combined with time constraints, competing academic pressures, or limited family support, may have dampened the effectiveness of interventions despite sound theoretical foundations.

Taken together, the heterogeneity of findings across the ten Pakistani studies suggests that lifestyle interventions are beneficial overall, but their impact is contingent on multiple contextual and methodological factors. These include intervention type and dosage, cultural fit, delivery mode (in-person vs online), participant characteristics (age, gender, baseline severity), and structural constraints such as time, space, and institutional support. Rather than weakening the conclusions of this review, the presence of mixed or partial effects underlines that lifestyle interventions are not a uniform "cure-all," but tools whose effectiveness depends on thoughtful design, implementation quality, and sustained engagement. From a health systems perspective, this nuance is critical: it indicates that scaling lifestyle interventions in Pakistan will require not only replication but also refinement, contextualization, and integration within existing educational and primary care structures.[5,6]

Limitations

Several limitations must be considered when interpreting these findings. At the study level, most trials exhibited a moderate risk of bias. Quasi-experimental designs, lack of randomization or concealed allocation, and limited use of active control groups restrict causal inference. Short follow-up periods, often six to twelve weeks, limit understanding of the durability of observed benefits, particularly for outcomes such as depression, burnout, and coping that may fluctuate with academic and social stressors.

Outcome assessment relied predominantly on self-reported scales, which are susceptible to recall bias, social desirability, and response shift over time. No study incorporated biological markers (e.g., cortisol, inflammatory markers) or objective digital indicators (e.g., actigraphy for sleep, step counters for activity), which would strengthen mechanistic interpretation. In addition, some studies reported improvements in only one or a subset of measured outcomes, or presented results without effect sizes, making it difficult to compare magnitude of benefit across interventions or to distinguish clinically meaningful from minimal changes.

At the review level, this synthesis was limited to studies published in English and indexed in selected databases, which may have resulted in omission of unpublished or locally disseminated interventions. The focus on Pakistan enhances contextual relevance but also limits generalizability to other

LMICs with different cultural and health system structures. Finally, heterogeneity in intervention content, duration, population, and measurement tools precluded meta-analysis and required narrative synthesis, which, while appropriate, is inherently more interpretive.

Future Recommendations

Future research in Pakistan should prioritize more rigorous and sufficiently powered randomized controlled trials with clearly defined control conditions and longer follow-up periods to assess the sustainability of mental health benefits. Incorporating objective measures, such as digital activity trackers, sleep monitoring, and, where feasible, biological markers, would strengthen mechanistic understanding and reduce reliance on self-report alone. Intervention manuals and fidelity checks should be reported in greater detail to allow replication and meta-analytic comparison.

Given the promising but variable effects observed, future interventions should increasingly combine modalities—such as integrating physical activity, dietary improvements, and mindfulness or CBT elements, into multimodal programs tailored to local cultural and socioeconomic realities. Implementation research is needed to identify optimal delivery formats (e.g., school-based, university-based, primary care–embedded, or community-led), and to evaluate cost-effectiveness, scalability, and equity of access, particularly for women, low-income groups, and rural populations.

At a policy level, lifestyle-based mental health promotion could be incorporated into national non-communicable disease and mental health strategies, aligning with stepped-care models that prioritize low-intensity, community-compatible interventions before specialist referral.[56] Partnerships between universities, schools, primary care centers, and faith or community organizations may offer sustainable platforms for delivering culturally congruent lifestyle programs. Training non-specialist facilitators—such as peer leaders, teachers, and community health workers—in basic lifestyle and behavioral mental health interventions could help bridge the substantial treatment gap in Pakistan.
Finally, future work should deliberately examine barriers to and facilitators of engagement, including stigma, family support, digital access, and gender norms. Qualitative and mixed-methods studies embedded within intervention trials could provide insight into why some participants show strong improvements while others benefit less, thereby informing refinement of content, delivery, and support mechanisms. Such an evidence base would allow Pakistan to move from promising pilot projects toward integrated, contextually grounded lifestyle mental health programs that are both scalable and sustainable.

Conclusion

Evidence from Pakistan aligns with international findings and supports the utility of lifestyle interventions, including physical activity, nutritional optimization, mindfulness, and culturally adapted CBT, in improving mental health outcomes across populations. Given feasibility, affordability, and cultural adaptability, these interventions warrant scale-up through academic institutions, primary care, and community health systems. More rigorous and powered trials with standardized psychological outcomes and long-term follow-up are required.

Authors' Contributions: RT contributed to conceptualization of the review, development of the study protocol, oversight of methodology, critical revision of content, and final approval of the manuscript. AMK completed the literature search, conducted data extraction, drafted the initial manuscript sections, and participated in revisions. AYRK assisted with data screening and eligibility assessment, constructed study tables, and synthesized results for presentation. KM contributed to interpretation of findings, drafting and refinement of the discussion section, and editorial polishing. AN provided supervision and methodological guidance, contributed to policy contextualization, and approved the final manuscript version. All authors fulfill ICMJE authorship criteria and agree to be accountable for all aspects of the work.

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