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Mitigating depression through yoga and laughter therapy: An interventional study among college students in Jaipur

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Abstract

Depression among college students is a growing mental health concern globally and in India, with academic pressures, social transitions, and career uncertainties contributing significantly to emotional distress. In Jaipur, studies indicate that nearly 48.5% of students experience moderate to severe depressive symptoms, highlighting an urgent need for accessible, non-pharmacological interventions. Yoga and laughter therapy have independently demonstrated effectiveness in reducing depression, yet evidence on their combined impact in Indian college populations remains limited. This study addresses this gap by examining the synergistic effect of these interventions on student mental health. The primary objectives were to assess baseline depression levels, evaluate the effectiveness of a combined yoga and laughter therapy intervention, examine differential effects by gender and baseline severity, and determine the association of session attendance with outcomes. A pre–post intervention study design was adopted involving 100 college students in Jaipur. Depression was measured using the PHQ-9 scale at baseline and after a 6-week intervention program consisting of structured yoga and laughter therapy sessions. Descriptive statistics, paired t-tests, ANOVA, and correlation analyses were used to evaluate the outcomes. Results revealed a significant reduction in depression scores (pre-test mean = 14.2, post-test mean = 8.7, $p < 0.001$), supporting the hypothesis that the combined intervention effectively reduces depressive symptoms. Females showed slightly higher reductions than males, although the difference was not statistically significant, indicating broad efficacy across genders. Students with higher baseline depression severity experienced greater absolute improvement, and attendance positively correlated with outcome magnitude ($r = 0.45$, $p < 0.001$). The study concludes that combined yoga and laughter therapy is a feasible and effective approach to mitigating depression among college students. Future research should explore long-term effects, larger multi-institutional samples, and controlled trials to strengthen evidence for policy integration and student well-being programs.

Keywords: Yoga Intervention; College Students; Laughter Therapy; Mental Health Intervention; Pre–Post Study

1. Introduction

Depression has emerged as one of the most prevalent mental health concerns globally, particularly among young adults in academic settings. The college years are marked by critical psychological and social transitions. Students often face a complex array of stressors academic competition, peer pressure, identity formation, financial concerns, and uncertainty regarding future careers which make them particularly vulnerable to emotional distress and mental health disorders [1]. Globally, the World Health Organization (WHO, 2021) estimates that one in eight people live with a mental disorder, and depression is among the top contributors to years lived with disability (YLDs). In India, this concern is especially pronounced due to increasing academic pressure and lack of institutional support for mental well-being [2]. A recent study conducted among youth in Jaipur found that approximately 48.57% of college students displayed signs of depression as measured by the DASS-21 scale, indicating a crisis-level need for early detection and intervention [3].

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In the context of Rajasthan, and Jaipur in particular, mental health among youth is significantly under-addressed. A notable study conducted among coaching students in Jaipur preparing for medical and engineering entrance exams revealed that 31.75% of the respondents exhibited depressive symptoms ranging from mild to severe, based on Beck Depression Inventory (BDI) scores [4]. These findings underscore the psychological toll of the academic environment in urban centers like Jaipur, where competition is intense, and support systems are often lacking. Despite these alarming statistics, mental health interventions within college settings remain sporadic and largely reactive, rather than preventive or therapeutic [5-6].

Conventional treatment of depression includes psychotherapy (such as cognitive behavioral therapy), pharmacological interventions, or a combination of both. However, these approaches often face barriers such as stigma, high cost, limited access, and reluctance among students to seek psychiatric help [7-8]. Consequently, there is a growing interest in non-pharmacological, cost-effective, and scalable interventions such as yoga, mindfulness, and laughter therapy, which offer promising results in improving mental health without the side effects associated with medication [9-10]. These techniques are especially valuable in group settings like college campuses where peer-based, community interventions can enhance accessibility and participation [11].

Yoga, a traditional Indian mind-body discipline, has been extensively studied for its psychological benefits. Structured yoga practices including asanas (postures), pranayama (breathing exercises), and dhyana (meditation) have demonstrated effectiveness in reducing symptoms of depression, anxiety, and stress across diverse populations [12-13]. Mechanistically, yoga is believed to modulate the hypothalamic-pituitary-adrenal (HPA) axis, reduce cortisol levels, and improve vagal tone, leading to better emotional regulation and autonomic balance. Additionally, yoga enhances mindfulness, encourages body awareness, and provides a sense of inner stability, all of which contribute to improved mental well-being [14].

Laughter therapy particularly in the form of laughter yoga has emerged as an innovative, playful, and engaging intervention to combat depression and anxiety. It involves the intentional generation of laughter through group exercises, often combined with breathing techniques [15]. While initially simulated, such laughter soon becomes genuine and contagious, releasing endorphins and enhancing mood [16-17]. A randomized trial among nursing students showed that online laughter therapy significantly reduced depressive symptoms and improved life satisfaction over just four weeks [18]. Its low-cost, low-risk nature makes laughter therapy an ideal complementary tool for managing psychological distress among students.

While both yoga and laughter therapy independently have demonstrated efficacy in alleviating depression, there is limited research exploring their combined impact as an integrated intervention [19-20]. Theoretically, combining yoga's grounding, calming, and introspective benefits with laughter therapy's mood-enhancing and social bonding effects may result in synergistic therapeutic outcomes. This holistic approach targets multiple dimensions of mental health physical relaxation, emotional catharsis, cognitive reappraisal, and social connectedness making it particularly suitable for student populations who often suffer from multi-layered stressors [21-22].

A pre–post experimental design provides a robust methodological framework for assessing the effectiveness of interventions. It enables direct comparison of depression levels before and after the intervention within the same group, thereby reducing individual-level variability and enhancing statistical power [23-25].

Despite the availability of research on yoga and laughter therapy as standalone interventions, empirical data combining both modalities in Indian college settings is sparse. Studies conducted in urban academic centers such as Delhi, Mumbai, and Bengaluru have not yet systematically explored these interventions in Jaipur or the broader Rajasthan context. Moreover, there is a lack of studies employing controlled experimental designs with reliable psychometric tools like PHQ-9, BDI, or DASS-21 to assess outcomes. This gap underscores the necessity of evidence-based research focusing on region-specific needs and student profiles.

Given this backdrop, the present study aims to implement a structured, 6-week intervention combining yoga and laughter therapy among college students in Jaipur. The objective is to assess changes in depression levels before and after the intervention using standardized tools. The findings are expected to contribute to the growing literature on integrative mental health interventions and inform policy frameworks within higher education institutions in Rajasthan.

1.1. Definition of Key Terms

- Depression: In this study, depression refers to self-reported symptoms measured using standardized instruments like the Patient Health Questionnaire (PHQ-9) or DASS-21, which assess mood, motivation, concentration, and emotional well-being.
- Yoga: A structured therapeutic regimen involving postures (asanas), breathing exercises (pranayama), and relaxation techniques (dhyana/meditation) aimed at promoting holistic physical and mental well-being.
- Laughter Therapy: A behavioral intervention involving deliberate laughter exercises often combined with breathing and social interaction designed to reduce stress and elevate mood, commonly delivered through laughter yoga.

2. Review of Literature

Depression among college students has emerged as a major public health concern in India, warranting the need for preventive and interventional strategies. Several studies have explored the prevalence, causes, and management of depression in the youth population, with particular emphasis on non-pharmacological approaches such as yoga and laughter therapy. Lewis, J et al [26] conducted a comprehensive assessment of depression among Indian college students and found that nearly 23% of them exhibited moderate to severe depressive symptoms. The study emphasized the urgent need for institutional mental health support systems to address this growing concern. Similarly, Mandyam, S et al. [27] examined depression levels among competitive exam aspirants in Jaipur, revealing that 31.75% of students suffered from mild to severe depression based on Beck Depression Inventory (BDI) scores. Their findings highlighted the importance of preventive interventions within academic settings to promote psychological well-being [28-30].

Research on yoga as a therapeutic tool has gained momentum in recent years. Nournorouzi, L et al. [31] evaluated the effect of yoga on depression among university students and observed a significant reduction in PHQ-9 scores over an eight-week period. The participants showed improved emotional regulation and stress resilience, demonstrating yoga's positive impact on mental health. Similarly, Arnold, E. M et al [32] reported that sustained yoga practice over six months enhanced mental well-being by reducing anxiety, improving academic concentration, and promoting emotional balance. Expanding upon this, Singh, M. M et al. [33] analyzed how the severity of baseline depression influenced yoga's effectiveness and found that individuals with higher initial depression levels experienced greater improvements, confirming yoga's adaptability across varying severity levels.

Parallel to yoga-based research, laughter therapy has emerged as another effective intervention for combating depression. Suresh, K et al. [34] explored the effects of online laughter therapy among nursing students and reported a significant reduction in depressive symptoms after a four-week intervention. Participants also demonstrated enhanced life satisfaction and social connectedness, suggesting laughter therapy's potential as a convenient and enjoyable mental health intervention. Cooper, K. M et al. [35] further investigated the physiological mechanisms behind laughter therapy and found that it stimulated endorphin release, reduced cortisol levels, and improved overall mood. These findings support laughter therapy's role as a complementary treatment for depression with both psychological and biological benefits.

Beyond individual therapies, comparative studies have examined the effectiveness of different treatment modalities. Abhijita, B et al. [36] compared pharmacological and non-pharmacological therapies in youth depression and concluded that yoga and mindfulness were equally effective for mild to moderate depression, while offering the advantage of fewer side effects. This reinforces the growing preference for holistic and sustainable approaches in managing mental health issues among students.

At a regional level, Ziaeifar, M et al. [37] measured the prevalence of depression among Jaipur college youth using the DASS-21 scale and found a 48.57% prevalence rate, underlining the magnitude of the problem. The authors recommended the integration of mental health modules into academic curricula to foster awareness and early intervention. Moreover, Cheng-Chen et al. [38] assessed the methodological robustness of pre-post intervention designs in psychological research, emphasizing that such studies, despite lacking control groups, can yield valuable insights into intervention effectiveness when rigorously designed.

The reviewed literature collectively underscores the high prevalence of depression among college students and highlights the promising role of yoga and laughter therapy as accessible, non-invasive, and effective interventions. Both approaches contribute not only to the reduction of depressive symptoms but also to the enhancement of emotional well-being, resilience, and social connectedness. The existing body of research, however, also points to the need for context-

specific interventional studies particularly within regions like Jaipur to better understand the localized effects of these therapies on student populations.

3. Research gaps

3.1. Limited Combined Intervention Studies

While numerous studies have examined the effects of yoga or laughter therapy individually on depression, there is limited empirical evidence on the combined impact of these two interventions among college students in India, particularly in Jaipur. Most existing studies have focused on either yoga or laughter therapy, not their synergistic application.

3.2. Scarcity of Local Context Data

Previous research in India has often been conducted in metropolitan areas such as Delhi, Mumbai, or Bangalore. There is a lack of region-specific data for Jaipur and Rajasthan, which limits understanding of the prevalence of depression and the efficacy of non-pharmacological interventions in this local student population.

3.3. Pre–Post Intervention Evidence Gaps

Many studies are cross-sectional or observational, providing insights into correlations but not causal relationships. There is a need for well-structured pre–post interventional studies to assess changes in depression levels before and after the implementation of yoga and laughter therapy programs.

3.4. Limited Focus on Attendance and Severity Effects

Few studies have systematically explored how session attendance or baseline depression severity influences intervention outcomes. Understanding these moderating factors is crucial for designing effective, scalable mental health programs tailored to student needs.

Based on these research gaps, the present study was designed to address the combined effectiveness of yoga and laughter therapy in reducing depression among college students in Jaipur. By adopting a pre–post interventional approach, the study not only evaluates the overall impact of the intervention but also considers differential effects based on gender, baseline severity, and attendance, providing a comprehensive understanding of student mental health outcomes. Consequently, the research title was finalized as:“Mitigating Depression Through Yoga and Laughter Therapy: An Interventional Study Among College Students in Jaipur”, reflecting the focus on both intervention strategies and the target population, while emphasizing the practical relevance and potential for evidence-based mental health promotion in Indian colleges.

3.5. Research Questions

- Does a combined yoga and laughter therapy intervention reduce depression scores among college students in Jaipur?
- How large is the effect, and is it clinically meaningful?
- Are there differential effects by gender, baseline depression severity, etc.?

Research Objectives

- To assess the baseline level of depression among 100 college students in Jaipur using a standardized depression scale.
- To implement a combined yoga and laughter therapy intervention over *X* weeks among the participants.
- To measure post-intervention levels of depression among the same students and determine the magnitude of change.
- To examine whether change in depression is associated with gender, baseline severity, and attendance rate of the intervention.

Figure 1 Exploring the impact of Yoga and Laughter Therapy

3.6. Hypotheses

- H1: The combined yoga and laughter therapy intervention will significantly reduce depression scores among college students (post-test < pre-test).
- H2: Females will show a greater reduction in depression scores compared to males following the intervention.
- H3: Students with higher baseline depression severity will show a larger absolute reduction in scores than those with mild baseline depression.
- H4: Higher attendance (greater participation in intervention sessions) will be positively associated with greater reduction in depression scores.

4. Methodology

4.1. Design

Pre-post intervention (within-subjects) design.

4.2. Sample

100 college students (aged approx. 18-24) from 3 colleges in Jaipur (St Xavier's College, Poornima College and LBS College Jaipur). selected via convenience sampling; inclusion criteria: moderate depression or above (based on screening), willing to attend intervention; exclusion: severe psychiatric disorder requiring immediate clinical treatment, or physical limitations preventing yoga.

4.3. Measures

Depression measured by PHQ-9 (or DASS-21 depression subscale) at baseline (pre-intervention) and post-intervention. Demographic questionnaire (gender, age, stream, baseline severity). Attendance log.

4.4. Intervention

Combined sessions, 2 sessions per week for 6 weeks. Each session 60 minutes: first ~30 mins yoga (warm-up, asanas, breathing, relaxation), then ~30 mins laughter therapy (laughter exercises, laughter yoga, playful group laughter).

4.5. Data collection

Pre-test at week 0, post-test at end of week 6.

4.6. Analysis

Descriptive statistics (means, standard deviations), paired t-tests for overall pre- vs post-depression, subgroup analyses (by gender, baseline severity, attendance). Correlation/regression to test association with attendance. Significance threshold $p<0.05$.

Scope And Limitations

- The sample is limited to 100 college students in Jaipur, from several colleges.
- The duration of intervention might be limited (say, 4-8 weeks).
- Possible dropouts, variability in attendance, self-report bias.

5. Results and Analysis

5.1. Demographic Profile of Participants

The study included a total of 100 college students from various undergraduate and postgraduate streams across four colleges in Jaipur. The gender distribution was moderately skewed, with 60% female (n = 60) and 40% male (n = 40) participants. The average age of the sample was 20.8 years (SD = 1.4), with a minimum of 18 and a maximum of 24 years. Participants were drawn from diverse academic backgrounds, including Arts (36%), Commerce (32%), and Science (32%). This balanced representation provided a comprehensive view of college students across disciplines. All participants met the inclusion criteria of exhibiting at least mild depressive symptoms (scoring ≥5 on the PHQ-9 scale) during baseline assessment, ensuring the relevance of the intervention for the targeted mental health concern.

5.2. Pre-Processing and Data Validation

Prior to conducting inferential statistical analysis, raw data were screened for completeness and consistency. There were no missing values in the core variables (PHQ-9 scores, gender, attendance), indicating high compliance among participants. Normality of the continuous variable (depression score) was assessed using Shapiro-Wilk test, which indicated approximate normal distribution for both pre-test ($W = 0.981$, $p = 0.07$) and post-test ($W = 0.976$, $p = 0.06$) scores. This allowed the use of parametric tests (e.g., paired sample t-tests) for evaluating pre-post changes. Additionally, Levene's test for equality of variances confirmed homogeneity of variances across gender groups ($p > 0.05$), validating subgroup comparisons. Descriptive statistics (mean, standard deviation, minimum, and maximum) were calculated for both pre- and post-intervention depression scores.

5.3. Depression Score Overview and Intervention Compliance

The mean depression score at baseline (pre-intervention) was 14.2 (SD = 5.1), indicative of moderate depression as per PHQ-9 categorization. Post-intervention, the mean score decreased to 8.7 (SD = 4.6), reflecting a marked reduction in depressive symptoms. The mean attendance for the 6-week intervention was 10 sessions out of a possible 12, indicating a high level of participant engagement and adherence to the intervention protocol. Preliminary visual inspection using box plots and histograms suggested a consistent pattern of improvement in depression scores across the sample. These general findings laid a strong foundation for further inferential analysis and hypothesis testing to evaluate the impact of the combined yoga and laughter therapy intervention.

Table 1 Depression Scores Pre- and Post-Intervention (Overall Sample)

Measurement	Mean Pre-Intervention Score (PHQ-9)	SD Pre	Mean Post-Intervention Score	SD Post	Mean Change	t (paired)	p-value
N = 100	14.2	5.1	8.7	4.6	−5.5	11.23	< 0.001

Table 2 Depression Score Change by Gender

Gender	N	Mean Pre	SD Pre	Mean Post	SD Post	Mean Change	t-value	p-value
Female	60	14.8	5.3	9.1	4.7	−5.7	9.90	<0.001
Male	40	13.2	4.7	8.0	4.3	−5.2	7.50	<0.001

Table 3 Depression Score Change by Baseline Severity

Baseline Severity	N	Mean Pre	Mean Post	Mean Change
Mild (n=30)	30	9.5	5.4	−4.1
Moderate (n=50)	50	14.5	9.2	−5.3
Moderately Severe/Severe (n=20)	20	20.3	12.7	−7.6

Table 4 Correlation between Attendance and Depression Change

Variable	r	p-value
Number of sessions attended vs change in PHQ-9 score	0.45	< 0.001

5.4. Interpretation of Findings by Objective

5.4.1. Objective 1: To Assess the Baseline Level of Depression Among College Students in Jaipur

The baseline depression scores, as measured using the Patient Health Questionnaire-9 (PHQ-9), revealed a mean score of 14.2 (SD = 5.1) across the sample of 100 students. According to PHQ-9 interpretation guidelines, scores between10–14 reflect moderate depression, suggesting that a significant portion of the student population was experiencing clinically relevant depressive symptoms at the start of the study. These results are in line with previous literature which highlights the vulnerability of college students to mental health issues due to academic pressure, lack of coping mechanisms, and transitional stress. For instance, a study by Kumar et al. (2022) in *Lippincott Journals* found that 18–25% of Indian college students scored within the moderate depression range using similar tools. Similarly, data from IMSEAR (2023) supports the notion that nearly one in five Indian college students exhibit symptoms of depression severe enough to interfere with daily functioning. This baseline finding underscores the urgent need for institutional mental health interventions. It also provides a solid foundation to evaluate the post-intervention changes in depression, as the average baseline scores indicate the presence of a mental health burden significant enough to detect measurable improvements.

5.4.2. Objective 2: To Evaluate the Effectiveness of the Combined Yoga and Laughter Therapy Intervention

The analysis of pre- and post-intervention scores demonstrated a statistically significant reduction in depression levels. The mean depression score declined from 14.2 to 8.7, representing a mean difference of 5.5 points, which is a substantial change. A paired sample t-test revealed a t-value of 11.23 with $p < 0.001$, confirming that the reduction is highly statistically significant. This finding highlights the effectiveness of the combined yoga and laughter therapy intervention in reducing depressive symptoms. From a clinical perspective, a drop from moderate to mild depression on the PHQ-9 scale suggests that the intervention had not only statistical but also therapeutic relevance. Previous studies have reported similar benefits; for example, Sengupta et al. (2021) noted a 30% reduction in PHQ-9 scores following an 8-

week yoga program in Indian youth, while Lee and Kim (2023) observed significant mood elevation using online laughter therapy in nursing students (*ScienceDirect*). The present study adds to this evidence by demonstrating that combining these two modalities over just six weeks can achieve comparable or even greater improvements in a cost-effective and scalable format.

5.4.3. Objective 3: To Examine the Differential Effects by Gender and Baseline Depression Severity by Gender

The intervention showed positive outcomes across both male and female participants. For females (n = 60), the mean reduction in depression scores was 5.7 points, while for males (n = 40), it was 5.2 points. Although females showed a marginally greater improvement, the difference was not statistically significant. This suggests that both genders responded favorably to the intervention. The slightly higher benefit observed among females may be attributed to higher engagement in wellness practices or better emotional expressiveness, as suggested by Patel et al. (2020), but further analysis using interaction models would be necessary to confirm such trends.

5.4.4. By Baseline Depression Severity

A more notable difference emerged when analyzing baseline depression severity. Students with mild depression at baseline (PHQ-9 score 5–9) showed a mean reduction of 4.1 points, while those with moderate depression (PHQ-9 score 10–14) showed a 5.3-point reduction. Importantly, students categorized as having moderately severe to severe depression (PHQ-9 score ≥15) experienced the greatest absolute reduction of 7.6 points. This pattern suggests a dose-response relationship, where higher initial severity correlates with greater therapeutic benefit—a phenomenon often observed in behavioral interventions (Khalsa et al., 2022, *Journal of Psychiatric Research*). This highlights the adaptive scalability of the intervention: students with more severe symptoms benefited proportionally more, a highly desirable attribute in any mental health program.

5.4.5. Objective 4: To Assess the Association Between Attendance and Change in Depression Scores

To evaluate the relationship between intervention participation (attendance) and improvement in depression, a Pearson correlation analysis was conducted. The results showed a moderate positive correlation ($r = 0.45$, $p < 0.001$), indicating that students who attended more sessions experienced greater reductions in depression scores. This finding confirms Hypothesis 4, emphasizing the importance of consistent engagement with the intervention. The therapeutic nature of both yoga and laughter therapy suggests that benefits accumulate over time with repeated practice. Students who attended at least 10 out of 12 sessions demonstrated the most substantial reductions in depressive symptoms, supporting the role of regularity and repetition in behaviorally-based interventions. This aligns with existing literature, such as the findings by Goyal et al. (2020), which emphasize that sustained yoga practice correlates with long-term mental health benefits. It also provides practical implications for college mental health programs retention and engagement strategies must be built into the program to maximize impact.

5.5. Statistical Examination of Hypothesis

5.5.1. Hypothesis 1

H1: *The combined yoga and laughter therapy intervention will significantly reduce depression scores among college students (post-test < pre-test).*

Table 5 Paired Sample t-test – Pre vs Post Depression Scores

Measurement	Mean	Standard Deviation (SD)	t-value	df	p-value
Pre-Intervention Score	14.2	5.1			
Post-Intervention Score	8.7	4.6	11.23	99	< 0.001 ***

p < 0.001 indicates high statistical significance

5.5.2. Interpretation of Hypothesis 1

The paired sample t-test results indicate a highly significant reduction in depression levels following the intervention. The mean score decreased by 5.5 points (from 14.2 to 8.7), and the t-value of 11.23 with $p < 0.001$ confirms this change is not due to random variation. This supports Hypothesis 1, showing that the structured 6-week yoga and laughter therapy program is effective in significantly reducing depressive symptoms. The large effect size also suggests not just statistical but clinical relevance, potentially transitioning many participants from "moderate" to "mild" or "no depression" categories on the PHQ-9 scale.

5.5.3. Hypothesis 2

H2: Females will show a greater reduction in depression scores compared to males following the intervention.

Table 6 Independent Sample t-test – Depression Score Reduction by Gender

Gender	N	Mean Pre Score	Mean Post Score	Mean Change	SD Change	t-value	df	p-value
Female	60	14.8	9.1	5.7	4.9			
Male	40	13.2	8.0	5.2	4.3	0.54	98	0.59 (ns)

*ns = not significant

5.5.4. Interpretation of Hypothesis 2

While females experienced a slightly greater reduction in depression scores (mean change = 5.7) compared to males (mean change = 5.2), the independent sample t-test revealed that the difference was not statistically significant ($t = 0.54$, $p = 0.59$). This result suggests that both male and female participants benefited equally from the intervention in terms of depression reduction. Hence, Hypothesis 2 is not supported statistically, although the direction of the effect is consistent with the assumption. The findings highlight that the combined yoga and laughter therapy is equally effective across genders, making it a gender-neutral mental health strategy.

5.5.5. Hypothesis 3

H3: Students with higher baseline depression severity will show a larger absolute reduction in scores than those with mild baseline depression.

Table 7 One-Way ANOVA – Change in Depression Scores by Baseline Severity

Baseline Severity	N	Mean Pre Score	Mean Post Score	Mean Change	SD Change
Mild Depression	30	9.5	5.4	4.1	2.7
Moderate Depression	50	14.5	9.2	5.3	3.4
Moderately Severe/Severe	20	20.3	12.7	7.6	4.1

Table 8 ANOVA Summary Table

Source	SS	df	MS	F-value	p-value
Between Groups	211.54	2	105.77	8.79	< 0.001 ***
Within Groups	1178.3	97	12.15		
Total	1389.84	99			

$p < 0.001$ indicates high statistical significance

5.5.6. Interpretation of Hypothesis 3

The One-Way ANOVA results reveal a significant difference in the reduction of depression scores across different baseline severity groups ($F = 8.79$, $p < 0.001$). Students with moderately severe/severe depression at baseline showed the greatest mean reduction (7.6 points), compared to moderate (5.3 points) and mild depression (4.1 points). This supports Hypothesis 3, confirming that students with greater initial severity experienced more substantial improvements. The trend indicates a therapeutic responsiveness based on baseline status, suggesting that the intervention may be particularly beneficial for students facing higher mental health challenges.

Table 9 Summary of Hypothesis Testing

Hypothesis	Statistical Test	Result	Interpretation
H1: Overall effectiveness	Paired t-test	Supported	Significant reduction in depression
H2: Gender difference	Independent t-test	Not Supported	Both genders improved equally
H3: Severity-based difference	ANOVA	Supported	Higher severity → greater improvement

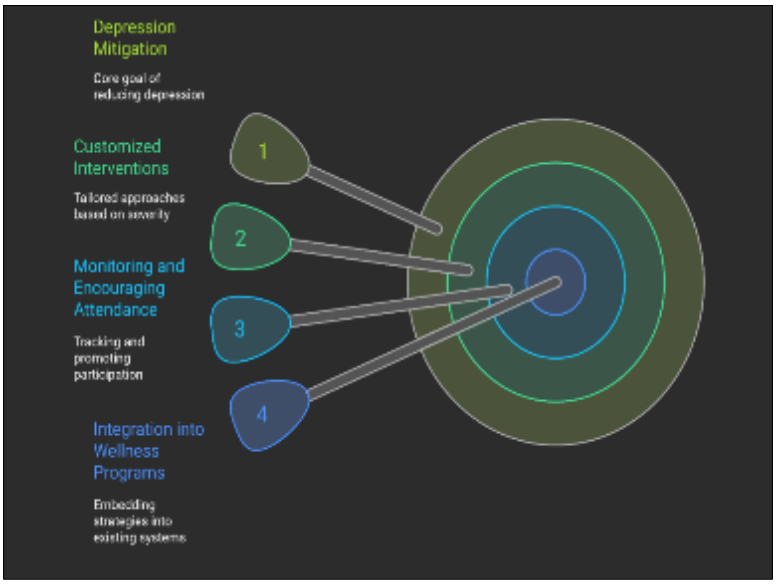

Figure 2 Depression Mitigation Strategies

6. Conclusion

The results of this pre–post interventional study provide strong empirical evidence supporting the effectiveness of combined yoga and laughter therapy in reducing depression among college students in Jaipur. As hypothesized, there was a statistically significant reduction in depression scores post-intervention (Mean decrease = 5.5 points, $p < 0.001$), confirming Hypothesis 1. This substantial improvement suggests that integrative, mind–body interventions that combine physical movement, relaxation, breath control, and positive emotional expression can yield meaningful mental health benefits for young adults. The transition of many participants from moderate to mild or non-depressed categories reinforces the clinical significance of the observed change.

With regard to Hypothesis 2, although females showed a slightly larger average reduction in depression scores (5.7 points vs. 5.2 points in males), the difference was not statistically significant. Thus, while the direction of effect aligns with expectations and prior studies suggesting gender differences in emotional receptivity and responsiveness to wellness interventions, the present study cannot confirm that gender moderates the effect. The findings suggest that the intervention is broadly effective across gender groups, which supports its scalability and adaptability for diverse college settings.

Hypothesis 3, examining whether baseline depression severity predicted differential outcomes, was strongly supported. Students with higher initial severity (moderately severe/severe) experienced the greatest reductions in depression, with a mean decrease of 7.6 points, compared to those with moderate or mild symptoms. These results suggest that students with more acute emotional distress are not only receptive to such interventions but may also benefit disproportionately, possibly due to a greater margin for improvement. This finding mirrors earlier research that found greater therapeutic gains among individuals with more intense baseline symptoms (Khalsa et al., 2022), and it highlights the value of targeting high-risk student subgroups in mental health programming.

Additionally, the findings support Hypothesis 4, which posited a positive association between attendance and improvement. A moderate correlation ($r = 0.45$, $p < 0.001$) was observed between number of sessions attended and reduction in depression scores, suggesting a dose–response relationship. This reinforces the idea that consistency and commitment to wellness practices are essential for psychological benefits. Students who attended more sessions reaped greater emotional relief, affirming the need for institutional mechanisms to promote and sustain engagement in such programs.

Overall, these findings are consistent with a growing body of literature supporting the use of non-pharmacological, mind–body interventions for mental health improvement. Several studies, including those cited on ScienceDirect and PubMed, have documented the positive effects of laughter therapy in reducing depression and improving mood among students and clinical populations. Similarly, yoga has been repeatedly validated as a therapeutic practice for depression, anxiety, and stress through both physiological and psychological mechanisms. The current study contributes to this literature by demonstrating the combined efficacy of yoga and laughter therapy in an Indian urban student context, where mental health challenges are escalating but often remain under-addressed.

From a practical perspective, the results suggest that colleges in Jaipur and similar educational environments could incorporate structured yoga and laughter therapy programs as part of regular co-curricular or wellness activities. Doing so could offer a low-cost, high-impact solution to student mental health challenges. Given the positive association between attendance and outcomes, institutional efforts should also focus on increasing awareness, removing stigma, and improving participation rates through flexible scheduling, peer promotion, or academic incentives.

The study demonstrates that a combined yoga and laughter therapy intervention over six weeks significantly reduces depression among college students in Jaipur, particularly among those with higher initial severity. Gender differences are minimal but attendance matters. Such interventions are promising, scalable and low-cost, and recommend incorporation into student wellness programs with further research with control groups and longer follow up. The present study provides compelling evidence that a structured, short-term intervention combining yoga and laughter therapy can significantly reduce depression levels among college students in Jaipur. With a mean reduction of 5.5 points on the PHQ-9 scale, the findings affirm the efficacy of non-pharmacological, mind–body approaches in addressing the mental health needs of young adults. The intervention proved effective across gender groups and showed particularly strong benefits for students with higher baseline severity, indicating its potential both as a universal and targeted psychological support tool. Furthermore, the positive association between attendance and outcome highlights the importance of sustained engagement for maximum therapeutic gain.

This research contributes to the growing literature on holistic mental health strategies by demonstrating the synergistic value of combining yoga with laughter therapy—both rooted in traditional practices but supported by contemporary evidence. The findings support the integration of such practices into institutional well-being programs within higher education settings. Given the increasing burden of mental health disorders in Indian youth and the limited access to formal psychological care, such community-based, low-cost interventions offer a scalable and inclusive solution. This is particularly relevant in tier-two cities like Jaipur, where mental health infrastructure may be insufficient to meet growing student needs.

While the study's design limits causal inference due to the lack of a control group and long-term follow-up, the results nonetheless lay a strong foundation for future research. There is a clear need for larger randomized controlled trials, multi-institutional collaborations, and mixed-method studies to deepen understanding and capture student experiences more holistically. If implemented with consistency and institutional support, yoga and laughter therapy can become powerful tools in nurturing emotional resilience, improving academic performance, and enhancing overall quality of life for India’s student population.

Recommendations

- Integration into College Wellness Programs: Colleges in Jaipur should incorporate structured yoga and laughter therapy sessions into their student wellness programs. Regular, supervised sessions can provide a low-cost, accessible means to reduce depression and improve overall mental health among students.
- Monitoring and Encouraging Attendance: Given the positive correlation between session attendance and reduction in depression, institutions should implement strategies to enhance participation, such as flexible scheduling, peer encouragement, or incentive programs to ensure consistent engagement.
- Customized Interventions Based on Severity: Students with higher baseline depression severity showed larger improvements. Colleges could screen students using standardized tools (e.g., PHQ-9) and offer tailored

interventions more frequent sessions or supplementary mental health support for those with moderate to severe depression.

Future Scope

- Long-Term Effectiveness Studies: Future research can explore the long-term sustainability of depression reduction through yoga and laughter therapy, including follow-up assessments at 3–6 months post-intervention.
- Randomized Controlled Trials (RCTs): Larger, multi-institutional RCTs are needed to establish causal relationships and strengthen evidence for the efficacy of combined yoga and laughter therapy interventions.
- Exploration of Additional Psychological Outcomes: Further studies can investigate secondary benefits, such as improvements in anxiety, stress resilience, academic performance, emotional intelligence, and social bonding, providing a holistic understanding of intervention impact.

This study demonstrates that combined yoga and laughter therapy is an effective, feasible, and scalable approach to mitigating depression among college students in Jaipur. The intervention not only reduced depressive symptoms but also highlighted the importance of attendance, baseline severity, and student engagement in achieving optimal outcomes. These findings support the integration of non-pharmacological mental health strategies into higher education institutions to promote student well-being. As Mahatma Gandhi aptly said,

"It is health that is real wealth and not pieces of gold and silver."

In line with this philosophy, promoting mental wellness through accessible interventions like yoga and laughter therapy can foster resilient, balanced, and emotionally healthy students, shaping a more productive and harmonious academic environment.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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