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VR-Assisted MCBT counseling based on tri kaya parisudha on adolescents' emotional disorders

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Abstract

This study investigated the effectiveness of Virtual Reality–assisted Mindfulness-Based Cognitive Therapy (MCBT) oriented toward Tri Kaya Parisudha in reducing emotional disorders among junior high school students in Denpasar, Indonesia. Using a single-subject A–B–A experimental design, five students identified with severe to very severe levels of depression, anxiety, and stress based on the DASS-21 were selected from an initial screening of 200 students. The intervention consisted of structured VR-assisted MCBT sessions integrating mindfulness practices, cognitive restructuring, and the ethical principles of Tri Kaya Parisudha. Data were collected across baseline (A_1), intervention (B), and post-intervention (A_2) phases and analyzed using visual analysis and ANOVA. The results demonstrated significant reductions in depression and stress, with improvements remaining stable after the intervention was withdrawn. Anxiety levels showed improvement but were less responsive compared to other emotional domains. Statistical analysis confirmed significant differences across phases for depression ($F = 27.134$, $p < .001$), anxiety ($F = 13.376$, $p = .001$), and stress ($F = 18.768$, $p < .001$). These findings indicate that VR-assisted MCBT oriented toward Tri Kaya Parisudha is an effective and culturally responsive counseling approach for reducing emotional disorders in adolescents.

Keywords: CBT, Emotional disorder, Mindfulness, Tri kaya Parisudha, Virtual reality

Introduction

Human well-being is closely associated with happiness, an important indicator of quality of life that encompasses physical, mental, and social dimensions (1). Happiness is subjective in nature and varies according to individual perceptions and life experiences. It includes feelings of pleasure and satisfaction as well as inner calm, gratitude, patience, and emotional balance (2). When emotional disorder such as stress, anxiety, and depression emerge, these positive states are often disrupted, resulting in lower levels of well-being (3). Adolescents are particularly vulnerable to these emotional challenges because they are navigating developmental transitions while facing increasing academic and social demands (4).

Recent data indicate a troubling rise in suicide cases in Bali. In 2024 alone, Bali recorded 95 suicide cases, a figure significantly higher than the national average, with several cases involving individuals in adolescent age groups. A growing body of research indicates that emotional disorders are among the most significant risk factors associated with suicidal behavior in adolescents (5,22). This situation reflects the substantial psychological pressure experienced by young people, including junior high school students, as academic demands, family-related stress, and limited emotional support often interact to exacerbate emotional disorders (6).

School-based counseling practices are particularly vital for adolescents who are at risk of emotional disorders. School counseling services provide a structured and accessible support system that enables at-risk students to recognize emotional difficulties, develop healthy coping strategies, and receive professional guidance within their everyday learning environment (7). Through early identification and targeted interventions, school counselors can help prevent the escalation of emotional problems into more severe outcomes, such as academic disengagement or self-harm (8). Moreover, effective counseling practices foster emotional regulation and psychological safety, which are essential for maintaining concentration and academic engagement among adolescents facing emotional challenges.

Mindfulness-based approaches have increasingly been recognized as effective strategies for addressing

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emotional disturbance. Mindfulness emphasizes present-moment awareness and acceptance, which counteracts mindlessness (9). One well-established approach is Mindfulness-Based Cognitive Therapy (MCBT), which integrates mindfulness practices with Cognitive Behavioral Therapy (CBT). MCBT has been shown to reduce symptoms of stress, anxiety, and depression while enhancing emotional regulation and cognitive flexibility (10,21). These developments also reflect broader trends in contemporary psychotherapy, where mindfulness principles have become central to modern CBT models (11).

To enhance the relevance and effectiveness of counseling interventions, it is increasingly important to integrate cultural values and technological innovation. Tri Kaya Parisudha (TKY), a Balinese Hindu ethical framework emphasizing right thinking (manacika), right speech (wacika), and right action (kayika), aligns closely with mindfulness and cognitive-behavioral principles and offers culturally meaningful guidance for students in Bali (12,22). At the same time, immersive Virtual Reality (VR) technology provides new opportunities to strengthen therapeutic engagement and concentration through controlled, interactive environments (13,14). Integrating VR with MCBT and TKY may therefore create a more effective and culturally responsive counseling model. Accordingly, this study examines the effectiveness of VR–assisted MCBT oriented toward TKY in reducing emotional disturbances and improving concentration among junior high school students in Denpasar.

Method

Design

This study employed an experimental method using a Single-Subject Research (SSR) design. Single-subject design is an experimental research approach that focuses on intensive, repeated measurement of an individual's behavior over time to examine the functional relationship between an intervention and observed outcomes (15,19). Specifically, an A–B–A design was implemented to examine the functional relationship between the independent and dependent variables. In this design, repeated measurements were conducted across three sequential phases: Baseline 1 (A_1), Intervention (B), and Baseline 2 (A_2). The basic structure of the A–B–A single-subject design is illustrated in Figure 1

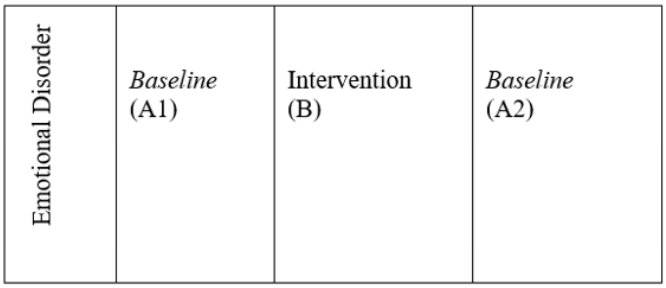

Figure 1. A–B–A design

Participants

This study employed purposive sampling, a non-probability sampling technique in which participants are selected based on predefined criteria aligned with the research objectives. Prior to participant selection, an initial screening was conducted involving 200 junior high school students in Denpasar, Bali, to identify students exhibiting emotional disorders. The screening process aimed to ensure that participants selected for the intervention represented adolescents with clinically significant emotional difficulties. The inclusion criteria required students to demonstrate at least one emotional disorder—depression, anxiety, or stress—at a severe or very severe level, as determined through a diagnostic assessment administered during Baseline Phase 1 (A_1). Based on the screening and baseline assessment results, five students met the inclusion criteria and were therefore selected as research participants. This focused sampling strategy is appropriate for single-subject research, which emphasizes intensive, repeated measurement of individuals who clearly manifest the target conditions rather than broad population generalization. All selected participants demonstrated clinically significant levels of emotional disorders and were categorized as adolescents at high risk for emotional dysregulation. The limited sample size is methodologically justified within the framework of single-subject research, as the primary analytical emphasis lies in within-subject change and functional relationships between intervention and outcome variables rather than statistical inference. The participants of the current study is presented in Table 1

Table 1. Research participants

P	Sex	Emotional Disorder
1	F	Severe stress, very severe anxiety, very severe depression
2	F	Very severe stress, severe anxiety, very severe depression
3	F	Severe stress, very severe anxiety, very severe depression
4	F	Severe stress, very severe anxiety, very severe depression
5	F	Severe stress, very severe anxiety, very severe depression

Ethical consideration

This study involved human participants and therefore adhered strictly to established ethical standards for educational and psychological research. Ethical approval was obtained from Universitas Pendidikan Ganesha prior to data collection (Approval No. 008/UN.48.16.04/PT/2025), confirming that all research procedures complied with the ethical principles of respect for persons, beneficence, and justice. The approval encompassed all stages of the research process, including participant screening, data collection, intervention implementation, and data analysis. Several ethical procedures were implemented to protect participants' rights and well-being. Informed consent was obtained from all participants and their parents or legal guardians, given that the participants were minors. Participants were provided with clear and age-appropriate information regarding the purpose of the study, research procedures, potential risks and benefits, and their right to withdraw from the study at any time without penalty. Confidentiality and anonymity were ensured by using participant codes instead of real names, and all data were stored securely and used solely for research purposes.

In addition, participants who exhibited severe emotional disorders were monitored carefully throughout the study, and appropriate support or referral procedures were prepared in collaboration with school counselors to ensure participant safety. These ethical safeguards ensured that the study was conducted responsibly and with due consideration for the psychological well-being of all participants.

Data collection

Data on emotional disorders were collected using the Depression Anxiety Stress Scales–21 (DASS-21), a standardized psychological instrument designed to assess levels of depression, anxiety, and stress. The DASS-21 consists of 21 items divided into three subscales, each comprising seven items that reflect symptoms associated with the respective emotional conditions. Participants were asked to rate the frequency of symptoms experienced over the past two weeks using a four-point Likert scale ranging from 0 (did not apply at all) to 3 (applied very much or most of the time). Subscale scores were summed and multiplied by two to align with the original DASS-42 scoring system, and severity levels were classified into normal, mild, moderate, severe, and very severe categories. The DASS-21 is widely recognized as a valid and reliable instrument for use in clinical, educational, and research settings to screen emotional disorders and monitor changes over time.

To strengthen diagnostic accuracy, the assessment of emotional disorders was interpreted in reference to the DSM-IV diagnostic framework, which provides standardized criteria for identifying depression and anxiety-related disorders based on symptom patterns, duration, and functional impairment. This framework supported the identification of students exhibiting clinically significant emotional disorders and ensured that intervention decisions were grounded in established diagnostic standards. The combined use of DASS-21 scores and DSM-IV criteria enabled systematic screening, classification, and monitoring of emotional disorders, thereby supporting the selection of participants and evaluation of intervention outcomes.

Data analysis

To statistically examine the effectiveness of VR-assisted MCBT counseling based on TKY on students' emotional disorders, the Wilcoxon Signed-Rank Test was employed. This non-parametric statistical test is used to compare two related measurements, such as pre-intervention and post-intervention scores, when data do not meet the assumption of normal distribution. The Wilcoxon test is particularly appropriate for single-subject and small-sample studies, where data are often non-normal. Statistical

significance was determined using an alpha level of 0.05. A p-value less than or equal to α ($p \leq 0.05$) indicates a statistically significant difference between conditions, leading to rejection of the null hypothesis (H_0), whereas a p-value greater than α ($p > 0.05$) indicates insufficient evidence to support a significant difference.

Findings and Discussions

Baseline A1

Five students were identified as exhibiting severe to very severe levels of stress, anxiety, and depression. Based on these findings. A detailed overview of the screening outcomes is presented in Table 2.

Table 2. Baseline A1

P	Depression	Category	Anxiety	Category	Stress	Category
1	13	Severe	10.5	Severe	12.25	Moderate
2	12	Severe	10.25	Severe	11.75	Moderate
3	12.25	Severe	12.25	Severe	13.25	Moderate
4	11.25	Severe	10.5	Severe	12.5	Moderate
5	14.25	Severe	13	Very Severe	13.25	Moderate

All five participants demonstrated serious psychological conditions, with stress, anxiety, and depression levels ranging from severe to very severe. Each participant presented a distinct combination of emotional symptoms reflecting the severity of their mental health status. Subject A exhibited severe stress accompanied by very severe anxiety and depression, manifested through persistent low mood, withdrawal from social interaction, and physical symptoms such as cold sweating and dry lips. Similarly, Subject B showed very severe stress and depression with severe anxiety, characterized by inattentiveness, refusal to engage socially, and sudden emotional outbursts. Subject C also presented a critical condition, with severe stress and very severe anxiety and depression, resulting in marked social withdrawal and reduced participation in physical and peer-related activities. Subject D exhibited the most severe profile, with very severe levels across all three dimensions, leading to frequent aggressive behavior, social isolation, and disorganized verbal behavior. Subject E demonstrated very severe stress and anxiety with severe depression, accompanied by physical symptoms, sleep disturbances such as nightmares, and avoidance of social interaction. Overall, these findings underscore the presence of significant emotional disorders among the selected participants, highlighting the necessity for targeted psychological intervention and systematic support.

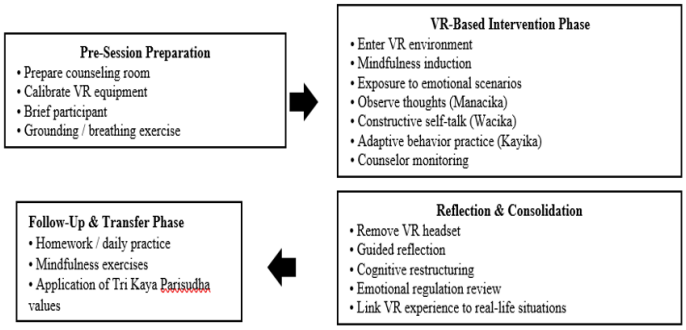

Figure 2. Intervention processes

Intervention

The VR–assisted counseling process was implemented as an integral component of MCBT oriented toward TKY. Each counseling session followed a structured sequence beginning with pre-session preparation, during which the counselor ensured a safe physical environment, calibrated the VR device, and provided brief instructions to participants regarding VR use. During the core intervention phase, participants interacted with VR simulations specifically designed to support mindfulness practice and cognitive-behavioral skill development. The simulations presented emotionally relevant scenarios that allowed participants to practice awareness of thoughts (manacika), regulation of emotional responses, and adaptive behavioral choices (kayika). Guided prompts within the VR environment encouraged participants to observe internal experiences without judgment,

apply cognitive restructuring techniques, and engage in constructive self-talk (wacika). Following the VR experience, the session concluded with a reflection and consolidation phase. Participants removed the VR equipment and engaged in a guided discussion facilitated by the counselor to reflect on their experiences, emotional responses, and insights gained during the simulation. The intervention processes are pictured in Figure 2.

The results of intervention section are presented in Table 3.

Table 3. Intervention

P	Depression	Category	Anxiety	Category	Stress	Category
1	9.25	Moderate	10.5	Severe	12.25	Moderate
2	7.75	Moderate	9	Severe	11.75	Moderate
3	9.5	Moderate	10.25	Severe	10	Moderate
4	6.75	Mild	9.25	Severe	10	Moderate
5	6.75	Mild	10.5	Severe	7.75	Mild

The intervention yielded differential effects across outcome variables. With respect to depressive symptoms, all five participants exhibited marked improvement, with scores decreasing from the *severe* category at baseline to the *moderate* range (P1 = 9.25; P2 = 7.75; P3 = 9.50) or the *mild* range (P4 = 6.75; P5 = 6.75). Reductions were also observed in stress levels, particularly for P5, whose score declined to the *mild* category (7.75), while P2 and P4 demonstrated reductions that remained within the *moderate* category. In contrast, anxiety levels did not exhibit categorical change; despite slight numerical decreases, all participants continued to fall within the *severe* category. Concentration outcomes were heterogeneous, with four participants demonstrating declines to the *low* category, whereas P5 showed an increase in concentration (score = 2.6825), remaining within the *high* category. On the basis of these findings, the intervention phase was discontinued and the study progressed to the A_2 (baseline withdrawal) phase, as the observed effects demonstrated stability and consistent response patterns. Improvements in depressive symptoms were sustained across participants, with scores stabilizing within the *moderate* or *mild* categories. Although anxiety remained at the *severe* level and concentration outcomes varied across individuals, these patterns likewise showed minimal variability over time. The stability observed across all outcome measures suggests that the intervention had reached an asymptotic effect or established a new steady-state condition. Accordingly, withdrawal of the intervention was deemed methodologically appropriate to evaluate the maintenance of intervention effects in the absence of active treatment.

Baseline A2

The tabulated results from Baseline A_2, which represents the condition after the implementation of Virtual Reality–assisted Tri Kaya Parisudha–oriented Mindfulness-Based Cognitive Therapy (MCBT), are presented in Table 4.

Table 4. Baseline A2

P	Depression	Category	Anxiety	Category	Stress	Category
1	7.75	Mild	10	Severe	12.75	Moderate
2	6.5	Normal	7.75	Moderate	11	Moderate
3	8	Moderate	8.75	Severe	8.5	Mild
4	5.5	Mild	7.75	Moderate	8.5	Mild
5	3.25	Normal	6.75	Moderate	4.75	Mild

Based on the data presented in Table 4, the post-intervention averages indicate stable and consistent improvement across most outcome variables following the withdrawal of the intervention. For

depression, all participants demonstrated substantial reductions compared to the initial baseline. Two participants—P2 (M = 6.50) and P5 (M = 3.25)—reached the *normal* category. Participants P4 (M = 5.50) and P1 (M = 7.75) were classified within the *mild* category, while only P3 remained in the *moderate* category (M = 8.00). These findings indicate that improvements in depressive symptoms were largely maintained after the intervention was discontinued. In contrast, outcomes for anxiety were more variable. Three participants—P2 (M = 7.75), P4 (M = 7.75), and P5 (M = 6.75)—improved to the *moderate* category, whereas P1 (M = 10.00) and P3 (M = 8.75) remained in the *severe* category, suggesting that anxiety symptoms were more resistant to change. For stress, the results were particularly favorable: three participants (P3 = 8.50; P4 = 8.50; P5 = 4.75) achieved the *mild* category, while P1 (M = 12.75) and P2 (M = 11.00) stabilized within the *moderate* range. In contrast to the emotional variables, concentration scores demonstrated a consistent decline during the A_2 phase. The mean concentration scores for all participants fell below 1.50, placing each participant in the *low* category. This included P5 (M = 1.45), who had previously demonstrated high concentration levels during the intervention phase. This pattern suggests that improvements in concentration observed during the active intervention phase were not maintained following withdrawal, indicating a potential dependency of attentional outcomes on continued VR-assisted engagement.

Overall, comparisons across Baseline A_1, Intervention B, and Baseline A_2 phases indicate that the intervention produced robust and enduring effects on depression and stress, with improvements largely sustained after treatment cessation. For depression, all participants exhibited pronounced reductions from the *severe* category at A_1 to *mild* or *normal* levels at A_2, demonstrating strong maintenance effects. For example, P5's depression score decreased substantially from 14.25 during A_1 to 3.25 during A_2. A similar maintenance pattern was observed for stress, with scores shifting from *moderate* levels at A_1 to *mild* levels at A_2. However, anxiety outcomes were comparatively less responsive, as some participants (P1 and P3) remained within the *severe* category despite numerical score reductions. These findings suggest that while the intervention was effective in producing sustained improvements in depression and stress, additional or prolonged intervention strategies may be required to achieve comparable effects for anxiety.

To determine the effect of the implementation of Virtual Reality–assisted Tri Kaya Parisudha–oriented Mindfulness-Based Cognitive Therapy (MCBT) on students' emotional disorder, an ANOVA test was conducted. The results are presented in Table 5.

Table 5. ANOVA results

		Sum of Squares	df	Mean Square	F	Sig.
Depression	Between Groups	122.476	2	61.238	27.134	.000
	Within Groups	27.083	12	2.257		
	Total	149.559	14			
Anxiety	Between Groups	42.525	2	21.263	13.376	.001
	Within Groups	19.075	12	1.590		
	Total	61.600	14			
Stress	Between Groups	66.210	2	33.105	18.768	.000
	Within Groups	21.167	12	1.764		
	Total	87.377	14			

The results present the ANOVA analysis conducted to examine differences in students' emotional disorder levels based on DASS-21 scores, which encompass three primary dimensions: depression, anxiety, and stress, across the pre-intervention, intervention, and post-intervention phases. The analysis revealed significance values of 0.000 for depression, 0.001 for anxiety, and 0.000 for stress, all of which are below the established significance threshold of 0.05. These findings indicate statistically significant differences across intervention phases for all three emotional disorder dimensions. In other words, the intervention in the form of Virtual Reality–assisted Tri Kaya Parisudha–oriented Mindfulness-Based

Cognitive Therapy (MCBT) had a significant effect on reducing students' emotional disorders. More specifically, the strongest effect was observed for depression, with an F value of 27.134, suggesting that the intervention was highly effective in alleviating feelings of sadness, hopelessness, and loss of motivation among students. For anxiety, the F value of 13.376 also indicates a significant effect, demonstrating that the counseling intervention contributed to reductions in excessive worry and psychological tension. Meanwhile, the stress dimension, with an F value of 18.768, showed a meaningful improvement in students' ability to manage emotional pressure and cope with stressful situations more effectively. Collectively, these results confirm the effectiveness of the MCBT intervention supported by VR technology in addressing multiple dimensions of emotional disorders among students.

The findings of this study demonstrate that Virtual Reality–assisted Mindfulness-Based Cognitive Therapy (MCBT) oriented toward Tri Kaya Parisudha is effective in reducing depression and stress among junior high school students, with improvements remaining stable even after the intervention was withdrawn. These results are consistent with prior research indicating that mindfulness-based and cognitive-behavioral interventions can significantly improve emotional regulation in adolescents, particularly when experiential and immersive elements are incorporated (16,17). The sustained reductions observed during the A_2 phase suggest that the intervention facilitated internalization of adaptive coping strategies, rather than producing only short-term symptom relief.

The strong effects observed for depression and stress may be attributed to the immersive nature of VR, which enhances attention, emotional engagement, and experiential learning. By allowing students to actively practice mindfulness and cognitive restructuring within realistic yet controlled environments, VR appears to strengthen the transfer of therapeutic skills to real-life contexts (18). Furthermore, the integration of TKY values likely contributed to the effectiveness of the intervention by providing culturally meaningful guidance that aligned emotional awareness (*manacika*), verbal expression (*wacika*), and behavior (*kayika*). This cultural congruence may have increased students' acceptance of the intervention and reinforced ethical self-regulation, thereby amplifying therapeutic outcomes. In contrast, anxiety symptoms showed more limited improvement, with some participants remaining in the severe category despite numerical score reductions. This finding suggests that anxiety may be more resistant to short-term intervention and may require longer treatment duration, higher session frequency, or continued VR exposure to achieve stable change. Similarly, the decline in concentration during the post-intervention phase indicates that attentional gains achieved through VR-assisted sessions may be contingent upon ongoing engagement with immersive technology. These results imply that while VR-assisted MCBT is effective for emotional regulation, sustained cognitive outcomes such as concentration may require maintenance sessions or hybrid delivery models that combine VR-based practice with daily mindfulness exercises.

This study extends existing literature by demonstrating that technology-enhanced, culturally grounded counseling interventions can be effectively implemented in school settings. The combination of MCBT, VR technology, and Tri Kaya Parisudha values offers a holistic approach that addresses emotional, cognitive, and moral dimensions of student development. These findings underscore the importance of integrating cultural context and technological innovation in counseling practice to enhance relevance, engagement, and long-term effectiveness among adolescent populations.

Conclusion

This study demonstrates that Virtual Reality–assisted Mindfulness-Based Cognitive Therapy (MCBT) oriented toward Tri Kaya Parisudha is effective in reducing depression and stress among junior high school students. Using a single-subject A–B–A design, the findings show that participants who initially exhibited severe emotional disorders experienced substantial improvement during the intervention phase, with these gains largely maintained after the intervention was withdrawn. ANOVA results further confirmed significant differences across intervention phases for depression, anxiety, and stress, with the strongest effects observed for depression. Nevertheless, anxiety symptoms showed more limited improvement, and gains in concentration declined during the post-intervention phase,

suggesting that these outcomes may require longer intervention periods or continued technological engagement. Future research is therefore recommended to explore extended or booster VR-assisted MCBT sessions, hybrid models combining VR with daily mindfulness practice, and larger samples to strengthen generalizability. Such studies may further clarify how technology-enhanced, culturally grounded counseling can optimally support adolescent mental health in school settings.

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