

ORIGINAL ARTICLE

Effects of CBT-Informed Peer Counselling on Depressive Symptoms Among University Students: A Matched-Control Quasi-Experimental Study

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ABSTRACT

Background: Depressive symptoms are common among university students, highlighting the need for accessible mental health support. However, evidence for structured, theory-informed peer counselling in higher education remains limited.

Aim: To examine the effects of a CBT-informed peer counselling programme on depressive symptoms among university students enrolled in health sciences programmes.

Methods: A matched-control quasi-experimental design with repeated measures was used. Sixty students with mild-to-moderate depressive symptoms were pair-matched by baseline CES-D scores and assigned to an intervention group ($n = 30$) or a control group ($n = 30$). The intervention group received six nurse-supervised, individual peer counselling sessions over 2 weeks, whereas the control group retained access to usual university support. Depressive symptoms were assessed at baseline, immediately post-intervention and 1-month follow-up using the Center for Epidemiologic Studies Depression Scale. Data were analysed using a mixed-design repeated-measures analysis of variance.

Findings: A significant group $\times$ time interaction was observed, $F(1.78, 103.39) = 20.47$, $p < 0.001$, partial $\eta^2 = 0.26$. Depressive symptoms decreased more in the intervention group than in the control group, and the improvement was maintained at 1-month follow-up.

Conclusion: CBT-informed peer counselling may help reduce mild-to-moderate depressive symptoms among university students enrolled in health sciences programmes. The programme shows potential as a structured, short-term mental health support approach in higher education, although further evaluation in larger and more diverse samples is warranted.

1 | Introduction

Depressive symptoms among adolescents and young adults represent a major public health concern. Depression and anxiety are among the leading causes of illness and disability among adolescents, while suicide is the third leading cause of death among those aged 15–29 years (World Health Organization 2025). Elevated depressive symptoms affect approximately one-third of

adolescents worldwide, underscoring the need for accessible and developmentally appropriate early support (Shorey et al. 2022).

University students may be particularly susceptible to mental health difficulties during the transition to emerging adulthood, which involves increasing academic demands, identity development and psychosocial adjustment. In Thailand, 31.4% of students in a nationwide survey reported depressive symptoms,

Implications for Policy and Practice

- The findings of this study highlight the potential of CBT-informed peer counselling as a scalable approach to enhancing access to mental health support within higher education settings. By extending cognitive-behavioural principles through trained peers under professional supervision, this model offers a practical strategy for addressing increasing demand alongside limited mental health resources.
- For practice, the programme demonstrates that structured peer counselling can be effectively integrated into university counselling services to support students experiencing mild-to-moderate depressive symptoms. The model may enhance engagement, reduce stigma and provide early intervention in a manner that is both accessible and contextually relevant.
- At the policy level, higher education institutions may consider incorporating structured peer-delivered interventions into student mental health frameworks. Such approaches align with contemporary strategies emphasising prevention, early intervention and task-sharing, particularly in resource-constrained contexts. The integration of supervised peer counselling may support more sustainable and cost-effective mental health service delivery within universities.

with differences observed across sociodemographic characteristics, living circumstances and health behaviours (Liangruenrom et al. 2025). Among Thai health sciences students, moderate-to-severe stress was common and was positively associated with depressive symptoms (Niamnuy et al. 2025). Supporting the mental health of these students is therefore important for both their well-being and their development as future healthcare professionals.

Cognitive-behavioural therapy (CBT) is an established psychological intervention for depression, with evidence supporting its efficacy and acceptability across different delivery formats (Cuijpers et al. 2021). Beck's cognitive model proposes that negative automatic thoughts, emotional responses and behavioural withdrawal interact to maintain depressive symptoms (Beck et al. 1979). Contemporary CBT targets these processes through strategies such as cognitive restructuring and behavioural activation (Beck 2021). However, rising demand for mental health services in higher education has increased interest in alternative models that may extend the capacity of existing student support systems (Pointon-Haas et al. 2024).

Peer counselling offers a potential means of providing structured early support within universities. In the present study, peer counselling was defined as manualised support delivered by trained students of similar age or status under professional supervision. Peer counsellors did not diagnose mental disorders or independently provide psychotherapy but delivered a

low-intensity programme incorporating selected CBT principles. Developmental evidence indicates that friendships can provide cognitive and social scaffolding distinct from that provided by non-friend relationships (Hartup 1996). Although counsellor-participant dyads in the present study were not pre-existing friendships, their shared student status provided a rationale for using a peer-based format.

Evidence concerning peer-based mental health interventions in higher education remains inconclusive because of substantial variation in programme definitions, delivery models, outcome measures and methodological quality (Pointon-Haas et al. 2024). Nurse-led mental health interventions for university students have generally shown promising outcomes, although the approaches have varied and many studies have been limited by small samples, single-site designs and inadequate long-term follow-up (Russell et al. 2025). Evidence remains particularly limited for structured, CBT-informed peer counselling programmes evaluated using a comparison group and follow-up assessment in Southeast Asian university settings.

The programme was informed by CBT and a peer influence perspective. Peer counsellors supported participants in identifying and reframing negative automatic thoughts, developing adaptive coping responses and re-engaging in meaningful activities. Horticultural engagement was incorporated as a concrete behavioural activation activity involving purposeful action, responsibility and contact with nature. Nature-based activities, including community gardening, may support social connectedness and mental well-being (Leavell et al. 2019). Social and therapeutic horticulture may also reduce depressive and anxiety symptoms, although the available studies show substantial heterogeneity and risk of bias (Wood et al. 2025). The horticultural component was therefore used to support behavioural activation rather than as a separate horticultural therapy intervention.

Accordingly, this study aimed to examine the effects of a CBT-informed peer counselling programme on depressive symptoms among university students enrolled in health sciences programmes at a Thai university. The study examined whether students receiving the programme demonstrated greater reductions in CES-D scores immediately after the programme and at one-month follow-up than students receiving usual university support.

2 | Methods

2.1 | Design

A matched-group quasi-experimental design with a control group and repeated measures was used. Depressive symptoms were assessed at baseline (T1), immediately after the intervention (T2) and at the one-month follow-up (T3). Eligible participants were selected using simple random sampling and

subsequently assigned to the intervention and control groups using pair matching based on baseline CES-D scores.

2.2 | Setting and Participants

The study was conducted across five health sciences faculties at a public university in eastern Thailand between November 2024 and April 2025.

2.2.1 | Participants Receiving the Intervention

Participants were undergraduate students who met the following inclusion criteria: (a) aged 18–25 years; (b) enrolled in a health sciences programme; (c) able to read and communicate in Thai; (d) had a CES-D score of 17–21, indicating mild-to-moderate depressive symptoms for the purposes of study eligibility; and (e) voluntarily agreed to participate and provided written informed consent. Students were excluded if their student health record documented any physician-diagnosed psychiatric disorder, as the programme was intended for students with depressive symptoms who did not require specialist psychiatric treatment. Students were also excluded if they reported previous participation in a structured psychosocial intervention, defined in the approved protocol as cognitive-behavioural therapy, problem-solving therapy or horticultural/garden therapy. Previous therapy was assessed during eligibility screening. Participants were discontinued from the intervention if they missed more than one of the six scheduled sessions.

2.2.2 | Peer Counsellors

Peer counsellors were recruited separately from students enrolled in the university's health sciences faculties. Eligibility criteria were: (a) aged 18–25 years; (b) able to read and communicate in Thai; (c) a CES-D score of 0–16; (d) no physician-diagnosed psychiatric disorder documented in the student health record; and (e) willingness to complete the required training and provide the six-session programme.

Peer counsellors were students of a similar age and university status to the participants, but they were not trainee psychologists or trainee psychotherapists. Their role was restricted to delivering manualised, low-intensity CBT-informed peer support, recognising possible clinical risk and consulting or referring to qualified professionals. They did not diagnose psychiatric disorders or provide independent psychotherapy.

2.2.3 | Sample Size

The sample size was estimated using G*Power version 3.1.9.7 (Faul et al. 2007, 2009) for an F test of the group $\times$ time interaction in a repeated-measures ANOVA. Assuming a small-to-medium effect size (Cohen's $f=0.21$; Cohen 1988), $\alpha=0.05$, power=0.80, two groups, three measurement occasions, a correlation of 0.50 among repeated measures and a non-sphericity correction of $\epsilon=0.75$, the minimum required total sample size

was 47 participants. This number was rounded up to 48 to permit equal allocation between groups. After allowing for an anticipated attrition rate of 20%, the recruitment target was increased to 60 participants, with 30 participants per group. Thirty peer counsellors were recruited separately and were not included in the power calculation because they did not contribute outcome data to the primary outcome analysis.

2.3 | Intervention, Peer Counsellor Training and Usual Care

2.3.1 | CBT-Informed Peer Counselling Programme

The structured peer counselling programme comprised six individual sessions delivered over 2 weeks on alternate days, with three sessions per week. Each session lasted approximately 40–90 min, depending on the participant's needs and the complexity of the session content. The programme was grounded in cognitive-behavioural principles and delivered by trained peer counsellors under professional supervision.

The intervention was designed to progressively develop cognitive awareness, cognitive restructuring and adaptive coping skills (Table 1). Across sessions, participants were guided to identify and monitor automatic negative thoughts, examine evidence for and against maladaptive cognitions, generate more balanced alternative thoughts and apply structured problem-solving strategies to personally relevant situations.

Behavioural activation was operationalised through manageable gardening and planting activities. Participants identified patterns of withdrawal or inactivity, planned and completed a purposeful horticultural task and reflected on changes in mood, engagement and perceived mastery. These activities were incorporated as behavioural activation and were not delivered as a separate horticultural therapy intervention.

The final session focused on consolidating learned skills, promoting independent cognitive appraisal, developing a plan for maintaining adaptive activities and coping strategies, recognising possible symptom escalation and identifying appropriate sources of professional help.

2.3.2 | Peer Counsellor Training and Supervision

Peer counsellors completed a 30-h training programme delivered over 5 days, comprising 3 days of theoretical instruction and 2 days of supervised practical training. The programme was delivered by members of the research team with expertise in mental health and psychiatric nursing and CBT-informed interventions.

Training covered the peer counsellor's role and scope of practice, depressive symptoms, the cognitive-behavioural model, active listening and supportive communication, identification and restructuring of automatic negative thoughts, structured problem-solving, behavioural activation, ethical boundaries, confidentiality, risk recognition, documentation and referral procedures (Table 2).

TABLE 1 | Structure of the CBT-informed peer counselling programme.

Session	Core focus	CBT-informed content and activities	Peer counselling process	Intended mechanism	Duration
1	Psychoeducation and collaborative understanding of depression	Introduction to the reciprocal relationships among thoughts, emotions, behaviours and physiological responses; identification of the participant's primary concern	Establishment of relational safety, confidentiality, trust and a collaborative working relationship	Increase awareness of the thought–emotion–behaviour–physiology linkage and promote engagement in counselling	40–90 min
2	Identification of the first automatic negative thought	Thought monitoring; identification of situations, automatic negative thoughts, emotions and related behavioural responses	Active listening, guided peer exploration, reflection and clarification	Enhance recognition of automatic negative thoughts and their emotional and behavioural consequences	40–90 min
3	Examination and restructuring of the first automatic negative thought	Identification of cognitive distortions; examination of evidence for and against the thought; generation of balanced alternative thoughts	Socratic peer questioning, guided discovery and supportive feedback	Reduce cognitive distortions and emotional intensity and strengthen realistic cognitive appraisal	40–90 min
4	Identification and generalisation to a second automatic negative thought	Application of thought monitoring to a second personally salient situation; identification of recurrent or more complex thinking patterns	Peer-supported reflection, clarification and guided application of previously learned skills	Strengthen transfer of cognitive monitoring skills across situations	40–90 min
5	Cognitive restructuring, problem-solving and behavioural activation through horticultural engagement	Examination and restructuring of the second automatic negative thought; structured problem-solving; identification of behavioural avoidance; planning and completion of a manageable gardening or planting activity; reflection on mood, engagement and sense of mastery	Collaborative activity planning, peer modelling, encouragement, problem-solving and reflective discussion	Reduce avoidance, increase engagement in meaningful activity, promote mastery and strengthen adaptive coping flexibility	40–90 min
6	Consolidation, evaluation and maintenance planning	Review and integration of thought monitoring, cognitive restructuring, problem-solving and behavioural activation skills; development of an individual plan for applying the skills in daily life; review of appropriate professional help-seeking when needed	Collaborative review, rehearsal, affirming feedback, reflection and planned closure	Consolidate acquired skills, strengthen confidence in independent skill use and support short-term maintenance of adaptive coping	40–90 min

Note: The programme comprised six individual sessions delivered over 2 weeks (three sessions per week; 40–90 min per session) under professional supervision. Gardening and planting activities in Session 5 were incorporated as behavioural activation rather than as a stand-alone horticultural intervention.
Abbreviation: CBT, cognitive–behavioural therapy.

TABLE 2 | Training protocol for peer counsellors.

Component	Content	Training strategy	Duration	Competency outcome
1. Foundations of Peer Counselling and Depression	Definition, role and scope of peer counselling; distinction between peer support and professional psychotherapy; benefits and limitations of peer counselling; depressive symptoms; cognitive-behavioural model of depression; recognition of warning signs and referral triggers	Didactic teaching; interactive discussion; case examples	3 h	Understanding of the peer counsellor's role, boundaries and scope of practice and the CBT-informed conceptualisation of depression
2. Core Counselling Skills and Identification of Automatic Negative Thoughts	Active listening; empathic communication; questioning and reflection skills; establishment of a supportive relationship; thought monitoring; identification of automatic negative thoughts and cognitive distortions	Demonstration; case-based learning; guided worksheets; paired role-play	3 h	Ability to establish a supportive peer relationship and facilitate identification of automatic negative thoughts without undertaking diagnosis or independent psychotherapy
3. Cognitive Restructuring Techniques	Examination of evidence; identification of cognitive distortions; generation of balanced alternative thoughts; guided discovery and Socratic questioning	Role-play; demonstration; supervised practice; structured feedback	6 h	Competence in guiding participants through manualised cognitive examination and reframing
4. Structured Problem-Solving Skills	Definition and prioritisation of problems; generation and evaluation of alternatives; selection, implementation and review of feasible solutions; differentiation between realistic problems and cognitively distorted appraisals	Simulation exercises; case analysis; guided practice	3 h	Ability to support systematic and realistic problem-solving within the peer counsellor's defined role
5. Behavioural Activation and Horticultural Engagement	Relationship between behavioural avoidance and depressed mood; activity monitoring and scheduling; use of structured gardening and planting tasks to promote purposeful engagement, mastery and responsibility; reflective evaluation of mood and engagement	Experiential learning; activity planning; horticultural practice; reflective discussion	3 h	Ability to facilitate safe, manageable behavioural activation activities and encourage adaptive behavioural engagement
6. Ethics, Boundaries, Risk Management and Referral	Confidentiality and its limits; maintenance of interpersonal boundaries; management of pre-existing or dual relationships; recognition of elevated risk; referral pathways; documentation and consultation procedures	Scenario-based discussion; ethical case analysis; referral simulation	3 h	Understanding of ethical limits, confidentiality requirements, risk-escalation procedures and criteria for referral to professional services
7. Supervised Practice and Competency Assessment	Mock delivery of all six counselling sessions; use of the programme manual and documentation forms; management of challenging situations; integration of CBT-informed and peer counselling skills	Observed mock counselling; structured competency checklist; individual and group feedback; additional practice when required	9 h	Demonstrated readiness to deliver the programme safely and consistently under professional supervision
Total			30 h	

Note: CBT = cognitive-behavioural therapy. The programme comprised six individual sessions delivered over 2 weeks (three sessions per week; 40–90 min per session) under professional supervision. Gardening and planting activities in Session 5 were incorporated as behavioural activation rather than as a stand-alone horticultural intervention.

Abbreviation: CBT, cognitive-behavioural therapy.

Training incorporated didactic instruction, case discussion, worksheets, role-play, mock counselling and supervised practice. Readiness to deliver the programme was assessed through observed mock counselling using a structured competency checklist, with additional supervised practice provided as needed before participant assignment.

During programme delivery, peer counsellors prepared brief session summaries and participated in weekly case-review and reflective supervision meetings. Consultation with the research team was also available between scheduled supervision meetings. Intervention adherence was supported through the programme manual, structured session records and weekly supervision. If a peer counsellor had been unable to continue, a trained member of the research team would have completed the participant's remaining sessions according to the manual. No peer counsellor discontinued programme delivery; this outcome is reported in the Results section. The archived report supports the 5-day theoretical/practical training structure and training content.

2.3.3 | Programme Review and Preliminary Testing

The programme content and activities were reviewed by three experts: one physician with expertise in CBT, one nurse with expertise in CBT and one clinical psychologist. The research team revised the content, activities, presentation methods, learning materials and evaluation procedures in response to their recommendations. The revised programme was subsequently pilot-tested with five university students who had characteristics similar to the intended participants. Pilot testing assessed the clarity and comprehensibility of the language, the appropriateness of the terminology and level of difficulty and the completeness of the programme materials. Further language revisions were made before implementation.

2.3.4 | Usual Care

Participants in the control group continued to have access to existing university support services but did not receive the study programme. Usual care comprised individual counselling based on students' presenting concerns through faculty-based or university student-affairs services. Students requiring specialist assessment could be referred to the university hospital. Individual use of these services was not systematically recorded.

2.4 | Measures

2.4.1 | Demographic Questionnaire

A researcher-developed demographic questionnaire was used to collect information on sex, age, year of study and faculty.

2.4.2 | Center for Epidemiologic Studies Depression Scale

Depressive symptoms were assessed using the 20-item Center for Epidemiologic Studies Depression Scale (CES-D; Radloff 1977),

translated and validated for Thai adolescents by Trangkasombat et al. (1997). Items assess symptoms during the preceding week on a four-point scale (0–3); Items 4, 8, 12 and 16 are reverse-scored. Total scores range from 0 to 60, with higher scores indicating greater symptom severity.

For screening and eligibility, scores of 0–16 indicated the normal range, 17–21 mild-to-moderate depressive symptoms and ≥ 22 clinically significant or severe symptoms. These categories were used for research screening rather than psychiatric diagnosis. The cut-off of 22 demonstrated 72% sensitivity, 85% specificity and 82% accuracy in Thai adolescents, and the Thai version demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.86$) (Trangkasombat et al. 1997). The 17–21 eligibility range is consistent with recent Thai studies (Pumsuwan et al. 2026; Vannasri et al. 2025). Internal consistency coefficients of Cronbach's $\alpha = 0.82$ and 0.86 were reported in these studies, respectively (Pumsuwan et al. 2026; Vannasri et al. 2025).

2.5 | Recruitment, Allocation and Data Collection

Students were recruited through announcements across five health sciences faculties and completed an online CES-D screening form. Of those meeting all eligibility criteria and scoring 17–21, 60 were selected by simple random sampling. After written informed consent, participants were pair-matched according to baseline CES-D scores, with a maximum difference of three points within each pair and assigned in equal numbers to the intervention and control groups (30 per group).

Thirty peer counsellors were recruited separately, and each was assigned to one intervention participant without a pre-existing close personal, academic, supervisory or conflictual relationship. CES-D scores were collected from both groups at baseline, immediately after the 2-week intervention period and 1 month after programme completion.

Peer counsellors documented session completion and attended weekly supervision. The research team would have completed any remaining sessions if a counsellor withdrew. All intervention participants and peer counsellors completed the programme, with no urgent referrals or counsellor discontinuations.

2.6 | Ethical Considerations

The study was approved by the Institutional Review Board and conducted in accordance with the Declaration of Helsinki (World Medical Association 2013). All participants received written and verbal study information and provided written informed consent. Participation was voluntary, and withdrawal was permitted at any time without academic or service-related consequences. Confidentiality was maintained except when disclosure was necessary to protect participant safety. Participants whose CES-D scores increased to ≥ 22 or who presented clinical or safety concerns were assessed by the supervising research team and referred to appropriate university mental health services or the university hospital.

2.7 | Data Analysis

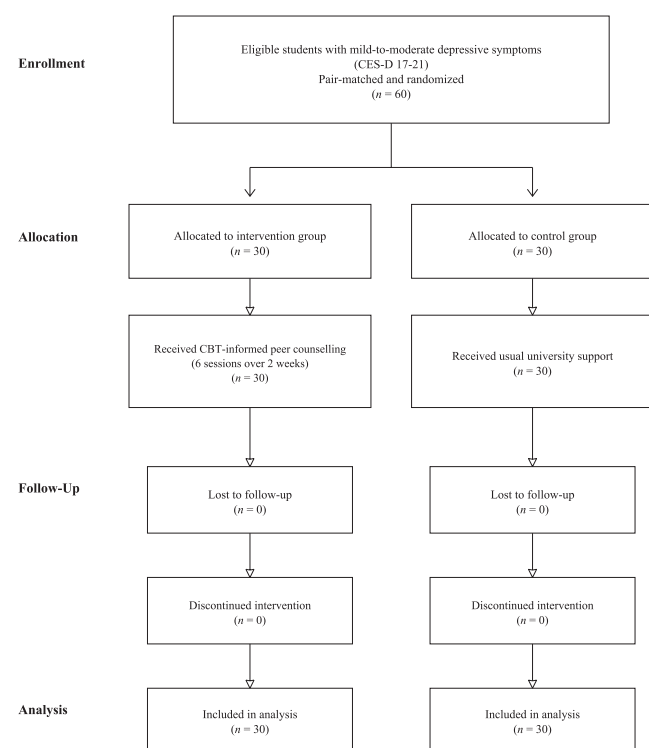
Data were analysed using IBM SPSS Statistics version 30.0. Categorical variables were summarised using frequencies and percentages, and continuous variables using means and standard deviations. Baseline group differences were examined using Fisher's exact test, Pearson's chi-square test or independent-samples *t*-tests, as appropriate and were interpreted descriptively.

A mixed-design repeated-measures ANOVA examined the effects of group, time and their interaction on CES-D scores across T1–T3. Sphericity was assessed using Mauchly's test, with Greenhouse–Geisser correction applied when violated. Partial eta squared, Bonferroni-adjusted pairwise comparisons, mean differences and 95% confidence intervals were reported. All enrolled participants were analysed according to their assigned groups; because outcome data were complete, no imputation was required.

3 | Results

3.1 | Participant Characteristics

Sixty students with mild-to-moderate depressive symptoms were pair-matched according to baseline CES-D scores, with a maximum difference of three points within each pair, and subsequently assigned in equal numbers to the intervention group ($n=30$) and the control group ($n=30$). All participants remained in their assigned groups, completed the immediate post-intervention and 1-month follow-up assessments and were included in the final analysis (Figure 1).



Note: All randomized participants completed follow-up and were included in the final analysis.
CES-D = Center for Epidemiologic Studies Depression Scale.

FIGURE 1 | Participant flow through the study.

Both groups comprised 27 female students (90.00%) and three male students (10.00%). The mean age was 19.07 years ($SD = 0.58$) in the intervention group and 19.20 years ($SD = 1.45$) in the control group. The distributions of sex, age, year of study and faculty were similar between the groups. At baseline, the mean CES-D score was 19.67 ($SD = 1.35$) in the intervention group and 19.07 ($SD = 1.20$) in the control group. Baseline CES-D scores did not differ significantly between the groups, $t(58) = 1.82$, $p = 0.074$ (Table 3).

Thirty peer counsellors were recruited separately. Most were female (90.00%), their mean age was 19.87 years ($SD = 0.58$), and the majority were second-year nursing students (63.30%).

3.2 | Effects of the Intervention on Depressive Symptoms

Mean CES-D scores for each group across the three assessment time points are presented in Table 4. In the intervention group, the mean CES-D score decreased from 19.67 ($SD = 1.35$) at baseline to 13.83 ($SD = 2.52$) immediately after the intervention and remained lower than baseline at the 1-month follow-up, with a mean score of 14.17 ($SD = 3.46$). In contrast, the control-group mean scores were 19.07 ($SD = 1.20$) at baseline, 19.93 ($SD = 5.55$) immediately after the intervention period and 18.93 ($SD = 6.22$) at the 1-month follow-up.

Mauchly's test indicated that the assumption of sphericity was violated; therefore, Greenhouse–Geisser-corrected results are reported. The mixed-design repeated-measures ANOVA demonstrated

TABLE 3 | Baseline characteristics of intervention and control groups ($N = 60$).

Characteristic	Intervention ($n = 30$)	Control ($n = 30$)	<i>p</i>
Sex, <i>n</i> (%)			1.000 ^a
Female	27 (90.0)	27 (90.0)	
Male	3 (10.0)	3 (10.0)	
Age, mean (SD), years	19.07 (0.58)	19.20 (1.45)	0.642 ^b
Year of study, <i>n</i> (%)			0.931 ^c
Second year	16 (53.3)	15 (50.0)	
Third year	4 (13.3)	5 (16.7)	
Fourth year	10 (33.3)	10 (33.3)	
Faculty, <i>n</i> (%)			1.000 ^a
Nursing	25 (83.3)	25 (83.3)	
Allied Health Sciences	5 (16.7)	5 (16.7)	
Baseline CES-D, mean (SD)	19.67 (1.35)	19.07 (1.20)	0.074 ^b

Abbreviation: CES-D, Center for Epidemiologic Studies Depression Scale.

^aFisher's exact test.

^bIndependent-samples *t*-test.

^cPearson's chi-square test.

significant main effects of group, $F(1, 58)=19.43$, $p<0.001$, partial $\eta^2=0.25$ and time, $F(1.78, 103.39)=15.42$, $p<0.001$, partial $\eta^2=0.21$. A significant group $\times$ time interaction was also observed, $F(1.78, 103.39)=20.47$, $p<0.001$, partial $\eta^2=0.26$, indicating that changes in CES-D scores over time differed between the intervention and control groups (Table 5; Figure 2).

Bonferroni-adjusted pairwise comparisons within the intervention group showed that CES-D scores decreased significantly from baseline to immediate post-intervention, with a mean decrease of 5.83 points (95% CI [4.84, 6.82], adjusted $p<0.001$). Scores also remained significantly lower at the 1-month follow-up than at baseline, with a mean decrease of 5.50 points

(95% CI [4.19, 6.81], adjusted $p<0.001$). The difference between immediate post-intervention and the 1-month follow-up was not statistically significant, mean difference = -0.33 , 95% CI [-1.79 , 1.13], adjusted $p=1.000$ (Table 6). Thus, the lower CES-D scores observed immediately after the intervention were retained over the one-month follow-up period.

4 | Discussion

The present study found that depressive symptoms decreased substantially among health sciences students who participated in the CBT-informed peer counselling programme, whereas scores in the control group remained largely unchanged. The significant group $\times$ time interaction, together with a large effect size, indicates a substantial difference in symptom change between the groups. However, given the matched-control quasi-experimental design, the findings should be interpreted as evidence associated with programme participation rather than definitive causal evidence.

These findings add to the limited and heterogeneous evidence concerning peer support in higher education. Pointon-Haas et al. (2024) found considerable variation in the definitions, delivery models and methodological quality of university peer-support interventions, preventing firm conclusions regarding their effectiveness. Simmons et al. (2023) similarly identified limited controlled-trial evidence for lived-experience peer support among young people, with inconsistent effects on depression and anxiety. Although the peer model examined in that review differs from the trained student peer counsellors used in the present study, the findings emphasise the need for clearly defined programmes and rigorous evaluation. The present study therefore contributes preliminary evidence regarding a structured, CBT-informed peer counselling programme with a comparison group and short-term follow-up.

The observed improvements may be interpreted through Beck's cognitive model. Beck et al. (1979) proposed that negative automatic thoughts, emotional distress and behavioural withdrawal interact to maintain depressive symptoms. The programme's emphasis on

TABLE 4 | Mean CES-D scores by group and assessment time point.

Assessment time point	Intervention ($n=30$), mean (SD)	Control ($n=30$), mean (SD)
Baseline	19.67 (1.35)	19.07 (1.20)
Immediate post-intervention	13.83 (2.52)	19.93 (5.55)
One-month follow-up	14.17 (3.46)	18.93 (6.22)

Note: Higher scores indicate greater depressive symptom severity.
Abbreviation: CES-D, Center for Epidemiologic Studies Depression Scale.

TABLE 5 | Mixed-design repeated-measures ANOVA for CES-D scores ($N=60$).

Source	F	df	p	Partial η^2
Group	19.43	1, 58	<0.001	0.25
Time	15.42	1.78, 103.39	<0.001	0.21
Group $\times$ time ^a	20.47	1.78, 103.39	<0.001	0.26

Abbreviation: CES-D, Center for Epidemiologic Studies Depression Scale.
^aMauchly's test indicated that the sphericity assumption was violated, $W=0.878$, $\chi^2(2)=7.55$, $p=0.023$. Greenhouse–Geisser correction was therefore applied, $\epsilon=0.891$. Partial η^2 denotes partial eta squared.

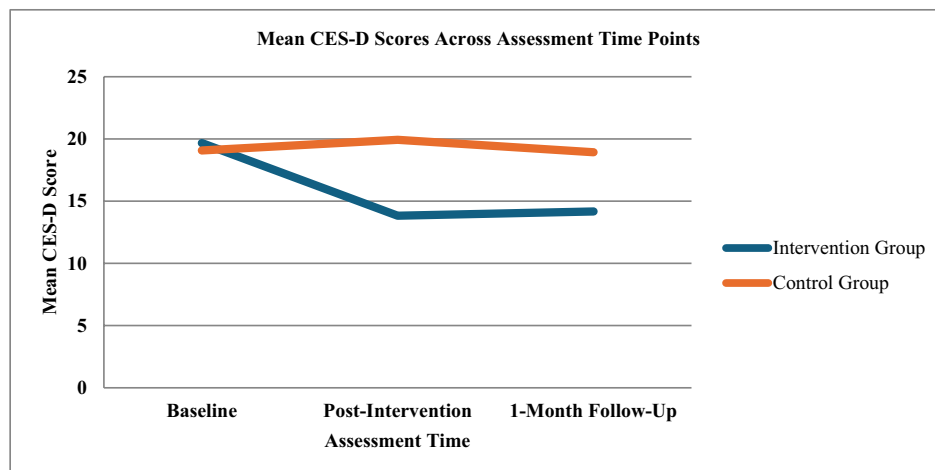


FIGURE 2 | Group $\times$ time interaction in mean CES-D scores across three assessment time points. CES-D = Center for Epidemiologic Studies Depression Scale. A significant group $\times$ time interaction was observed, $F(1.78, 103.39)=20.47$, $p<0.001$, partial $\eta^2=0.26$.

TABLE 6 | Bonferroni-adjusted pairwise comparisons of CES-D scores in the intervention group.

Comparison	Mean difference	95% CI	Adjusted <i>p</i>
Baseline vs. immediate post-intervention	5.83	[4.84, 6.82]	< 0.001
Baseline vs. one-month follow-up	5.50	[4.19, 6.81]	< 0.001
Immediate post-intervention vs. one-month follow-up	−0.33	[−1.79, 1.13]	1.000

Note: Pairwise comparisons were conducted within the intervention group using Bonferroni adjustment. Positive mean differences indicate lower CES-D scores at the later assessment time point relative to the earlier comparison point.

Abbreviation: CES-D, Center for Epidemiologic Studies Depression Scale.

identifying and reframing negative automatic thoughts and increasing adaptive behavioural engagement is consistent with contemporary CBT practice (Beck 2021). These processes may have contributed to the observed improvement; however, cognitive and behavioural mechanisms were not measured directly and cannot be confirmed as mediators of the programme effects.

The peer-delivered format may also have contributed to programme engagement. Hartup (1996) described friendships as providing cognitive and social scaffolding that differs from that provided by non-peer relationships, offering a plausible basis for the use of peer support. Although the review by de Beer et al. (2024) focused on peer workers with lived experience of mental health difficulties, it identified engagement and emotional support as common peer roles and emphasised the importance of clear role expectations, organisational support and collaboration with professionals. In the present study, manualised delivery and nurse supervision may have supported these functions while maintaining appropriate role boundaries. Nevertheless, engagement, emotional disclosure and perceived stigma were not directly measured.

Horticultural engagement was incorporated as a behavioural activation activity rather than as a separate horticultural therapy intervention. Leavell et al. (2019) identified gardening among nature-based activities that may support mental well-being through nature contact and intrapersonal, interpersonal and environmental processes. More recent evidence indicates that social and therapeutic horticulture may reduce depressive symptoms, although substantial heterogeneity and risk of bias remain across studies (Wood et al. 2025). Because the horticultural component was not evaluated separately in the present study, its specific contribution to the observed outcomes cannot be determined.

CES-D scores did not differ significantly between immediate post-intervention and 1-month follow-up, indicating short-term maintenance of improvement rather than evidence of long-term durability. Future studies should include longer follow-up periods and evaluate whether booster sessions or continuing peer support improve the maintenance of programme benefits.

4.1 | Limitations and Future Directions

Several limitations should be acknowledged. The study was conducted at a single university, and the sample was predominantly female, limiting generalisability to other settings and more gender-diverse populations. Demographic data were limited, and peer-related mechanisms, such as perceived connectedness

and engagement, were not assessed. Therefore, the specific contribution of peer delivery cannot be distinguished from that of the CBT-informed content. The quasi-experimental design, lack of participant blinding and unstandardised use of usual-care services may have introduced bias. In addition, the 1-month follow-up was insufficient to establish long-term durability. The study was not prospectively registered or preregistered but followed the approved research protocol.

Future studies should use randomised multicentre designs, recruit more diverse samples, include longer follow-up periods and measure peer-related mechanisms. Comparisons with an active intervention and evaluations of implementation feasibility, costs and adverse outcomes are also needed before wider adoption.

5 | Conclusion

This study found that participation in a structured, CBT-informed peer counselling programme delivered under nurse supervision was associated with greater reductions in depressive symptoms than usual care among health sciences university students, with improvements maintained at one-month follow-up. By integrating cognitive-behavioural principles with a peer influence perspective, the programme offers a theoretically grounded and potentially accessible approach to early mental health support in higher education. These findings provide preliminary support for further evaluation of nurse-supervised, peer-delivered programmes in larger, more diverse and rigorously controlled studies.

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Disclosure

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated institutions.

Ethics Statement

This study was approved by the Institutional Review Board of Burapha University, Thailand (IRB No. HS037/2567). All procedures were conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments.

Consent

Written informed consent was obtained from all participants prior to participation in the study. Participants were informed that their data would be used for research purposes and reported in a de-identified manner.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The datasets generated and/or analysed during the current study are available from the corresponding author on reasonable request.

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