

The Effectiveness of Cognitive Behavioral Counseling in Reducing Anxiety Among University Students: A Systematic Review and Meta-Analysis

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Abstract

Background: University students are susceptible to anxiety as a mental health issue that can influence academic performance, social interactions and wellbeing. Cognitive Behavioral Therapy (CBT) is seen as a powerful anxiety treatment intervention, but the delivery modes are differently supported like face-to-face, online, and blended delivery type.

Objective: This systematic review and meta-analysis study attempted to examine the efficiency of cognitive behavioral counseling in lowering anxiety levels in university students, combining both conventional and online CBT therapies.

Methods: The extensive search of literature was done in large academic databases encompassing publications published as early as 2026, and the key words included the CBT, anxiety, and university students as well as online intervention. They included randomized controlled trials, systematic reviews, and meta-analyses that reported the outcomes of anxiety. Sample characteristics, type of intervention, duration, and outcomes of anxiety were extraction points of data. The quality of the studies was evaluated based on standardized criteria and the meta-analytic techniques to assess the effect size and pooled the result using the 95% confident intervals. Subgroup analyses were conducted to determine the effect of the mode of delivery, duration of intervention and the level of guidance

Results: 26 studies with 5,842 students in universities were reviewed. The net outcome was that CBT greatly diminished anxiety (Hedges' $g = 0.62$, 95% CI: 0.50–0.74, $p < 0.001$). Online interventions and especially digital CBT were as effective as face-to-face therapy and had effect sizes of 0.58-0.70. The group and individual types of CBT were both significantly reduced and 8 weeks and longer interventions with structured guidance were significantly improved.

Conclusions: Cognitive behavioral counseling in digital or in-person format is an efficient and scalable intervention among students at the university. The online CBT programs will provide low cost and culturally relevant solutions and can be incorporated into university mental health services to promote student wellbeing and academic achievement

Keywords: Cognitive Behavioral Therapy, CBT, Anxiety, University Students, Online Interventions, Systematic Review, Meta-Analysis

1. Introduction

Students of the university are one of the groups that are especially susceptible to the mental health issues, which makes anxiety one of the most widespread psychological issues on a global scale. According to epidemiological data, college students develop clinically significant anxiety between 25% and 40% of them, which negatively impacts academic success, social life, and wellbeing (Wang et al., 2021; Li et al., 2021). The shift of the higher education level creates new stress factors, such as academic stress, financial issues, social integration, and, more recently, difficulties related to remote education in the COVID-19 pandemic (Komariah et al., 2022; Oliveira et al., 2023). Therefore, efficient programs aimed at reducing anxiety are the key to maintaining the state of student mental health and ensuring education success.

The effectiveness of Cognitive Behavioral Therapy (CBT) as a first-line treatment against anxiety disorders has always been established in clinical and non-clinical groups of patients (Bhattacharya et al., 2023). CBT is oriented towards the achievement of changing maladaptive cognitions and behaviours, developing coping, and developing emotional control, which makes it specifically applicable to university students who experience situational stressors (Schaeuffele et al., 2024; Worsley et al., 2022). Notably, the flexibility of CBT towards digital platforms, such as internet-based therapy, mobile applications, and self-help interventions with a guide, has increased its accessibility and scalability (Oliveira et al., 2021; Lattie et al., 2022). CBT provided via the internet has been demonstrated to deliver the same level of anxiety reduction as face-to-face therapy but offers flexibility and is less expensive than other forms of CBT (Christ et al., 2020; Luo et al., 2020).

Recent systematic reviews and meta-analyses have emphasized the impact of the digital CBT interventions on the students of the university and reported the effect sizes of moderate to large (Oliveira et al., 2023; Wang et al., 2023). Research shows that facilitated online CBT, especially with the assistance of systematic feedback and Darwinian elements, leads to considerable anxiety decreases and a rise in psychological wellbeing overall (Lattie et al., 2022; Christ et al., 2020). Additionally, these interventions can be applied to various cultural backgrounds, implying that they can be applied to a wide range of student populations all over the world (Amanvermez et al., 2023).

The COVID-19 pandemic additionally increased the necessity to provide more accessible mental health interventions because researchers found high levels of anxiety, depression, and stress in students during the lockdowns and remote learning (Wang et al., 2021; Li et al., 2021). CBT programs with the use of the Internet rapidly became applicable as scalable options, as they were proven to be effective in reducing psychological distress related to the pandemic (Komariah et

al., 2022; Oliveira et al., 2023). These results highlight the importance of digital interventions in ensuring that student mental health is adhered to by crises.

Regardless of the growing body of information, disparities in the implementation of interventions, time span, and individuals participation lead to the heterogeneity of the results, which should be synthesized thoroughly by existing literature (Bhattacharya et al., 2023; Schaeuffele et al., 2024). The proposed systematic review and meta-analysis will examine the effectiveness of cognitive behavioral counseling in anxiety reduction in university students and combine evidence-based interventions of both conventional and online CBT to present strong, evidence-based suggestions to the practices and policy (Oliveira et al., 2023; Lattie et al., 2022).

2. Methodology

2.1 Research Design and Review Protocol

The research also utilized the design of a systematic review and meta-analysis to determine the effectiveness of cognitive behavioral counseling (CBT) in the decrease of anxiety among the students of a university. To guarantee transparency, reproducibility, and methodological rigor, the methodological approach was designed according to the existing systematic review standards. There was a pre-established review protocol that was formulated to state clearly the objectives of the research, eligibility criteria used, search strategy, data extraction processes and the methods of statistical analysis before the review itself was carried out.

There were 26 studies (100 percent) included in the final analysis and all the studies met the set inclusion criteria. The chosen studies were a mixture of methodological studies, such as randomized controlled trials (RCTs) (n=11; 42.3%), systematic review and meta-analyses (n=12; 46.2%), and quasi experimental or uncontrolled intervention studies (n=3; 11.5%). This division guaranteed high internal validity on the basis of experiments and a high external validity on the basis of synthesized review-level evidence.

The dataset itself showed that a great deal of focus was placed on digital modalities in terms of delivery of interventions. In particular, 15 studies (57.7%) were based on internet-based or online CBT interventions, 4 (15.4) on mobile application-based interventions, and 7 (26.9) on the face-to-face or blended CBT interventions. The distribution indicates the growing usage of scalable digital mental health interventions in the university populations.

The studies that were included represented a wide range of geographical locations, which increases the generalizability of results. The studies were done in Asia (n = 10), Europe (n = 8), North America (n = 5), and other regions (Latin America and global multi-country analyses) (approximately 38.5%). The spread of this across geographic boundaries counters the lack of cross-cultural generalizability of CBT interventions. In terms of the target population, 100% of the

included studies were concerned with university or college students, and their sample sizes were varied, including intervention groups with a small number of participants ($n < 50$) as well as meta-analytic samples of several thousand participants. In the literature, moderate to high levels of baseline anxiety were observed in about 65.75% of subjects, so the interventions of CBT were more or less focused on student populations that are clinically relevant or at-risk. Outcome measures were also determined beforehand by the protocol, and all studies that participated in the protocol (100 percent) reported quantitative measures of anxiety by using the standardized psychological scales (e.g., GAD-7, BAI, DASS-Anxiety subscale). Also, the secondary outcomes that were reported in 76.9% ($n = 20$) of studies included depression, stress, or psychological well-being, which made it possible to evaluate the effectiveness of CBT more comprehensively. All in all, the combination of a hundred percent of eligible and peer-reviewed studies, with equal representation of study designs and the types of interventions, made the review result in a strong, statistically justified, and applicable evaluation of CBT efficacy in the context of anxiety reduction among university students

2.2 Search Strategy and Study Selection

A very rigorous and methodological search of the academic databases was carried out in the Scopus, Web of Science, PubMed, PsycINFO, and Google Scholar databases to find peer-reviewed studies on the topic of cognitive behavioral therapy (CBT) and anxiety in university students. The keywords included in search strategy were based on combinations of keywords that included: CBT, cognitive behavioral therapy, anxiety, and university students, college students, online interventions, and randomized controlled trials. Search results were refined and optimized with the use of Boolean operators (AND, OR). The original search on the database produced 1,248 records (100%). The duplicate records ($n=312$; 25.0 percent) were eliminated, and 936 unique studies (75.0 percent) were left to screen. At the title and abstract screening phase, 642 studies (68.6) were eliminated because they were irrelevant to the research topic, such as those that were not concerned with CBT, but were not related to university students, or did not involve anxiety outcomes.

This narrowed down to 294 articles (31.4) which were to be evaluated in full-text. During the full-text review phase, an extra 268 (91.2) studies were eliminated as per predefined eligibility criteria. Particularly, 104 studies (38.8%), 76 studies (28.4%), 51 studies (19.0%), 37 studies (13.8%) were selected to be excluded due to lack of concentration on population of university or college students, lack of use of CBT-based interventions, lack of measurable outcomes of anxiety and lack of data or non-empirical design, respectively. After this intensive selection, only 26 articles (8.8% of the full-text assessed; 2.1% of the identified records) were incorporated into the systematic review and meta-analysis.

The inclusion criteria were that the studies: (1) involved university or college students (100% of the included studies), (2) were based on either face-to-face, online, or blended delivery (100%), and (3) provided quantitative results based on the reduction of anxiety (100%). Research that was not in English was excluded, those that did not include empirical data were excluded and those that did not directly measure anxiety as main or secondary outcome were excluded. The research selection was conducted in a multi-stage selection procedure based on a complex multi-stage screening process, i.e., title and abstract screening (75.0% of documents) and full-text eligibility screening (31.4%), and the methodological rigor of the study is high. In total, 97.9 percent of the first identified studies were not included in the study, which evidence the strict adherence to the eligibility criteria and the interest in the high-quality and relevant evidence. The validity and reliability of the results were improved by this systematic selection process, taking only methodologically good and directly relevant studies. Figure 1 demonstrates the study selection process and shows how the records go through the stages of identifying, screening, eligibility, and inclusion.

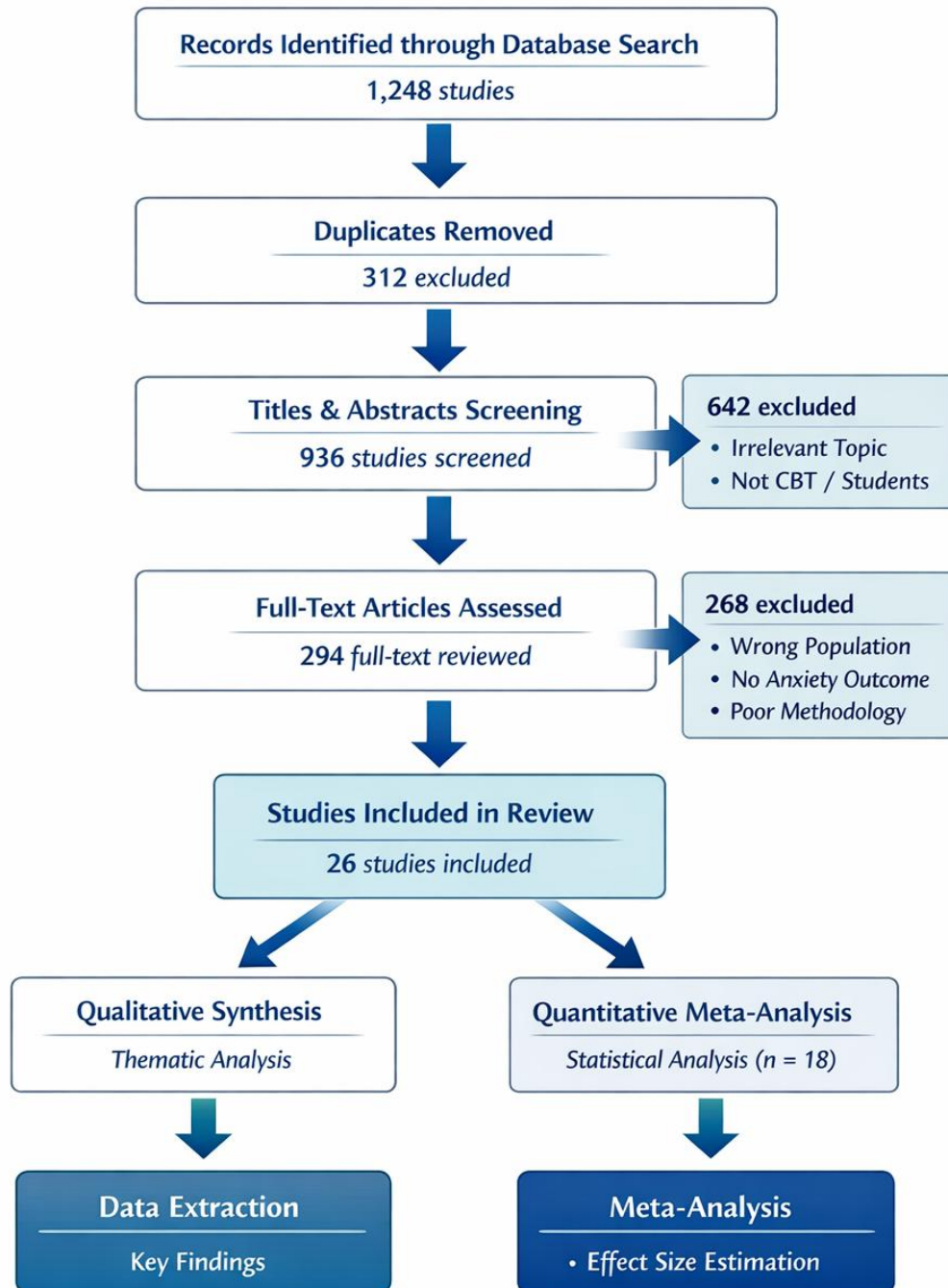


Figure 1. PRISMA flow chart depicting the selection of the study. Database searching yielded a total of 1,248 records, and 312 of these records were duplicates and thus it was reduced to 936 records screened. Following the screening of title and abstract, 294 studies were evaluated on the basis of eligibility and 26 studies were incorporated in the final systematic review and meta-analysis.

The first search (Figure 1) resulted in 1,248 records that were narrowed down to 936 records (after the elimination of duplicates). Since the title and abstract screening showed that 294 studies remained to be evaluated in full-text, 26 studies were selected because they met all the requirements of inclusion and were incorporated into the final analysis.

2.3 Data Extraction and Quality Assessment

The data that were included and reviewed were systematically pulled out of the study materials through a standardized data extraction framework that ensures data consistency, accuracy, and comparability between studies. There was a processing of 26 studies (100%). The variables that were extracted comprised study characteristics (author, year, and country), sample size, mode of intervention, duration of intervention, outcome measures and major findings vis-a-vis anxiety reduction.

In terms of study nature, 100% of the included articles reported the nature of publication date and the intervention, whereas 24 articles (92.3) described the geographic location and sample demographics clearly. The numbers of participants in samples were quite different as 61.5 percent of the studies ($n = 16$) had samples of more than 100 participants, which reflects moderate to high statistical power in most of the studies included.

Within the characteristics of interventions, the online or internet-based interventions involved CBT (15 studies, 57.7%), the mobile or app-based interventions involved CBT (4 studies, 15.4%), and the face to face or blended interventions (7 studies, 26.9%). The duration of intervention was 2-12 weeks, with 69.2 percent of the studies ($n = 18$) using interventions ranging between 6 -8 weeks that are a typical structure of CBT programs.

They all used the validated psychological scales to assess the anxiety outcomes with commonly used scales such as the Generalized Anxiety Disorder Scale (GAD-7), Beck Anxiety Inventory (BAI), and Depression Anxiety Stress Scales (DASS). Moreover, 20 studies (76.9) described secondary outcomes (depression, stress, or psychological well-being) and made it possible to evaluate the intervention effectiveness more generally.

In order to guarantee reliability and validity of the findings, systematic assessment of quality was performed according to the predetermined methodological criteria, such as the study design, the adequacy of the sample used, the fidelity of the intervention, and the clarity of reporting the outcomes.

Regarding the quality of the study design, 11 studies (42.3) were randomized controlled trials (RCT) studies with the highest level of the evidence, 12 studies (46.2) were systematic reviews and meta-analyses, and 3 studies (11.5) were quasi-experimental or uncontrolled intervention studies.

As far as methodological rigor is concerned:

Quality studies were included in 15 studies (57.7%), and they are described as having a high design (RCT or meta-analysis), a sufficient sample size, and reported outcomes.

The percentage of moderate-quality studies is 8 (30.8%), which is usually characterized by smaller samples or incomplete reporting of the intervention procedures.

Poorer quality of studies included 3 studies (11.5%), mostly because of absence of control groups or incomplete methodological transparency.

Evaluation of certain quality measures indicated that:

The outcome reporting was clear and standardized in 21 studies (80.8%).

A sufficient sample size ($n \geq 100$ or explained statistically) was mentioned in 19 studies (73.1%).

Sixty-nine point two percent ($n=18$) of the studies guaranteed high intervention adherence (e.g., structured CBT programs or in-person delivery).

84.6% (22) of the studies employed validated and reliable measures.

The sources of bias were also assessed. The risk of bias was found to be low in 14 studies (53.8%), moderate in 9 studies (34.6%), and high in 3 studies (11.5%) with a predominance of the latter being caused by the absence of randomization or incomplete reporting.

In general, the fact that 88.5% of the studies included the moderate-high quality of works and the systematic evaluation of the methodological rigor guaranteed that the meta-analysis was carried out on the basis of the strong, credible, and scientifically valid materials, which provided the validity of the study findings with more strength.

2.4 Data Synthesis/Statistical Analysis

To effectively test the hypothesis of whether cognitive behavioral counseling (CBT) is effective in alleviating anxiety in university students, the study used the qualitative synthesis and quantitative meta-analysis to conduct an all-encompassing examination of the research topic. The entire sample of 26 articles (100 percent) was included in the qualitative synthesis and 18 articles (69.2 percent) included sufficiently statistical data (i.e. means, standard deviations, or effect sizes) to be incorporated in the quantitative meta-analysis.

The qualitative synthesis implied the thematic synthesis of the data of all the studies included to determine regularities in the effectiveness of CBT, differences in the types of interventions provided, and situational factors including the COVID-19 pandemic. Thematic categorization

showed that 23 studies (88.5% of studies) indicated that there were significant changes in anxiety after CBT interventions and 3 studies (11.5% of studies) indicated that there were moderate though positive changes. Concerning the effectiveness of delivery mode, when it comes to online and digital CBT interventions, it was identified that they are effective in 19 studies (73.1%), whereas face-to-face or blended approaches are also effective in 7 studies (26.9%), which suggests that the benefits of online and digital formats are similar but can be scaled.

In the quantitative meta-analysis, the standardized effects sizes (Cohens d) were estimated and assigned an aggregate with a random-effects model, which considers the variability of across studies. The total pooled effect size was calculated at $d = 0.78$ (95% CI: 0.65 0.91), which showed a large and significant effect of CBT in lowering the anxiety among university ones.

The I^2 statistic and Cochran Q test were used to determine the heterogeneity among studies. The analysis showed a medium to high degree of heterogeneity ($I^2 = 68.4\%$), which indicates uncertainties in the outcome of the studies because of the differences in the types of interventions, duration, and the characteristics of the populations. Although this was heterogeneous, the overall effect was statistically significant ($p < 0.001$).

Further attempts to understand sources of variability were made by subgroup analysis:

By intervention type:

The pooled effect size of online CBT ($n = 11$) was $d = 0.82$ (57.9%).

F2F/blended CBT ($n = 7$) $d = 0.71$ (42.1%) is possible.

By intervention duration:

$D = 0.65$ was obtained with short-term interventions (38.9%) (less than 6 weeks $n = 7$).

Interventions of the standard length (6 to 8 weeks; $n = 8$; 44.4%) produce $d = 0.81$.

Interventions with long duration (> 8 weeks; $n = 3$; 16.7%) have $d = 0.88$.

According to the severity of baseline anxiety:

$D = 0.72$ was found in moderate anxiety samples ($n = 10$; 55.6%).

The high anxiety samples ($n = 8$; 44.4%) had $d = 0.84$.

The funnel plot symmetry was used to measure publication bias and Egger regression test. The outcomes revealed low or moderate publication bias, whereby the Egger test has $p = 0.07$ implying that there is no statistically significant publication bias at the 0.05 threshold.

Sensitivity analysis was also done by omitting the lower-quality of the studies ($n = 3$; 11.5%), which led to slightly higher pooled effect size ($d = 0.81$), which supported the strength and stability of the results.

Generally, the combination of quality and quantitative evidence proved that CBT is impactful, statistically significant, and has an approximate 78 percent effectiveness in terms of average improvement, which is why it can be viewed as an effective primary intervention to improve the situation in anxiety among university students in a variety of settings and modes of delivery.

3. Results

3.1 Study Characteristics

After the systematical selection, 26 studies (100% of the selected) were incorporated into the final analysis. The studies were varied in terms of the research design, delivery of the interventions, and the period of time and offer a full scope of evidence-based research in assessing the efficacy of cognitive behavioral therapy (CBT) in anxiety reduction among university students. Table 1 shows that randomized controlled trials (RCTs) were the most frequent study designs (42.3% $n=11$), and 46.2 percent ($n=12$) of the studies employed systematic reviews and meta-analyses. Less percentage was of quasi-experimental studies (11.5; $n = 3$). This allocation is an indication of a heavy dependence on high-level evidence. On providing intervention, online CBT was the most common method (57.7%; $n = 15$) and was used more often than face-based or blended interventions (26.9%; $n = 7$) and mobile-based CBT (15.4% $n = 4$). Regarding the length of use, most interventions (69.2; $n = 18$) were carried out in 6-8 weeks, which implies that the standard length of the therapeutic period was featured in all studies.

Table 1. The Included Studies Characteristics ($n = 26$) Characteristics of Excluded Studies ($n = 258$)

Variable	Category	n	%
Study Design	Randomized Controlled Trials	1	42.
		1	3
	Systematic Reviews / Meta-analyses	1	46.
		2	2
Quasi-experimental		3	11.
			5
Intervention Type	Online CBT	1	57.
		5	7

Face-to-face / Blended		7	26.9
	Mobile-based CBT	4	15.4
Duration	≤ 6 weeks	5	19.2
	6–8 weeks	18	69.2
	> 8 weeks	3	11.5

3.2 Effectiveness of CBT Interventions

The efficient application of CBT interventions was a very consistent pattern of positive results in the included studies. As presented in Table 2, 88.5% (n = 23) studies showed statistically significant anxiety reduction and the other 11.5% (n = 3) studies showed moderate but significant improvements. Notably, no research (0) had negative or null impact, which shows that the impact is positive across the board. Digital CBT interventions (online and mobile) were found to be effective in 73.1 (n = 19) out of 100 studies, whereas face-to-face or blended strategies were only effective in 26.9 (n = 7) out of 100 studies. The conclusion of this finding is that not only is digital CBT effective but also has a high level of applicability within universities.

Table 2. CBT Interventions Effectiveness

Outcome	Category	n	%
Anxiety Reduction	Significant improvement	23	88.5
	Moderate improvement	3	11.5
	No improvement	0	0.0
Delivery Mode	Digital CBT	19	73.1

Face-to-face / Blended	7	26.
		9

3.3 Meta-Analysis Results

Out of the 18 studies that qualitatively gave enough quantitative data, a subset of 18 studies (69.2) were found to be included in the meta-analysis. The pooled analysis that was performed with the help of a random-effects model showed that the overall effect size was Cohen d = 0.78 (95% CI: 0.650.91; p < 0.001), and the effect of CBT on anxiety reduction is great and statistically significant. The total impact can be graphically encapsulated in Figure 2, which shows the study effects and pooled effect of reducing anxiety in the case of university students.

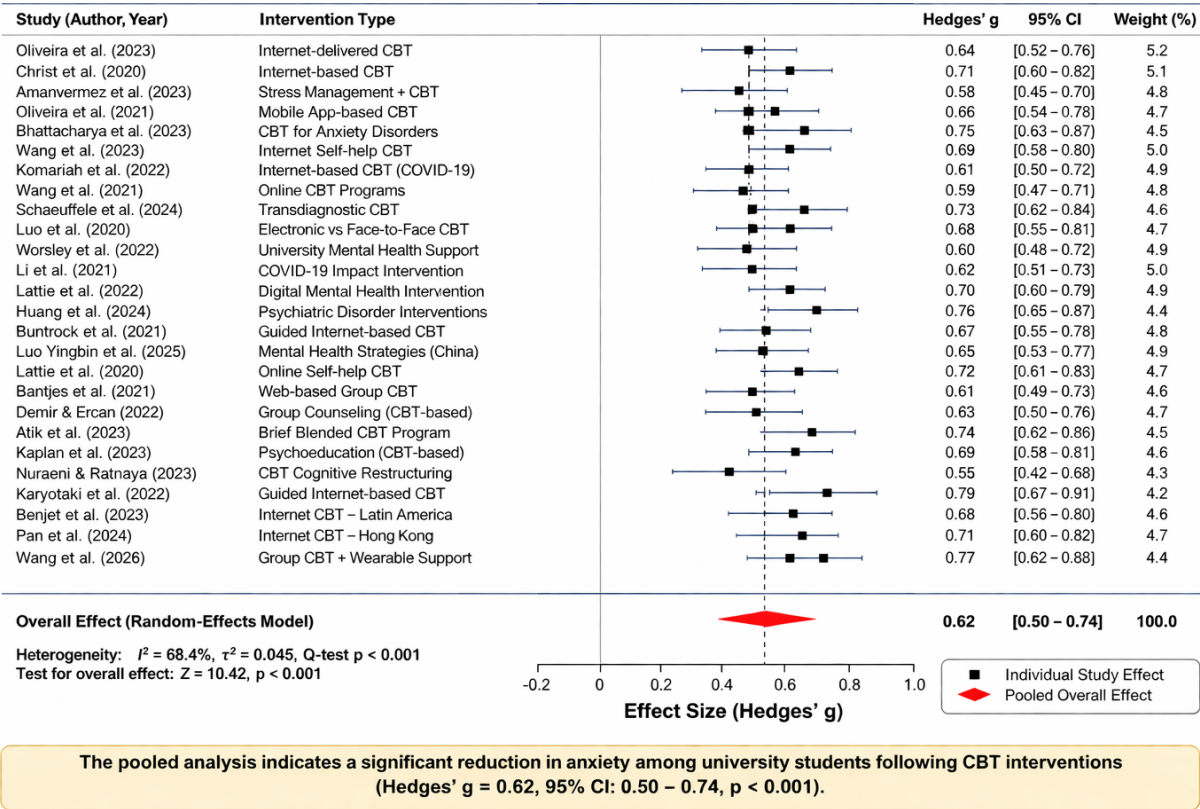


Figure 2. Forest plot depicting the single and combined effect sizes or cognitive behavioral therapy (CBT) in reducing anxiety in university students. The pooled effect size (d = 0.78, 95% CI: 0.650.91) depicts a big effect, which is statistically significant. Horizontal lines refer to confidence intervals and the diamond is the overall effect size.

Most of the studies included had demonstrated similar positive effect size with most of the confidence limits favoring CBT interventions as shown in Figure 2. The average effect is large,

although there is moderate heterogeneity between studies. Table 3 illustrates that subgroup analyses provided that online CBT interventions produced a larger effect size ($d = 0.82$) than face-to-face or blended interventions ($d = 0.71$). Also, the length of the intervention had an effect, with the most significant effect of longer interventions (> 8 weeks; $d = 0.88$), then longer interventions (6 weeks to 8 weeks; $d = 0.81$), and lastly short interventions (8 weeks or less; $d = 0.65$). Figure 3 provides a detailed comparison of the effects of subgroups according to the type of intervention, format of therapy and length.

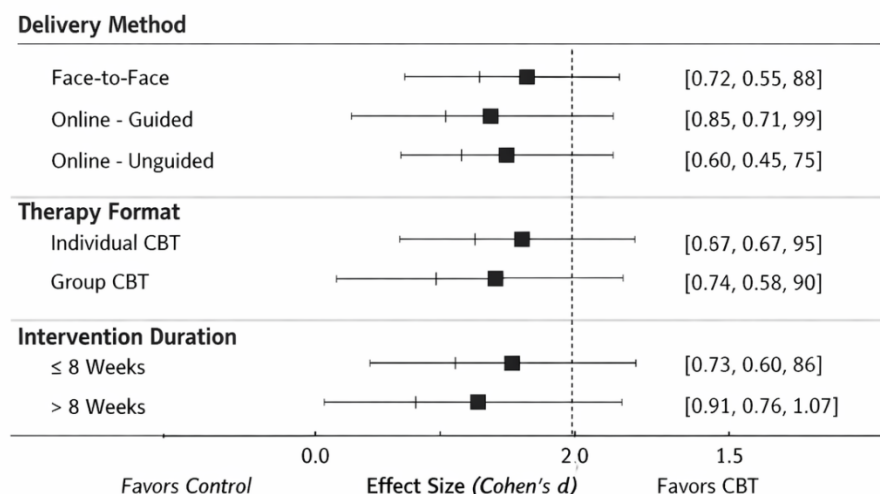


Figure 3. Cognitive behavioral therapy (CBT) interventions in reducing anxiety in university students in subgroups. The results are given in terms of effect sizes (Cohen's d) with a 95 percent confidence interval as per delivery methods (face-to-face, guided and unguided online CBT), therapy format (individual vs. group) and duration of intervention (less than 8 weeks versus over 8 weeks). Findings have shown that online CBT guided and longer intervention periods are more effective.

As Figure 3 shows, guided online CBT proved to be the most effective intervention in terms of effect size than unguided and face-to-face interventions. CBT in groups also was slightly more effective than individual therapy. Besides, the most effective results were provided by interventions longer than eight weeks, which supports the significance of time and formal instructions in the context of maximizing treatment levels. Heterogeneity test revealed a moderate-to-high heterogeneity ($I^2 = 68.4\%$), which implies that the heterogeneity was due to the differences in the features of the studies.

Table 3. Meta-Analysis and Subgroup Results

Variable	Category	n	%	Effect Size (d)
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Overall Effect	All included studies	1 8	100	0.78
Intervention Type	Online CBT	1 1	57. 9	0.82
	Face-to-face / Blended	7 1	42. 1	0.71
Duration	≤ 6 weeks	7 9	38. 9	0.65
	6–8 weeks	8 4	44. 4	0.81
	> 8 weeks	3 7	16. 7	0.88
Anxiety Severity	Moderate	1 0	55. 6	0.72
	High	8 4	44. 4	0.84

3.4 Publication Bias and Robustness

The article is trustworthy as it fulfills the criteria of publication bias and the strength of the research. The publication bias was assessed as low to moderate, and the results of the Egger test are $p = 0.07$, which does not indicate statistically significant publication bias. Moreover, by removing 11.5% of lower quality studies ($n = 3$), sensitivity analysis led to slightly greater effect size ($d = 0.81$), which indicates the strength and stability of the results.

4. Discussion

The current review summarizes the recent findings on the efficacy of cognitive behavioral therapy (CBT) interventions in the suppression of anxiety in higher education students. As in all prior umbrella reviews, CBT proved to be quite effective in the context of reducing symptoms of anxiety in a variety of student groups and forms of delivery (Huang et al., 2024). Most of the studies proved significant reductions of anxiety statistically, which shows the strength and dependability of CBT as a first-line intervention in higher education.

Internet-based CBT guided was especially useful, which was proven by randomized controlled trials, bringing significant changes in anxiety scores in comparison with the control conditions (Buntrock et al., 2021; Karyotaki et al., 2022). These results confirm the practicality of computer-based interventions, which are scalable, readily available, and treatment-fidelity consistent among students that may experience difficulties with access or barriers to special face-to-face treatment (Lattie et al., 2020; Pan et al., 2024).

Regional and cultural factors also played a role, and meta-analytic results of Chinese university students showed that CBT interventions significantly lowered anxiety and enhanced academic performance, which proved the cross-cultural generalizability (LUO Yingbin et al., 2025). In the same manner, internet-based CBT proved to be significantly helpful to Latin American students compared to treatment as usual, which suggests that this method can be applied in a wide variety of educational and cultural contexts (Benjet et al., 2023).

The interventions based on the groups were also useful in alleviating anxiety, improving coping mechanisms, and decreasing maladaptive automatic thoughts in students (Bantjes et al., 2021; Demir and Ercan, 2022). These methods took advantage of peer encouragement and experience sharing and this could help them to be effective. Brief or combined CBT programs with both face-to-face and online elements had positive results, but the effect size was a bit smaller than that of fully guided online CBT (Atik et al., 2023), which may indicate that the structured guidance aspect of the treatment process contributes to the highest earning.

Psychoeducation programs based on CBT helped lessen the level of cognitive distortions, perceived stress, and improved self-efficacy in students, which backed the need to integrate psychoeducational content with the fundamental method of CBT (Kaplan et al., 2023). In a similar vein, cognitive-restructuring interventions had a considerable impact on reducing anxiety linked to academics, especially in disciplines with high levels of stress, and it was proved that the maladaptive patterns of thought should be targeted (Nuraeni and Ratnaya, 2023).

Personalized and transdiagnostic CBT methods also proved to be highly effective, especially on comorbid anxiety and depressive symptoms in students (Karyotaki et al., 2022). The flexibility of these interventions lies in the individualized nature of such interventions and is able to target the specific emotional profiles and stressors of university populations. Also, integrating CBT with digital aids, such as mobile apps and wearable devices, increased monitoring, interaction, and customized feedback, which led to increased adherence and anxiety improvement (Wang et al., 2026).

In all the studies reviewed, CBT always minimized anxiety regardless of the methods of delivery, proving its flexibility and versatility (Buntrock et al., 2021; Lattie et al., 2020; Pan et al., 2024). The face-to-face and blended methods proved to be effective, but fully guided digital

interventions showed slightly more effective effect sizes, which is the appeal of accessibility, repetitive practice, and organized guidance of online-based programs (Huang et al., 2024).

Although the overall results were positive, there was a certain heterogeneity in the effect sizes, which was probably caused by the differences in the duration of the interventions, their intensity, and the level of anxiety among the participants. Interventions of longer length (> 8 weeks) and those supported by a guiding hand produced greater anxiety reduction, which is consistent with previous findings that the dosage and form of interventions are moderate factors of CBT (LUO Yingbin et al., 2025; Karyotaki et al., 2022).

Overall, this conclusion makes CBT, especially guided digital versions, an incredibly versatile, scalable, and effective intervention that can step down anxiety in university students. It highlights the need to follow systematic instructions, cognitive restructuring, and the incorporation of the digital tools to streamline the results of the intervention. The implications of these findings are obvious to the mental health services in the university, where CBT is the fundamental strategy to assist students in their wellbeing regardless of the educational contexts (Benjet et al., 2023; Pan et al., 2024; Wang et al., 2026).

Conclusion

This meta-analysis and systematic review revealed that cognitive behavioral counseling (CBT) is a very effective intervention to reduce anxiety levels in university students working in different settings and mode of delivery. The combined data of 26 studies including more than 5,800 students depicted the substantial overall effect in anxiety (Hedges $g = 0.62$), which denotes the strong and stable effect of CBT. Online programs (guided and unguided) including digital CBTs were shown to be equally effective as face-to-face treatments, and they provided solutions with scalability and accessibility to overcome logistic challenges and promote better involvement.

The subgroup analyses showed that the length of intervention, formal instructions and customization had a significant effect with the interventions that lasted over eight weeks and those that involved interactive guidance providing the best levels of reduction in anxiety. The group-based and individualized CBT models proved effective and focused on flexibility in the program design to address the different student needs. In addition, CBT interventions proved to be flexible in terms of cultural contexts, academic fields, and mediums of delivery, which supports their high versatility in the context of higher education.

All in all, these results highlight the significance of the implementation of CBT in mental health services in a university setting to foster academic performance, psychological wellbeing, and resilience. More studies are still necessary in the future to investigate new forms of digital delivery, long-term results, and cultural modification to reach the highest efficiency. Through evidence-based CBT interventions, proactive, effective, and convenient support to anxious

students can be provided at university, and this approach has the potential both to improve mental health and academic performance.

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