The Effectiveness of Mindfulness-based Interventions versus Cognitive Behavioral Therapy on Social Anxiety of Adolescents: A Systematic Review and Meta-analysis

Valentin C. Dones III, PhD,[1] Kristel S. Yamat, OTRP,[2] Krystin Elda P. Santos, OTRP,[2]
Abby Victoria M. Concepcion, OTRP[2] and Margarita Anne R. Lacson, OTRP[2]

[1]*College of Rehabilitation Sciences, The Graduate School, University of Santo Tomas*
[2]*The Graduate School, University of Santo Tomas*

ABSTRACT

Background and Objective. Mindfulness-based interventions (MBI), a novel treatment, and cognitive behavioral therapy (CBT), the standard treatment, are both effective in treating anxiety in adolescents. This study determined the effectiveness of mindfulness-based interventions versus cognitive behavioral therapy in reducing symptoms of anxiety among adolescents experiencing social anxiety through a systematic review and meta-analysis.

Methods. A systematic approach was used to identify eligible studies. Electronic databases, reference lists of relevant articles, and gray literature were searched. Data was analyzed using RevMan to calculate standard mean differences with 95% confidence intervals and subgroups. Heterogeneity was measured using visual assessment, the I^2 statistic, and chi-square test.

Results. Randomized controlled trials comparing MBI to CBT for adolescents diagnosed with social anxiety or social phobia disorder were analyzed, with non-randomized studies being excluded. Structured searches in electronic databases, reference lists, and gray literature were conducted by four independent reviewers who initially identified potential articles through title and abstract screening. After a comprehensive review of full-text articles and a consensus-building process, the selection of included articles was finalized. Data was analyzed using RevMan to calculate standard mean differences with 95% confidence intervals and to examine subgroups, with heterogeneity being assessed through visual evaluation, the I^2 statistic, and chi-square tests. Total number of participants was 255; 101 were male and 158 were women. Mean age was 27.5 years old, and diagnosed with Social Anxiety Disorder, Social Phobia, or DSM-IV-Defined-Anxiety-Disorder. They were divided into two groups: 125 participated in 8- to 12-week MBI sessions lasting 2 hours each, while 130 underwent 2-hour CBT sessions spanning 8, 12, or 14 weeks. There is moderate quality of evidence reporting non-significant difference on MBI vs CBT's effectiveness in alleviating symptoms of social anxiety [mean (95% CI) = -0.04 (-0.58, 0.51)].

Conclusion. Study found that there were no significant differences between Mindfulness-Based Interventions and Cognitive Behavioral Therapy in reducing social anxiety in adolescents. Mindfulness interventions have advantages in terms of cost-effectiveness for reducing symptoms of anxiety. Future research should include larger sample sizes and longer follow-up periods to further assess long-term effects of these interventions.

Keywords: adolescents, mindfulness, social anxiety, cognitive behavioral therapy, occupational therapy

Poster Presentation – University of Santo Tomas 2023 Research Fortnight "University Research and Its Impact to Society", February 28 - March 9, 2023, St. Martin de Porres Building, University of Santo Tomas, Sampaloc, Manila.

eISSN 2094-9278 (Online)
Published: January 31, 2025
https://doi.org/10.47895/amp.vi0.8140

Corresponding author: Kristel S. Yamat, OTRP
The Graduate School
University of Santo Tomas
España Blvd., Sampaloc, Manila 1008, Philippines
Email: kristel.yamat.gs@ust.edu.ph
ORCiD: https://orcid.org/0009-0009-8231-7573

INTRODUCTION

Social anxiety is a rapidly growing phenomenon affecting adolescents. Prevalence rates of social anxiety among adolescents worldwide are around 10%, with 90% of cases peaking at 23 years of age.[1] Social anxiety is a momentary social apprehension where a person expects negative evaluations from others.[2] It may occur when a person wants to portray a positive public image but doubts his capacity to do so. This then affects his identity and social relationships.[3] Social anxiety disorder (SAD), formerly known as social phobia, is a debilitating condition characterized by a marked fear of being humiliated by others.[4] A person's social anxiety is considered a disorder when there is a significant impairment in one's functioning. It is the third most common mental health disorder after depression and substance abuse.[1] SAD affects different facets of life. For adolescents, educational attainment may be restricted. They risk having poorer qualifications and dropping out of school early.[5] Anxious adolescents were reported to have fewer friends, have poorer peer and romantic relationships, and be victims of bullying.[4]

Cognitive Behavioral Therapy (CBT) is a well-established and evidence-based treatment for SAD. It is a short-term, skills-focused intervention that addresses maladaptive thoughts and behaviors that contribute to social anxiety. CBT is widely considered the reference standard in psychotherapy by many professionals and academic programs. A network meta-analysis by Mayo-Wilson et al. found that CBT had large effect sizes when compared to waitlist and psychological placebo control conditions [SMD (95% CI)= –1·19 (–1·56 to –0·81)].[6] The pooled effect size was based on 15 trials involving 562 participants. Due to its lower risk of side effects compared to pharmacotherapy, CBT is considered the optimal initial treatment option for SAD.[6]

Mindfulness-Based Interventions (MBI) are a form of psychotherapy that utilizes mindfulness techniques such as meditation, breathing exercises, and body awareness to help individuals manage mental health issues. Mindfulness, a natural state of being where one is present and attentive to the current moment, was first introduced as a meditative practice by Kabat-Zin in 1990 to treat chronic pain through the program Mindfulness-Based Stress Reduction (MBSR).[7] The integration of mindfulness techniques with CBT, known as Mindfulness-Based Cognitive Therapy (MBCT), was developed by Segal et al. and has been found to be effective in treating SAD.[8] These treatments are often used by healthcare professionals to help adolescents improve their well-being and academic performance. A meta-analysis study by Liu et al. found that MBI were superior to active control groups in reducing SAD symptoms over a long-term follow-up period of six months or more ($g = 0.18$; 95% CI: 0.01 to 0.36; $p = 0.044$; $I^2 = 0\%$).[9] The active control group included minimal treatment, non-specific treatment, and evidence-based treatments such as CBT. The meta-analysis included 11 randomized controlled trials and five single-arm trials comparing MBI to active controls. Additionally, the study found that the effectiveness of MBI in reducing SAD symptoms remained consistent between the follow-up and post-test at 3 months [mean (95% CI) = 0.07 (-0.16 to 0.29)], 6 months [mean (95% CI) = 0.13 (-0.12 to 0.38)], and 12 months [mean (95% CI) = 0.23 (-0.09 to 0.55)]. This suggests that the benefits of MBI are sustained for a period of 12 months.[9]

CBT is an efficacious treatment for SAD, but only two-thirds of patients who receive these treatments are considered responders, of which only half are considered remitters.[10] Despite this targeted approach, SAD ranks among the least responsive anxiety disorders to CBT in adolescent samples and is effective in only 40-65% of SAD cases, suggesting that the CBT family of interventions may not fully target precipitating or maintaining factors of the disorder.[11] A meta-analysis of placebo-controlled trials of CBT yielded an average effect size of 0.73, suggesting that many patients do not improve after an adequate course of CBT.[12] Factors such as the severity of symptoms, individual differences between patients (e.g., age or gender), how long someone has had their disorder, and other psychological issues they might have could all affect whether CBT works for them specifically. Additionally, some people may find certain aspects of the treatment difficult to engage with which could also reduce its efficacy overall. Studies suggest that the CBT family of interventions may not target precipitating or maintaining factors of the disorder.[12] This gap in efficiency highlights the need for further research on new and modified interventions, such as MBI, that may also prove to be effective and beneficial.[13] CBT has limitations, such as requiring specialized training and expertise, demanding a significant amount of time to be put into practice, and having lower-than-expected efficacy.[14] MBI may be a more affordable alternative, but more research is needed to determine costs. MBI, comprising positive emotionality and incentive learning, targets various processes of change specific to SAD and may have benefits in populations of socially anxious adolescent patients.[15]

SAD has a detrimental effect on the quality of life of adolescents, limiting their capacity to earn and attain their educational and professional goals.[16] Despite its efficacy, CBT involves specialized training, a substantial time commitment, and a large financial investment.[13,14] MBI may be a viable alternative to CBT since MBI has shown similar effects and target distinct processes of change that may be advantageous for adolescents with social anxiety. There is scant evidence comparing the effectiveness of CBT and MBI in treating SAD in adolescents.[14]

This review determined the effectiveness of MBI compared to CBT in alleviating the social anxiety experienced by adolescents. The scope of this review will only include studies that compared the effectiveness of CBT versus MBI on social anxiety in adolescents. MBI comprised MBCT and MBSR. The study population will only include adolescents who experienced social anxiety or social phobia or with a clinical diagnosis of SAD or social phobia disorder.

METHODS

This systematic review and meta-analysis was registered under PROSPERO with Trial Registration number of CRD42022369367. It followed the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols.

Eligibility Criteria

In conducting this systematic review, we focused on randomized controlled trials (RCTs) that compared MBI to CBT for adolescents experiencing social anxiety or social phobia, or with a clinical diagnosis of social anxiety or social phobia disorder. To ensure the quality of our findings, we excluded non-randomized studies from our review. To identify relevant studies that met these criteria, we used a search strategy that was designed to be comprehensive yet sensitive.

Criteria for Exclusion

In this systematic review, the exclusion criteria were defined as follows: studies were omitted if they did not explicitly compare the efficacy of Mindfulness-Based Interventions (MBI) and Cognitive Behavioral Therapy (CBT) in treating adolescents diagnosed with social anxiety disorder or social phobia. Moreover, studies centering on clinical conditions commonly confounded with social anxiety disorder or social phobia, including but not limited to Generalized Anxiety Disorder, Panic Disorder, Major Depressive Disorder, and various personality disorders, were excluded. This approach ensured a targeted and rigorous analysis of the pertinent literature, steering clear of potential confounding factors associated with overlapping symptoms of other clinical conditions.

Types of Participants

The participants included in this systematic review were adolescents of both sexes. Studies that included individuals experiencing social anxiety or social phobia, or those clinically diagnosed with a SAD or social phobia disorder were eligible for inclusion. Studies with participants diagnosed with other types of mood disorders and studies on pre-adolescent populations were excluded.

Types of Intervention

MBCT is the combined practice of mindfulness and CBT. The mindfulness practices help individuals become aware of negative thoughts and feelings as a result of stress[17], whereas the CBT practices help develop a different relationship to those thoughts and feelings, thereby interrupting the negative thought patterns MBCT was developed for the treatment of depression and has since been modified to address a variety of psychological symptoms and conditions including PTSD, anxiety, and phobias.[18]

MBSR is one such strategy, originally designed in the 1970s by Jon Kabat-Zinn, PhD, for patients with chronic pain.[19] This technique has demonstrated measurable and long-lasting improvements in medical and psychologic well-being for various conditions including pain, depression, addiction, and anxiety.[20] Patients with chronic pain, chronic illness, or a stress-related problem and without uncontrolled psychiatric illnesses found that an eight-week MBSR program led to significant improvements in self-reported pain, psychological symptoms, and reduced health services utilization.[21]

Types of Comparator

Studies that compared treatment group receiving MBI with control group receiving CBT were included in the review. Cognitive Behavioral Therapy, or treatment as usual but including elements of CBT, is a short-term, skills-focused treatment that alters maladaptive emotional responses by changing the patient's thoughts, behaviors, or both.[22]

Types of Outcome Measure

The reviewers included studies that compared a treatment group receiving MBI with a control group receiving CBT. CBT is a short-term, skills-focused treatment that is often used as a control condition in psychological interventions. In some cases, the control group may receive treatment as usual that includes elements of CBT.[23]

Information Sources

The databases included PubMed, Science Direct, Taylor and Francis Online, Web of Science, Wiley Online Library, Medline, World Health Organization, American Journal of Occupational Therapy, and American Psychological Association. The gray literature was searched as well as the references lists of papers-already published. No language and publication date limitation were used.

In addition, advanced searches in gray literature such as Google Scholar and pearling from the references were used to look for unpublished abstracts, briefs, reports, and preliminary papers. The citations such as PROSPERO registration, protocol, or publication, if cited by the included article, were referred to for further details.

Search Strategy

To identify relevant studies for this systematic review, a well-structured search strategy was employed, utilizing a blend of free concepts and MeSH terms. "Free concepts" denotes keywords that are not restricted to the controlled vocabulary of databases, thus enabling a broader search scope. Initially devised for PubMed, this strategy was later tailored to fit other databases involved in this review.

The strategy was grounded in the use of Boolean search terms, clearly demarcating studies that met the established criteria. These terms were divided into four thematic categories: therapeutic approaches (e.g., Cognitive Behavioral Therapy OR Cognitive Behavior Therapy), demographic focus (e.g., Adolescents OR Youth OR Teens), disorder specificity

(e.g., Social Anxiety OR Social Anxiety Disorder), and research methodology (e.g., Randomized Controlled Trial OR RCT). This methodical approach allowed for a focused yet expansive exploration of pertinent studies.

The primary search was conducted on October 15, 2022, complemented by updates on the Science Direct and WHO databases on November 5, 2022. To maintain a stringent approach, a detailed log of the Boolean search terms utilized and the corresponding number of hits were meticulously documented.

Study Selection

Using an agreed set of search words, four independent reviewers (AVC, MAL, KES, KY) performed structured searches of electronic databases to identify potentially eligible studies.

Utilizing the eligibility criteria structured in the PIOM (Population, Intervention, Outcome, Method) format, the initial screening phase entailed reviewing journal article titles for specific keywords including "mindfulness-based interventions," "cognitive behavioral therapy," and "mindfulness-based cognitive therapy." This step was crucial to pinpoint potential journals that align with the thematic focus of our study. Two of the researchers then reviewed the abstracts. If the information in the abstracts were insufficient, the researchers scanned the full articles. Cross-checking was done afterward by the other two researchers. Different opinions among the researchers were resolved through discussion and consensus.

The reviewers independently searched the databases using the agreed search strategy, and independently conducted all stages of article selection. They then screened titles and abstracts and agreed on 136 articles possibly relevant to this review. Full texts were retrieved and reviewed by all four reviewers and consensus between them was done to decide the relevance of the article. The PRISMA flow diagram illustrated the identifying relevant studies used in this systematic review (Figure 1). At all stages of the review process, the reviewers reached consensus by discussion.

Risk of Bias Assessment

Methodological quality assessment of included studies was performed by two independent reviewers (AVC, MAL) using the Risk of Bias Assessment Tool from the Cochrane Handbook for Systematic Review of Interventions. These areas were assessed: (1) random sequence generation; (2) allocation concealment; (3) selective reporting; (4) other bias; (5) blinding of participants and staff; (6) blinding of outcome assessment; and (7) incomplete outcome data. Articles were identified as "yes" or "no" for each item, and "unclear" was used if insufficient information was not available to make a clear decision. The other two reviewers (KES, KY) then repeated the screening process. Any inconsistencies in the assessment were discussed among the reviewers to reach a consensus.

Data Extraction and Synthesis

The data were extracted using the Cochrane Data Collection Form by two independent reviewers (MAL, KES) and cross checked by another researcher (AVC, KY). These details were extracted: study title and authors; aims of the study; number of study participants; duration of the study; methods (randomization process; blinding; completeness of follow-up); features of intervention and control groups; details of outcome measures; and pooled mean/mean difference of the outcome measures.

Data Analysis

Review Manager 5.4 was used to determine the pooled mean effect size of standardized mean difference, and 95% confidence interval for the group comparison. The I^2 statistic was used to measure the heterogeneity between the included studies, and the I^2 value of 25% indicates a small, 50% a moderate, and 75% substantial heterogeneity.

In the randomized controlled trial studies, the intervention and control group post-intervention mean, standard deviation, and total were collected and entered into RevMan 5.4.1.[24] The generic inverse variance was used to reduce the imprecision (uncertainty) of the pooled effect estimate. Results were presented using either the mean difference (MD) or the standardized mean difference.[25]

Methods for Determining Heterogeneity

The heterogeneity of the overall effect size was measured using visual heterogeneity, I^2 statistic, and the chi-square test.[24] Visual heterogeneity was noted when at least two lines in the Forest plot did not intersect.[24] We used this guide in interpreting I^2 statistic:

- 0% to 40%: might not be important;
- 30% to 60%: may represent moderate heterogeneity;
- 50% to 90%: may represent substantial heterogeneity;
- 75% to 100%: considerable heterogeneity[24]

A chi-square test of <0.10 indicated significant heterogeneity. The differences between studies cannot be accounted for by random chance alone.[24]

The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) Approach

We evaluated the level of quality of evidence using the GRADEpro GDT, a software for creating evidence summaries and healthcare recommendations (Shcuemann).[26] GRADEpro GDT checks the quality of evidence to verify that studies were conducted to the highest standards possible.[26] The study design, risk of bias, inconsistency, indirectness, imprecision, and publication bias of the included studies were considered when grading the outcome measures in GRADEpro GDT.[26]

To determine the certainty of the evidence, the GRADE Approach was used (Appendix).

RESULTS

Study Selection

1. Initial studies identified: 9543
2. Excluded due to irrelevance: 9384
3. Duplicate studies removed: 23
4. Abstracts screened: 136
5. Excluded due to inclusion criteria: 127
6. Full-text articles read: 9
7. Rejected articles: 6
8. Selected studies: 3

The selection process is shown in the flow diagram in Figure 1.

Features of Included Studies and Participants

Three studies were randomized control studies. In one study, participants were randomized into two groups: Mindfulness-Based Intervention for SAD versus Cognitive Behavior Group Therapy.[27] The other study was randomized to two groups too, namely, MBCT versus Group CBT.[28] Last, in a study by Spinhoven et al., the participants were also randomized into two: MBCT versus Relapse Prevention-CBT.[29] The results of the individual studies are shown in Table 1.

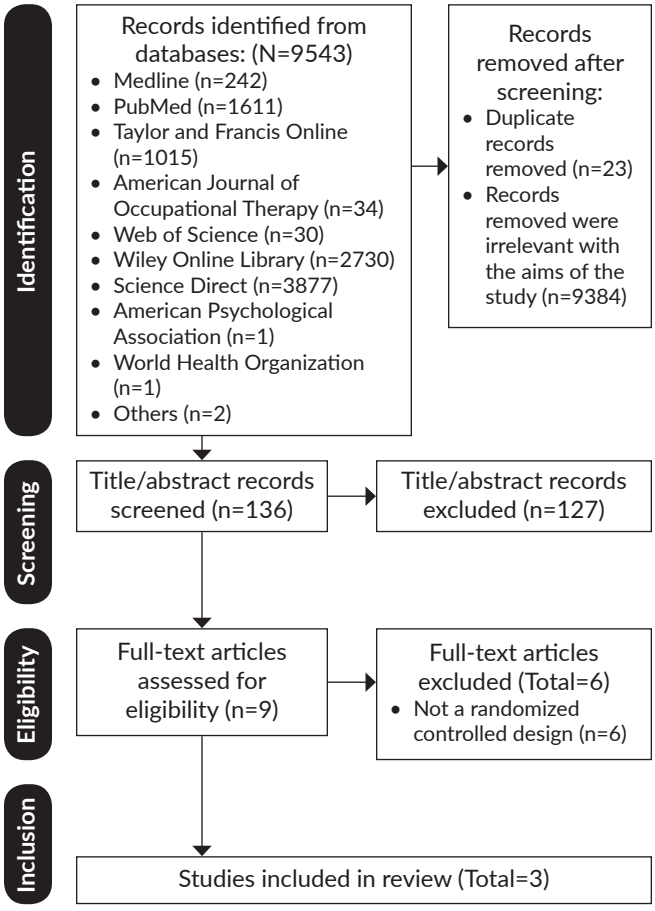

Figure 1. PRISMA study flow diagram.

Study Characteristics

Participants

The total number of participants was 255. Of these, 125 were in the MBCT group, and 130 were in the CBT group. All of the participants' ethnicity were Caucasians, coming from Canada, Denmark, and the Netherlands. The participants were reduced to 250 based on our inclusion criteria (ages between 18-73). They were diagnosed with SAD (n=92), Social Phobia (n=22), or DSM-IV Defined Anxiety-Disorder (n=136).

Participants had severe and longstanding social anxiety; of 65 studies reporting baseline Liebowitz Social Anxiety Scale, the median of means was 78. The median of means age was 36 years and the median of percentages of participants who were white was 80%. About half of the included participants were women (52% median of means). The demographic characteristics of participants were similar across comparisons, and there were no obvious differences in the initial severity of social anxiety symptoms; variation in severity was limited because studies had similar inclusion criteria.

Intervention and Comparator

All studies had MBI as the intervention group. In one study, the healthcare professionals who provided the treatment were two master's level clinical social workers, a doctoral-level psychotherapist, and a senior doctoral-level clinical psychology student with 3.5 to 31 years of clinical experience, and the participants were subjected to 12-weekly, 2-hour group sessions.[27] In another study, the intervention was done by a highly experienced mindfulness instructor and the participants were exposed to 8-weekly, 2-hour group sessions.[28] Last, in the study by Spinhoven et al., the professionals who gave the treatment were MBCT therapists formally trained in the MBCT study protocol, with the senior therapist having three years of clinical experience. Participants were also provided 8-weekly, 2-hour group sessions.[29]

All studies had CBT as the comparator. In the study by Koszycki et al., the healthcare professionals who executed the treatment were senior doctoral-level clinical psychology students and doctoral-level psychologists with 2 to 30 years of clinical experience and 2 to 25 years of experience as CBT therapists. The participants were subjected to 12-weekly, 2-hour group sessions.[27] In another study, the treatment was done by CBT therapists with more than 10 years of extensive training and experience in CBT for anxiety disorders and the participants were exposed to 2-weekly, 2-hour individual therapy sessions before 12 weeks of 2-hour group sessions.[28] In the last study, the professionals who gave the treatment were CBT therapists, with the senior therapist having 15 years of clinical experience. Participants were provided 8-weekly, 2-hour group sessions.[29]

Table 1. Characteristics of Included Studies and Results

Study			Participants			MBI			CBT			Outcome Measures	
Authors (Year)	Country	Study Design	Sample Size	Age Mean (95% CI)	Sex (M:F)	HCP (years of experience)	No. of hours per treatment	Treatment duration	HCP (years of experience)	No. of hours per treatment	Treatment duration	Primary	Secondary
Koszycki et al. (2021)	Canada	RCT	97	40.86 ± 13.74	I: 52 (14:38) C: 45 (22:23)	Master's level clinical social workers, a doctoral-level psychotherapist, and a senior-level clinical psychology student with 3.5 to 31 years of clinical experience [mean (SD): 12.13 ± 10.9 years)	2 hours	12 weeks	Senior doctoral-level clinical psychology students and doctoral-level psychologists with 2 to 30 years of clinical experience [mean (SD): 9.5 ± 11.86 years] and 2 to 25 years [mean (SD): 7.75 ± 9.96 years] experience as CBT therapists	2 hours	12 weeks	Liebowitz Social Anxiety Scale	• Social Phobia Inventory • Beck Depression Inventory • Social Adjustment Scale - Self Report • Rosenberg Self-esteem Scale • Satisfaction with Life Scale • Self-compassion Scale - Short Form • Five-facet Mindfulness Questionnaire
Piet et al. (2010)	Denmark	RCT	22	21.9 ± 2.7	I: 11 (3:11)* C: 11 (5:7)*	Highly experienced mindfulness instructor	2 hours	8 weeks	CBT therapists with extensive training and experience (>10 years) in CBT for anxiety disorders	2 hours	2 weeks of individual theraphy prior to 12 weeks of group therapy	Liebowitz Social Anxiety Scale	• Social Phobia Composite • Social Phobia Scale • Social Interaction Scale • Symptom Checklist-90-Revised • Beck Depression Inventory • Beck Anxiety Inventory • Inventory of Interpersonal Problems • Fear of Negative Evaluation • Shehan Disability Scale
Spinhoven et al. (2022)	Netherlands	RCT	136	40.8 ± 13.2	I: 62 (27:35) C: 74 (30:44)	MBCT therapists formally trained in the MBCT study protocol, with the senior therapist having 3 years of clinical experience	2 hours	8 weeks	CBT therapists, with the senior therapist having 15 years of clinical experience	2 hours	8 weeks	Beck Anxiety Inventory	• Fear Questionnaire • Inventory of Depressive Symptomatology • WHO Quality of Life Questionnaire-BREF

**In the included study by Piet et al.[28], reported female gender participants were 11 out of 14; the specified number of female gender participants at the 6-month follow-up was not reported. Therefore, the number of males and females that were mentioned were the original participants in the study.*

RCT – Randomized Control Trial; M – Male; F – Female; HCP – Healthcare professional; WHO – World Health Organization

The two studies' intervention and comparator groups excluded the participants who previously received psychotherapy or counseling, but included participants concurrently using psychotropic medication, psychopharmacological treatment (e.g., antidepressant medication, or benzodiazepines) as long as the medication type and dose had remained stable for 6 weeks prior to randomization[27] and had been stable for at least three months[29], before inclusion. While in one study, participants currently using psychopharmacological or psychotherapeutic therapy were excluded.[28] Coexisting treatment with any psychotherapy was ruled out and kept at constant dosage level during the active phase of the trials and adherence to this rule was regularly checked by the research-assistant at each assessment.[27,29]

Outcomes

Two out of the three studies had a primary outcome measure of Liebowitz Social Anxiety Scale to see if there is a reduction of social anxiety symptoms. In the other study, however, the Beck Anxiety Inventory was used as the primary outcome measure to examine the effectiveness of MBCT for people that responded insufficiently to evidence-based first-line psychological treatment for their anxiety disorder compared CBT-RP in a clinical setting representative of a routine clinical care setting

Risk of Bias in Studies

Figure 2 shows the overall summary of the included studies for each domain. Two out of the three studies had a high risk of performance bias. In a study by Spinhoven et al. (2022)[29], one of its reported limitations was that treatment allocation was not concealed for participants during pre-treatment and subsequent assessments. Attrition bias and detection bias were also unclear.

We assessed all included studies for risk of bias. Random sequence generation and allocation concealment were adequately described in the three studies. Selective reporting was present in the study of Koszycki et al.and Piet et al., while there was no selective reporting in the study of Spinhoven et al.[27–29]

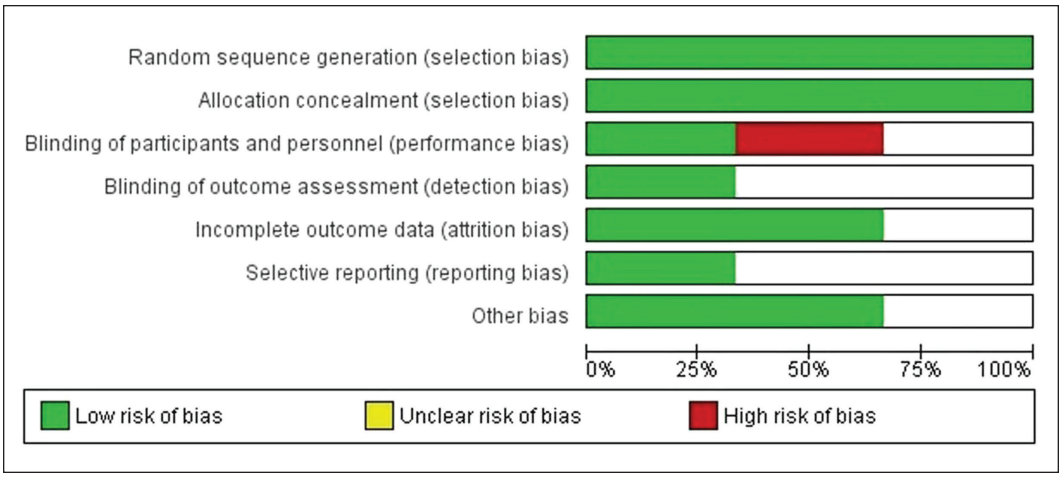

Figure 2. Quality scoring of the included studies using the Cochrane Risk of Bias Tool.

The studies of Piet et al. and Koszycki et al. have blinded their participants while Spinhoven et al. did not include participant blinding. Koszycki et al. have blinding of outcome assessment while the other two studies did not. Other biases were regarded as an unclear risk of bias. For incomplete outcome data, the studies were regarded as low (e.g., in the flow diagram in Piet's study, incomplete data was noted; for Spinhoven, attrition bias cannot be excluded; and for Koszycki, incomplete data was also noted).[27–29]

The three studies have shown 100% low risk of bias on random sequence generation

and allocation concealment while 25% low risk of bias was found for blinding of participants and staff, and selective reporting bias. Attrition bias and other biases showed 70% low risk of bias.

Results of Individual Studies

Table 1 reports the summary of results on the effectiveness of MBI and CBT in alleviating social anxiety among students. In the study done by Koszycki et al.[27], the Liebowitz Social Anxiety Scale (LSAS) exhibited a favorable outcome towards CBT. This study has one of the bigger study sizes, as seen by having a smaller horizontal line and a bigger green box representing the point estimate. Since the study did not cross the line of null effect, it means the null value does not lie within the 95% confidence interval (CI). This may imply that the study result is not a null value, so the study has a statistically significant difference between the treatment and control groups. Results from the study revealed that the CBT group had a standard MD of 50.09 (SD = 21.07), while the MBCT group had 59.5 (SD = 22.44).[27]

Meanwhile, a similar study by Piet et al. (2010), which also used the LSAS, favored MBCT. It has the smallest size indicating the smallest population size. The horizontal line representing the confidence interval crosses the line of null effect, which reports that the study does not indicate a statistically significant result. Results from the study revealed that the CBGT group had a standard MD of 39.79 (SD = 16.83), while the MBCT group had 32.72 (SD = 21.31).[28]

Last, in another study by Spinhoven et al., which uses the Beck Anxiety Inventory, results showed a favorable outcome on MBCT.[29] While this study also has a bigger study size, it minimally crossed the line of null effect. This means that the null value lies within the 95% confidence interval. Thus, the study has no statistically significant difference between the treatment and control groups. Results from the study revealed that the CBGT group had a standard MD of 17.71 (SD = 13.33), while the MBCT group had 14.16 (SD = 11.09).[29]

The study of Koszycki et al. has participants aged 18 to 65 years old with a mean age of 40.86 with a standard deviation of 13.74. The study of Piet et al. has participants aged 18-25 years old with a mean age of 21.9 with a standard deviation of 2.7.[28] The study of Spinhoven et al. has participants aged 18 - 73 years old with a mean age of 40.8 and a standard deviation of 13.2.[29] Table 1 reports the results on the effectiveness of MBI and CBT in alleviating social anxiety among students.

Meta-analysis

Figure 3 shows the forest plot of the three studies included that was analyzed through RevMan 5.4. Two of the three studies, Spinhoven et al. and Piet et al., favor the intervention group, leaving one study, Koszycki et al., not favoring the intervention group. With having the same outcome measure, the Koszycki et al. and Piet et al. study results were pooled together and showed that CBT and MBCT were favored in the studies, respectively. These two studies combined showed a P-value of 0.74 and showed no statistical significance between the intervention and control groups. Spinhoven, using a different outcome measure assessing for the same outcome of social anxiety, was subgrouped and favored MBCT, and showed a P-value of 0.10, just slightly favoring the intervention group. With this, the overall effect estimate on social anxiety shows a P-value of 0.32, which indicates all included studies synthesized

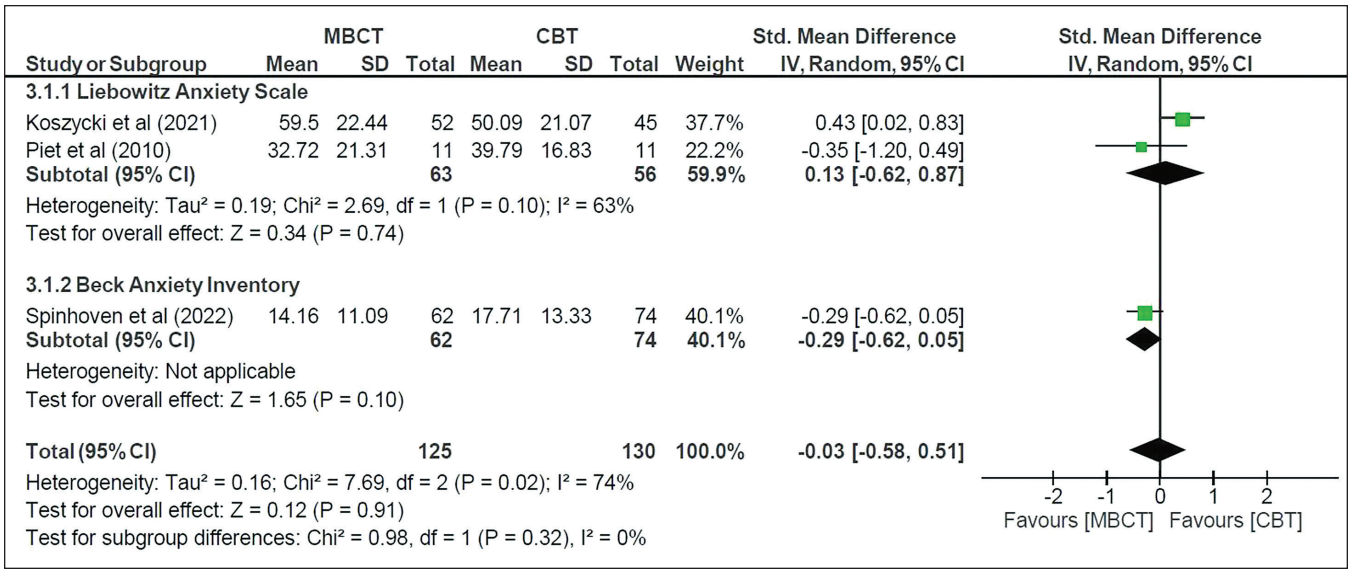

Figure 3. Forest Plot.

showed no statistical significance between intervention and control group.

Certainty of Evidence

There is moderate quality of evidence reporting non-significant difference on the effectiveness of MBI versus CBT on alleviating anxiety of students with SAD [mean (95% CI): -0.04 [-0.58, 0.51].

DISCUSSION

The main objective of this study was to evaluate the effectiveness of MBI in comparison to CBT, which is considered the standard treatment for adolescents with social anxiety. Although MBI is a promising intervention for social anxiety, our analysis indicates that its post-treatment effectiveness is statistically similar to that of CBT in two out of three examined studies. Therefore, the overall findings of this study report that there were no significant differences between the effectiveness of MBI versus CBT at the end of interventions and follow-up sessions for treating adolescents with social anxiety.

MBI and CBT both target cognitive and emotional processes that are involved in social anxiety, such as negative self-evaluation, rumination, avoidance, and emotional regulation.[30] Cognitive and emotional processes play a crucial role in influencing our thoughts, feelings, and behavior. People who suffer from social anxiety experience excessive fear and discomfort in social situations, often worrying about being judged negatively by others or embarrassing themselves. Negative self-evaluation, rumination, avoidance, and emotional regulation are some of the cognitive and emotional processes that contribute to social anxiety. MBI and CBT both aim to target these processes by helping individuals challenge and change their negative beliefs, reduce ruminative thinking patterns, gradually face their fears of social situations, and learn effective coping skills for regulating and expressing their emotions. By addressing these cognitive and emotional processes, MBI and CBT can improve individuals' self-esteem, social skills, and overall well-being.

MBI and CBT both involve exposure to feared social situations, either in vivo or imaginal.[31] Exposure is considered a key component of effective treatment for social anxiety.[3] Exposure is a technique used in treating anxiety that involves confronting or facing situations or stimuli that cause fear or anxiety. Exposure is a key component of effective treatment for social anxiety because it helps individuals to reduce their physiological arousal, increase their self-efficacy, and expand their behavioral repertoire. There are two types of exposure: in vivo and imaginal. In vivo exposure involves facing real-life situations that cause anxiety, while imaginal exposure involves facing anxiety-provoking situations in one's imagination. MBI and CBT both use exposure to feared social situations to help individuals with social anxiety overcome their avoidance, reduce their fear, and improve their functioning. These therapies may use different methods or strategies, such as mindfulness exercises, cognitive restructuring, relaxation techniques, or behavioral experiments, to facilitate exposure.

MBI and CBT both have positive effects on other outcomes that may influence social anxiety, such as self-esteem, mindfulness skills, stress reduction, and quality of life.[30] People with low self-esteem may benefit from challenging negative self-evaluation and enhancing self-compassion, while mindfulness exercises and practices can help individuals improve their ability to pay attention to the present moment without distraction or judgment. Coping strategies and relaxation techniques taught through MBI and CBT can also help individuals manage the physical and psychological effects

of stress. Furthermore, by helping individuals achieve their goals and enjoy their activities, MBI and CBT can improve their overall satisfaction and well-being, which can positively impact their interactions with others. By influencing these outcomes, MBI and CBT can enhance not only social anxiety symptoms but also overall well-being.

The present study confirms the effectiveness of MBI as second or third-line treatment given to adolescents with SAD, in particular to those with a strong preference for mind-body interventions or those who display insufficient response to first-line treatment such as CBT.[27] MBI can be an alternative to CBT for reducing anxiety symptoms as it is more accessible compared to CBT having geographic inequity of the accessibility and availability in specific populations.[22]

MBI can be used as a treatment plan for adolescents with SAD because therapists (i.e., occupational and physical therapists) assess adolescents' capacity to participate in school and offer treatments to enhance learning, academic performance, and participation. Therapists are in a good position to apply MBI for health and recovery to integrate mindfulness into everyday activities and jobs so that it becomes ingrained in daily life.[9] Using MBI may not only alleviate anxiety symptoms but can also provide easier generalizability as this approach can be embedded in daily occupations that adolescents may have. Using MBI embedded in occupational therapy sessions and daily activities may decrease potential costs for the clients as MBI provides low-cost treatments.[32]

Limitations

The three studies that compared MBI and CBT for adolescents with SAD had several limitations that may affect their validity and generalizability. First, only one study used a waitlist or a non-specific control condition to account for the effects of time and attention. Second, all three studies had high dropout rates in their intervention groups, which may introduce attrition bias. Third, none of the studies reported the level of anxiety as a separate outcome measure, which may be due to their small sample sizes and their focus on other outcomes. Fourth, the studies were conducted in different countries with different cultural and environmental factors that may influence the effectiveness of MBI versus CBT for this population. Therefore, more rigorous, and larger RCTs are needed to compare MBI and CBT for adolescents with SAD across different settings and contexts.

CONCLUSION

This systematic review found no significant difference between MBI and CBT in reducing anxiety levels among students with SAD, based on moderate quality evidence. However, the results should be interpreted with caution due to the heterogeneity and limitations of the included studies. More high-quality RCTs are needed to confirm the comparative effectiveness of MBI and CBT for adolescents with SAD.

Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

All authors declared no conflicts of interest.

Funding Source

None.

REFERENCES

1. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. Arch Gen Psychiatry. 2005 Jun;62(6):593-602. doi: 10.1001/archpsyc.62.6.593. PMID: 15939837. Erratum in: Arch Gen Psychiatry. 2005 Jul;62(7):768. Merikangas, Kathleen R [added].
2. Jefferies P, Ungar M. Social anxiety in young people: A prevalence study in seven countries. PLoS One. 2020 Sep;15(9):e0239133. doi: 10.1371/journal.pone.0239133. PMID: 32941482; PMCID: PMC7498107.
3. Russell G, Topham P. The impact of social anxiety on student learning and well-being in higher education. J Ment Health. 2012 Aug;21(4):375-85. doi: 10.3109/09638237.2012.694505. PMID: 22823093.
4. Leigh E, Clark DM. Understanding social anxiety disorder in adolescents and improving treatment outcomes: applying the Cognitive Model of Clark and Wells (1995). Clin Child Fam Psychol Rev. 2018 Sep;21(3):388-414. doi: 10.1007/s10567-018-0258-5. PMID: 29654442; PMCID: PMC6447508.
5. Van Ameringen M, Mancini C, Farvolden P. The impact of anxiety disorders on educational achievement. J Anxiety Disord. 2003;17(5):561-71. doi: 10.1016/s0887-6185(02)00228-1. PMID: 12941366.
6. Mayo-Wilson E, Dias S, Mavranezouli I, Kew K, Clark DM, Ades AE, et al. Psychological and pharmacological interventions for social anxiety disorder in adults: a systematic review and network meta-analysis. Lancet Psychiatry. 2014 Oct;1(5):368-76. doi: 10.1016/S2215-0366(14)70329-3. PMID: 26361000; PMCID: PMC4287862.
7. Shapero BG, Greenberg J, Pedrelli P, de Jong M, Desbordes G. Mindfulness-based interventions in psychiatry. Focus (Am Psychiatr Publ). 2018 Winter;16(1):32-9. doi: 10.1176/appi.focus.20170039. PMID: 29599651; PMCID: PMC5870875.
8. Segal ZV, Williams JMG, Teasdale JD. M Mindfulness-based Cognitive Therapy for Depression, 2nd Ed. Guilford Publications; 2013. pp. 63-68.
9. Liu X, Yi P, Ma L, Liu W, Deng W, Yang X, et al. Mindfulness-based interventions for social anxiety disorder: a systematic review and meta-analysis. Psychiatry Res. 2021 Jun;300:113935. doi: 10.1016/j.psychres.2021.113935. PMID: 33895444.
10. Blanco C, Schneier FR, Schmidt A, Blanco-Jerez CR, Marshall RD, Sánchez-Lacay A, et al. Pharmacological treatment of social anxiety disorder: a meta-analysis. Depress Anxiety. 2003;18(1):29-40. doi: 10.1002/da.10096. PMID: 12900950.
11. Ginsburg GS, Kendall PC, Sakolsky D, Compton SN, Piacentini J, Albano AM, et al. Remission after acute treatment in children and adolescents with anxiety disorders: findings from the CAMS. J Consult Clin Psychol. 2011 Dec;79(6):806-13. doi: 10.1037/a0025933. PMID: 22122292; PMCID: PMC3371083.
12. Hofmann SG, Smits JAJ. Cognitive-behavioral therapy for adult anxiety disorders: a meta-analysis of randomized placebo-controlled trials. J Clin Psychiatry. 2008 Apr;69(4):621-32. doi: 10.4088/jcp.v69n0415. PMID: 18363421; PMCID: PMC2409267.
13. Singh SK, Gorey KM. Relative effectiveness of mindfulness and cognitive behavioral interventions for anxiety disorders: Meta-analytic

review. Social Work in Mental Health [Internet]. 2018 [cited 2022 Sep];16(2):238-251. Available from: https://scholar.uwindsor.ca/cgi/viewcontent.cgi?article=1057&context=socialworkpub.
14. Ebrahiminejad S, Poursharifi H, Bakhshiour Roodsari A, Zeinodini Z, Noorbakhsh S. The effectiveness of Mindfulness-Based Cognitive Therapy on Iranian female adolescents suffering from social anxiety. Iran Red Crescent Med J. 2016 Jun;18(11):e25116. doi: 10.5812/ircmj.25116. PMID: 28191335; PMCID: PMC5292141.
15. Richey JA, Brewer JA, Sullivan-Toole H, Strege MV, Kim-Spoon J, White SW, et al. Sensitivity shift theory: A developmental model of positive affect and motivational deficits in social anxiety disorder. Clin Psychol Rev. 2019 Aug;72:101756. doi: 10.1016/j.cpr.2019.101756. PMID: 31351312.
16. Woodward LJ, Fergusson DM. Life course outcomes of young people with anxiety disorders in adolescence. J Am Acad Child Adolesc Psychiatry. 2001 Sep;40(9):1086-93. doi: 10.1097/00004583-200109000-00018. PMID: 11556633.
17. Dimidjian S, Segal ZV. Prospects for a clinical science of mindfulness-based intervention. Am Psychol. 2015 Oct;70(7):593-620. doi: 10.1037/a0039589. PMID: 26436311; PMCID: PMC5853107.
18. Mealer M, Hodapp R, Conrad D, Dimidjian S, Rothbaum BO, Moss M. Designing a resilience program for critical care nurses. AACN Adv Crit Care. 2017 Winter;28(4):359-65. doi: 10.4037/aacnacc2017252. PMID: 29212643; PMCID: PMC6080201.
19. Kabat-Zinn Jon, Nhat Hanh, Thich. Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness. Random House Publishing Group; 2009., p. 499.
20. Chiesa A, Serretti A. Mindfulness based cognitive therapy for psychiatric disorders: a systematic review and meta-analysis. Psychiatry Res. 2011 May;187(3):441-53. doi: 10.1016/j.psychres.2010.08.011. PMID: 20846726.
21. Binda DD, Weinberg JM, Nguyen T, Morone NE. Characterizing interprofessional collaboration and referral to mindfulness-based stress reduction programs. Glob Adv Health Med. 2022 Sep;11: 2164957X221126484. doi: 10.1177/2164957X221126484. PMID: 36118601; PMCID: PMC9478712.
22. Kaczkurkin AN, Foa EB. Cognitive-behavioral therapy for anxiety disorders: an update on the empirical evidence. Dialogues Clin Neurosci. 2015 Sep;17(3):337-46. doi: 10.31887/DCNS.2015.17.3/akaczkurkin. PMID: 26487814; PMCID: PMC4610618.
23. What is Cognitive Behavioral Therapy? [Internet]. 2017 [cited 2022 Sep]. Available from: https://www.apa.org/ptsd-guideline/patients-and-families/cognitive-behavioral
24. Deeks J, Higgins J, Thomas J, Chandler J, Cumpston M, Li T, et al. Cochrane Handbook for Systematic Reviews of Interventions, version 6.3. Cochrane; 2022.
25. Andrade C. Mean Difference, Standardized Mean Difference (SMD), and Their Use in Meta-Analysis: As Simple as It Gets [Internet]. 2020 [cited 2023 Jan]. Available from: https://www.psychiatrist.com/JCP/article/Pages/mean-difference-standardized-mean-difference-smd-and-their-use-in-meta-analysis.aspx
26. Schünemann H, Brożek J, Guyatt G, Oxman A, editors. GRADE handbook for grading quality of evidence and strength of recommendations [Internet]. Updated October 2013 [cited 2023 Mar 6]. The GRADE Working Group, 2013. Available from: guidelinedevelopment.org/handbook.
27. Koszycki D, Guérin E, DiMillo J, Bradwejn J. Randomized trial of cognitive behaviour group therapy and a mindfulness-based intervention for social anxiety disorder: Preliminary findings. Clin Psychol Psychother. 2021 Jan;28(1):200–18. doi: 10.1002/cpp.2502. PMID: 32818325.
28. Piet J, Hougaard E, Hecksher MS, Rosenberg NK. A randomized pilot study of mindfulness-based cognitive therapy and group cognitive-behavioral therapy for young adults with social phobia. Scand J Psychol. 2010 Oct;51(5):403–10. doi: 10.1111/j.1467-9450.2009.00801.x. PMID: 20210911.
29. Spinhoven P, Hoogerwerf E, van Giezen A, Greeven A. Mindfulness-based cognitive group therapy for treatment-refractory anxiety disorder: A pragmatic randomized controlled trial. J Anxiety Disord. 2022 Aug;90:102599. doi: 10.1016/j.janxdis.2022.102599. PMID: 35777128.
30. Carlton CN, Sullivan-Toole H, Strege MV, Ollendick TH, Richey JA. Mindfulness-Based Interventions for Adolescent Social Anxiety: A Unique Convergence of Factors. Front Psychol [Internet]. 2020 [cited 2022 Sep 29];11. Available from: https://www.frontiersin.org/articles/10.3389/fpsyg.2020.01783. doi: 10.3389/fpsyg.2020.01783. PMCID: PMC738771.
31. Jefferson JW. Social anxiety disorder: more than just a little shyness. Prim Care Companion J Clin Psychiatry. 2001 Feb;3(1):4–9. doi: 10.4088/pcc.v03n0102. PMID: 15014622; PMCID: PMC181152.
32. White BP, Brousseau P, Daigneault J, Harrison E, Lavallee V, St Cyr K. Are we missing opportunities? How occupational therapists would benefit from connecting mindfulness to occupational participation. Open J Occup Ther. 2020 Apr;8(2):1–9. doi.org/10.15453/2168-6408.1650

APPENDIX

GRADEpro Results

Certainty assessment							No. of patients		Effect		Certainty
No. of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	MBT	CBT	Relative (95% CI)	Absolute (95% CI)	
Social Anxiety Level											
3	randomized trials	not serious	not serious	not serious	not serious	publication bias strongly suspected; strong association	125	130	–	SMD 0.03 **lower** (0.58 lower to 0.51 higher)	⨁⨁⨁⨁ HIGH
Social Anxiety Level – Liebowitz Anxiety Scale											
2	randomized trials	not serious	not serious	not serious	not serious	publication bias strongly suspected; strong association	63	56	–	SMD 0.13 **higher** (0.62 lower to 0.87 higher)	⨁⨁⨁⨁ HIGH
Social Anxiety Level – Beck Anxiety Inventory											
1	randomized trial	serious	not serious	serious	not serious	publication bias strongly suspected; strong association	62	74	–	SMD 0.29 **lower** (0.62 lower to 0.05 higher)	⨁⨁◯◯ LOW

CI: Confidence interval; SMD: Standardized mean difference