Meta-Analysis Comparing the Efficacy of ACT and CBT for Academic Procrastination

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Abstract

The efficacy of acceptance and commitment therapy (ACT) and cognitive behavioural therapy (CBT) was meta-analytically examined to identify if they are effective interventions for reducing the academic procrastination of students. A comparison of the efficacies of ACT and CBT as the more effective treatment in reducing academic procrastination in students at post-treatment and follow-up was also assessed. I conducted a meta-analysis of nine randomised-control trials. A large overall pooled effect size of g = -1.96, 95% CI [-4.48, 0.57] was found in favour of ACT and CBT treatment interventions compared to control in reducing academic procrastination. CBT was more effective at reducing academic procrastination post-treatment with a moderate effect size, g = -0.69, 95% CI [-1.14, 0.24] compared to ACT, with a small effect size, g = -0.33, 95% CI [-1.38, 0.72]. This is one of the first meta-analyses to directly compare ACT and CBT interventions in relation to the academic procrastination of students. Limitations and future recommendations are discussed.

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List of Abbreviations

ACT	Acceptance and commitment therapy
CBT	Cognitive behavioural therapy
PASS	Procrastination assessment scale-students
APS	Academic procrastination scale
TPS	Tuckman procrastination scale

Academic Procrastination

Procrastination is a phenomenon that affects us all. It is estimated that up to 20–70% of university students procrastinate (Schouwenburg, 2004). Steel (2007) defined procrastination as “to voluntarily delay in an intended course of action despite expecting to be worse off from the delay” (p. 66). Academic procrastination is a subset of procrastination and is defined as the tendency to delay intended academic tasks (completing assignments, studying for tests and exams) even though this may result in negative consequences (failing a course, getting a bad grade, not graduating). Procrastination is not only linked to the poorer academic performance of students (Balkis & Duru, 2007; Steel, 2007) but also to the poorer workplace performance of adults (Nguyen et al., 2013). Academic procrastination has also been found to positively correlate with stress, anxiety, depression, and sleep problems and negatively correlate with the self-esteem and physical activity of students (Gagnon et al., 2019; Solomon & Rothblum, 1984; Tice & Baumeister, 1997). Academic procrastination is commonly attributed to feelings of fear of failure, task aversiveness, a lack of psychological flexibility, and emotional regulation (Afzal & Jami, 2018; Glick et al., 2014; Kachgal et al., 2001). The more averse a person finds a task, the more likely they are to procrastinate. Both the process of performing the task and the anticipated result or outcome of the task can be aversive or unpleasant. In this context, "aversive" refers to something that is unpleasant, causing discomfort, or something that people try to avoid. It implies that the task is perceived as unpleasant or undesirable in both its execution and the potential consequences. An example of this could be in the context of having to write an assignment for school. The task of writing the assignment might be aversive because it requires concentrated effort and time to finish. Time and effort that some people would rather spend doing other things. The anticipated outcome of the task (finishing the assignment) might also be aversive, as a person may experience anxiety or fear of failure before completing the assignment. All these factors

can contribute to finding a task aversive and result in procrastination. Even with its evident negative consequences, academic procrastination is a widespread and prevalent issue among students across the world. Further research is needed to investigate the causes and correlations of academic procrastination to better support students in working against it.

Literature Review

Academic Procrastination Scales

Academic procrastination is commonly measured by self-report. Currently, there is no universally accepted scale for measuring academic procrastination in the literature. Different researchers choose to use a variety of different scales to measure academic procrastination in students. In a recent review by Vangsness et al. (2022) in evaluating scales that measure academic procrastination, it was identified that three scales had the highest interval reliability for academic procrastination. These scales include the Procrastination Assessment Scale-Students (PASS; Solomon & Rothblum, 1984), the Tuckman Procrastination Scale (TPS; Tuckman, 1991), and the Academic Procrastination Scale (APS; Milgram et al., 1998). For the purposes of the present meta-analysis, these three scales were chosen to be used in the present meta-analysis for measuring academic procrastination in students. Descriptions and critiques of all three scales will now be discussed.

The procrastination assessment scale-students (PASS; Solomon & Rothblum, 1984) was the first and most widely used scale for measuring procrastination in an academic context and was developed as a representative procrastination inventory based on the assumption that procrastination is dysfunctional. The scale has twelve items asking students to report the frequency with which they procrastinate, the extent to which procrastination causes them a problem, and their desire to stop procrastinating. The PASS assesses academic procrastination across six separate domains of academia (writing a term paper, studying for an exam, keeping up with weekly reading assignments, performing administrative tasks, attending meetings, and performing academic tasks in general). Each item is rated on a 5-point Likert scale with how often a participant procrastinates on each task (1 = never procrastinate; 5 = always procrastinate). Participants are then asked how much each task is a problem for them (1 = not at all; 5 = always a problem). The scale also includes items designed to prompt reasons for

procrastination from participants. A common criticism of the PASS is that it only measures procrastination across six domains of academic performance and not in other areas. Milgram et al. (1998) argued that the PASS is too heterogeneous in nature, with tasks such as attending meetings and performing administrative tasks not really having anything to do with academic tasks. The final item of the PASS regarding levels of procrastination with school activities in general could also be argued to have little to do with academic tasks. Additionally, not all procrastination behaviour is necessarily problematic (Schraw et al., 2007). As the PASS views procrastination behaviours as problematic, it fails to effectively assess all aspects of procrastination compared to other procrastination scales (McCloskey & Scielzo, 2015). A counterargument to this claim is that because the PASS is one of the only procrastination scales to assess problematic and negative feelings of procrastination with tasks, it is one of the only scales that can accurately distinguish between harmful and trivial forms of procrastination (Svartdal & Nemtcan, 2022). This aspect of the PASS makes it beneficial for use in research and applied/clinical settings compared to other procrastination scales. The overall internal reliability of the PASS is 0.90, according to Cronbach's alpha.

The Tuckman procrastination scale (TPS; Tuckman, 1991) assesses academic procrastination resulting from an inability to self-regulate or control task schedules (Ferrari et al., 1995). The TPS has 16 items that ask participants to evaluate their academic procrastination with statements such as "When I have a deadline, I wait till the last minute.". Participants rate each statement on a 4-point Likert scale from (1 = very inappropriate) to (4 = very appropriate). Criticism of the TPS comes from its use of a 4-point Likert scale to measure academic procrastination instead of a 5-point Likert scale like other procrastination scales. McCloskey and Scielzo (2015) argued that having a scale with only four points limits the range of potential responses from a participant. The overall internal reliability of the TPS is 0.93, according to Cronbach's alpha.

The academic procrastination scale (APS; Milgram et al., 1998) was developed after the PASS and TPS to address criticisms from those earlier procrastination scales. The APS measures academic procrastination on a 27-item scale across three subscales of academic tasks (preparing homework, preparing for tests, and preparing for term papers). All items are measured with a 5-point Likert scale from (1 = rarely) to (5 = most of the time) across the three subscales of homework (e.g., “I put off my homework till the last minute”), tests (e.g., “I daydream when I have to study for a test”), and term papers (e.g., “When I sit to write a term paper, I put it off again and again.”). The overall internal reliability of the APS is 0.94, according to Cronbach’s alpha.

Across the literature, there is much debate on what scale is best for measuring academic procrastination in students. Recent studies still use the PASS to measure academic procrastination. Though there is not a universally accepted scale for measuring academic procrastination currently, there is evidence to suggest that self-report measures of academic procrastination still give better psychometric properties and stronger predictive validity compared to other direct behavioural measures of task engagement in students (Vangsness et al., 2022).

Academic Procrastination Interventions

Cognitive behavioural therapy (CBT) is one of the most common and effective interventions for addressing the underlying psychological factors that contribute to general procrastination (van Eerde & Klingsieck, 2018). CBT addresses the cognitive and behavioural factors of negative beliefs about oneself, task aversiveness, fear of failure, low self-esteem, and perfectionism (Rozental et al., 2015). Another intervention, acceptance and commitment therapy (ACT), has also been effective in reducing procrastination by teaching individuals to accept their thoughts and emotions and to commit to values-based behaviours (Glick & Orsillo, 2015).

Acceptance and Commitment Therapy

ACT is a third-wave behavioural therapy based on mindfulness and acceptance processes to help an individual increase their psychological flexibility (Harris, 2006). ACT has six core processes: acceptance, cognitive defusion, being in the present moment, self as context, values, and committed action. ACT teaches individuals to accept their thoughts and emotions and to commit to value-based behaviours that align with their goals. In the context of academic procrastination, ACT has been effective in helping individuals change their relationship with task-related thoughts and emotions (Glick & Orsillo, 2015). ACT can help individuals accept the discomfort of starting a task and overcome their avoidance behaviour by committing to their goal of completing the task. The theoretical underpinnings of ACT come from Relational Frame Theory (RFT), which focuses on functional contextualism (Hayes et al., 2004). Functional contextualism is defined as the understanding that the function of behaviour changes because of the context and situations within the environment. RFT is deeply rooted within the principles of applied behavioural analysis (ABA), where human language and cognition are focused on observable behaviours and environmental interactions. All six of ACT's core processes are deeply integrated in relation to the theoretical concepts of RFT.

Outside the domain of academic procrastination, ACT as a treatment has been effective in several domains. These domains include reducing stress and anxiety (Forman et al., 2007; Levin et al., 2015), smoking cessation (Gifford et al., 2011), enhancing the wellness and wellbeing of students (Wahyun et al., 2019), reducing work procrastination (Salehi, 2020), treating insomnia (Salari et al., 2020), treating obesity (Iturbe et al., 2022), and even treatment for OCD (Twohig et al., 2010). ACT is also an effective treatment for helping parents with children diagnosed with autism (Blackledge & Hayes, 2006).

Few studies have examined the use of ACT in reducing the academic procrastination of students. Compared to CBT, literature on the use of ACT to reduce academic procrastination in students is scarce. Scent and Boes (2014) were among the first researchers to directly examine ACT as a treatment for reducing academic procrastination among students. They defined academic procrastination as a problem of cognitive fusion and experiential avoidance from an ACT perspective. Over the course of two workshop sessions with students, an ACT intervention was carried out via the use of metaphors, stories, and experiential exercises. In the first workshop session, students were engaged in the defusion, contact with the present moment, and acceptance aspects of ACT. Students were asked to partake in mindfulness exercises and metaphoric stories of procrastination. The second workshop, carried out a week later, entailed the other aspects of ACT: personal values, self as context, and committed action. Students facilitated discussion of their own personal values and how procrastination can negatively affect these values. The effect of both workshops was assessed by measuring each student's psychological flexibility (acceptance and action questionnaire II; AAQII; Bond et al., 2011), their level of procrastination (PASS; Solomon & Rothblum, 1984), and their level of experiential avoidance (multi-dimensional experiential avoidance questionnaire; MEAQ; Gaméz et al., 2011) before the first workshop and then again after the second workshop. The results indicated no correlation between psychological flexibility scores and academic procrastination scores. Students, however, self-reported increases in psychological flexibility and reductions in procrastinatory behaviours after the intervention and that the intervention was beneficial and helpful for them.

Glick and Orsillo (2015) developed one of the first online implementations of an ACT intervention to reduce academic procrastination among students. The authors believed academic procrastination to be a result of psychological inflexibility and that by increasing psychological flexibility, academic procrastination would decrease. Glick and Orsillo

compared time management (TM) strategies and acceptance-based therapies (ABBTs). ABBT is an umbrella term used to classify behavioural therapies such as ACT that utilize acceptance, mindfulness, and values to increase the psychological flexibility of individuals. Random assignment of participants to either the TM or the ABBT intervention was done. Participants were shown a 20-minute video presentation about procrastination and the negative consequences of it. Both treatments demonstrated success in reducing self-reported procrastination. However, no significant difference between the two intervention groups was found in terms of reducing academic procrastination. There was also no control group, so even if there was a significant difference between the groups, it could not be attributed with certainty to the intervention. This is a common limitation across the ACT literature (Zack & Hen, 2018).

Gagnon et al. (2016) assessed the role of the committed action aspect of the hexaflex model of ACT in reducing academic procrastination. Up until this point, studies investigating academic procrastination with ACT had examined only the mindfulness, cognitive fusion, and acceptance aspects of the ACT hexaflex model. No empirical evidence has yet been gathered on the impact of the committed action aspect of the hexaflex model on academic procrastination. Gagnon et al. investigated whether committed action would predict the self-reported academic procrastination of students. The pure procrastination scale (PPS; Steel, 2010) was used to measure academic procrastination, and committed action was measured using the committed action questionnaire (CAQ-8; McCracken et al., 2015). Committed action negatively correlated with the self-reported academic procrastination of students, and it was the strongest predictor of all the ACT components (cognitive fusion, acceptance, and mindfulness). The authors argued that the other aspects of the ACT hexaflex model are not effective without committed action to fully define academic procrastination.

Dionne et al. (2016) conducted a pilot study to examine the effectiveness of an ACT intervention to reduce academic procrastination among students. The ACT intervention involved three individual 90-minute sessions of ACT via experiential learning (metaphor stories, mindfulness exercises in group environments, and as an individual). Measurements were taken three times across the intervention: pre-test (T1), post-intervention (T2), and after a 1-month follow-up (T3). Psychological flexibility increased and academic procrastination significantly decreased at the 1-month follow-up. Interestingly, a reduction in academic procrastination was only observed during the follow-up period (T3) and not immediately post-intervention (T2). This is common across the ACT literature, where longer-term effects are more common than immediate effects (Fang & Ding, 2023; Wang et al., 2017). The limitations addressed by the authors were that no control group was used, so no cause-and-effect relationship could be established. Additionally, the sample size of the study was small (n = 10), so the study would have had low statistical power.

Wang et al. (2017) conducted a unique study by not just implementing an ACT intervention for the treatment of academic procrastination but comparing the efficacies of both ACT and CBT interventions for the treatment of academic procrastination. This study was the first to include a control group. The APS (Milgram et al., 1998) was used to measure academic procrastination. Participants were randomly allocated to either the CBT intervention group, the ACT intervention group, or a control group. Procrastination was measured pre-test, immediately following treatment, and after a 3-month follow-up period. Both treatments were effective immediately following treatment in reducing academic procrastination, but ACT had better longer-term effects compared to CBT, a similar finding to Dionne et al.'s (2016). There was no difference between CBT and ACT.

Joharifard and Morakhani (2018) carried out an experimental study to evaluate the effectiveness of an ACT intervention in reducing academic procrastination and increasing

frustration tolerance and psychological hardiness among students in Iran. Psychological hardiness was defined as a personality trait that is correlated with how well an individual responds to stressful events in their lives. An individual who is high in psychological hardiness tends to be healthier in that they respond more effectively to stress than individuals who score low in hardiness. Using a control group and a randomized allocation of participants, the ACT intervention significantly reduced academic procrastination and increased psychological hardiness and frustration tolerance. This study was the first of many ACT intervention studies in the Middle East pertaining to reducing academic procrastination using a randomized control trial.

Ahangari et al. (2018) successfully used an ACT intervention to reduce academic procrastination and increase the academic performance of students. Using a pre-test-post-test randomized control trial design, the ACT intervention was implemented across eight 60-90-minute sessions. ACT was effective in reducing academic procrastination and increasing the academic performance of students with academic failure. Joda et al. (2018) used ACT as a treatment intervention for reducing academic procrastination and improving emotion regulation in medical students in Iran, with success. Over eight sessions in a randomized control trial, the intervention was effective in reducing academic procrastination and improving the emotional regulation of students. ACT has also been shown to be an effective treatment option for not only students but also for students who suffer from attention deficit hyperactivity disorder (ADHD). An ACT treatment intervention by Piri et al. (2020) found that ACT reduced academic procrastination and decreased depression in students with ADHD.

Einabad et al. (2019) examined the relationship between anxiety, mindfulness, and acceptance in the academic procrastination of students in Iran. Trait anxiety was significantly correlated with academic procrastination but not acceptance or mindfulness. This was a

completely different result compared to what Glick et al. (2014) found, where psychological flexibility (mindfulness and acceptance) was significantly negatively correlated with academic procrastination. The authors' attribute this finding to differences in cultural contexts between the studies, with evidence from a cross-sectional study suggesting that eastern-cultured students are more judgemental of themselves compared to students from middle eastern cultures (Klassen et al., 2009).

Gagnon et al. (2019) used an interactive online ACT website to implement an intervention over the course of six weeks. Students worked at their own pace to complete the intervention, with academic procrastination being reduced after the intervention. However, they did not include a control group, limiting the internal validity of their findings.

Lopez-Lopez et al. (2020) was the final identified ACT study across the literature that was found to be useful in reducing the academic procrastination of students. Conducted as a random controlled trial across five weekly 2-hour sessions, the ACT intervention was carried out in person and focused on the acceptance, cognitive defusion, committed action, and value aspects of ACT. Story metaphors and experiential exercises were used across sessions to assess these aspects of ACT. Results from this study specified that ACT resulted in a reduction of academic procrastination in students and a reduction in fear of failure amongst students in the intervention group over the control group.

A common attribute across the literature is that ACT is successful in treating academic procrastination, but with mixed results in some studies. What is missing across the ACT literature are more randomized-control trials. There is also evidence to suggest that ACT has longer-term effects on academic procrastination compared to CBT and that the immediate effect of ACT is not as effective compared to CBT. A possible cultural bias could also be identified in the literature.

Cognitive Behavioural Therapy

The primary form of treatment for academic procrastination has been CBT. CBT focuses on a person's thoughts and how they determine the way a person feels and behaves. According to CBT, all thoughts, feelings, and behaviours are interconnected, and changing maladaptive thought patterns can lead to changes in behaviour (Wang et al., 2017). In the context of academic procrastination, CBT has been found to be effective by addressing the underlying psychological factors that contribute to general procrastination (Rozental et al., 2018; van Eerde & Klingsieck, 2018). CBT helps individuals identify and challenge negative self-talk and irrational beliefs about their own abilities or the task at hand (e.g., underestimating the time needed to complete a thesis on time). Additionally, CBT can help individuals develop problem-solving and time-management skills, which can help reduce their tendency to delay tasks. CBT is a popular treatment intervention for therapists and researchers across the world. CBT is known to be an effective treatment option for a variety of different applications. These applications include treating depression (Leichsenring, 2001), personality disorders (Leichsenring & Leibing, 2003), generalized anxiety disorder (Hunot et al., 2007), improving self-efficacy (Keshi & Basavarajappa, 2013), and reducing the internet addiction of students (Yang et al., 2022).

CBT treatment for academic procrastination across the literature is much more abundant than ACT. Ozer et al. (2013) conducted a pilot study of the use of a CBT intervention to reduce academic procrastination among students. The focus of this intervention was to change the irrational thoughts of students to productive thinking. The authors hypothesized that CBT would result in a reduction in self-reported academic procrastination. The PASS was used as the outcome measurement for academic procrastination, alongside the general procrastination scale (GPS; Lay, 1986). Measurements for self-reported procrastination were recorded at pre-treatment, post-treatment, and after an

8-week follow-up. Carried out over the course of 5 weeks in 90-minute sessions, results indicated that self-reported procrastination decreased post-treatment and was maintained after follow-up. Ozer et al. provided evidence that changing an individual's irrational beliefs using CBT is effective in decreasing academic and general procrastination. However, no control group was used, and random allocation was also not implemented.

CBT, as an online internet treatment intervention for procrastination rather than a physical face-to-face treatment, has also been examined widely across the literature. Rozental et al. (2015) examined the use of an internet-based CBT intervention to treat procrastination in individuals. The online treatment was delivered weekly via an online self-help book based on CBT and procrastination. The self-health book included 10 modules for participants to work through over 10 weeks. Participants were assigned to three different groups: guided self-help, unguided self-help, and a waitlist control condition. In the guided self-help group, a trained therapist gave feedback and monitored the progress of participants. The online CBT intervention was successful in reducing procrastination compared to the control. The guided self-help treatment was more successful in reducing procrastination than the unguided self-help treatment. A follow-up was carried out a year later. Results indicated that internet-based CBT interventions were maintained over the period. However, there was no difference between guided self-help and unguided self-help at follow-up (Rozental et al., 2016). This study gives evidence to suggest that an internet-based intervention treatment could be beneficial for the treatment of procrastination.

Rozental et al. (2018) compared the effects of a CBT intervention carried out in person in groups vs. one delivered via the internet. Participants were randomly assigned to either self-guided CBT (internet) or group CBT (in person). University students were the population of interest, and the PASS was used as the measurement for academic procrastination. Academic procrastination decreased for both self-guided CBT (internet) and

group CBT (in person) participants, with large within-group effect sizes. However, there was no difference between conditions after the treatment period and at follow-up. Interestingly, group CBT (in-person) participants maintained their improvement in academic procrastination at follow-up, while self-guided CBT (internet) participants regressed. This is an interesting finding, as it suggests that although CBT overall may be an effective treatment for academic procrastination, in-person group CBT might be more effective than internet-based CBT for maintenance.

Overall, these studies often do not directly examine the academic procrastination of students. Across the literature, there is more research being conducted on CBT and general procrastination in the general population than on the academic procrastination of students. Another issue is that many of the previous researchers did not use control groups or randomly allocate participants. Luckily, a greater number of CBT studies featuring random allocation and utilization of a control group can be found across the literature (Binder, 2000; Budiman et al., 2020; Larson, 1992; Toker and Avci, 2015; Ugwuanyi et al., 2020) compared to ACT.

Examining CBT and ACT as Treatment Outcomes

Ruiz (2012) was one of the first researchers to conduct a meta-analysis and systematic review comparing the efficacies of CBT and ACT. Sixteen studies were identified, and a statistically significant effect size of Hedge's $g = 0.40$ was found, suggesting that ACT was preferred in primary outcomes compared to CBT overall. Scores of depression and quality of life at post-treatment were all significantly higher for ACT treatments compared to CBT.

Kohli et al. (2022) conducted a systematic review of ACT and CBT in terms of treatment efficacies for reducing academic procrastination. Twenty articles were included. They concluded that both ACT and CBT are effective treatment options for reducing academic procrastination, but that ACT has better long-term effects compared to CBT.

Fang and Ding (2023) conducted a meta-analysis to compare the efficacy of ACT and CBT across every domain, not just procrastination. CBT outperformed ACT for anxiety and depression in the short and long term, but ACT outperformed CBT in relation to mindfulness in the short term but not in the long term. Another noteworthy finding was that ACT may be more effective for individuals who have no diagnoses or physical symptoms, while CBT may be more effective for individuals who display physical symptoms.

Previous Systematic Reviews

Several systematic reviews have been conducted on academic procrastination interventions. Zack and Hen (2018) conducted a review assessing interventions on academic procrastination over the last two decades. Analysis from this review suggests that there are clear shortcomings in effective interventions for academic procrastination, and the current literature is scarce. A lack of randomized-control trials is another clear limitation of current studies on intervention treatments for academic procrastination. There is a need for more research to be done in this area by researchers to address this limitation. Xu (2021) analysed the results of adolescent procrastination among students. Their general conclusions were that self-regulation and low self-efficacy across adolescent populations are the main causes of academic procrastination. Xu also discussed the growing problem that the internet and digital media provide extra distractions for adolescents and increase the tendency for youth to procrastinate compared to other populations. Cross-cultural demographics were also discussed as an issue across the literature, with Xu mentioning that people from western cultures have a different outlook towards procrastination compared to people from eastern cultures, where procrastination is more prevalent. This is another area of the current literature that warrants further investigation.

Salguero-Pazos and Reyes-de-Cozar (2023) conducted a qualitative systematic review of classroom interventions for academic procrastination. The authors were not able to find

any literature on interventions examining the academic procrastination of primary school students. It is evident that there is a bias in student samples for academic procrastination, with either secondary school students or university students being used in samples. Self-regulation was also identified as the main dimension for effectiveness in interventions for academic procrastination by students compared to other dimensions (self-efficacy, self-esteem, and personality).

To contrast the above review, a scoping review by González-Brignardello et al. (2023) focused on the academic procrastination of adolescents and children. Primary school student studies made up seven of the total 79 studies from the scoping review, with the rest being from secondary school student populations. The small proportion of studies using younger children supports Salguero-Pazos and Reyes-de-Cozar's (2023) assertions that there is a clear lack of studies including this population for examining academic procrastination. González-Brignardello et al. (2023) point out that there is a research gap in this area and that further research is needed to investigate this population.

Previous Meta-Analyses

Previous meta-analyses on academic procrastination have been conducted in the past. Kim and Seo (2015) ran a meta-analysis of thirty-three studies analysing the relationship between academic performance and procrastination. Several interesting findings were found from this meta-analysis. First, academic procrastination was found to be negatively correlated with academic performance, while academic procrastination, as measured by the TPS (Tuckman, 1991), was also negatively correlated with academic performance. Secondly, it was identified that students tend to inflate their grades using self-report measures (Kim & Seo, 2015). Individuals also exaggerate the extent to which they delay carrying out work. Evidence was found to suggest that there is an overestimation of academic procrastination in self-reported data from students. Kim and Seo (2015) also found that academic

procrastination was negatively correlated with academic performance in western individualistic regions (USA, Oceania, and Europe) but not in eastern regions (Asia, the Middle East, and Africa).

Meta-analyses on academic procrastination interventions have been conducted across the literature, but with mixed results. Rozental et al. (2018) conducted a meta-analysis and systematic review of twelve studies on psychological treatments that reduce procrastination. Both general and academic procrastination were included. The reported samples were from both general and student populations. The authors evaluated the effectiveness of psychological interventions in reducing procrastination overall. They found a small but significant effect size (Hedge's $g = 0.34$) at post-treatment compared to control. This finding suggests that psychological interventions have some effect on reducing procrastination compared to control. High heterogeneity between studies was an issue reported by the authors. The high risk of bias was another issue, with blinding in studies being a problematic issue in several studies. Because of these issues, the authors report that the overall effect size should be treated with great caution. The authors conducted subgroup analyses of all intervention studies and found evidence to suggest that CBT is the most effective treatment for procrastination, with a moderately significant effect size (Hedge's $g = 0.55$). However, only three studies used CBT as their intervention. This meta-analysis also only included one ACT intervention (Wang et al., 2017), so this finding should be treated with caution as well. The authors stressed that additional randomized-control trials are needed to determine the true effectiveness of CBT for procrastination.

In a similar meta-analysis conducted by van Eerde and Klingsieck (2018), twenty-four studies were reviewed for behavioural interventions to treat and reduce procrastination. The researchers asked whether people could reduce their procrastination and, if so, which intervention led to the strongest reduction in procrastination. CBT was again found to be the

most effective intervention treatment for procrastination. The same ACT intervention by Wang et al. (2017) was used in this meta-analysis as in the previous meta-analysis. Like in the previous meta-analysis, high heterogeneity was an issue. However, there were several limitations, the first being that the authors relied mostly on published studies for their analysis. Only two unpublished studies were used. Another limitation was that the authors did not conduct a quality assessment for the risk of bias in the studies that they chose to include in their meta-analysis. They state that this could have affected the reliability and validity of their findings. Finally, the authors did not examine the long-term effects of the interventions on procrastination at follow-up.

Malouff and Schutte (2018) conducted a meta-analysis to assess the efficacy of randomized-control interventions in reducing procrastination in general and in student populations. Twelve studies were identified, and a large effect size (Hedge's $g = 1.18$) was found. Low power and high heterogeneity in studies were limitations mentioned by the authors. As such, this result should be treated with caution. An interesting finding was that they found evidence to suggest that in-person interventions had greater effects compared to online interventions. This finding suggests that in-person interventions may be the better treatment method of choice for professionals to use when treating a person with problems with procrastination. This meta-analysis was focused on general procrastination, with only one of the studies from student populations measuring academic procrastination.

Across the literature, previous meta-analyses have identified a lack of randomized-control trials using ACT interventions for reducing academic procrastination in students. Findings of high heterogeneity and low statistical power within studies were common characteristics of previous meta-analyses. Over seven new randomized controlled trials that use ACT as a treatment intervention for reducing academic procrastination have been conducted since 2018 (Association for Cognitive Behavioural Science, 2023). When most of

these meta-analyses were released in 2018, ACT's utility as a treatment intervention for academic procrastination was underutilized at the time. It was evident that there was a clear lack of random controlled trials in the literature in 2018 compared to what we have now in the current literature. This is a clear gap in the literature that needs to be further investigated. There is a need for a new, updated meta-analysis analysing the efficacy of ACT treatment interventions in reducing academic procrastination in students.

The Present Study

I aimed to conduct a meta-analysis to compare the efficacy of both ACT and CBT interventions in reducing academic procrastination. The literature on ACT since 2018 has increased. There is a need for an investigation of the efficacy of ACT to reduce academic procrastination in students. I aimed to address the limitations in previous systematic reviews and meta-analyses by conducting a meta-analysis that includes only randomized-control trials and, instead of assessing general procrastination in general populations, directly examining the academic procrastination of students as the sole population of interest. The following hypotheses would be tested with this meta-analysis:

Hypothesis 1: ACT and CBT interventions will both be effective in reducing academic procrastination in students compared to control at the post-test level.

Hypothesis 2: CBT will have better treatment efficacy compared to ACT in reducing academic procrastination in students at the post-test level.

Hypothesis 3: ACT will have better treatment efficacy compared to CBT in reducing academic procrastination in students at follow-up.

Method

Eligibility Criteria

To be included in the study, the research items needed to have used an appropriate procrastination scale that measures academic procrastination of students and not general procrastination, randomly assigned participants to conditions, included a control condition, reported usable statistics for use in quantitative analysis (means, standard deviations, and sample sizes), used ACT or CBT as an intervention with intent to reduce academic procrastination, and, finally, been written in English. No restrictions were given regarding publication year or publication type. Eight studies with a total population of 316 participants (155 in treatment and 161 in control) met the criteria for inclusion. The present meta-analysis was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) system for finding and selecting articles (Page et al., 2021). Table 1 summarizes the studies included in the meta-analysis.

Information Sources

I used four electronic databases (Scopus, PubMed, Google Scholar, and PsychINFO) for the literature search. Further records were found via Google Scholar using reference lists of included studies via backwards and forwards citation searching. As no criteria related to the inclusion or exclusion of publications based on year or type, unpublished articles, doctoral and master's theses, and conference presentations were also included as records to be screened in the literature search.

Table 1

Studies Included in Meta-analysis

Author (year)	Country	Publication Type	Total N	Treatment N	Control N	ES	95% CI	Procrastination Scale	Intervention Type
Binder (2000)	Canada	MT	33	15	18	-0.71	[-1.42, -0.01]	PASS	CBT
Budiman et al. (2020)	Indonesia	PRA	16	8	8	-8.08	[-11.04, -5.11]	TPS	CBT
Joharifard and Morakhani (2018)	Iran	PRA	32	16	16	-0.25	[-0.94, 0.45]	TPS	ACT
Larson (1992)	United States	DT	30	15	15	0.66	[-0.07, 1.40]	PASS	CBT
Lopez-Lopez et al. (2020)	Spain	PRA	22	7	15	-0.99	[-1.93, -0.05]	PASS	ACT
Toker and Avci (2015)	Turkey	PRA	26	13	13	-0.96	[-1.77, -0.15]	APS	CBT
Ugwuanyi et al. (2020)	Nigeria	PRA	64	34	30	-8.37	[-9.90, -6.84]	PASS	CBT
Wang et al. (2017)	China	PRA	46	23	23	-0.07	[-0.65, 0.51]	APS	ACT
Wang et al. (2017)	China	PRA	47	24	23	-0.56	[-1.15, 0.02]	APS	CBT

Note. master's thesis (MT), peer reviewed article (PRA), doctoral thesis (DA), effect size (ES), confidence Interval (CI), acceptance and commitment therapy (ACT), cognitive behavioural therapy (CBT), academic procrastination scale (APS), tuckman procrastination scale (TPS), procrastination assessment scale-student (PASS)

Search Strategy

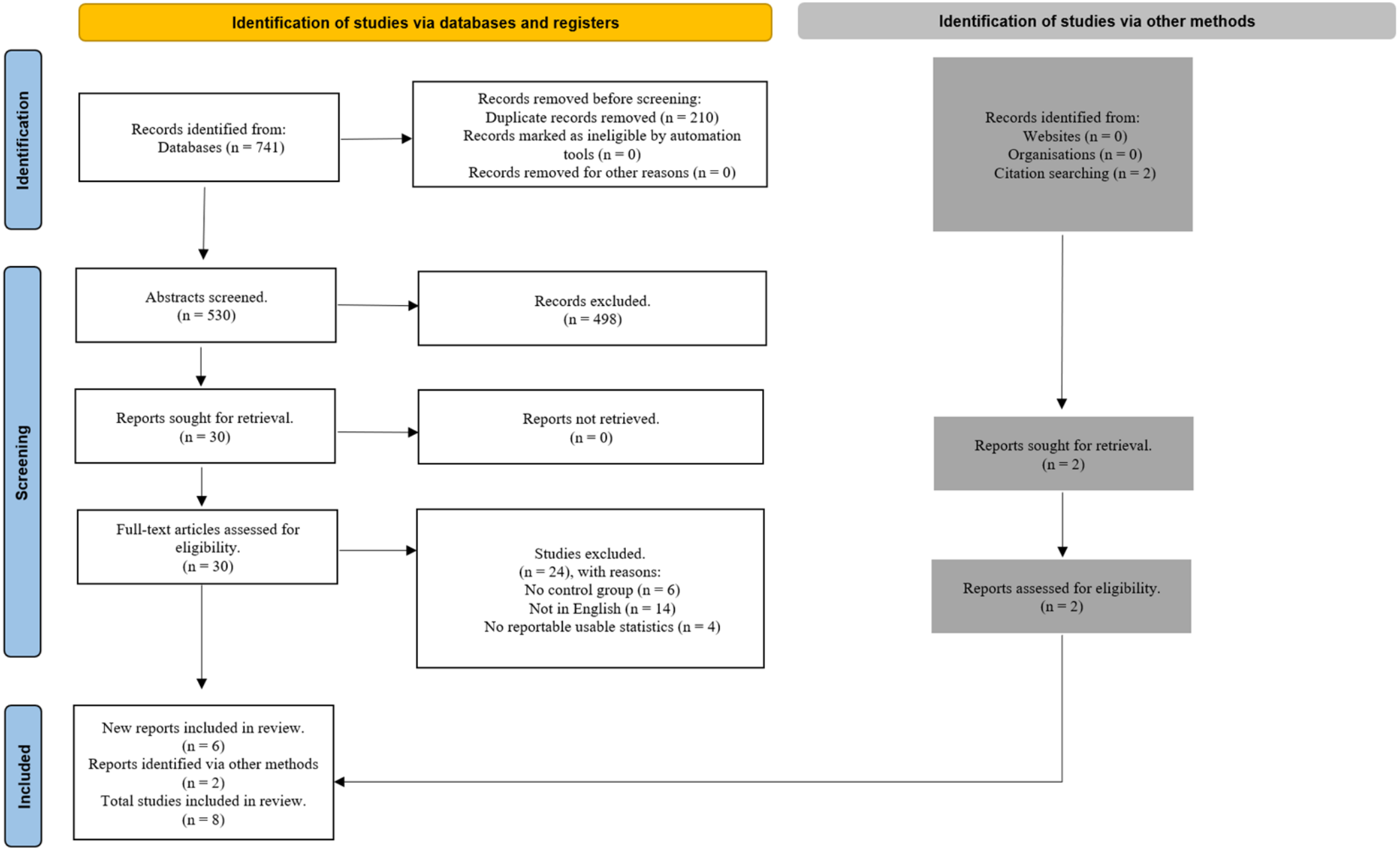
My search terms combined variations of the terms “academic procrastination” alongside variations of the terms “cognitive behavioural therapy” and “acceptance and commitment therapy” and the term “intervention.” The search strings used were considered in a title, abstract, and keyword search. Search strings included: TITLE-ABS-KEY ("academic procrastination") AND ("acceptance and commitment therapy") OR TITLE-ABS-KEY ("academic procrastination") AND ("cognitive behavioural therapy") OR TITLE-ABS-KEY ("academic procrastination") AND ("intervention").

Search Process and Data Collection Process

The literature search resulted in 741 records. All records were transferred into EndNote (Version 21; Clarivate, 2023) to be analysed in a digital library titled “Thesis Library.” Duplicates were identified using EndNote and were transferred to a separate library titled “Duplicates Library.” After all duplicates were removed, 530 records remained. I screened the titles and abstracts of those records for inclusion. Screening for records resulted in 498 records being removed due to not fitting inclusion criteria. Screening of the full text of the remaining 30 records was conducted. After full-text screening of records, six records were selected for inclusion in the meta-analysis. Reasons for exclusion included having no control group (n = 6), not being in English (n = 14), and not having reported useable statistics for quantitative analysis (n = 4). I assessed the reference lists of the six records selected for inclusion for further records. I selected two further records for inclusion. A total of eight records were included. For a detailed flow chart, refer to Figure 1.

Figure 1

PRISMA Flow Diagram of Included Studies



Coding

I coded a variety of variables for each study. Author and publication year were included alongside country of study, publication type, sample population (all studies were from university student populations), total *n*, treatment *n*, control *n*, format of delivery of intervention (online/in person), selected procrastination scale, and intervention type (CBT or ACT). Scales included were the APS (Milgram et al., 1998), TPS (Tuckman, 1991), and PASS (Solomon & Rothblum, 1984). One study, Ugwuanyi et al. (2020), used two different measurements for procrastination, the PASS and the Academic Procrastination Behaviour Scale (APBS). I decided to exclusively use the PASS scale measurement for my analysis rather than add a procrastination scale that only one study had. Another study, Larson (1992), used two interventions of CBT (group CBT and individual CBT). I elected to use the group CBT intervention for my meta-analysis as it shared characteristics with other studies included in my analysis that also used group CBT interventions. Wang et al. (2017) treated both CBT and ACT as separate treatments in the same study. In this specific case, as it met inclusion criteria for the meta-analysis, I coded each treatment (ACT and CBT) as separate entities for the meta-analysis. This brought the total number of studies from eight to nine. For effect sizes, I coded means and standard deviations at post-treatment and follow-up assessments for each study.

Data Synthesis and Analysis

All analysis and data synthesis was carried out using the latest version of Jamovi (Version 2.3; https://www.jamovi.org/). Due to the different measures of procrastination, I used a random effect model to calculate the standardized mean difference using Hedge's *g* at post-treatment and follow-up for effect sizes. Hedge's *g* was used as it allows for interpretation when sample sizes between control and treatment groups are not equal and when sample sizes are small (Hedges, 1984). Effect sizes were interpreted using the

conventions of Hedges (1994), with Hedges *g* of 0.20 considered a small effect, 0.50 a moderate effect, and 0.80 a large effect. Confidence intervals (95%) of effect sizes between treatment and control mean differences were also calculated. Knapp-Hartung adjustments (Knapp & Hartung, 2003) were used to calculate the confidence intervals around the pooled effect. This adjustment was added as the number of studies included in the meta-analysis was small, and including it can reduce the number of false positives (Harrer et al., 2021). Forest plots were produced to illustrate effect size differences between studies. A test for heterogeneity using the Q-statistic and $I2$ was performed to test for variation across studies alongside a 95% confidence interval. Heterogeneity was interpreted using the guidelines by Higgins and Thompson (2002), with $I2$ of 25% being considered low heterogeneity, $I2$ of 50% considered moderate heterogeneity, and $I2$ of 75% considered substantial heterogeneity. Outliers and overly influential results were assessed using Viechtbauer's (2010) method. If a study's effect size confidence interval does not overlap with the confidence interval of the pooled effect size, then it is considered an outlier. For extremely large effects, this is when the lower bound of the 95% confidence interval is higher than the upper bound of the overall pooled effect size confidence interval. For an extremely small effect, this occurs when the upper bound of the 95% confidence interval is lower than the lower bound of the overall pooled effect size confidence interval. Visual inspection of forest plots was also used to assess for potential outliers. Fail-safe *N* and Egger's regression calculations alongside funnel plots were produced to assess for publication bias and small study bias. To assess the robustness of the analysis, a sensitivity analysis was performed by removing studies with high potential risk of bias and outlier potential. Finally, a subgroup analysis was performed to assess effect size differences and heterogeneity between CBT and ACT studies.

Risk of Bias

An assessment of bias was conducted using the guidelines provided by the Cochrane Handbook for Systematic Reviews of Interventions (Higgins et al., 2011). Risk of bias was assessed across six domains, including random sequence generation, allocation concealment, blinding of participants, blinding of outcome assessment, incomplete outcome data, and selective reporting bias. I judged each study across all six domains, assessing for high risk of bias, unclear risk of bias, or low risk of bias. Risk of bias was assessed using the online visualization tool, Robvis (McGuinness et al., 2020). A complete overview of the risk of bias assessment can be seen in Figures 2 and 3. Blinding of participants and personnel was identified as a high risk of bias in almost all studies, with over 75% having bias for this. Incomplete outcome data and selective reporting were also identified as other domains of concern for high risk of bias. Four studies were identified as being at high risk of bias (Budiman et al., 2020; Larson, 1992; Toker & Avci, 2015; Ugwuanyi et al., 2020).

Figure 2

Cochrane Risk of Bias Tool Quality Assessment Summary

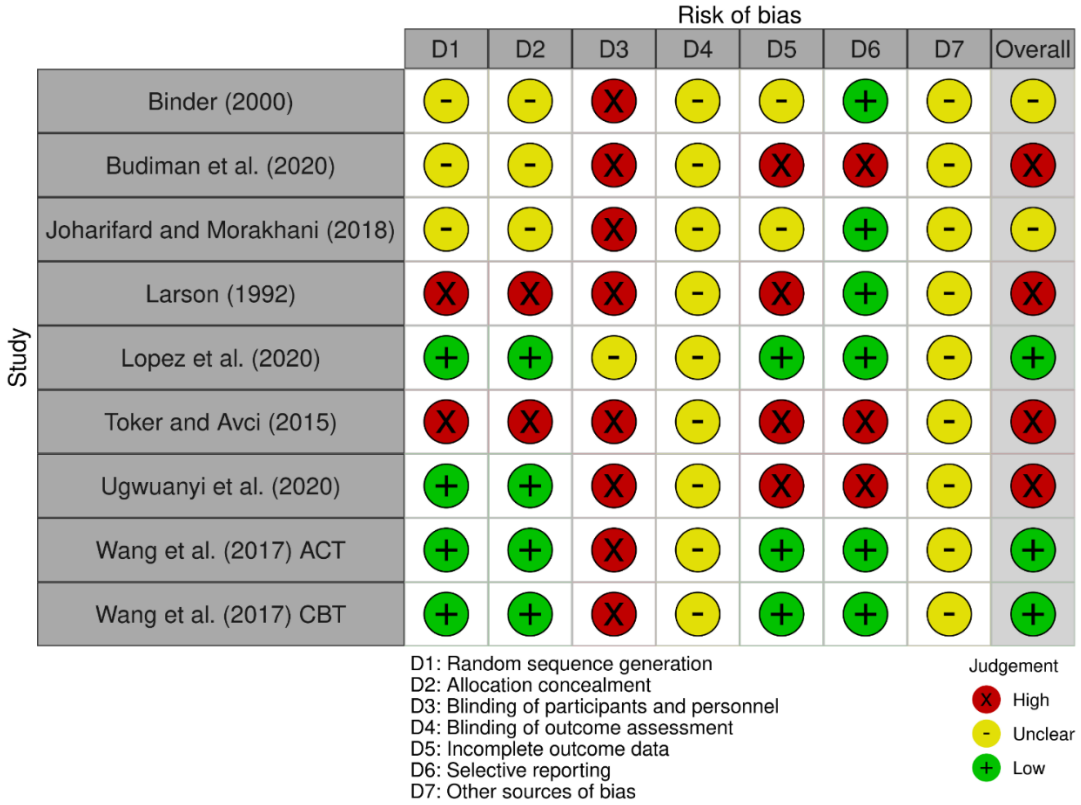
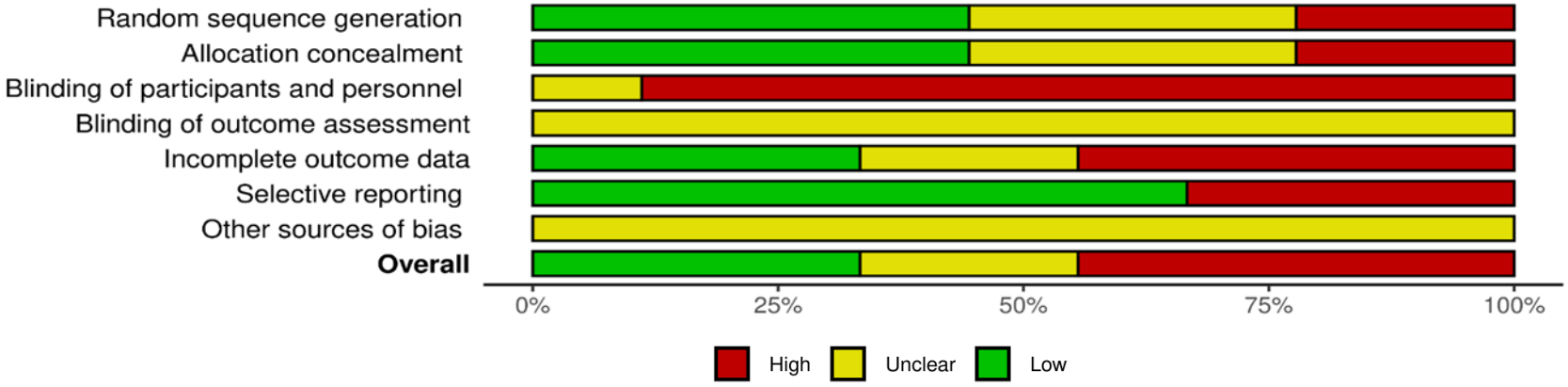


Figure 3

Overall Assessment of Risk of Bias for Each Domain



Results

Meta Analysis

To test the hypothesis that ACT and CBT treatment interventions reduce academic procrastination in students, an overall meta-analysis was conducted comparing CBT and ACT interventions to control groups across studies. A total of k = 9 studies and 316 participants (155 in treatment and 161 in control) were included in the analysis. The standardized mean difference (*g*) at post-treatment for ACT and CBT treatments of academic procrastination was $g = -1.96$, $p = 0.08$, 95% CI [-4.15, 0.24], representing a large effect size. The average outcome did not differ significantly from zero, indicating a non-significant result ($Z = -1.79$, $p = 0.11$). Though a large effect size was found, the difference between the control and CBT and ACT treatment groups in reducing academic procrastination was not significant. The non-significance of the effect could be due to influential outliers in the study. According to the Q-test, the true outcomes were very heterogeneous, $Q(8) = 138.90$, $p < 0.0001$, $tau^2 = 10.95$, $I^2 = 98.55\%$, indicating substantial heterogeneity. See Table 2 for the overall effect size results. A forest plot of this analysis can be seen in Figure 4. Both the rank correlation and the regression test indicated potential funnel plot asymmetry ($p = 0.02$ and $p < 0.0001$, respectively). A funnel plot assessing the risk of publication bias can be seen in Figure 5. Studies that reported negative effect sizes represented decreases in levels of procrastination (intended effect) and studies that reported positive effect sizes represented increases in levels of procrastination (unintended effect).

Table 2

Overall Results for Effect Size and Heterogeneity

	k	*g* (*SE*)	95% CI	Z	p_1	*Q*	I^2	p_2
Total Studies RE	9	-1.96 (1.10)	[-4.48, 0.57]	-1.79	0.11	138.9	98.55%	<.001

Note. RE = random effect; *k* = number of comparisons; *g* = Hedge's *g* effect size; *SE* = standard error; CI = confidence interval; Z = Z-score; p_1 = significance level between treatment and control, *I*2 = percentage of total variance; Q = variance between studies as a proportion of total variance; p_2 = significance level assessing heterogeneity among included studies.

Figure 4

Forest Plot Comparing Treatment with Control

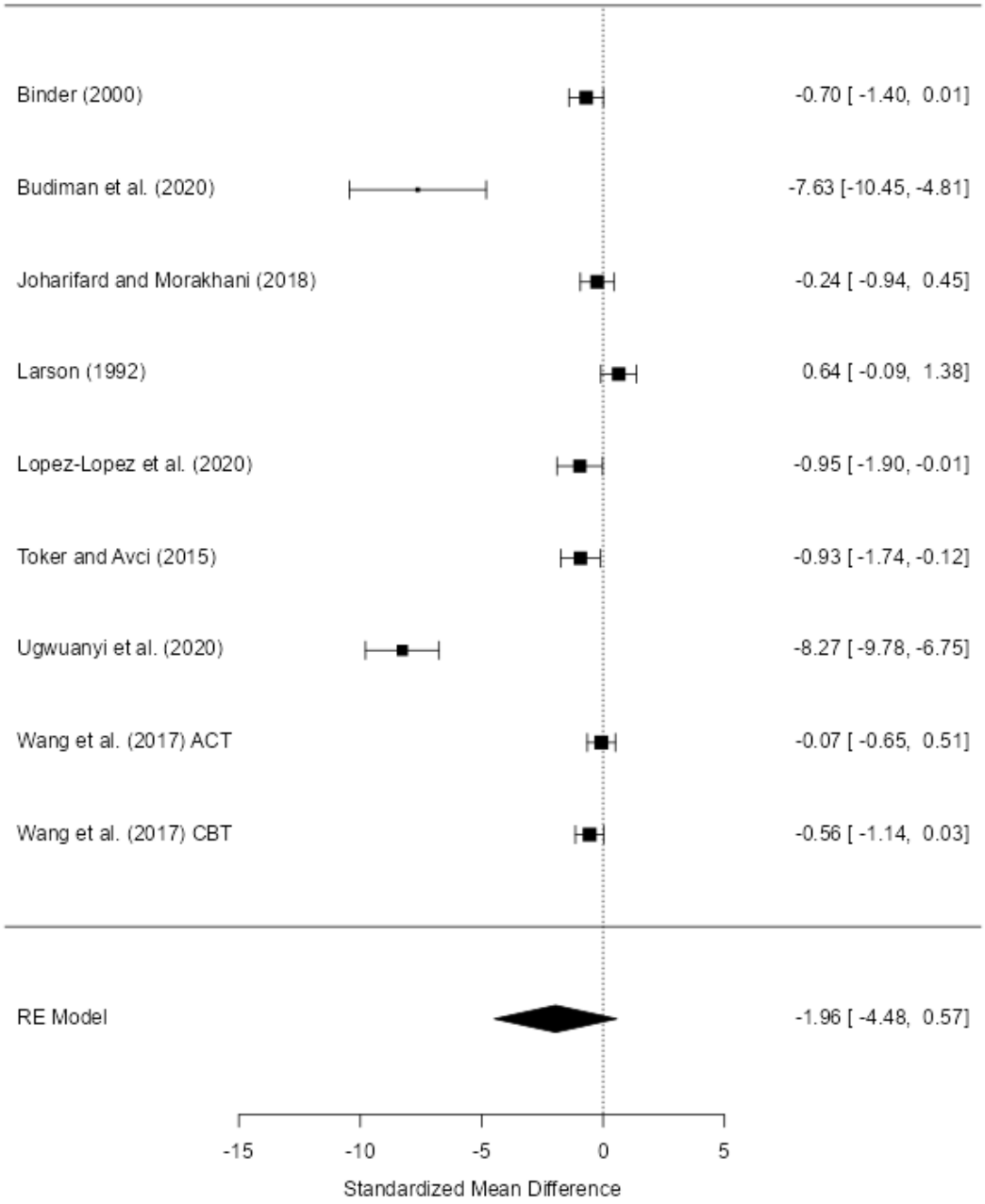
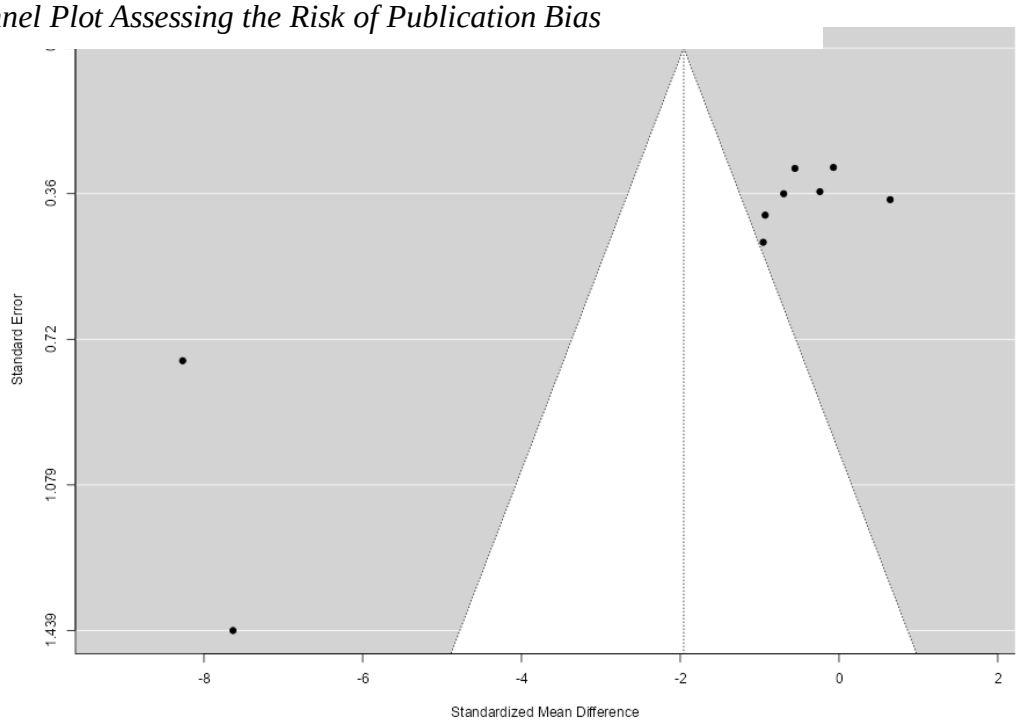


Figure 5

Funnel Plot Assessing the Risk of Publication Bias



Sensitivity Analysis

Given the non-significant result in the overall analysis and the presence of substantial heterogeneity, a sensitivity analysis is required to investigate for potential outliers in the analysis. From visual inspection alone of the forest plot in Figure 4, there was clear evidence of potential outliers from the studies of both Budiman et al. (2020) and Ugwuanyi et al. (2020). Additionally, both studies were assessed as being potentially at high risk of bias from the risk-of-bias assessment. Concerns of selective reporting and incomplete outcome data were evident in both studies. Using Viechtbauer and Cheung's (2010) method of identifying outliers, the study by Larson (1992) was also identified as an outlier, with its lower bound confidence interval (0.64) being higher than the upper bound of the overall pooled effect size confidence interval (0.57). Alongside the suggestions of evidence of substantial heterogeneity in the overall results, a sensitivity analysis (Table 3) was conducted to assess the robustness of the total effect without all three potential outlier studies.

Table 3

Sensitivity Analysis with Influential Cases Removed

	k	g (SE)	95% CI	Z	p_1	Q	I^2	p_2
Main Analysis	9	-1.96 (1.10)	[-4.48, 0.57]	-1.79	0.11	139	98.55%	<.001
Influential Cases Removed[1]	6	0.49 (0.14)	[-0.86, -0.13]	-3.45	0.02	4.97	0%	0.42

[1] Removed as outliers: Budiman et al. 2020;Larson 1992; Ugwuanyi et al. 2020.

A total of $k = 6$ studies were included in the final analysis and 206 participants (98 in treatment and 108 in control). The treatment effect size for ACT and CBT treatments of academic procrastination was $g = -0.49$, $p = 0.02$, 95% CI [-0.86, -0.13], representing a small effect size. The average outcome did differ significantly from zero, indicating a statistically significant result (Z = -3.45, $p = 0.02$). This result indicates that there was a significant difference between treatment and control groups in reducing academic procrastination. According to the Q test, there was no significant amount of heterogeneity in the true outcomes Q(5) = 4.97, $p = 0.42$, $\text{tau}^2 = 0.00$, $I^2 = 0.00\%$. A forest plot of this analysis can be seen in Figure 6. Neither the rank correlation nor the regression test indicated potential funnel plot asymmetry ($p = 0.06$ and $p = 0.10$, respectively). A funnel plot assessing the risk of publication bias can be seen in Figure 7.

Figure 6

Forest Plot Comparing Treatment with Control Excluding Outliers

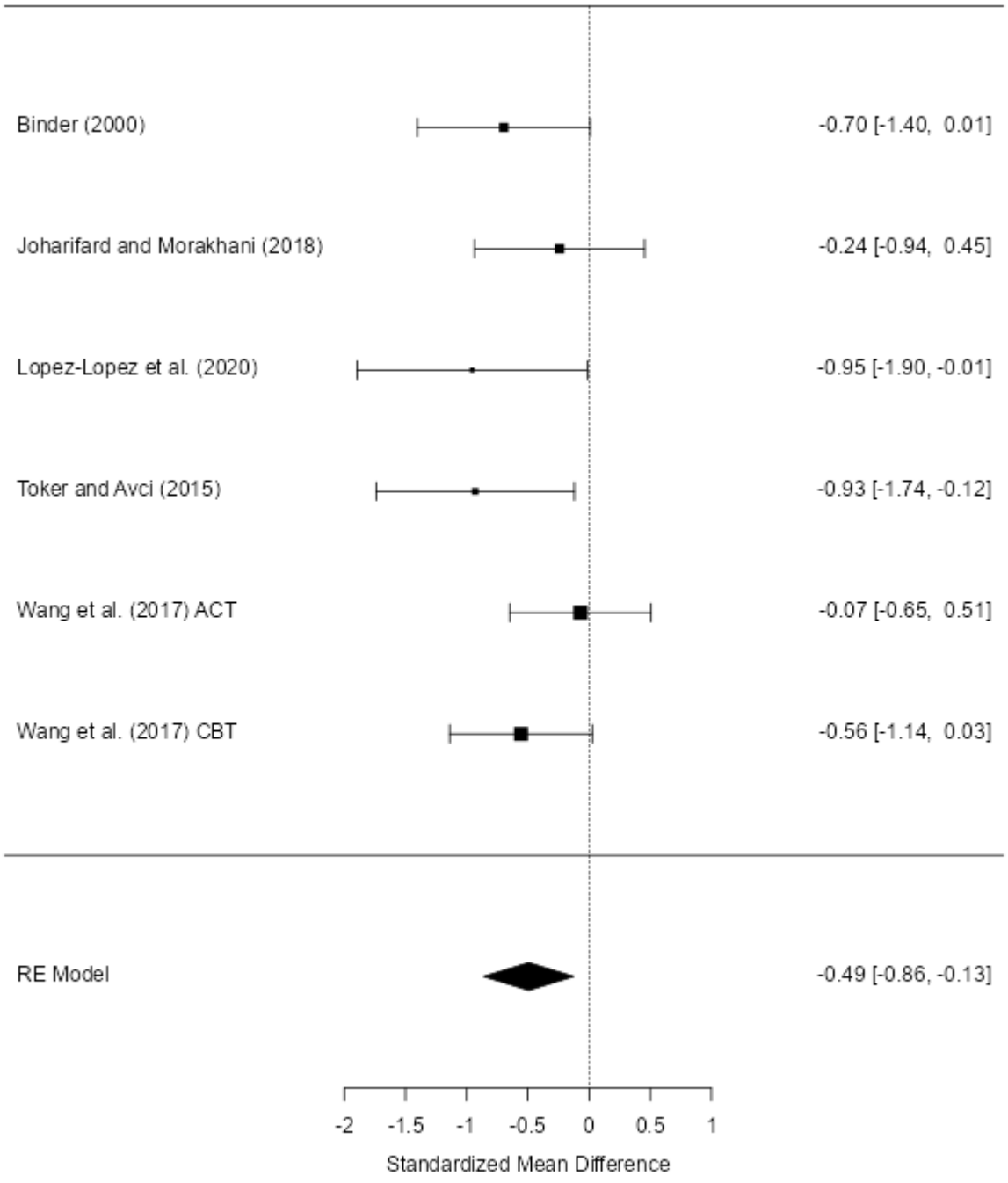
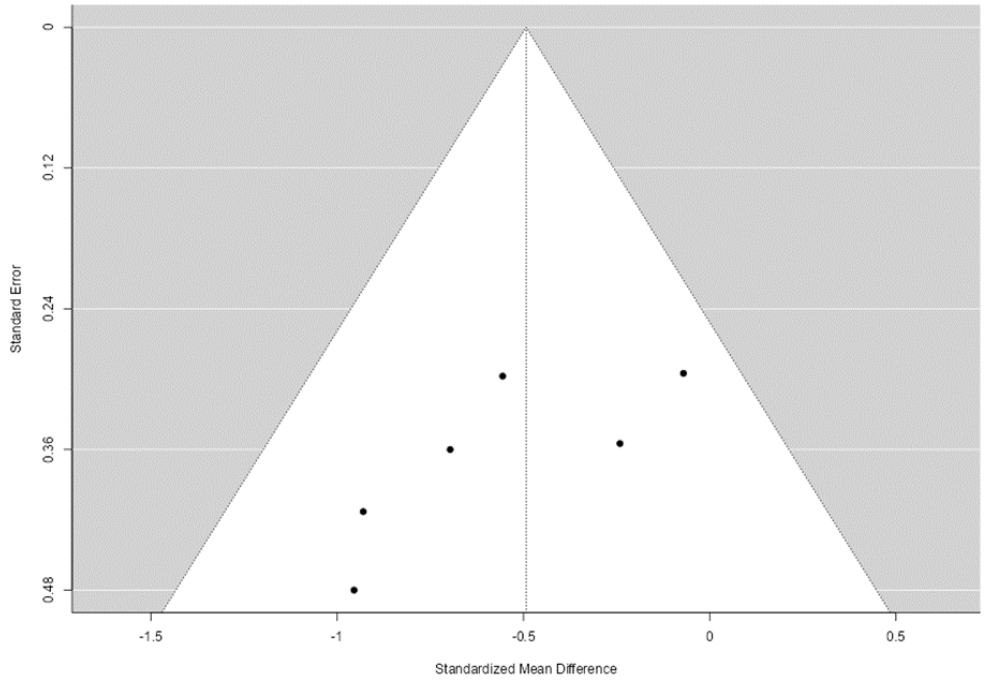


Figure 7

Funnel Plot Assessing the Risk of Publication Bias Excluding Outliers



Subgroup Analysis Post-Treatment

To test the hypothesis that CBT will have better treatment efficacy compared to ACT in reducing academic procrastination in students at post-test level, a subgroup analysis would be conducted (Table 4) to assess effect sizes and heterogeneity between CBT-only studies (Binder, 2000; Toker & Avci, 2015; Wang et al., 2017) and ACT-only studies (Joharifard & Morakhani, 2018; Lopez-Lopez et al., 2020; Wang et al., 2017). Forest plots for each subgroup analysis for ACT and CBT are in Figures 8 and 9, respectively. It appears that CBT is more effective compared to ACT in terms of reducing academic procrastination post-treatment.

Table 4

Subgroup Analysis Post-treatment

	k	*g* (SE)	95% CI	Z	p_1	Q	*I*2	p_2
Total Studies[1]	6	-0.49 (0.14)	[-0.86, -0.13]	-3.5	0.02	4.97	0%	0.42
ACT Only Studies	3	-0.33 (0.25)	[-1.38, 0.72]	-1.3	0.31	2.49	34.86%	0.29
CBT Only Studies	3	-0.69 (0.10)	[-1.14, 0.24]	-6.6	0.02	0.54	0%	0.76

[1]Excluding outlier studies of: Budiman et al. 2020; Larson 1992; Ugwuanyi et al. 2020.

Figure 8

Forest Plot ACT-Only Comparing Treatment with Control Post-Treatment

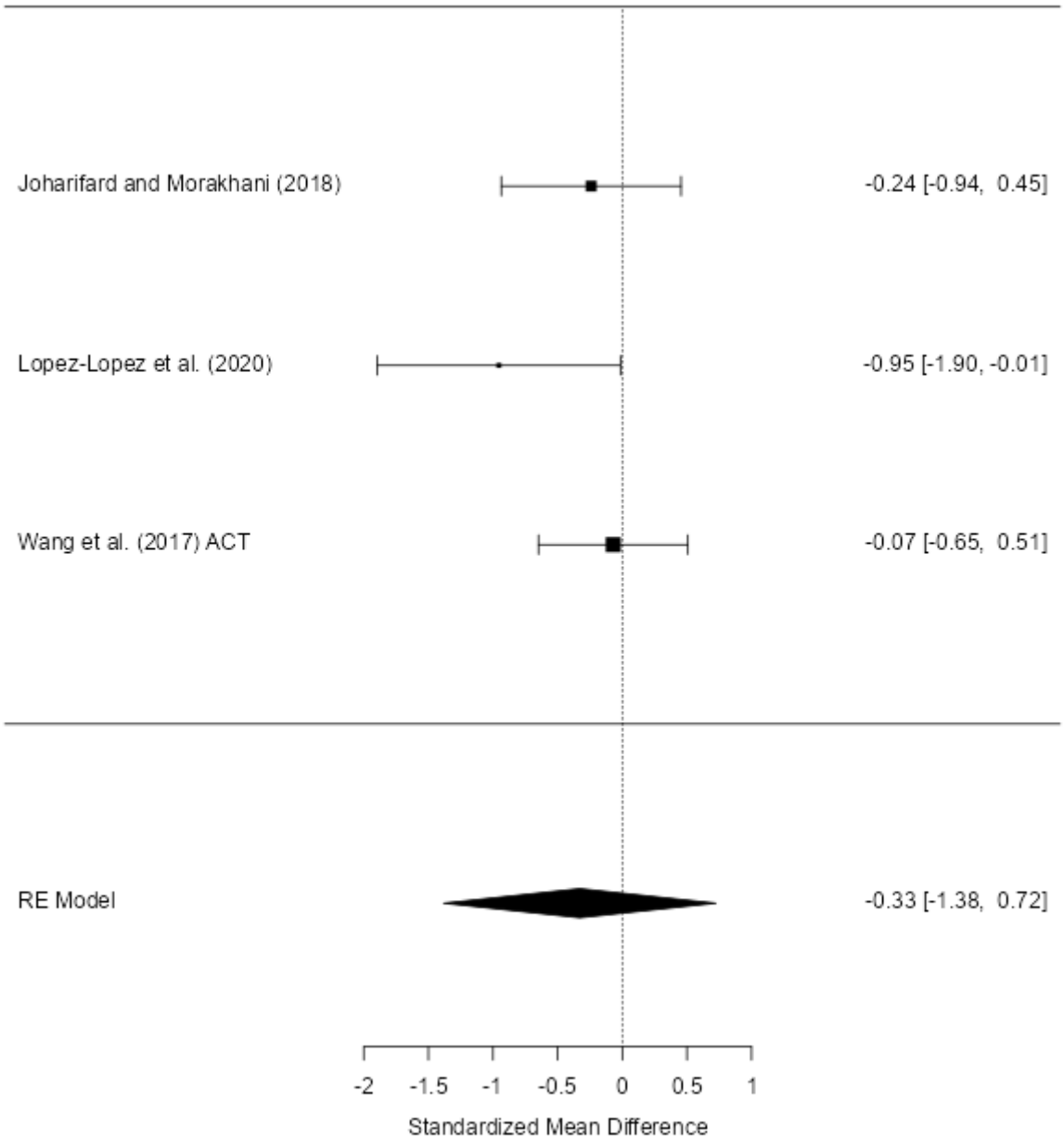
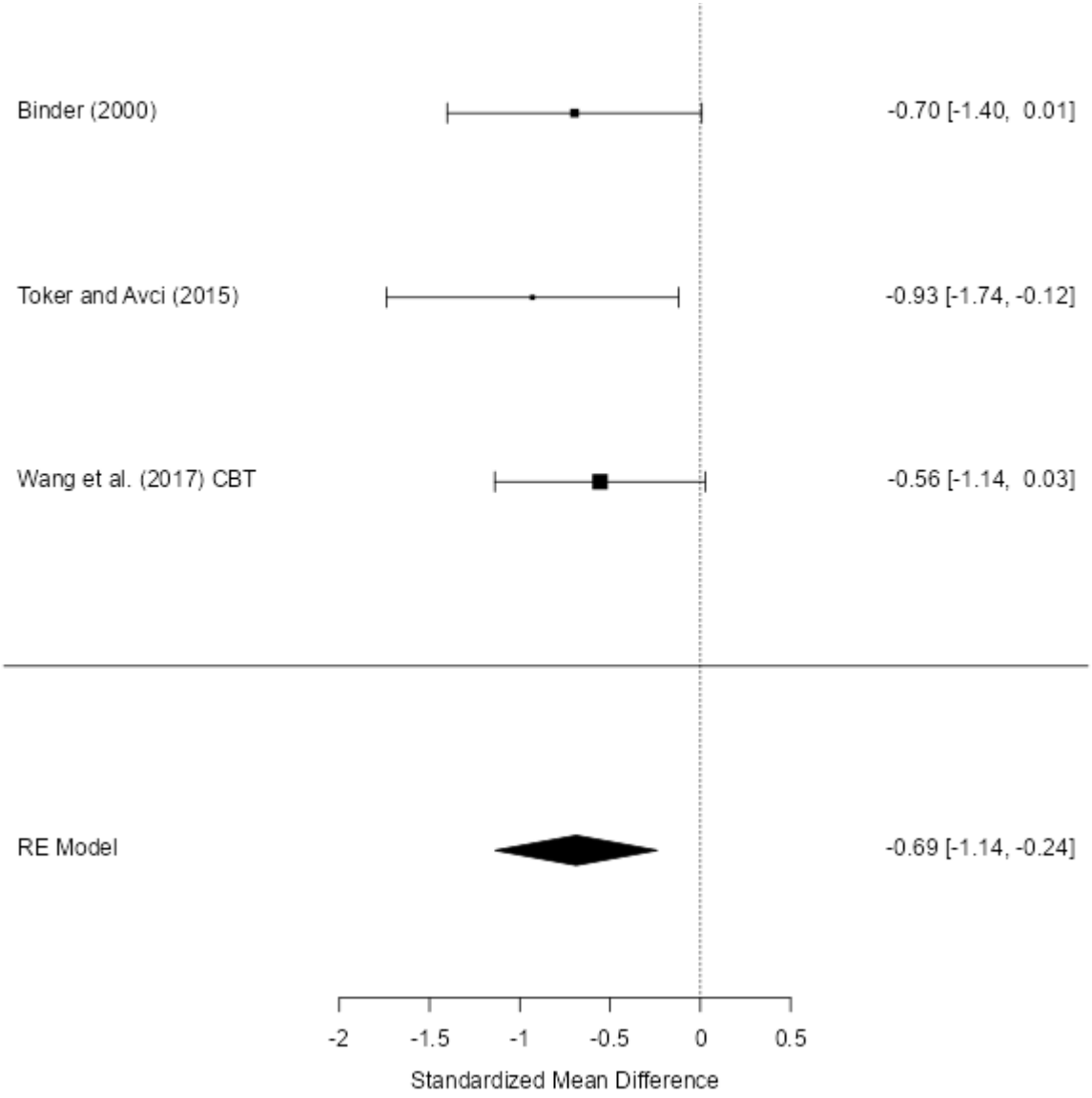


Figure 9

Forest Plot CBT-Only Comparing Treatment with Control Post-Treatment



Subgroup Analysis Follow-Up

To test the hypothesis that ACT will have better treatment efficacy compared to CBT in reducing academic procrastination in students at follow-up, a subgroup analysis would be conducted with follow-up data. Unfortunately because only two studies (Joharifard & Morakhani, 2018; Wang et al., 2017) with follow-up data for ACT-only studies were available, a subgroup analysis for ACT was not possible. A subgroup analysis at follow-up was conducted (Table 5) to assess effect sizes and heterogeneity between CBT-only studies (Binder, 2000; Toker & Avci, 2015; Wang et al., 2017). A forest plot for CBT-only studies comparing treatment with control at follow-up can be in Figure 10.

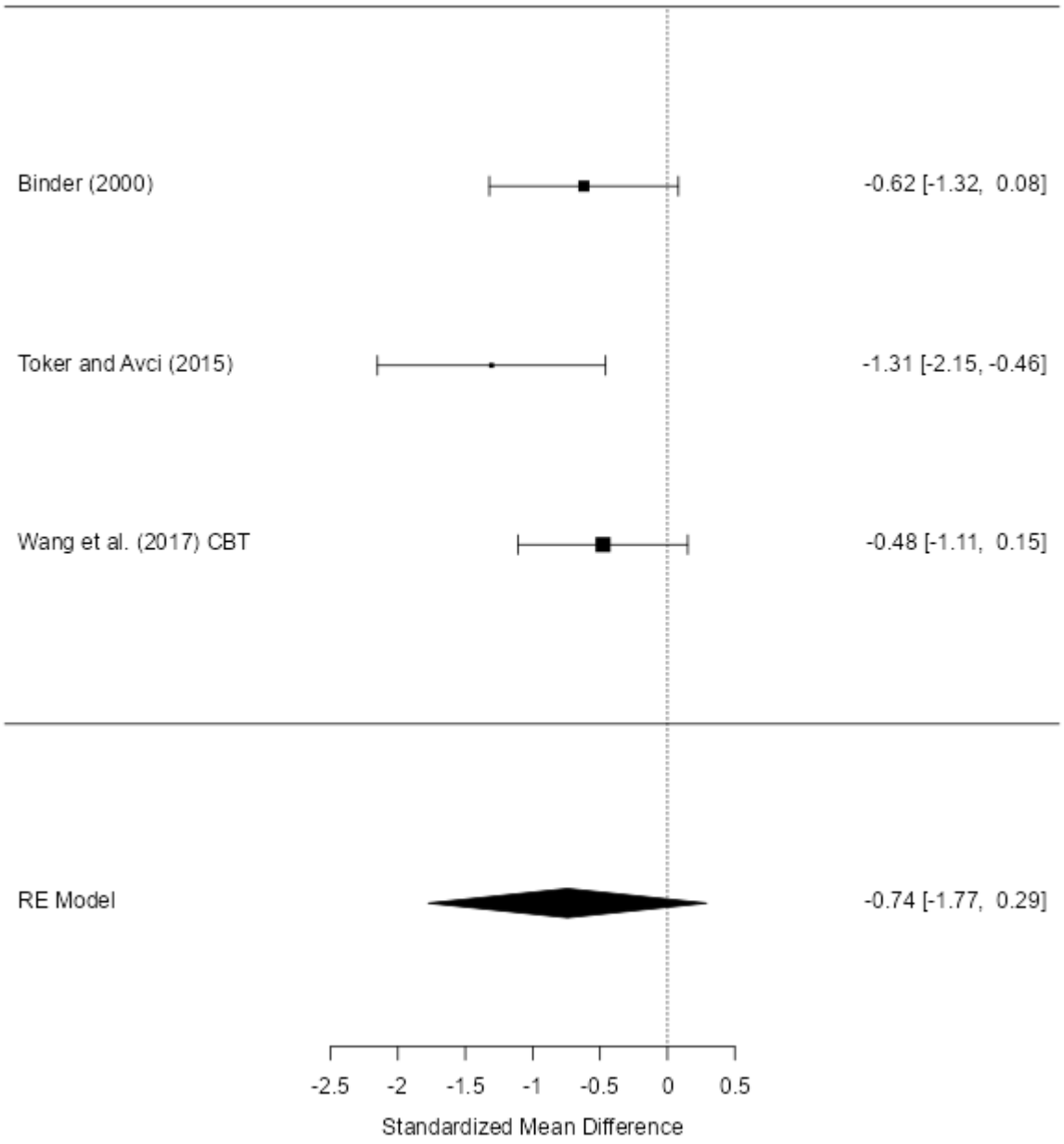
Table 5

Subgroup Analysis Follow-up

	k	g (SE)	95% CI	Z	p1	Q	I2	p2
Total Studies	5	-0.57 (0.26)	[-1.28, 0.14]	-2.22	0.09	9.64	0.63	0.05
CBT Only Studies	3	-0.74 (0.24)	[-1.78, 0.29]	-3.09	0.091	2.483	30%	0.289

Figure 10

Forest Plot CBT-Only Comparing Treatment with Control Follow-up



Discussion

My primary aim was to evaluate the effectiveness of ACT and CBT interventions in reducing the academic procrastination of students. Furthermore, I aimed to compare the efficacy of ACT and CBT interventions for the academic procrastination of students at both post-treatment and at follow-up. A large overall pooled effect size of g = -1.96, 95% CI [-4.48, 0.57], Z = -1.79, p = 0.11 was found in favour of ACT and CBT treatment interventions compared to control in reducing academic procrastination. However, this result was a non-significant result due to influential cases of outliers in the meta-analysis. As a result, a sensitivity analysis without the influential outliers was conducted. A small effect size in favor of ACT and CBT treatments of academic procrastination was found: g = -0.49, p = 0.02, 95% CI [-0.86, -0.13], Z = -3.45, p = 0.02. This result indicates that there was a significant difference between treatment CBT and ACT interventions and control groups in reducing academic procrastination. A subgroup analysis of both CBT and ACT interventions at post-treatment was separately conducted. CBT was found to be significantly more effective at reducing academic procrastination with a moderate effect size, g = -0.69, 95% CI [-1.14, 0.24], compared to ACT with a small effect size, g = -0.33, 95% CI [-1.38, 0.72]. A subgroup analysis at follow-up was not possible due to the low number of studies in the ACT intervention group. Due to the high risk of bias within studies, substantial heterogeneity, and low power due to the small number of studies included, caution is required when interpreting these results.

Interpretation of Results

The results from the present study shared common results with previous meta-analyses on CBT and ACT interventions in reducing academic procrastination (Fang & Ding, 2023; Kim & Seo, 2015; Rozental et al., 2018; van Eerde & Klingsieck, 2018). However, as with previous meta-analyses on interventions for reducing procrastination (Kim & Seo, 2015;

Malouff & Schutte, 2018; Rozental et al., 2015; van Eerde & Klingsieck, 2018), only a small number of studies were included in the meta-analysis. Randomised-control trials are still sparse in the current literature. Only three ACT studies were included. A further three CBT studies had to be removed from the analysis due to being outliers. High heterogeneity was also another common characteristic of the present meta-analysis that was also shared with previous meta-analyses (Rozental et al., 2015; van Eerde & Klingsieck, 2018). The high risk of bias was another concern that previous meta-analyses encountered (Fang & Ding, 2023; Rozental et al., 2015).

Limitations

My study had several limitations that must be addressed. Firstly, due to the small number of studies included in the overall meta-analysis, tests like Egger's test and funnel plot analysis should be interpreted with caution. Both tests should have a minimum of 10 studies for proper interpretation (Higgins & Green, 2011). Even before outliers were removed from the analysis, only nine studies were included. The low number of studies included would have provided limited statistical power to detect significant results. Similarly, publication bias cannot be accurately interpreted and should be treated with caution. The small number of studies also likely explains why the results changed so drastically when the three studies identified as outliers were removed from the sensitivity analysis. Subgroup analysis interpretation was also limited due to the smaller number of included studies, with only three studies for each intervention being included for analysis at post-treatment. A subgroup analysis for ACT at follow-up was not even possible due to only two studies having follow-up data (Joharifard & Morakhani, 2018; Wang et al., 2017). Like previous meta-analyses that found the same results in the subgroup analyses, treatment effects comparing CBT and ACT had low statistical power (Fang & Ding, 2023; Rozental et al., 2018). The strict inclusion criteria for the present study may also be another limitation. Choosing only academic

procrastination scales (PASS, TPS, and APS) for measurements of procrastination and excluding general procrastination scale measurements limited the number of studies included in the present meta-analysis. It is possible, however, that including general procrastination scales for the present study may have just further increased the amount of heterogeneity between studies, as evidenced in previous meta-analyses (Rozental et al., 2015; van Eerde & Klingsieck, 2018).

Language bias is another limitation of the present study. A total of 14 studies were excluded from the present meta-analysis due to not being written in English. There are increasing numbers of randomised-control trials in the Middle East, especially in countries like Iran, on ACT interventions that treat and reduce academic procrastination (Ahangari et al., 2018; Joda et al., 2018; Piri et al., 2020). According to the Association for Contextual Behaviour Science (2023), a total of only eight ACT randomised-control-trial studies have been carried out since 1986 that assess the academic procrastination of students. Three of those studies (Joharifard & Morakhani, 2018; Lopez-Lopez et al., 2020; Wang et al., 2017) were included in the present analysis. The remaining five studies were not included as they were not written in English. There may have also been an underestimation of ACT interventions due to not including studies that were not in English (Egger & Smith, 1988). Another limitation of the present study was that CBT and ACT were the only selected interventions for inclusion criteria. Another limitation of the present study was that treatment interventions using online technology to reduce academic procrastination were not examined. All interventions in the present meta-analysis were carried out in person. Prior research has discovered that online implementation of behavioural interventions is often more cost-effective and less resource-intensive compared to in-person interventions (Gagnon et al., 2019). Several studies have examined the use of online interventions in reducing academic procrastination with good results. Glick and Orsillo (2015) were able to develop a successful

online implementation of an ACT intervention to reduce academic procrastination with the use of online videos to guide students through the intervention. Gagnon et al. (2019) also conducted a successful online ACT intervention to reduce the academic procrastination of students. By using an interactive online website to conduct the intervention. A limitation of these studies, however, is that they did not include a control group for comparison, limiting the internal validity of their findings. For this reason, none of these studies were included in the present analysis. Evidence, however, also suggests that in-person interventions produce larger effect sizes in reducing procrastination compared to online interventions when moderated as variables (Malouff & Schutte, 2018). This area of study warrants more investigation.

Future Recommendations

Though the present study may have had limitations, there are still positive implications that can be drawn. More randomised-control trials are still needed to address limitations in the treatment of academic procrastination. This finding also demonstrates that there is more research needed to conceptualize procrastination overall. Despite procrastination being a widespread problem across the world for not just students but also for people in their general day-to-day functioning at work and at home (Steel, 2007), there is still much that is unknown about procrastination and how to treat it. Future research on assessing academic procrastination needs to focus on the long-term effects of interventions rather than the immediate short-term effects. My study and others assessing the efficacy of CBT vs. ACT (Fang & Ding, 2023; Wang et al., 2017) found that CBT interventions have better short-term effects in reducing academic procrastination compared to ACT interventions. Research on ACT in the extant literature illustrates that the long-term effects of the treatment are more effective than the long-term effects of CBT interventions (Kohli et al., 2022). This finding applies beyond academic procrastination to the treatment of depression and anxiety (Twohig

& Levin, 2017). Randomized controlled trials with longer follow-up periods would be beneficial in addressing this limitation. A longitudinal analysis could also be useful in assessing the longer-term effects of interventions for reducing academic procrastination.

Conclusion

Both CBT and ACT interventions were found to be effective in reducing the academic procrastination of students. CBT overall was more efficacious compared to ACT post-treatment at reducing the academic procrastination of students. Follow-up treatment analysis was not able to be assessed due to the low number of studies for analysis. These findings should be treated with caution, as there was substantial heterogeneity between studies, along with the inclusion of only a small number of studies with limited statistical power. Recommendations for future analysis would be to include studies that are not in English to avoid language bias, include studies on the use of modern technologies in reducing academic procrastination, and conduct more randomized controlled trials with longer follow-up periods. Despite its limitations, this study contributes to the growing literature on academic procrastination and the treatment interventions of CBT and ACT. Mine was one of the first meta-analyses to directly examine the efficacy of CBT and ACT treatment effects on the reduction of academic procrastination in students. The findings may be useful for counsellors and therapists who use CBT or ACT as treatments for clients. More research is needed with randomized-control trials, especially with ACT. Procrastination is such a ubiquitous phenomenon that affects so many students around the globe. There is still so much to learn about it.

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