Sleep difficulties and interventions: Exploring links between sleep and mental health in adolescents and assessing adherence to Cognitive Behavioural Therapy for Insomnia.

Hannah M. Cowie *(Trainee Clinical Psychologist)*

Primary Supervisor: Dr Laura Pass *(Clinical Associate Professor)*

Secondary Supervisor: Professor Niall Broomfield *(Head of Department of Clinical Psychology and Psychological Therapies (CPPT))*

Doctorate in Clinical Psychology

University of East Anglia

Faculty of Medicine and Health Sciences

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Abstract

Background: Insomnia is the most prevalent sleep disorder. The impact of chronic insomnia is far reaching. Cognitive Behavioural Therapy for Insomnia (CBT-I) has been shown to improve both sleep and mental health outcomes. Therefore, it is important to better understand the links between poor sleep and mental health and ensure CBT-I is tolerable.

Method: A systematic review and meta-analysis was conducted to determine rates of dropout, refusal, attendance, and adherence to CBT-I. An empirical study used survey data to explore associations between components of poor sleep, symptoms of depression and anxiety, and wellbeing in an adolescent sample.

Results: 62 studies were included in the systematic review. A proportion meta-analysis yielded a pooled estimated dropout of 9.79%. Subgroup analyses indicated significantly higher dropout in individual when compared to group CBT-I. The most common reason provided by those who dropped out was that CBT-I required too high of a time commitment. A proportion meta-analysis yielded a pooled estimate of 96.71% attendance. Refusal of CBT-I rates ranged from 8.57% to 41.67%. Adherence rates to homework tasks and treatment instructions ranged from 50-90%. The results from the empirical study indicated that anxiety symptoms were significantly positively correlated with sleep disturbance, daytime dysfunction and insomnia severity. Depression symptoms were significantly positively correlated with sleep disturbance, sleep latency, daytime dysfunction, sleep quality and insomnia severity. Wellbeing was significantly negatively correlated with daytime dysfunction and insomnia severity.

Conclusions: The results indicate that dropout from CBT-I was lower than other CBT interventions. Furthermore, the results indicate that certain components of poor sleep may impact more on anxiety, depression, and wellbeing. The findings suggest that mental health outcomes, as well as rates of dropout, refusal, attendance, and adherence to treatment should be routinely recorded and reported within CBT-I studies to improve the acceptability, efficacy, and efficiency of the intervention.

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CHAPTER ONE

Introduction to Thesis Portfolio

Introduction to Thesis Portfolio

Sleep occurs in every organism, to some extent, indicating its importance as a fundamental biological need (Siegel et al., 2008). On average, humans spend one third of their lives sleeping. There is no single physiological role that sleep serves, instead playing an essential role in many vital processes such as development, energy conservation, brain waste clearance, cognition, performance, vigilance, and psychological state (Zielinski et al., 2016).

Sleep deprivation refers to a lack of sleep during a certain time period, or shorter than optimal sleep duration, and can be caused by a number of factors. Sleep loss has both physical and psychological consequences. For example, chronic sleep deprivation can impact upon immune responses and secretion of the growth hormone, as well as increasing the risk of obesity, diabetes and cardiovascular disease (Orzeł-Gryglewska, 2010). Furthermore, sleep deprivation can cause impairments in perception, difficulty concentrating, poorer memory functioning, and poorer wellbeing (Orzeł-Gryglewska, 2010). There is also emerging evidence that poor sleep in middle age is a risk factor for dementia (Sabia et al., 2021).

Chronic sleep loss can lead to an individual being diagnosed with a sleep disorder. Insomnia is the most prevalent sleep disorder (Ohayon & Reynolds, 2009) and is becoming increasingly common, affecting approximately 10-15% of adults (Kraus & Rabin, 2012). The lifetime prevalence of insomnia within an adolescent sample has been estimated at 10.7% (Johnson et al., 2006). The Diagnostic and Statistical Manual for Mental Disorders 5th Edition (DSM-V) defines insomnia disorder as a difficulty initiating or maintaining sleep, or early morning awakenings with an inability to return to sleep occurring at least three nights a week for at least three months (American Psychiatric Association [APA], 2013). The impact of

chronic insomnia is far reaching. Insomnia is associated with a range of physical health conditions, such as heart disease, high blood pressure, and chronic pain (Taylor et al., 2007b), as well as mental health difficulties (Hertenstein et al., 2019) and poorer daytime functioning (Daley et al., 2009).

Sleep and mental health difficulties are closely associated, with the DSM-V criteria for many mental health disorders listing sleep disturbance symptoms (APA, 2013). A recent review suggests a bi-directional relationship between sleep and mental health across the lifespan, with the dominant path being from sleep difficulties to the occurrence of other mental health disorders (Freeman et al., 2020). Although there is growing evidence to support the associations between poor sleep and mental health difficulties, research has not yet dismantled the concept of poor sleep into component parts and explored which components are correlated with mental health difficulties and poorer wellbeing in an adolescent sample.

Despite the prevalence of insomnia and the widespread negative consequences on both a person's physical and mental health, the disorder is often not recognised, and therefore left untreated. Individuals often resort to self-help remedies, such as alcohol or over the counter medication (Morin & Benca, 2012). When recognised, insomnia is commonly treated by medical professionals using medication, such as Zopiclone, due to widespread availability and rapid clinical improvement. However, the majority of sleep medications are not approved for long-term use, are not curative, and can cause side effects and longer-term dependence (National Institute of Health [NIH], 2005).

Cognitive Behavioural Therapy for Insomnia (CBT-I) is an effective non-pharmacological intervention that improves sleep outcomes with minimal adverse effects (Trauer et al., 2015). CBT-I is recommended as the first line treatment for

chronic insomnia in adults of any age (Riemann et al., 2017; Qaseem et al., 2016). Furthermore, CBT-I is often preferred by patients to medication (Vincent & Lionberg, 2001). Evidence suggests that although medication may be superior in the short term, CBT-I has superior effectiveness in the longer term (Mitchell et al., 2012).

CBT-I combines educational, cognitive, and behavioural therapeutics to manage psychological factors that play a role in insomnia (Morin, 2004). The five key components of CBT-I are relaxation (R), sleep hygiene (SH), stimulus control (SC), sleep restriction (SR), and cognitive therapy (CT) to target dysfunctional beliefs and attitudes about sleep (Trauer et al., 2015; NIH, 2005). Research has shown that combining the components is more effective than separate delivery (Harvey et al., 2014) although evidence is converging of the efficacy of single-component CBT-I therapeutics.

There is a wealth of evidence indicating the effectiveness of CBT-I on sleep outcomes (Trauer et al., 2015). However, there is increasing evidence that suggests CBT-I also improves mental health outcomes, without directly targeting these symptoms within treatment (Freeman et al., 2017; Gee et al., 2019). CBT-I has, for example, been found to improve both depression (Cunningham & Shapiro, 2018) and anxiety symptoms (Belleville et al., 2011) in adults. These finds are promising, and further support the effectiveness and efficiency of CBT-I. However, there are questions as to how well people tolerate and adhere to CBT-I treatment.

Dropout, attendance, refusal, and adherence within CBT-I are often discussed between clinicians as being a challenge within treatment. This is possibly because sleep restriction and stimulus control initially involve spending less time in bed, which may make them more difficult to adhere to and more likely that participants

will refuse, dropout or not attend sessions. However, these outcomes are often not explored empirically or reported within CBT-I research. Thus far, the research into dropout, attendance, and refusal within CBT-I is limited.

The World Health Organisation (WHO) defines adherence as "the extent to which a person's behaviour… corresponds with agreed recommendations from a healthcare provider" (Sabaté & Sabaté, 2003). The average adherence to common medical treatments is around 75% (DiMatteo, 2004). However, with adherence rates of 65.5%, sleep-related treatments, such as taking medication or employing health behaviours, have been found to have the lowest adherence of all treatments studied (DiMatteo, 2004). It is important to understand and study adherence to treatments as poor adherence leads to poorer healthcare outcomes and increased costs. Moreover, improving adherence increases healthcare effectiveness and improves patient safety (Sabaté & Sabaté, 2003). Two previous systematic reviews have explored how adherence is measured within CBT-I studies (Matthews et al., 2013; Agnew et al., 2021). However, adhering to the treatment recommendations is not the only important factor when considering how well tolerated CBT-I is. More recently, adherence reviews have also explored dropout, refusal, and attendance as well as completion of between session tasks (e.g. Leeuwerik et al., 2019). These additional variables have not yet been reviewed within the CBT-I literature.

This thesis portfolio aims to address two gaps within the sleep literature. The first aim is to explore rates of dropout, refusal, attendance, and adherence to CBT-I treatments through a systematic review and meta-analysis which is presented in chapter two. As the evidence has demonstrated that treating insomnia can also improve mental health outcomes, it is important that CBT-I is as effective and tolerable as possible.

The second aim of this thesis portfolio is to add to the evidence exploring the links between poor sleep and mental health difficulties in an adolescent sample through an empirical study using questionnaire data. This is presented in chapter four. More specifically, this study will break down poor sleep into its component parts to explore whether certain components are more highly associated with mental health difficulties and poorer wellbeing in adolescents.

Theoretical and contextual links between these chapters are discussed in chapter three, additional methodology and results for the empirical study are discussed in chapters five and six, and finally chapter seven integrates both findings in a joint discussion. Strengths, limitations, and implications of the thesis portfolio are also explored.

CHAPTER TWO

Systematic Review and Meta-Analysis

Prepared for Submission to Cognitive Behavioural Therapy

(Author Guidelines Appendix A)

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Dropout, Attendance, Refusal and Adherence in Cognitive Behavioural Therapy for Insomnia (CBT-I): A Systematic Review and Meta-Analysis

Hannah Cowie[a]*, Joel Owen[a], Laura Pass[a], Niall Broomfield[a], & Faith Orchard[b]

[a]*Department of Clinical Psychology and Psychological Therapies, University of East Anglia, Norwich Research Park, Norwich, Norfolk, NR4 7TJ, United Kingdom*

[b]*School of Psychology, University of Sussex, Falmer, East Sussex, BN1 9QH, United Kingdom*

*Corresponding author: h.cowie@uea.ac.uk

Dropout, Attendance, Refusal, and Adherence in Cognitive Behavioural Therapy for Insomnia (CBT-I): A Systematic Review and Meta-Analysis

Abstract

Cognitive Behavioural Therapy for Insomnia (CBT-I) has been found to be an effective non-pharmacological intervention for insomnia, and is recommended as the first line treatment. However, less is known about whether CBT-I is acceptable to participants. The primary aim of this review was to explore dropout, attendance, refusal, and adherence to homework tasks within CBT-I studies. The secondary aim was to explore factors that may influence dropout rates through subgroup analyses. A systematic search identified 62 eligible studies including 2238 participants. Meta-analyses were run on the extracted dropout and attendance data. Refusal and adherence data were synthesised and discussed. A proportion meta-analysis yielded a pooled estimated dropout of 9.79%. Subgroup analyses indicated significantly higher dropout in individual when compared to group CBT-I. The most common reason provided by those who dropped out was that CBT-I required too high of a time commitment. A proportion meta-analysis yielded a pooled estimate of 96.71% attendance. Refusal of CBT-I rates ranged from 8.57% to 41.67%. Adherence rates to homework tasks and treatment instructions ranged from 50-90%. This review provided a comprehensive systematic review and meta-analysis of dropout, attendance, refusal, and adherence rates in CBT-I. Dropout from CBT-I was minimal compared to other types of CBT and attendance was high. The most common reasons given for refusal of CBT-I and dropout were related to time commitments, which warrants further exploration. The findings indicate that this data needs to be routinely recorded and reported in research to further enhance understanding around treatment acceptability and to reach a consensus around defining, measuring, and reporting adherence in CBT-I studies.

Keywords: Insomnia, sleep, CBT-I, adherence, dropout, attendance, refusal

Word Count: 8315

Introduction

Background

Insomnia is the most prevalent sleep disorder (Ohayon & Reynolds, 2009) and is becoming increasingly common, affecting approximately 10-15% of adults (Kraus & Rabin, 2012). The Diagnostic and Statistical Manual for Mental Disorders 5th Edition (DSM-V) defines insomnia disorder as a difficulty initiating or maintaining sleep, or early morning awakenings with an inability to return to sleep occurring at least three nights a week for a minimum of three months (American Psychiatric Association, 2013). The impact of chronic insomnia is far reaching. Insomnia is linked to poorer day-time functioning, increased work absenteeism, healthcare utilisation, and non-motor vehicle accidents (Daley et al., 2009). Insomnia is also a significant predictor for the onset of depression, anxiety, alcohol abuse, and psychosis (Hertenstein et al., 2019) and is associated with serious health conditions (Taylor et al., 2007).

Despite the prevalence of insomnia and the significant impact it can have, the disorder is often left untreated, with individuals resorting to self-help remedies such as alcohol or over the counter medication (Morin & Benca, 2012). When recognised, insomnia is often treated by medical professionals using medication, such as Zopiclone, due to the widespread availability and rapid clinical improvement. However, the majority of sleep medications are not approved for long-term use, are not curative, and can cause side effects and longer-term dependence (National Institute of Health [NIH], 2005; National Institute for Health and Care Excellence [NICE], 2004). Furthermore, these adverse effects appear to be worse in older adults (NIH, 2005). Therefore, non-pharmacological alternatives for treating insomnia need to be considered.

Cognitive Behavioural Therapy for Insomnia (CBT-I) is an effective non-pharmacological intervention that improves sleep outcomes with minimal adverse effects (Trauer et al., 2015). CBT-I is recommended as the first line treatment for chronic insomnia in adults of any age in European (Riemann et al., 2017; NICE, 2021) and United States (Qaseem et al., 2016) guidance. Furthermore, patients often prefer CBT-I to medication (Vincent & Lionberg, 2001). Evidence suggests that although medication may be superior in the short term, CBT-I has superior effectiveness longer term (Mitchell et al., 2012).

CBT-I combines educational, cognitive, and behavioural techniques to manage psychological factors that play a role in insomnia (Morin, 2004). The five key components of CBT-I are relaxation (R), sleep hygiene (SH), stimulus control (SC), sleep restriction (SR), and cognitive therapy (CT) to target dysfunctional beliefs and attitudes about sleep (Trauer et al., 2015; NIH, 2005). See Table 2.1 for more details about each component. Research has shown that a combination of components is more effective than separate delivery (Harvey et al., 2014) although evidence is converging of the efficacy of single-component CBT-I therapeutics.

Dropout, attendance, refusal, and adherence within CBT-I are often discussed between clinicians as a challenge within treatment. This is possibly because sleep restriction and stimulus control initially involve spending less time in bed, which may make them more difficult to adhere to and more likely that participants will refuse, dropout or not attend sessions. However, these outcomes are often not explored empirically or reported within CBT-I research.

A 2015 meta-analysis of self-help CBT-I explored dropout as part of a wider review and found an average of 14.5% dropout, compared to 16.7% dropout for therapist-administered CBT-I and 8.9% dropout from waitlist conditions (Ho et al.,

2015). This review only looked at studies that included a self-help CBT-I condition, and the dropout data from therapist-administered and waitlist control conditions were only taken from the comparison arms of the included studies. Furthermore, some individual studies have explored those who are at risk of dropping out of CBT-I. One study found that those who had an average baseline total sleep time of less than 3.65 hours were at greater risk of early treatment termination (Ong et al., 2008). Another study found that those with longer sleep, greater depression, and less severe insomnia predicted non-completion of an internet self-help CBT-I programme (Yeung et al., 2015).

Previous studies have explored dropout in other formats of Cognitive Behavioural Therapy (CBT). A 2015 meta-analysis (Fernandez et al., 2015) looked at dropout from CBT for a range of mental health disorders (not including insomnia) in 115 studies. The authors found an average of 26.2% dropout during treatment across disorders, with the highest dropout rate in those experiencing depression (36.4%), followed by eating disorders (31.0%), comorbid anxiety and depression (28.8%), PTSD (27.2%), psychosis (20.1%), and anxiety disorders (19.6%).

The research into session attendance in CBT-I is limited. Attendance rates are rarely reported, and studies that do discuss attendance tend to focus on treatment completers and dropouts, without further detail. A recent study (Short et al., 2021) explored attendance in a CBT-I group intervention, and found that the majority of participants attended one or more sessions, with an average of three out of five sessions attended for treatment initiators. They also found that participants with poorer global sleep quality and longer sleep onset latency were less likely to attend group sessions, and attended fewer sessions overall (Short et al., 2021). A second study exploring predictors of treatment attendance and adherence within an out-

patient insomnia clinic found that being older was associated with better attendance, whereas anxiety and depression symptoms were associated with poorer attendance (Cui & Fiske, 2019). Further research into attendance within CBT-I is needed to add to the evidence base.

To the authors' knowledge, no studies have been conducted that primarily explore participant refusal to take part in CBT-I. Some studies report rates of refusal within participant flow charts and some studies explicitly state the reasons given for refusing. However, reasons for refusal are not consistently reported, meaning it is not clear whether refusal was related to CBT-I or for other reasons. Again, refusal is often not explored in more detail than simply reporting the figures, and this information is not routinely reported.

Often, adherence to treatment is used as an umbrella term and within that, dropout, attendance, and refusal will also be discussed. The World Health Organisation (WHO) defines adherence as "the extent to which a person's behaviour… corresponds with agreed recommendations from a healthcare provider" (Sabaté & Sabaté, 2003). A recent meta-analysis exploring adherence to CBT-I concluded that there was a lack of consensus around the definition of adherence within CBT-I studies (Agnew et al., 2021). Within this review, adherence will be explored separately to dropout, attendance, and refusal rates. Using the WHO definition, adherence to CBT-I will be explored in relation to completing homework tasks or following CBT-I instructions.

The average adherence to common medical treatments, both pharmacological and non-pharmacological, is around 75% (DiMatteo, 2004). However, with adherence rates as low as 65% in some studies, sleep-related treatments were found to have the lowest adherence of all treatments studied (DiMatteo, 2004). If

adherence rates to CBT-I could be calculated, then this information may help clinicians to better understand reasons for non-adherence and if these can be addressed, then treatment could be administered more effectively. It is important to understand and study adherence rates as poor adherence leads to poorer healthcare outcomes and increased costs. Moreover, improving adherence increases healthcare effectiveness and improves patient safety (Sabaté & Sabaté, 2003).

Two previous systematic reviews have explored adherence to CBT-I. Matthews and colleagues (2013) conducted a review to explore how adherence is measured within CBT-I studies and the outcomes reported. The authors found 15 studies that measured adherence, for example through measuring a participant's use of SC instructions or SR prescriptions. The Matthews and colleagues systematic review was then updated (Agnew et al., 2021) and included 53 studies. Similarly, Agnew and colleagues extracted and described how adherence was measured in CBT-I studies and the outcomes, but also the quality of the adherence measure. They also described reported correlations between adherence and outcomes and predictors of adherence.

The findings and conclusions from both studies indicated that adherence is not consistently measured or reported within CBT-I research, and associations between adherence and insomnia outcomes are rarely explored. Agnew and colleagues (2021) also highlighted that adherence to CBT-I is a complex concept that currently lacks consensus around definition. Additionally, Matthews and colleagues found that a very small number of studies used an explicit conceptual model or theory of adherence. Both of the reviews extracted and reported information about adherence as narrative syntheses, and meta-analytic techniques

were not deployed. Moreover, neither of the reviews explored dropout, attendance or refusal rates in detail.

The current review will add to and build upon previous literature by conducting the first comprehensive systematic review and meta-analysis of dropout, attendance, refusal, and adherence to homework tasks within CBT-I. These are outcomes that are often not explored in depth within CBT-I research. This review will include all modes of delivering CBT-I, unlike previous research (e.g. Ho et al., 2015; Short et al., 2021), and will extract and synthesise dropout, attendance, and refusal data that is often not elaborated on (e.g. Matthews et al., 2013; Agnew et al., 2021). Furthermore, studies where participants are taking sleep medication will be excluded from the review as there is no clear consensus as to whether this would be a confounding variable within the variables of interest. The results from this systematic review and meta-analysis will help towards reaching a consensus definition and measurement tool of adherence within research.

Primary Objective

To calculate proportions of dropout, attendance, refusal, and adherence to homework tasks within CBT-I studies. Meta-analytic techniques will be used where possible. If there is not enough data to conduct a meta-analysis, extracted information will instead be synthesised and described.

Secondary Objective

To explore moderators of dropout using subgroup analyses. Subgroup analyses will be carried out where possible using the dropout data to explore factors that may influence dropout rates, including comparing participant age (adolescent, adult or older adult), method of delivery (e.g. therapist delivered or computerised), setting of delivery (e.g. inpatient, community, individual, group or family therapy),

session frequency, number of sessions, duration of treatment, and therapist experience.

Method

Search Methods

This study was registered on PROSPERO in September 2020 (Ref: CRD42020183118). Medline OVID, PsycINFO and Embase were searched from their inception to 01/02/2021. The following search terms were used ((“Sleep Initiation and Maintenance Disorders” or Insomnia or Sleep Wake Disorders or Sleep Disorder* or Sleep Disturbance* or Sleeplessness) AND (Cognitive Behavioural Therapy or Cognitive Behavioral Therapy)) or (CBT-I or CBTI). Terms were searched for in the title and/or abstract. Results from electronic database searches were checked against references from previous systematic reviews of CBT-I. Finally, the references of all eligible studies were hand searched.

Inclusion/Exclusion Criteria

Studies were included if they; a) evaluated CBT-I, providing at least two of the key components (Table 2.1), using any design; b) had participants age 11 and over (samples containing any subjects under the age of 11 were excluded) who were suffering from symptoms of insomnia (formal diagnosis of insomnia disorder was not required); c) used valid and reliable measures of insomnia symptoms; d) had measured and reported at least one variable of interest (dropout, attendance, refusal or adherence to homework tasks); e) were written in the English language; f) had been published in a peer reviewed journal. Opinions and editorial pieces were not included. The intervention could be delivered face to face or remotely, be therapist led or computerised, and have been delivered individually, in groups, couples or family sessions. Both controlled and uncontrolled studies were included.

Studies were excluded if they; a) included any other therapeutic element aside from the key CBT-I components in Table 2.1 (such as mindfulness); b) allowed participants to continue taking medication that was prescribed to improve sleep, such as hypnotics, or didn't specifically state that participants were not taking sleep medication; c) included participants who were not suffering from symptoms of insomnia (e.g. preventative studies); d) did not include sufficient details about the CBT-I treatment to be able to determine if at least two of the key components were used; e) were secondary analyses of data where data relevant to this review had already been published previously; f) only provided one session of CBT-I (such as a one-off workshop) as some of the main outcomes of this review (e.g. dropout and adherence) could not be properly measured in a single session. Reasons for exclusion were reported as the first reason that screeners found within the paper. Four papers were not accessible due to restrictions placed on online articles by the journal and COVID-19 preventing access to the physical copies.

Screening and Data Extraction

The first two authors screened studies for eligibility against the inclusion/exclusion criteria. The authors checked their agreement during title and abstract screening by double screening 15% of the search results (once duplicates were removed) and achieved 95% agreement before independently screening half of the remaining results each. Full text screening was also completed by the first two authors; author one screened 93% and author two screened 7%. Data extraction was completed by the first author and a proportion (10%) was checked by the second author with 98% accuracy. Disagreements at any stage were discussed and resolved by the first two authors through reference to the inclusion and exclusion criteria.

The following data were extracted from each study; Title, authors, year published, location of study, overall study sample size, eligible treatment arm sample size, participant age, ethnicity, gender, marital status, employment status, years of education, prior CBT experience, comorbidities, study design, insomnia type, how insomnia is defined, how insomnia is measured, recipient of intervention, primary outcome measures, secondary outcome measures, intervention components, intervention setting (inpatient or community), how intervention was administered (therapist or self-help), intervention modality (individual, group, face to face or remote), intervention length, number of sessions, duration of sessions, follow-up length, insomnia outcomes pre and post intervention, therapist experience, refusal rates, reasons for refusal, dropout, reasons for dropout, session attendance, between session tasks completed, measures of adherence used, adherence outcomes, association between adherence and therapy outcomes, predictors of adherence, and reasons given for non-adherence.

Categorisation of Variables

Dropout

Dropout refers to the number of participants that attended at least one session of the intervention but discontinued before the planned ending or completion of treatment. Participants who completed treatment but did not attend a follow-up or post treatment session were not counted as dropouts. Reasons given by participants for dropout and predictors of dropout or treatment completion were collated and reported separately.

Attendance

Session attendance referred to the number of offered sessions that the participant attended. The mean number and percentage of sessions were taken as a

proportion of the total number of sessions planned or offered. For computerised or remote CBT-I, the number and percentage of completed modules or viewed pages were calculated where applicable.

Therapy Refusal

Therapy refusal was defined as the number of participants who were eligible and offered CBT-I but declined. To be included in the analyses it had to be clear that participants were aware that they were going to be offered CBT-I when they refused. Reasons for refusal were collated and reported.

Adherence to Homework Tasks

Adherence to the treatment was defined by how many of the set homework tasks were completed or instructions were followed. The mean number of tasks adhered to were extracted. How studies measured adherence and any further analyses run with the adherence data (e.g. associations between adherence and outcome) were extracted and reported.

Subgroup Analyses

Before data extraction, multiple subgroup comparisons were planned dependent on the available dropout data: adolescents (11-18 year olds), adults (18-65), and older adults (65+); inpatient settings and community settings; CBT-I delivered individually, in a group setting, and family sessions; therapist administered and self-administered (e.g. computerised CBT-I); type of CBT delivered (e.g. full CBT-I or some of the components); session frequency (how many sessions in a week); session number (how many sessions in total); treatment duration (number of weeks); therapist experience.

Quality Rating

Study quality was assessed using the Moncrieff and colleagues (2001) quality assessment tool for trials of psychotherapy. The tool includes 23 items by which study quality is assessed, and each item is rated 0-2, with higher scores indicating higher quality (maximum score of 46). Previous research has used the following cut-off criteria; studies scoring 30 or more are considered "high quality", those scoring 23-29 are considered "adequate", and those scoring less than 23 are considered "low quality" (e.g. Merry et al., 2012; Reynolds et al., 2012; Bortolotti et al., 2008). A sensitivity analysis was conducted including only studies that scored in the "high" or "adequate" range. Quality ratings were completed by the first author and 21% were double rated by the second author. There was 87.16% agreement between the two authors and any disagreements were discussed and resolved.

Deviations from the PROSPERO Protocol

There were some minor deviations from the PROSPERO protocol. During the screening process the inclusion criteria were updated to specify that at least two of the five key elements of CBT-I had to be provided to count as a CBT-I intervention and be included. This is because CBT-I is defined as a multi-modal intervention, so more than one element was required to meet that definition. Additionally, it was agreed between the authors that studies only providing one session of CBT-I should be excluded as this did not allow for the areas of interest within the review to be properly assessed. The same inclusion/exclusion criteria were used by Trauer and colleagues (2015) when systematically reviewing the efficacy of CBT-I.

The systematic review by Agnew and colleagues (2021) was published during the data analysis for this review. As they had not explored dropout rates in

CBT-I it was agreed between the authors to focus mostly on this aspect to ensure this review added to the evidence base rather than repeated previous research. Furthermore, for this review, several subgroup analyses were identified a priori that could not be run once the data had been extracted. This was primarily because there were not enough studies to run a meaningful subgroup meta-analysis (less than 10 studies; Higgins & Green, 2005), or because the data extracted could not be used in a meta-analysis. For example, therapist experience/training was reported in varying ways between studies and the authors could not find a way to quantify or compare it meaningfully. Finally, it was agreed that due restrictions on time and resources, only research that has been published in a peer reviewed journal would be included, and therefore the grey literature was not searched.

Statistical Analyses

Proportion meta-analyses were conducted using the Metafor (Viechtbauer, 2010) and Meta (Schwarzer et al., 2015) packages in R (R Core Team, 2014). Logit-transformed meta-proportions were calculated as prevalence estimates of dropout across studies were less than .2 and for attendance higher than .8 and therefore less likely to be normally distributed (Lipsey & Wilson, 2001). Random effects models were used, estimated using the DerSimonian and Laird method (DL; DerSimonian & Laird, 1986) with 95% confidence intervals calculated. Proportion of dropout was calculated by the number of cases who dropped out, divided by the starting sample size of the included treatment arm. Individual study data was combined to create a weighted average proportion. Reasons given for dropout and predictors of treatment dropout and completion were extracted and described.

Moderator analyses were conducted on the dropout data where there were at least 10 data points available (Higgins & Green, 2005). It was not possible to run

subgroup analyses and comparisons for the following: Studies that used an adolescent sample (k = 6); comparing studies that used an inpatient sample (k = 1) to a community sample (k = 58); CBT-I delivered by family therapy sessions (k = 0); comparing therapist led (k = 67) to self-help studies (self-help k = 5); comparing in-person therapy (k = 20) to remote therapies (k = 8).

Ten studies reported sufficient attendance data to run a prevalence meta-analysis to combine the data. Proportion of attendance was calculated by the number of sessions attended divided by the total number of sessions offered across the whole sample and analyzed in the same way as the dropout data. Rates of refusal were collated and described as there was not sufficient data to run a meaningful meta-analysis. Measures of homework task adherence used within a study were extracted where applicable and described, along with any outcomes reported. Predictors of task adherence and associations between task adherence and outcomes were extracted and described as there were not enough studies that reported this information to run a meaningful meta-analysis.

Results

[Figure 2.1]

Study Characteristics

In total, 6307 studies were identified through database searching and other sources. Of these, 62 studies published between 1993 and 2020 met the inclusion criteria for this review. For the full study flow chart see Figure 2.1. Two studies that provided further adherence data about a study that had already been included in the meta-analysis are not included in the flow chart. Some studies had multiple treatment arms that were eligible for the meta-analysis and therefore multiple data points were extracted from the same study. There were a total of 2238 participants from the

included studies, with an approximate mean age of 54.67 (10 studies did not report age data or data could not be extracted because it was pooled with treatment arms that were excluded from the meta-analysis). Approximately 61.44% of participants were female (eight studies did not report gender of participants or data could not be extracted because it was pooled with treatment arms that were excluded from the meta-analysis). Sample sizes ranged from 5-96 participants. The duration of the intervention ranged from 2-14 weeks and the number of CBT-I sessions provided ranged from 2-9 sessions. Further details about the included studies can be found in Table 2.2.

Quality Rating

41.94% of the studies ($k = 26$) were deemed high quality, 35.48% ($k = 22$) were deemed adequate quality, and 22.58% ($k = 14$) were deemed low quality. See Table 2.3 for study ratings.

Dropout

Proportion Meta-Analysis

Sixty-one studies reported dropout data and some of these studies had more than one eligible treatment condition. Therefore, 72 data points were extracted from 61 studies. A proportion meta-analysis yielded a pooled estimate of 9.79% dropout across all included data points ($k = 72$, 95% CI 7.73, 12.10), with medium heterogeneity ($Q = 161.56$, $df = 71$, $p < .001$, $I^2 = 56.05$). I^2 indicates that approximately 56% of the total variance is attributed to variability in true effects (Borenstein et al., 2009). The forest plot (Figure 2.2) shows dropout rates with 95% confidence intervals. Across the studies, dropout ranged from 0% to 42%, and no studies were identified as outliers.

[Figure 2.2]

Subgroup Analyses

[Table 2.4]

Full results from the subgroup analyses can be found in Table 2.4. No significant difference in dropout estimates was found between adult and older adult samples. A significant difference in estimates of dropout was found when CBT-I was delivered individually compared to in a group. No significant difference in dropout estimates was found when all components of CBT-I were delivered compared to those who did not receive the full package. No significant difference in dropout estimates was found when participants were given four sessions of CBT-I compared to eight sessions. No significant differences in dropout estimates were found when participants were given treatment over a period of four weeks in comparison to a period of eight weeks. Finally, no significant differences in dropout estimates were found when participants had treatment sessions less than once per week in comparison to weekly sessions.

Reasons for Dropout

Reasons given by participants for dropping out of treatment were extracted and collated. Twenty-seven studies reported reasons for dropout. This information is provided in Table 2.5. The most common reasons given by participants for dropping out were; being too busy or the time commitment being too high (n = 22), poor adherence to the treatment instructions (n = 5), and being admitted to hospital or experiencing a health crisis (n = 5). Not all reasons given for dropout were directly related to CBT-I but were included nonetheless (e.g. participant dropped out due to side effects of antidepressant medication or requirements of research trial).

Predictors of Treatment Dropout and Completion

Five studies reported predictors of treatment dropout and completion. Harvey and colleagues (2014) found that those who dropped out of treatment were more likely to have a longer duration of insomnia. Epstein and colleagues (2012) found that those who dropped out of treatment were more likely to be older males. Manber and colleagues (2016) found that those who dropped out of treatment were more likely to be younger in age and with a lower level of education. Perlis and colleagues (2001) found that those who completed treatment were more likely to be diagnosed with primary insomnia and delayed sleep phase syndrome. Finally, although the difference was not significant, Birling and colleagues (2018) found that non-adherence to SR sleep prescriptions and SC instructions was higher in those who dropped out of treatment, compared to those who completed treatment.

Attendance

Proportion Meta-Analysis

Sixteen studies reported attendance data, however the way that this data was reported varied between studies. Eight studies provided data that could be used within the analysis, however some studies had multiple eligible treatment conditions. Therefore, 10 data points were extracted. A proportion meta-analysis yielded a pooled estimate of 96.71% attendance across all included data points (k = 10, 95% CI 92.78, 98.54), with large heterogeneity (Q = 42.10, df = 9, p <.001, I^2 = 78.62). I^2 indicated that approximately 78% of the total variance was attributed to variability in true effects (Borenstein et al., 2009). The forest plot (Figure 2.3) shows attendance rates with 95% confidence intervals. Across studies, attendance ranged from 85% to 100%, and no studies were identified as outliers. The full attendance data extracted from all studies can be found in Table 2.6.

[Figure 2.3]

Sensitivity Analysis

A sensitivity analysis was conducted to re-run the two main meta-analyses (participant dropout and attendance) including only the studies that were rated as "high" or "adequate" quality. See Table 2.3 for study ratings. Fourteen studies rated as "low" quality were removed from the dropout proportion meta-analysis which equated to 17 data points. A proportion meta-analysis yielded a pooled estimate of 9.26% dropout across all included studies (k = 55, 95% CI 7.18, 11.89), with moderate heterogeneity (Q = 114.46, df = 54, p <.001, I^2 = 52.82). I^2 indicated that approximately 53% of the total variance was attributed to variability in true effects (Borenstein et al., 2009).

[Figure 2.4]

One study was removed from the attendance proportion meta-analysis which equated to two data points. This left eight data-points for the meta-analysis which meant that it was not possible to run the analysis for the attendance data if the studies rated as low quality were removed.

Refusal of CBT-I

Five studies reported rates of refusal of CBT-I, and only four of these studies reported the reasons given. Therefore, it was not possible to run a proportion meta-analysis on this data. Refusal rates ranged from 8.57% to 41.67%. Xing and colleagues (2020) found that six participants refused because they were unwilling to accept CBT-I, Lah and colleagues (2019) found that two participants refused CBT-I because they didn't have the time to do it, and Birling and colleagues (2018) found that eight participants refused because they were unwilling or unable to follow the CBT-I programme. McCarthy and colleagues (2018) found that four participants refused CBT-I, two because they were uncomfortable with the technology involved

in the electronic delivery and two because they believed it would be too burdensome. Further details of refusal and percentages can be found in Table 2.7.

Adherence to the Treatment

Measures of Adherence

Only 19 of the 62 studies included measured adherence to the treatment protocol. The studies and descriptions of these measures can be found in Table 2.8. This was covered in more detail in previous systematic reviews (Matthews et al., 2013; Agnew et al., 2021) so has not been elaborated upon further. Matthews and colleagues (2013) included 15 studies where adherence had been measured and reported, whereas Agnew and colleagues (2021) included 53 studies. It is difficult to directly compare these numbers, as different inclusion/exclusion criteria were utilised.

Between Session Tasks Completed

The majority of studies measured between session tasks completed by reporting the extent to which advice and sleep instructions were followed. Overall, 11 studies measured the completion rate of between session tasks. Only eight studies reported this data and this was reported as a combination of means and percentages. Therefore, it was not possible to run a meta-analysis on this data. Average treatment compliance to between session tasks reported in percentages ranged from 50-90% (Epstein et al., 2012; Perlis et al., 2004; Vallieres et al., 2005; Lichstein et al., 2000; Riedel et al., 2001). Further details of reported means and averages can be found in Table 2.8.

Predictors of Adherence

One study reported a predictor of adherence to the treatment protocol. Bastien and colleagues (2004) reported that increased self-efficacy scores predicted increased adherence to the treatment.

Association Between Adherence and Outcomes

Three studies reported associations between adherence and outcomes, therefore it was not possible to run a meta-analysis on this data. Manber and colleagues (2008) found that therapist's ratings of participant compliance were not significantly associated with an improvement in insomnia outcomes. Lichstein and colleagues (2000) measured adherence using an index that rated minutes of relaxation practice, change in relaxation ratings and heart rate pre and post practice and proportion of SC instructions followed. They found that adherence in these areas was correlated with an improvement in sleep quality ratings from baseline to follow up ($r = .44$, $p < .05$). Finally, Riedel & Lichstein (2001) found that more closely adhering to the time in bed prescription was associated with significantly lower wake after sleep onset in minutes and significantly higher sleep efficiency. They also found that more consistent waking times predicted significantly fewer awakenings at night and higher sleep quality ratings. Overall, adherence to bedtime restriction and sleep schedule consistency significantly predicted wake after sleep onset post treatment.

Publication Bias

Publication bias was unlikely to be an issue for this meta-analysis. This is because proportion meta-analyses do not involve a calculation of significance, therefore, statistical non-significance is unlikely to be an issue that may have biased publications (Maulik et al., 2011).

Discussion

This systematic review and meta-analysis explored dropout, attendance, refusal, and adherence to the treatment within CBT-I. A proportion meta-analysis yielded a pooled estimated dropout of 9.79%. Subgroup analyses indicated significantly higher dropout in individual CBT-I sessions compared to group CBT-I. Furthermore, although the differences were not significant, higher dropout was found in adult samples compared to older adults, some elements of CBT-I compared to full CBT-I, eight sessions compared to four, eight weeks of treatment compared to four weeks, and session frequency of less than once per week compared to weekly. The most common reason provided by those who dropped out of treatment was that CBT-I required too high of a time commitment. Several predictors of dropout were reported, including longer insomnia duration, being an older male, being younger in age with a lower level of education, and non-adherence to SC and SR. One study reported a predictor of treatment completion as having a diagnosis of primary insomnia and delayed sleep phase syndrome.

Attendance of CBT-I sessions was high, with a proportion meta-analysis yielding a pooled estimate of 96.71% attendance. Refusal of CBT-I was reported by a small number of studies, and rates ranged from 8.57% to 41.67%. Eighteen participants gave reasons for refusing CBT-I. Similar to the dropout data, four participants gave reasons relating to CBT-I taking up too much time or being too burdensome, and eight participants stated they were unwilling to follow the CBT-I treatment requirements. Only 19 studies measured adherence to the treatment, and measurement and reporting varied greatly between the studies. From the data reported, adherence to homework tasks and treatment instructions ranged from 50-90%. One study reported that higher self-efficacy predicted adherence to the

treatment. Three studies reported associations between adherence and insomnia outcomes. One study found that adherence was not significantly related to improvements in insomnia outcomes. However, the other two studies found that increased adherence to the treatment correlated with higher sleep quality ratings, lower wake after sleep onset in minutes, higher sleep efficiency, and fewer night time awakenings.

To the authors knowledge, no other proportion meta-analyses have been conducted to explore dropout rates in CBT-I, so this is the first indication of pooled dropout across multiple studies. The estimate of pooled dropout was lower than all estimates of during-treatment dropout from a meta-analysis of CBT across multiple mental health disorders, with depression and substance abuse being the highest rates and anxiety disorders being the lowest (Fernandez et al., 2015). Lower dropout rates could indicate that CBT-I may be more tolerable than other types of CBT.

The most common reason given for dropout was that the treatment required too much of a time commitment. The full package of CBT-I requires participants to make a number of changes to multiple areas of their life, including both their daytime and night time behaviours (e.g. reducing caffeine intake and stopping daytime naps). CBT-I also includes the addition of new behaviours (e.g. relaxation strategies or SC instructions), and previous research has shown that combining CBT-I components is more effective than providing the individual elements alone (Harvey et al., 2014). This could be perceived as burdensome by participants and therefore a reason for discontinuing treatment. However, it is also interesting that the results indicated higher dropout when participants are provided with some components of CBT-I when compared to the full package. It could be assumed that the full package would be more burdensome, so this does not fit with the findings about the reasons

given for dropout. As previous research has shown that complete CBT-I is more effective (Harvey et al., 2014), it could be hypothesised that if participants could see a noticeable improvement in their sleep, they were less likely to drop out of treatment and more likely to invest their time into the intervention.

The subgroup analyses of dropout that explored participant age and the way the treatment was delivered highlighted some important findings. This review found lower rates of dropout in group compared to individual CBT-I. A previous systematic review (Ho et al., 2015) found higher dropout in self-help CBT-I compared to therapist-led. It was not possible to replicate this study as there was not enough data, but these findings highlight that mode of delivery may be a factor in whether a participant completes treatment or not. This will be an important consideration for future CBT-I research when aiming to reduce dropout. Furthermore, although not significant, less dropout was found in older adult samples compared to adult samples. This is promising, as older adults experience more adverse effects from sleep medication than adults (NIH, 2005). Therefore, it is important that CBT-I is generally well tolerated by older adults.

Further subgroup analyses of dropout fit with the reasons given for dropout. For example, higher dropout was found in eight sessions compared to four, and eight weeks of treatment compared to four. This indicates that shorter time periods of CBT-I led to fewer dropouts, perhaps because participants found the time commitment more manageable. However, weekly sessions were found to have less dropout than sessions being provided less frequently. This does not fit with the most common reason given for dropout, as it would be assumed that weekly sessions are more time consuming than sessions held every two or three weeks. Participants may have felt that weekly sessions provided more motivation to continue treatment,

whereas less frequent sessions could have reduced this motivation or commitment to treatment.

Longer insomnia duration being a predictor of dropout fits with a previous study that found an average baseline total sleep time of less than 3.65 hours was a predictor for dropout (Ong et al., 2008) which, together, might indicate that increased insomnia severity may be a predictor for dropout. However, a meta-analysis exploring predictors of dropout from CBT-I (Yeung et al., 2015) found that those with longer sleep duration and less severe insomnia were less likely to complete treatment. This could be because those with better sleep at baseline were less invested in the treatment, which would fit with the findings about reasons given for dropout. These contradictory findings indicate that further research is needed into reasons for and predictors of dropout in CBT-I.

In the small number of studies that reported attendance, a large majority of sessions were attended, which may indicate that participants committed to the intervention. None of the included studies reported predictors of attendance, and there was not enough data available to run subgroup analyses within this review, therefore it was not possible to make comparisons with previous research findings (Short et al., 2021; Cui & Fiske, 2019). The proportion of attendance found in this review was higher than in previous research (Short et al., 2021). However, this estimate is from a small number of studies, and further research is needed to confirm and extend these findings. Consequently, this review indicates a need for future studies to report attendance routinely as part of their findings.

Refusal of CBT-I was only reported by a small number of studies, and it was not possible to run a proportion meta-analysis. From the studies that reported reasons for refusal, the majority related to CBT-I being too burdensome or that participants

were unwilling to follow the CBT-I protocol. This fits with the reasons given for dropout. Future research should investigate refusal rates and reasons given for refusal, as the high rates of refusal identified (up to 41.67% in one study; Lah et al., 2019) warrant further exploration. It appears that there are currently no studies that primarily explore rates of refusal in CBT-I in more detail than reporting numbers within participant flow charts. Future studies should routinely report refusal rates and reasons given for refusal. If a participant states that they are unwilling to follow the CBT-I protocol it would be helpful to further explore this and ascertain which elements specifically cause them concern. This information, combined with further studies about why participants dropout of CBT-I, may provide an indication of changes that could be made to make CBT-I more acceptable and therefore reduce refusal and dropout rates.

Only 19 of the 62 included studies reported measuring adherence to the treatment protocol, which is more than the 15 studies from Matthews and colleagues (2013) but less than those from Agnew and colleagues (2021). This is likely due to differing inclusion/exclusion criteria (e.g. this review excluded studies where participants were taking sleep medication). It is important for studies to routinely measure and report adherence findings. Less than half of the included studies in this review measured adherence and even less reported their findings, with only eight reporting the completion rate of between session tasks. Similar conclusions were drawn by the two previous reviews (Matthews et al., 2013; Agnew et al., 2021). The findings from this review and the previous studies will add to the literature around adherence within CBT-I. Furthermore, the findings could help to reach a consensus around defining adherence to standardise measuring and reporting adherence outcomes.

From the studies that did report their findings, adherence ranged from 50-90%, indicating that further research is needed into why these estimates varied so greatly. The adherence to treatment estimates within this review fit with previous findings of adherence to common medical and sleep related treatments (DiMatteo, 2004). Only one study reported a predictor of adherence, and three reported associations between adherence and insomnia outcomes. The findings between the studies were contradictory, highlighting the need for further research in this area to better understand the links between adherence and insomnia outcomes. Increasing understanding around adherence to treatment instructions within CBT-I is important, as adhering increases the effectiveness of a healthcare treatment and improves patient safety (Sabaté & Sabaté, 2003).

Within the review 7.5% of studies were excluded for reporting no data relating to dropout, refusal, attendance, or adherence. However, this number is likely higher, as reasons for excluding a study were reported as the first exclusion criteria that the researchers found. From the variables of interest, dropout was mostly commonly reported (61 of the 62 included studies), but only 27 of those studies reported reasons given for dropout. Only 16 of the included studies reported attendance, five studies reported refusal, and 19 measured and/or reported adherence data. These findings were not routinely analysed or reported within the research, even within the studies that had measured adherence. This again highlights the need for these variables to be routinely recorded and reported within CBT-I research.

Strengths and Limitations

This is the first comprehensive systematic review and meta-analysis of dropout, attendance, refusal, and adherence to treatment within CBT-I. To the authors knowledge, this is the first study to explore refusal in CBT-I in detail. A

strength of this review is that participants who were taking sleep medication were excluded, as it was unclear whether medication impacts upon the outcomes explored. Sixty-two studies were identified and included within the review, which strengthens the findings. Although it was not possible to run all of the subgroup analyses that were planned a-priori, a number of factors were still explored and some interesting differences found, which could be used to help shape service provision in the future.

The findings highlight several key areas to be considered by future research, including the need for routine measuring and reporting of these outcomes. The findings can be used to help reach a consensus around defining and measuring adherence to treatment.

This review has a number of limitations. Firstly, there were several studies that were potentially eligible for this review, but did not report the variables of interest and were therefore excluded. Unfortunately, due to limitations on time and resources, it was not possible to contact the authors of these papers to request any relevant data that might not have been published. Furthermore, only studies that were published in a peer reviewed journal were included, which may mean that data from unpublished studies are missing.

Additionally, as studies that allowed participants to continue taking sleep medication were excluded, the results are not representative of all CBT-I studies and cannot be generalised to those taking sleep medication. Future reviews may wish to compare adherence in CBT-I interventions that allow medications to those that do not to see if adherence and dropout differs. It is important to note another limitation, in that the exclusion of medication that was prescribed for sleep does not necessarily mean that all participants taking medication that may have impacted on their sleep were excluded from the study. Participants may have been taking over the counter

medication for their sleep and not have notified the researchers, or they may be taking other medications, such as antihistamines or antidepressants, which may still impact upon sleep, even if they were not prescribed for this reason.

Another limitation is that, due to limited time and resources, it was not possible for each study to be screened by both of the first two authors against the inclusion/exclusion criteria. Only a small percentage of studies were double screened at the title and abstract stage (15%) and none at the full text stage, although the first author screened a large majority. Furthermore, only a small percentage of studies (21%) could be double rated using the quality assessment tool and only a small percentage of the data extraction could be checked for accuracy. Future reviews may wish to use additional resources to have each stage checked by two reviewers to increase accuracy and reliability.

An additional limitation is that it was not possible to run all of the subgroup analyses that were planned. This was unfortunate, as some potentially influential moderators of dropout may have been missed. This study attempted to be as broad and inclusive as possible, by including both controlled and uncontrolled studies to ensure the results were as ecologically valid and reflective of real-life situations as possible. However, this means that some of the uncontrolled studies may not be as rigorous as a randomized control trial (RCT) of CBT-I. To minimise the impact of this, a quality rating tool was used and a sensitivity analysis conducted to remove the low-quality studies, however it may be beneficial for a future review to run a similar analysis using only RCT data to see if the results differ. The studies included in this review varied in terms of their quality ratings, and less than half were rated as high quality, which may have also impacted on the findings. Alternatively, using rigorously controlled laboratory settings to conduct research into CBT-I may not

provide representative results of what “real life” therapy may look like, for example within primary mental health services. Therefore, dropout rates may differ in research settings compared to clinic settings. It may be more beneficial for future research to assess these outcomes within an Improving Access to Psychological Therapies service instead.

Another limitation of the current review is that not all studies reported the reasons given by participants for dropout. The authors defined dropout for this study and applied these criteria when extracting dropout data, however there may have been cases where participants dropped out of treatment because they were early responders and did not require the full dose of the intervention for improvements to be seen. Therefore, dropout from the intervention may not always be negative. However, it would be helpful for this information to be reported routinely to be able to make this distinction.

A final limitation of this study is that some of the 95% confidence interval estimates were quite wide, particularly in subgroup analyses with a small number of included studies. Furthermore, some of the meta-analysis results showed that studies had significant heterogeneity. Therefore, the results should be generalised with caution.

Implications

The findings from this review indicate that CBT-I is generally well tolerated and acceptable when considering that dropout rates were low and favourable when compared to other forms of CBT, and attendance was generally high. However, there may be steps that researchers can take in order to reduce dropout and refusal further, and increase attendance and adherence. In order to further improve the acceptability of CBT-I interventions, researchers should consider the findings from this study,

particularly that participants often find CBT-I to be time consuming and burdensome, and that certain subgroups showed higher dropout that others.

The findings highlight that mode of delivery may be a factor in whether a participant completes CBT-I treatment or not. This will be an important consideration for future research when aiming to reduce dropout. Finding significantly higher dropout in individual compared to group CBT-I indicates that offering group interventions may be better for participants, but also for services as an efficient way to use already stretched resources. Another review had previously suggested that self-help CBT-I has higher dropout than therapist led treatment (Ho et al., 2015), indicating that it may be more effective for therapists to provide treatment directly, even if it may be less efficient.

The finding that there was lower dropout in older adult samples when compared to adult samples is promising, supporting the recommendation that CBT-I is a better alternative for older adults with insomnia than sleep medication (NIH, 2005). Future research should continue to explore subgroup differences in dropout, attendance, refusal, and adherence as there are many other potential modifiers that may have been missed from this analysis, such as anxiety and depression symptoms.

It is imperative that future intervention studies routinely assess and report findings around dropout, attendance, refusal, and adherence to the treatment. Rates of refusal and reasons for this warrant further exploration in particular, as this is an area that is rarely focused upon within CBT-I studies. It appears that often participants are refusing because they are perceiving CBT-I negatively, but it is not clear which elements specifically are causing them concern, which could be explored further.

Many studies were excluded from this review because they had not assessed or reported the outcomes of interest. This would support the suggestions made by Agnew and colleagues (2021) that there is a need for consensus around the definition of adherence and how to measure it, for example with a standardised outcome measure. From the results of this review, it is clear that not only a consensus definition for adherence is needed, but also for dropout, attendance, and refusal. Routinely measuring and reporting these variables would also allow for further research to be conducted on predictors of treatment completers and treatment dropouts, as well as associations between adherence to the intervention and insomnia outcomes.

Although the results from this meta-analysis provide helpful and important data, they could also be seen as reductive. Qualitative, interview-based studies with participants who have taken part in CBT-I interventions would allow for a more in-depth exploration of each outcome, including reasons for dropout, refusal, non-attendance, and non-adherence. This may provide further insight into how to make CBT-I more tolerable for participants. Improving these outcomes would likely make CBT-I more effective and efficient, and would therefore be a better use of resources.

Conclusion

In conclusion, this study is the first to provide a comprehensive systematic review and meta-analysis of dropout and attendance in CBT-I, as well as further adding to the literature around refusal and adherence to treatment. This review found that dropout from CBT-I is minimal compared to other formats of CBT, and attendance was high. The most common reasons given for refusal of CBT-I and dropout before treatment completion were related to the time commitment required. This warrants further exploration and should be taken into consideration by

researchers when designing CBT-I interventions and offering the treatment to participants. Furthermore, the findings indicate that there is a significant need for dropout, attendance, refusal, and adherence to be routinely recorded and reported in research findings to further enhance understanding of treatment acceptability and to reach a consensus around defining, measuring and reporting adherence in CBT-I studies.

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Table 2.1. Key components of Cognitive Behavioural Therapy for Insomnia

Component	Description
Stimulus control	Instructions designed to reassociate bed with sleep and to establish a consistent sleep/wake schedule.
Sleep restriction	Instructions to limit time in bed to actual sleep time. Creates mild sleep deprivation to result in more consolidated and efficient sleep.
Relaxation training	Methods aimed at reducing somatic tension or intrusive thoughts interfering with sleep.
Cognitive therapy	Aims to challenge and change faulty beliefs and attitudes about sleep and insomnia.
Sleep hygiene	General guidelines about health practices and environmental factors that may affect sleep.

Table 2.2. Included study characteristics

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Aslund et al. (2020)	23	15.5 (1.6) AD	18	Non-controlled clinical pilot study	NS[a]	DSM-IV criteria and ISI >10	SE, SH, SR, SC, R	Therapist led Individual Face to face	Six 45-minute sessions weekly	Clinical psychologist with >18 months CBT training.
Bastien et al. (2004) *Individual CBT*	15	43.9 (10) A	11	Repeated measures comparison pre and post	SOI or SMI	SOL or WASO > 30 minutes per night, minimum of three nights per week for at least 6 months. Complaint of at least one negative daytime effect attributed to poor sleep.	SC, SR, CT, SH	Therapist led Individual Face to face	Eight 50-minute sessions weekly	Certified clinical psychologists or doctoral students in the field of psychology with prior clinical experience, working from a treatment manual.
Bastien et al. (2004) *Group CBT*	16	40 (10.4) A	11	Repeated measures comparison pre and post	SOI or SMI	SOL or WASO > 30 minutes per night, minimum of three nights per week for at least 6 months. Complaint of at least one negative daytime effect attributed to poor sleep.	SC, SR, CT, SH	Therapist led Group (4-6 participants) Face to face	Eight 90-minute sessions weekly	Certified clinical psychologists or doctoral students in the field of psychology with prior clinical experience, working from a treatment manual.
Bastien et al. (2004) *Telephone CBT*	14	41.6 (9.5) A	7	Repeated measures comparison pre and post	SOI or SMI	SOL or WASO > 30 minutes per night, minimum of three nights per week for at least 6 months. Complaint of at least one negative daytime effect attributed to poor sleep.	SC, SR, CT, SH	Therapist led Telephone	Eight 20-minute sessions weekly	Certified clinical psychologists or doctoral students in the field of psychology with prior clinical experience, working from a treatment manual.

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Bergdahl et al. (2016)	32		30	Prospective RCT	NS	DSM-V criteria	SE, SC, SR, CT, R	Therapist led Individual Face to face	Six 90-minute sessions weekly	Registered psychologists who have undergone CBT training and are experienced in providing CBT-I
Birling et al. (2018)	72	46.9 (12.8) A	57	One arm pilot trial	NS	DSM-V criteria	SE, SH, SC, SR, CT, R	Therapist Led Group and individual sessions	Eight 50-90-minute sessions weekly	Postgraduate clinical psychology students who received 3 days training from a CBT specialised psychiatrist. All had treated at least 4 patients using CBT-I prior to the trial.
Carney et al. (2017) *CBT-I + AD*	36	45 (9.4) A	20	Blinded RCT split plot experimental design	NS[a]	Research diagnostic criteria for Insomnia, ISI >= 15, mean sleep diary total wake time >= 60 minutes per night and mean sleep efficiency <85%	SE, SC, SR, CT	Therapist led	Four 60-minute sessions over 8 weeks	Novice graduate students naïve to sleep treatments. Masters level students with at least one year of practicing other CBTs. Trained by the principle investigator in CBT-I
Carney et al. (2017) *CBT-I + Placebo*	36	41.8 (12.9) A	26	Blinded RCT split plot experimental design	NS[a]	Research diagnostic criteria for Insomnia, ISI >= 15, mean sleep diary total wake time >= 60 minutes per night and mean sleep efficiency <85%	SE, SC, SR, CT	Therapist led	Four 60-minute sessions over 8 weeks	Novice graduate students naïve to sleep treatments. Masters level students with at least one year of practicing other CBTs. Trained by the principle investigator in CBT-I

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Crönlein et al. (2019)	95	50.9 (12.1) A	76	Pre and post design	CI	ICD-10 criteria	SC, SR, R, CT	Therapist led Group (8 participants) and individual	10 hours of group sessions and 5 hours single sessions over 14 days	
Dang-Vu et al. (2017)	29	42.8 (15.7) A	19	Pre and post pilot study	CP	ICSD-3 criteria for Chronic Insomnia Disorder	SE, SH, SC, SR, R	Therapist led Group (4-6 participants)	Six 90-minute sessions weekly	Licensed clinical psychologist with training and experience in CBT-i
de Bruin et al. (2015) *Internet*	39	15.3 (1.4) AD	33	Parallel group RCT	P	DSM-IV criteria	SE, SH, SC, SR, CT, R	Self-help Online intervention with therapist feedback	Required to log on once per week for 6 weeks	Therapist guided by protocol
de Bruin et al. (2015) *Group*	38	15.6 (1.7) AD	26	Parallel group RCT	P	DSM-IV criteria	SE, SH, SC, SR, CT, R	Therapist led Group (6-8 participants)	Six 90-minute sessions weekly	Therapist guided by protocol
de Bruin et al. (2014) *Internet*	13	14.3 (1.3) AD	11	Pilot study	NS	Insomnia complaints at least 3 days a week for four weeks or more based on self-reports and the HSDQ	SE, SH, SC, SR, CT, R	Self-help personalised online intervention with therapist feedback	Required to log on once per week for six weeks, with a booster session two months later	Certified sleep specialists who attended a day long training session in online conversation skills

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
de Bruin et al. (2014) *Group*	13	14.9 (1.9) AD	10	Pilot study	NS	Insomnia complaints at least 3 days a week for four weeks or more based on self-reports and the HSDQ	SE, SH, SC, SR, CT, R	Therapist led Group (6-7 participants)	Six 90-minute sessions, weekly	Certified sleep specialists
Drake et al. (2019)	52	55.3 (5.9) A	52	RCT	CI[a]	DSM-V criteria; WASO >= 60 minutes on three or more nights per week, onset or exacerbated during peri/post-menopausal period. Mean WASO of >= 45 minutes across two overnight PSGs.	SH, SC, SR, CT, R	Therapist led Individual Face to face	Six sessions, weekly	Registered nurse specialist in behavioural sleep medicine.
Edinger et al. (1996)	8	64.5 (4.1) OA	5	2x2 Comparison pre and post pilot study	NS[a]	Insomnia complaints for more than six months	SE, SC, SR	Therapist led Individual	Four sessions, weekly	
Edinger & Sampson (2003)	10			Single blind randomized group design	P	DSM-IV criteria and >= 1-month difficulty initiating and/or maintaining sleep.	SE, SC, SR	Therapist led Individual	Two 25-minute sessions twice weekly	Beginning level clinical psychologist with training and supervision in behavioural sleep medicine.

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Edinger et al. (2007) *Two sessions*	18	55.5 (10.6) A	10	Double blind randomised parallel group design	SMI	DSM-IV criteria for primary insomnia, nightly mean WASO >60 minutes, insomnia duration over six months, onset after age 10, and reported one or more poor sleep hygiene practices	SE, SC, SR	Therapist led Individual Face to face	Two sessions over eight weeks, first session 45-60 minutes, second session 15-30 mins	Licensed clinical psychologists, 5 and 17 years of experience with sleep disordered patients
Edinger et al. (2007) *Four sessions*	24	57 (10.2) A	12	Double blind randomised parallel group design	SMI	DSM-IV criteria for primary insomnia, nightly mean WASO >60 minutes, insomnia duration over six months, onset after age 10, and reported one or more poor sleep hygiene practices	SE, SC, SR	Therapist led Individual Face to face	Four sessions over eight weeks, first session 45-60 minutes, subsequent sessions 15-30 mins	Licensed clinical psychologists, 5 and 17 years of experience with sleep disordered patients
Edinger et al. (2007) *Eight sessions*	17	54.7 (9.8) A	9	Double blind randomised parallel group design	SMI	DSM-IV criteria for primary insomnia, nightly mean WASO >60 minutes, insomnia duration over six months, onset after age 10, and reported one or more poor sleep hygiene practices	SE, SC, SR	Therapist led Individual Face to face	Eight sessions over eight weeks, first session 45-60 minutes, subsequent sessions 15-30 mins	Licensed clinical psychologists, 5 and 17 years of experience with sleep disordered patients

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Edinger et al. (2001)	25	55.8 (12.1) A	11	Double blind placebo controlled RCT group design	PPI	Met criteria for PPI, one-week average WASO >= 60 minutes or, insomnia onset after age 10, insomnia duration over six months	SE, SC, SR	Therapist led Individual Face to face	Six 30-60-minute sessions, weekly	Beginner level clinical psychologists naïve to behavioural insomnia therapy.
Epstein et al. (2012)	41	67.2 (6.6) OA	27	RCT with waitlist control	CP	Sleep onset or maintenance insomnia of 45 minutes or longer per night for at least 3 nights per week, duration over 6 months, and impaired daytime functioning as a result of insomnia	SE, SH, SC, SR	Therapist led Group (4-6 participants) and telephone	Six sessions, weekly, first session two hours, next three sessions 1hour, final two sessions 15 minutes	Masters level psychiatric mental health clinical nurse specialist and PhD level nurse. Experienced mental health therapist, trained in insomnia treatments.
Falloon et al. (2015)	46	55.4 (12.7) A	39	Parallel design RCT	P	Primary insomnia for over 6 months	SH, SR	Therapist led initially, then self-help Individual Face to face	Two sessions, two weeks apart	Study GP
Fernando et al. (2013)	22	58 A	15	Double blind RCT	P	Difficulty with sleep initiation or maintenance on at least three nights per week for more than one month with no other causes of insomnia identified	SH, SR	Therapist led Individual	Written instructions for SH provided, personalised instructions for SRT, sessions at 2 and 6 weeks	

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Friedman et al. (2000)	16	65.1 (8.6) OA	9	Pre and post design	P	SE < 80%, SOL > 30 minutes or TST < 6 hours or > 30 WASO on 5 nights during two weeks of sleep diary data	SH, SR	Therapist led Individual	Once a week for four weeks and a final session later	
Guillemin ault et al. (2008)	15	30.9 (5) A	10	Prospective randomised crossover study	NS[a]	Complaint of insomnia for at least 3 months, sleep problems at least 3 times per week, report of sleep disturbance at least 30 minutes on the insomnia nights, associated consequences of daytime fatigue or sleepiness, difficulty concentrating and impairment of daytime social or professional activities.	SH, SC, SR, R	Therapist led Group	Seven 90-minute sessions over 9 weeks	Experienced psychologist board certified in behavioural sleep medicine
Guillemin ault et al. (2002)	34	A	34	Pre and post experimental design with control	CI[a]		SH, SC, SR, CT	Therapist led	Four, weekly sessions, two week break, then two, weekly sessions all 90 minutes	

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Ham et al. (2020)	28	A	28	RCT	Insomnia or poor sleep quality	ISI score >= 10 or PSQI score >5	SH, SC, SR, CT, R	Therapist led Group and individual sessions	Group session two hours, weekly. Individual sessions 30-60 minutes	Sleep psychologist, psychiatrist, nurse counsellors. Trained by a nurse practitioner working in the field of sleep, participated in a CBT-I seminar and sleep symposium.
Harvey et al. (2014) *CBT-I*	60	46.9 (11.3) A	32	RCT	PPI	SOL and/or WASO greater than or equal to 6.5 hours per night, insomnia present for over three nights per week and longer than 6 months. Sleep disturbance or associated fatigue causes significant distress or impairment in functioning (Score of 2 and over on item 5 or 7 of the ISI)	SC, SR, CT	Therapist led Individual	Eight 75-minute sessions, weekly	Licensed clinical psychologist or advanced graduate students in clinical psychology who completed all of their clinical training requirements. Attended joint workshops with study principle investigators

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Harvey et al. (2014) *BT*	63	48.5 (13.6) A	40	RCT	PPI	SOL and/or WASO greater than or equal to 6.5 hours per night, insomnia present for over three nights per week and longer than 6 months. Sleep disturbance or associated fatigue causes significant distress or impairment in functioning (Score of 2 and over on item 5 or 7 of the ISI)	SC, SR	Therapist led Individual	Eight 45-60-minute sessions, weekly	Licensed clinical psychologist or advanced graduate students in clinical psychology who completed all of their clinical training requirements. Attended joint workshops with study principle investigators
Hou et al. (2014)	52	54.5 (13.8)	31	RCT	NS[a]	Met criteria for insomnia in CCMD-3	SC, R	Therapist led Group (8-9 participants)		Physician
Hwang et al. (2019)	21	46.9 (11.9) A	16	Pre and post design	CI	ICSD-2 criteria for psychophysiological insomnia for over six months	SH, SC, SR, CT[b]	Therapist led Individual	Five 90-minute sessions, weekly	Certified psychologists
Jacobs et al. (2004)	15	47.1 (8.1) A	10	Placebo controlled RCT with four conditions	SOI and SMI	Primary sleep onset insomnia for at least 6 months defined as SOL of at least 1 hour 3 or more times per week - verified by sleep diaries. At least one negative daytime complaint attributed to insomnia	SC, SR, R[b]	Therapist led Individual Face to face	Four 30-minute face to face sessions and one 15-minute telephone session over six weeks	Pre-doctoral and post-doctoral psychologists

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Jan et al. (2019)	35	40.3 (11.3) A	23	Pre and post design	NS	DSM-V criteria with SOL more than or equal to 30 minutes, WASO more than or equal to 30 minutes, and/or early morning awakening. Frequency 3 or more nights per week and longer than 3 months with associated stress and/or daytime impairments.	SE, SH, SC, SR, R		Six sessions over 7 weeks	Clinical psychologist with certification in behavioural sleep medicine or graduate students who received training in behavioural sleep medicine under the supervision of the certified psychologist
Johann et al. (2020)	23	40.8 (14) A	14	Preliminary RCT	NS	DSM-V criteria	SH, SC, SR, SC, R[b]	Therapist led Individual	Eight 50-minute sessions, weekly	

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Jungquist et al. (2010)	19	52 (9.9) A		Single Blind RCT	Comorbid insomnia[a]	SOL and/or WASO more than 30 minutes for at least three days per week for over six months	SH, SC, SR, CT	Therapist led Individual	Eight 30-90-minute sessions, weekly	Masters prepared nurse therapist who attended a 2.5-day seminar on diagnosing and treating sleep disorders and the delivery of CBT-I, viewed a series of videotaped CBT-I sessions conducted by a licensed clinical psychologist who had experience conducting CBT-I in research and clinical venues. Worked from a treatment manual
Kapella et al. (2011)	14	65 (9) A	2	Pre and post-test design with random assignment	NS[a]	Self-reported difficulty initiating or maintaining sleep, waking too early or poor sleep quality.	SH, SC, SR, CT, R	Therapist led Individual	Six sessions, weekly	Nurse behavioural sleep medicine specialist who attended a 2.5 day seminar on insomnia and CBT-I.
Kim et al. (2019)	19	49 (12.3) A	10	Repeated measures experimental design	PI	ICSD-2 criteria for PI	SE, SH, SC, SR, CT	Therapist led Individual	Five 90-minute sessions, weekly	Certified Psychologists
Kim et al. (2017)	25	49 (12.3) A	10	Exploratory prospective intervention study	PI	ICSD-2 criteria for PI	SE, SH, SC, SR, CT	Therapist led Individual Face to face	Five sessions	Certified Psychologists

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Lah et al. (2019)	5	11.8 AD	1	A-B design with follow up and randomised baseline	NS[a]	Meeting RDC for insomnia and a score of 8 or over on the ISI	SE, SH, SC, SR	Therapist led Individual and family sessions Remote delivered via video conferencing.	Four 75-minute sessions, weeky	Clinical Psychologist or clinical neuropsychologist skilled in CBT and trained in implementation of CBT-I
Lee et al. (2018)	25	51 (10.2) A	10	Pre and post experimental design with control	PI	ICSD criteria for PI	SC, SR, CT	Therapist led Individual Face to face	Five 90-minute sessions, weekly	Certified psychologists
Lichstein et al. (2000)	23	67.1 (6.1) OA	11	Clinical Trial	S[a]	Reported concerns about their sleep, daytime impaired functioning, and disturbed sleep. SOL >30 minutes, awakenings during the night totalling > or equal to 30 minutes, and early morning awakenings. Present for at least 3 times per week on average for at least 6 months	SH, SC, R	Therapist led Individual Face to face	Four 60-minute sessions, weekly	Graduate students in clinical psychology with 2-3 years clinical experience. Trained to use the treatment manual.
Lovato et al. (2016)	63	OA		RCT	SMI	WASO of > 30 minutes, at least 3 nights per week for at least 6 months, plus impaired daytime functioning	SE, SR, CT	Therapist led Group (4-5 participants)	Four 60-minute sessions, weekly	Therapist/Clinical consultant psychologists

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Lovato et al. (2014)	86	OA		2 (treatment) by 3 (time) mixed factorial design	SMI	WASO of > 30 minutes, at least 3 nights per week for at least 6 months, plus impaired daytime functioning	SE, SH, SR, CT	Therapist led Group (4-5 participants)	Four 60-minute sessions, weekly	Trainee psychologists with experience in CBT-i, using a treatment manual
Manber et al. (2019)	96	33.4 (5.2) A	96	RCT	Prenatal insomnia[a]	DSM-V criteria for Insomnia Disorder (except for one-month duration)	SE, SH, SC, SR, CT[b]	Therapist led Individual Face to face	Five sessions	Therapists naïve to CBT-I who were then trained to deliver CBT-I
Manber et al. (2016)	75	48.3 (12.7) A	53	RCT	P or insomnia due to another mental disorder[a]	DSM-IV Insomnia Disorder criteria and ISI score 11 or above	SE, SC, SR, CT	Therapist led Individual	Seven 45-minute sessions, weekly for four weeks, then two weeks, two weeks and four weeks	Trained to deliver intervention - workshop, self-guided reading and role plays.
Manber et al. (2008)	15	49.5 (13.6) A	8	Randomised control pilot study	NS[a]	DSM-IV criteria, SOL > 30 minutes and/or WASO >30 minutes per night, total sleep time < or equal to 6.5 hours at least three times per week	SE, SC, SR, CT	Therapist led Individual	Seven sessions, five weekly sessions and two every other week	Licensed clinical psychologists, naïve to CBT-I and trained in the delivery of CBT-I through treatment manuals and role play
McCarthy et al. (2018)	18	57.7 (6.5) A	18	Pre and post-test quasi experimental design	ST insomnia[a]	ISI score of 8 or more	SE, SH, SC, SR, CT	Therapist led Individual Remote via video conferencing	Six 30-60-minute sessions, weekly	Advanced practice nurse with CBT-I training

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Moon et al. (2020)	11	63 A	7	RCT - open-label parallel-group pilot trial	P[a]	ISI score 8 or more and sleep deprivation >1 month	SH, SC, SR, CT, R	Therapist led Individual	Four sessions, weekly	Five years of clinical experience
Morin et al. (1999)	18	64.4 (7.5) OA	13	4x2 placebo controlled RCT	SOI or SMI	SOL and/or WASO longer than 30 minutes per night on at least 3 nights per week, insomnia duration at least 6 months, complaint of at least one negative effect during waking hours attributed to insomnia	SE, SH, SC, SR, CT	Therapist led Group (4-6 participants) Face to face	Eight 90-minute sessions, weekly	Licensed clinical psychologist or post-doctoral fellow in clinical psychology, previously treated a minimum of 4 cases using the protocol.
Morin et al. (1993) *Immediate*	12	OA		2x2 split plot factorial design	SMI	ICSD criteria for PPI. WASO >30 per night for minimum 3 nights per week, duration at least 6 months, complaint of at least one negative effect during waking hours attributed to poor sleep.	SE, SH, SC, SR, CT	Therapist led Group (4-6 participants)	Eight 90-minute sessions, weekly	Clinical psychologist using detailed treatment manual

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Morin et al. (1993) *Delayed*	12	OA		2x2 split plot factorial design	SMI	ICSD criteria for persistent psychophysiological insomnia. WASO >30 per night for minimum 3 nights per week, duration at least 6 months, complaint of at least one negative effect during waking hours attributed to poor sleep.	SE, SH, SC, SR, CT	Therapist led Group (4-6 participants)	Eight 90-minute sessions, weekly	Clinical psychologist using detailed treatment manual
Morin et al. (2009)	80	51.7 (10.8) A	50	RCT	PPI	Difficulty initiating and/or maintaining sleep defined as SOL and/or WASO >30 minutes, corresponding sleep time less than 6.5 hours at least 3 nights per week. Duration over 6 months, and significant distress or impairment of daytime functioning measured by a score of 2 or over on item 5 of the ISI.	SH, SC, SR, CT	Therapist led Group therapy	Six 90-minute sessions, weekly	Masters level clinical psychologists using a treatment manual
Okajima et al. (2020) *Tailored BBTI*	24	43.4 (11.9) A	10	RCT - prospective parallel group design	Initial, middle or terminal insomnia	ISI score of 8 or over	SE, SH, SC, SR, R	Self-help Smartphone App tailored based on assessments	Two weeks	N/A

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Okajima et al. (2020) *Standard BBTI*	23	42.6 (11.3) A	7	RCT - prospective parallel group design	Initial, middle or terminal insomnia	ISI score of 8 or over	SE, SH, SR, R	Self-help Smartphone App standard programme	Two weeks	N/A
Ong et al. (2020) *Arm A*	41	47.7 (12.6) A	20	Three arm RCT partial factorial design	Comorbid insomnia[a]	ICSD-2 criteria for insomnia	SH, SC, SR, CT	Therapist led Individual	Four 50-minute sessions, weekly	Doctoral level student, postdoctoral fellow or staff sleep psychologist
Ong et al. (2020) *Arm B*	39	53.2 (11.1) A	25	Three arm RCT partial factorial design	Comorbid insomnia[a]	ICSD-2 criteria for insomnia	SH, SC, SR, CT	Therapist led Individual	Four 50-minute sessions, weekly	Doctoral level student, postdoctoral fellow or staff sleep psychologist
Park et al. (2020)	19	45.8 (8.6) A	13	Pilot study	P[a]	DSM-IV criteria and PSQI score over 5	SH, SC, SR, CT	Self-help Computerised intervention with feedback from a sleep therapist	Nine 30-minute sessions, three per week	Automated online programme
Perlis et al. (2001)	89	46.5 (16) A	58	Case series	P or S	Extensive intake interview at sleep clinic	SH, SC, SR, CT	Therapist led Individual	3-9 sessions	Clinician with a PhD in Clinical Psychology, 15 years of experience and specialised expertise in behaviour therapy and behavioural sleep medicine plus a two week training period for using the clinical protocol

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Perlis et al. (2004)	11	47.4 (1.7) A	9	Randomised study with 3 arms	P	ICSD criteria for psychophysiological insomnia including; insomnia complaint and impaired daytime functioning, an indication of learned sleep-preventing associations and somaticized tension. SOL > or equal to 30 minutes, two or more awakenings at night of > or equal to 15 minutes duration and/or WASO > or equal to 30 minutes, where TST did not exceed 6 hours (unless SE 80% or less). Frequency of problem on more than 4 nights per week with a problem duration of six months or over.	SH, SC, SR, CT	Therapist led Individual Face to face	Eight 30-90-minute sessions, weekly	PhD level clinician with specialised expertise in CBT-i
Pigeon et al. (2017)	13	A	1	Pilot RCT	NS[a]	Trouble initiating or maintaining sleep for at least 3 months, contributing to at least one insomnia related daytime consequence and ISI score of 10 or over.	SE, SH, SC, SR, CT	Therapist led Individual Face to face and telephone	Four sessions, weekly	Graduate level psychology students trained in CBT-I

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Riedel & Lichstein (2001)	22	68 (7.1) OA	16	Pre and post design	SOI or SMI	Sleep difficulty three times per week for at least six months. SOL or WASO >30 minutes confirmed by two weeks of sleep diaries.	SH, SR	Therapist led Individual Face to face	Six sessions, weekly	Advanced graduate students in clinical psychology.
Sivertsen et al. (2006)	18	59.8 (4.3) OA	7	Randomised double blind placebo-controlled trial	CP	DSM-IV criteria, duration at least 3 months and complaints of impaired daytime functioning	SH, SC, SR, CT, R	Therapist led Individual Face to face	Six 50-minute sessions, weekly	Clinical psychologists
Smith et al. (2015)	50	59.2 (9.9) A	38	Double blind RCT with active placebo	NA[a]	RDC for Insomnia Disorder, symptom duration over one month, more than two nocturnal awakenings of over 15-minute duration, or self-reported WASO and/or SOL over 30 minutes	SH, SC, SR, CT	Therapist led Individual	Eight 45-minute sessions	Advanced doctoral candidates and postdoctoral clinical psychology fellows or faculty with experience in behavioural medicine
Talbot et al. (2014)	29	37.1 (10.4) A	22	RCT	NS[a]	RDC for insomnia, ISI score above 14	SH, SC, SR, CT	Therapist led Individual	Eight sessions, weekly	Licensed clinical psychologists or board-certified psychiatrist, trained by co-author who published the treatment manual for three days

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Taylor et al. (2007)	10	36.7 (11.6) A	6	Repeated measures pilot study	NS[a]	Self-report of insomnia for at least six months, SOL and/or WASO > or equal to 31 minutes at last three nights per week.	SH, SC, R	Therapist led Individual	Six 30-60-minute sessions, weekly	Advanced doctoral level graduate students in clinical psychology trained according to the procedures outlined.
Taylor et al. (2014)	17	19.5 (1.7) A	4	Pilot RCT	NS	DSM-V criteria	SH, SC, SR, CT, R	Therapist led Individual	Six sessions	Doctoral level graduate students trained in CBT-I
Tomfohr-Madsen et al. (2017)	14	31 (3.7) A	14	Open pilot study	NS[a]	ISI score of 8 or over	SE, SC, SR, CT	Therapist led Group (3-4 participants)	Five 90-minute sessions, weekly	Licensed PhD level clinical psychologist and a clinical psychology doctoral trainee, both trained in the delivery of group-based CBT-I
Vallieres et al. (2005)	6	A		Multiple baseline study sequential treatments	CI	SOL, WASO or early morning awakening equal or superior to 60 minutes at least four nights per week for the last six months, reporting significant distress or daytime impairments	SH, SC, SR, CT	Therapist led Individual	Five 50-minute sessions, once every two weeks	Licensed clinical psychologist who had previously treated several patients using the protocol.

Author	*n*	*M* age (*SD*)	Female	Study design	Insomnia type	Insomnia criteria	CBT-I	Administered	Intervention duration	Therapist training/experience
Wilckens et al. (2017)	40	69.3 (7.9) OA	29	Pre and post design	General insomnia disorder	DSM-IV/ICSD-2 criteria, ISI score 10 or over, combined mean sleep diary SOL and WASO >40 minutes, SE <90 minutes.	SH, SC, SR, CT, R	Therapist led Individual Face to face and telephone	Eight sessions, weekly. Six 45-50 minute in person sessions and two telephone sessions	Masters level mental health clinicians
Wu et al. (2006)	19			Four arm randomised trial	Chronic SOI or SMI	Difficulties in falling or staying asleep, SOL and/or WASO lasting longer than 30 mins per night, occurring at least three times per week for at least six months, causing distress or influencing daytime functioning	SH, SC, SR, CT	Therapist led	Eight weeks, sessions twice weekly	Licensed clinical psychologist using a manual. Undergone training in sleep CBT and independently treated three insomniacs using the manual before participating in the study
Xing et al. (2020)	32	49.4 (14) A	23	Prospective RCT	CI	Met DSM-V criteria, longer than six months	SE, SH, SC, SR, CT, R	Therapist led Group (8-10 participants)	Four 90-120 minutes sessions, weekly	Professional psychotherapist and clinician with 10 or more years of experience
Zavesicka et al. (2008)	10	48.6 (13.7) A	2	Randomised comparative clinical trial	CP	DSM-IV criteria for primary insomnia	SE, SH, SC, SR, CT, R	Therapist led Group (5 participants)	Eight 60-minute sessions weekly	

Note. Study conditions have been specified in the author column if there were multiple conditions; BT = Behaviour Therapy, BBTI = Brief Behavioural Therapy for Insomnia. Age: A = Adult, AD = Adolescent, OA = Older Adult. Study design; RCT = Randomised Control Trial. [a]Study stated that participants were experiencing comorbidities (e.g. depression). [b]Study stated that participants had no prior CBT-I

experience. Insomnia type; P = primary insomnia, S = secondary insomnia, CI = chronic insomnia, CP = chronic primary insomnia, PI = psychophysiological insomnia, PPI = persistent primary insomnia, SMI = sleep maintenance insomnia, SOI = sleep onset insomnia, ST = subthreshold, PLMD = Periodic Limb Movement Disorder, NS = not specified. Insomnia criteria; SOL = sleep onset latency, WASO = wake after sleep onset, SE = sleep efficiency, TST = total sleep time, ISI = Insomnia Severity Index, PSQI = Pittsburgh Sleep Quality Index, HSDQ = Holland Sleep Disorder Questionnaire, DSM = Diagnostic and Statistical Manual of Mental Disorders, ICD = International Classification of Diseases, PSG = Polysomnography, RDC = research diagnostic criteria, ICSD = International Classification of Sleep Disorders, CCMD = Chinese Classification of Mental Disorders. CBTI components; SE = sleep education, SH = sleep hygiene, SC = stimulus control, SR = sleep restriction, CT = cognitive therapy, R = relaxation.

Table 2.3. Study quality ratings

Author	Score	Rating
Aslund et al. (2020)	23	Adequate
Bastien et al. (2004)	22	Poor
Bergdahl et al. (2016)	27	Adequate
Birling et al. (2018)	25	Adequate
Carney et al. (2017)	35	High
Crönlein et al. (2019)	22	Poor
Dang-Vu et al. (2017)	23	Adequate
de Bruin et al. (2015)	31	High
de Bruin et al. (2014)	21	Poor
Drake et al. (2019)	33	High
Edinger et al. (1996)	23	Adequate
Edinger & Sampson (2003)	26	Adequate
Edinger et al. (2007)	34	High
Edinger et al. (2001)	37	High
Epstein et al. (2012)	36	High
Falloon et al. (2015)	36	High
Fernando et al. (2013)	20	Poor
Friedman et al. (2000)	29	Adequate
Guilleminault et al. (2008)	25	Adequate
Guilleminault et al. (2002)	15	Poor
Ham et al. (2020)	33	High
Harvey et al. (2014)	38	High
Hou et al. (2014)	23	Adequate
Hwang et al. (2019)	20	Poor
Jacobs et al. (2004)	31	High
Jan et al. (2019)	22	Poor
Johann et al. (2020)	32	High
Jungquist et al. (2010)	31	High
Kapella et al. (2011)	29	Adequate
Kim et al. (2019)	19	Poor
Kim et al. (2017)	19	Poor

Author	Score	Rating
Lah et al. (2019)	27	Adequate
Lee et al. (2018)	22	Poor
Lichstein et al. (2000)	23	Adequate
Lovato et al. (2016)	31	High
Lovato et al. (2014)	29	Adequate
Manber et al. (2019)	35	High
Manber et al. (2016)	33	High
Manber et al. (2008)	30	High
McCarthy et al. (2018)	28	Adequate
Moon et al. (2020)	29	Adequate
Morin et al. (1999)	31	High
Morin et al. (1993)	28	Adequate
Morin et al. (2009)	35	High
Okajima et al. (2020)	37	High
Ong et al. (2020)	37	High
Park et al. (2020)	22	Poor
Perlis et al. (2001)	15	Poor
Perlis et al. (2004)	23	Adequate
Pigeon et al. (2017)	36	High
Riedel, & Lichstein (2001)	22	Poor
Sivertsen et al. (2006)	35	High
Smith et al. (2015)	33	High
Talbot et al. (2014)	36	High
Taylor et al. (2007)	21	Poor
Taylor et al. (2014)	32	High
Tomfohr-Madsen et al. (2017)	23	Adequate
Vallieres et al. (2005)	27	Adequate
Wilckens et al. (2017)	23	Adequate
Wu et al. (2006)	23	Adequate
Xing et al. (2020)	34	High
Zavesicka et al. (2008)	24	Adequate

Table 2.4. Subgroup analysis results

	Dropout (%)	*k*	95% CI	*Q*	*df*	*p*	I^2
Age							
Adult	10.93	50	[8.46, 14.00]	119.09	49	<.001*	58.85
Older adult	6.28	12	[3.51, 10.99]	16.08	11	.14	31.59
Comparison						.08	
Mode of delivery							
Individual	12.39	42	[9.71, 15.67]	76.66	41	.001*	46.51
Group	4.24	15	[2.70, 6.60]	5.00	14	.99	0.00
Comparison						.001*	
CBT-I components							
All components	8.48	15	[5.58, 12.70]	17.23	14	.24	18.76
Some components	10.25	57	[7.93, 13.14]	139.57	56	<.001*	59.88
Comparison						.44	
Number of sessions							
Four sessions	9.37	14	[4.84, 17.34]	46.29	13	<.001*	71.91
Eight sessions	11.07	18	[8.01, 15.10]	19.16	17	.29	13.97
Comparison						.65	
Time period							
Four weeks	6.93	12	[3.99, 10.09]	10.42	11	.49	0.00
Eight weeks	11.32	21	[7.38, 16.99]	46.46	20	<.001*	56.95
Comparison						.07	
Frequency of sessions							
Less than weekly	14.00	13	[8.35, 22.55]	34.14	12	<.001*	64.85
Weekly	9.34	46	[7.24, 11.96]	69.14	45	.01*	34.92
Comparison						.16	

Table 2.5. Reasons given for dropping out of treatment

Reason	*n*
Too busy/time commitment too high	22
Poor adherence	5
Admitted to hospital/health crisis	5
Wished to stop CBT-I	4
Lack of interest	3
Refusal to follow instructions	3
Started medication	3
Refusal of study assessments (e.g. MRI)	3
Gave birth	3
Moved away	2
Comorbid sleep disorders	2
Worsening criteria	2
Family problems/illness	3
Lost contact	2
Unable to stop medication	2
Life events	2
Personal problems	2
Disliked intervention	1
Moved hospitals	1
Chose to discontinue	1
Reported that CBT-I was not working	1
Primary diagnosis changed	1
Long commute	1
Refused to take placebo medication as part of study	1
Medication side effects	1
Intolerance of SR	1
Participant died	1
Depression	1

Table 2.6. Attendance data

Study	Total sessions	Attendance	Proportion of attendance
Aslund et al. (2020)	6	18 participants attended all sessions, one participant attended one session, two participants attended two sessions, and two participants attended three sessions.	86.23%
de Bruin et al. (2015) *Internet*	6	One participant opened four sessions, the rest opened all six sessions	99.15%
de Bruin et al. (2015) *Group*	6	One participant attended four sessions, two participants attended five sessions, 35 participants attended all six	98.25%
de Bruin et al. (2014) *Group*	6	All participants completed all sessions	100%
de Bruin et al. (2014) *Internet*	6	All participants opened all six sessions, eleven of these participants completed all parts of these sessions, two participants only completed four sessions.	94.87%
Epstein et al. (2012)	6	*M* attendance = 5.83 sessions (*SD* = 0.45)	97.17%
Harvey et al. (2014) *BT and CBT-I*	8	58 participants completed at least six sessions	Not able to calculate
Johann et al. (2020)	8	*M* attendance = 7.3 sessions (*SD* = 1.3)	Not able to calculate
Kapella et al. (2011)	6	All participants completed all sessions	100%
Lah et al. (2019)	4	Four participants completed all four sessions, one participant completed one session	85%

Study	Total sessions	Attendance	Proportion of attendance
Lovato et al. (2014)	4	84 participants attended all four sessions	Not able to calculate
Manber et al. (2019)	5	*M* attendance = 4.8 sessions (*SD* = 0.7)	Not able to calculate
Morin et al. (1993) *Immediate*	8	One participant missed more than one session	Not able to calculate
Morin et al. (1993) *Waitlist*	8	Two participants missed more than one session	Not able to calculate
Morin et al. (2009)	6	*M* attendance = 5.6 sessions (*SD* = 0.6)	Not able to calculate
Sivertsen et al. (2006)	6	All participants attended all sessions	100%
Smith et al. (2015)	8	86% of participants attended 6-8 sessions	Not able to calculate
Taylor et al. (2014)	6	15 participants completed all six sessions, one participant completed four sessions	97.92%
Tomforh-Madsen et al. (2017)	5	Eight participants attended all five sessions, five participants attended four sessions	92.31%

Table 2.7. Refusal of CBT-I and reasons

Study	Offered	Refused (%)	Reason
Bergdahl et al. (2016)	35	3 (8.57)	Not reported
Birling et al. (2018)	80	8 (10.00)	4 = Unwilling to follow CBT-I
			4 = Unable to follow CBT-I
Lah et al. (2019)	12	5 (41.67)	2 = Lack of time
			3 = Reasons not given
McCarthy et al. (2018)	22	4 (18.18)	2 = Uncomfortable with technology
			2 = Study too burdensome
Xing et al. (2020)	63	6 (9.52)	Unwilling to accept CBT-I

Table 2.8. Measures of adherence and outcomes by study

Study	Measure of adherence	Outcome
Bastien et al. (2004)	A weekly adherence score was derived from daily sleep diaries. Seven behaviours deemed important to adherence and rated as present or absent for each day of the week, for a possible maximum score of 7 points per week per behaviour. Weekly adherence varied from 0-49. Points subtracted if; 1) bedtime - goes to bed >15 minutes before prescribed time 2) rising time - stays in bed >30 minutes past prescribed time or if wakes up >30 minutes after rising time 3) TIB - stays in bed >30 minutes than prescribed time in bed 4) getting out of bed - fails to get out of bed when SOL or WASO >30 minutes for a given night 5) time and duration of naps - nap started after 3pm and duration >60 minutes 6) routine - participant reports not having followed usual evening routine. 7) bed used for nonsleeping activity - participant reports engaging in nonsleeping activity other than sex in bed or bedroom. Participant could not lose more than one point per day per criterion.	Data pooled – unable to extract
Birling et al. (2018)	TIB difference method - subtracted the amount of TIB prescribed from mean TIB reported with sleep diary. A high difference reflected low adherence to SC and SR.	TIB difference was significantly lower ($t = 4.95$, $p < .001$) at week 8 ($M = 2.00$, $SD = 64.83$) than week 2 ($M = 38.41$, $SD = 54.07$).
Carney et al. (2017)	Asked to complete treatment adherence ratings - no further details.	Data not reported
Edinger et al. (2001)	Average nightly TIB and within subjects *SD* of daily rising times during baseline, in treatment week and post treatment measured by sleep diary data.	Means not reported
Edinger et al. (2007)	TIB variability was compared between CBT-I and WLC. TIB SD calculated for each participant at baseline and for the first and final weeks of the 8-week treatment using actigraphy and sleep diary data.	Data not reported

Study	Measure of adherence	Outcome
Epstein et al. (2012)	Asked participants questions about following treatment advice to measure compliance	Overall *M* compliance rates to advice was 90% (*SD* = 8.5)
Harvey et al. (2014)	Adherence to Behavioural Strategies (ABS, Tremblay et al., 2009) was derived from self-reported daily sleep diaries. Scoring was completed by therapists within session. Five behaviours were evaluated: 1) Bedtime - goes to bed >15 minutes before prescribed bedtime. 2) Rise time - stays in bed or wakes up >30 minutes past prescribed rising time. 3) Getting out of bed - fails to get out of bed when SOL or WASO exceeds 20 minutes 4) Time and duration of naps - naps started after 3pm and duration exceeded 60 mins. 5) Sleep window - stays in bed >30 minutes over the prescribed time in bed. Average ABS across sessions were calculated for global and specific ABS. Global ABS for each session was calculated as the average adherence for the five behaviours. Average ABS across sessions was calculated for global ABS and each specific ABS component. Therapists also rated patient's homework assignment completion after each session from 0% (did not complete) to 100% (fully completed). Therapists also completed the Treatment Adherence Rating Scale - Therapist Report (TARS-TR) derived from Lichstein et al's 1994 treatment implementation model to measure aspects of treatment adherence. Used at the end of each weekly treatment session on a scale of 0-100%.	Data pooled – unable to extract
Jungquist et al. (2010)	Assessed using sleep diaries and actigraphy data (reported time to bed or time out of bed vs prescribed time to bed or time out of bed) and by a mismatch between WASO and SOL to reported time out of bed during the night.	Data not reported

Study	Measure of adherence	Outcome
Kapella et al. (2011)	Adherence to SC and SR assessed at each session using the sleep diary and/or actigraphy. Adherence to SC assessed by examining responses to sleep diary question about how periods of being awake in the night were managed. Adherence to SR assessed by comparing the recommended time in bed with the reported time in bed	Data not reported
Lichstein et al. (2000)	Adherence logs kept to conveniently track relaxation and SC home practice. Relaxation log provided tables to record the amount of time spent practicing relaxation, pre-practice and post practice ratings of relaxation (1-10) and pre and post pulse rates. SC log listed the six parts of SC instructions and provided seven columns to record adherence for a week. Participants marked "yes" or "no" in each box to indicate whether the instruction was followed.	Pre-relaxation *M* = 4.9 (*SD* = 1.4), post relaxation *M* = 7.2 (*SD* = 1.0). Pre-relaxation pulse rate *M* = 74.1 *SD* = 13.7, post relaxation pulse rate = 68.8 *SD* = 11.0 indicating successful relaxation inductions. Participants practiced relaxation *M* = 12.6 times per week (*SD* = 1.8) duration 10.6 minutes (*SD* = 2.0). Following SC instructions *M* = 8.8 (out of 10), *SD* = 1.5. SC participants averaged 85.6% adherence (*SD* = 9.2%).
Lovato et al. (2014)	TIB on sleep diaries and actigraphy was compared to prescribed TIB using SR	Data not reported
Manber et al. (2008)	Therapists rated each participant with a 5-point Likert scale as to how much each instrument was followed. 0 = "poor/no compliance", 1 = "marginal", 2 = "fair", 3 = "good", 4 = "very good", 5 = "excellent". Overall compliance = mean score of all items across all time points	Data not reported

Study	Measure of adherence	Outcome
Morin et al. (1999)	Self-rated Likert scales of adherence and ratings by significant others	Data not reported
Perlis et al. (2004)	Measured extent to which patient engaged in prescribed behaviours in SR and SC; 1) delaying bedtime until appointed time 2) leaving the bedroom during the night for the WASO time intervals that occur during the sleep period 3) ending the sleep period at the appointed time 4) not napping. Adherence measured as the difference between prescribed time to bed and reported time to bed.	Average of 51% adherence to tasks.

Study	Measure of adherence	Outcome
Riedel et al. (2001)	1) Subtracting the amount of TIB prescribed at final treatment session from mean reported TIB at post treatment (TIB difference). 2) Adherence percentage calculated by dividing reported TIB reduction since baseline by prescribed TIB reduction and multiplying by 100. 3) Change in mean TIB from baseline to post-treatment (TIB change). 4) Consistency of night to night time spend in bed - TIB variance calculated by computing the variance of nightly TIB values for each participant at baseline and post treatment. A variance of 0 would indicate that TIB was perfectly consistent night to night, and higher variances would indicate less schedule consistency. 5. Compute the variance of time arising from bed in the morning at baseline and post treatment (time arising variance) defined as minutes after midnight.	1) More time spent in bed than prescribed *M* = 27.89 mins (*SD* = 31.72). Fourteen participants were within 30 minutes of their prescribed TIB post treatment and 8 of those participants were within 15 minutes of their prescribed TIB. 2) Reported mean adherence percentage of 68.99% *SD* = 26.31. 3) Self-reported TIB post treatment (*M* = 400.39 *SD* = 69.90) was significantly lower than TIB at baseline (*M* = 467.92 *SD* = 66.24). 4) Each participant's TIB variance was used to calculate a sample mean at baseline (*M* = 4095.01) and post (*M* = 1189.80). TIB variance was significantly lower at post treatment than baseline. 5) Sample *M* arising time variance was 1790.86 minutes at baseline and 692.37 minutes at post treatment – the difference was significant.

Study	Measure of adherence	Outcome
Sivertsen et al. (2006)	Participants rated adherence on a 5-point scale ranging from 0 = "never" to 5 = "every night" showing the extent to which they followed advice and instructions in treatment.	*M* = 4.8, *SD* = 0.1
Smith et al. (2015)	Questionnaire to ask participants to rate how closely and frequently they followed their various prescriptions in the preceding week, 0 = "not at all" to 7 = "followed precisely every day".	*M* = 5.49, *SD* = 0.93
Taylor et al. (2007)	Recorded adherence to SH, SC and R on weekly logs which were reviewed by the therapist.	Data not reported
Vallieres et al. (2005)	Adherence to treatment protocol was evaluated with sleep diaries. Weekly percentage of adherence to each behavioural procedure was computed for each participant.	Average treatment observance assessed via sleep diary varied from 50.0% to 85.7%

Note. TIB = time in bed, SOL = sleep onset latency, WASO = wake after sleep onset, WLC = wait list control, SR = sleep restriction, SC = stimulus control, SH = sleep hygiene, R = relaxation, *SD* = standard deviation, *M* = mean.

Figure 2.1. Study flow

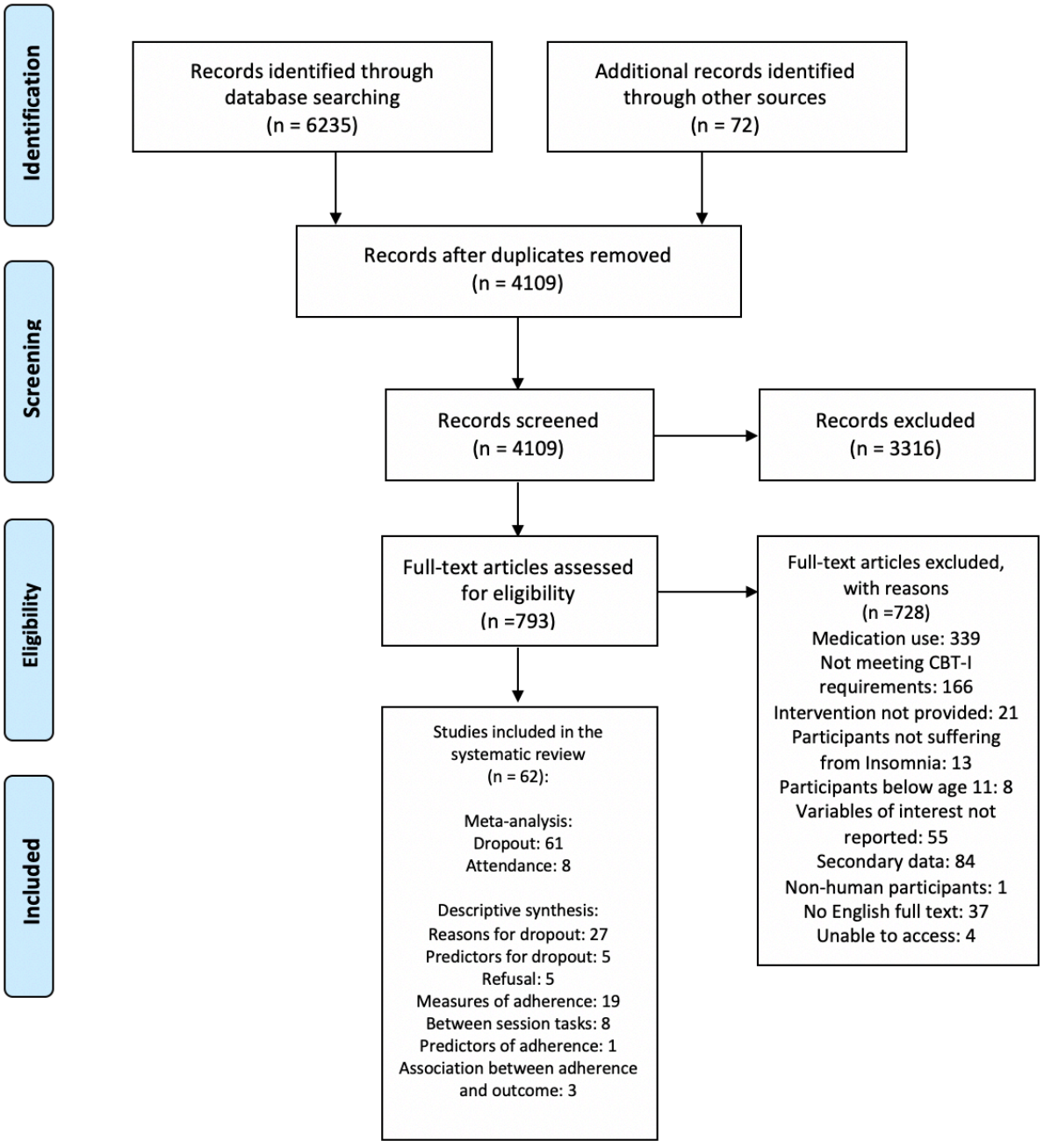


Figure 2.2. Forest plot of dropout rates

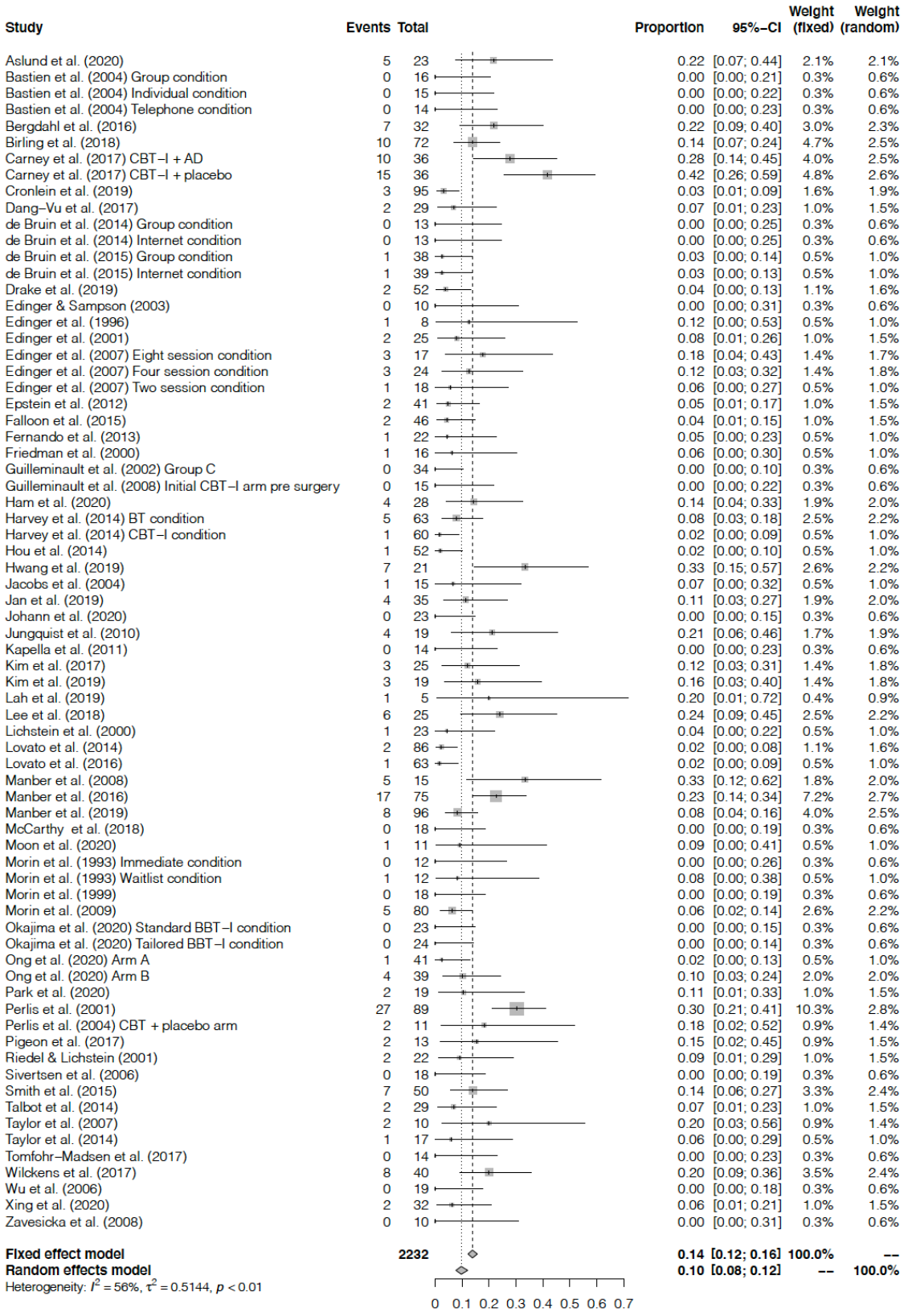


Figure 2.3. Forest plot of attendance rates

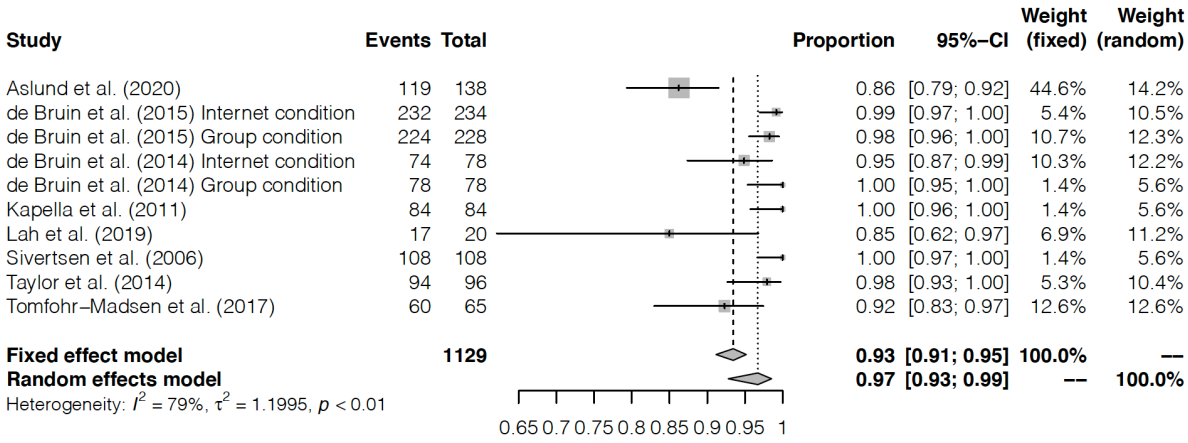
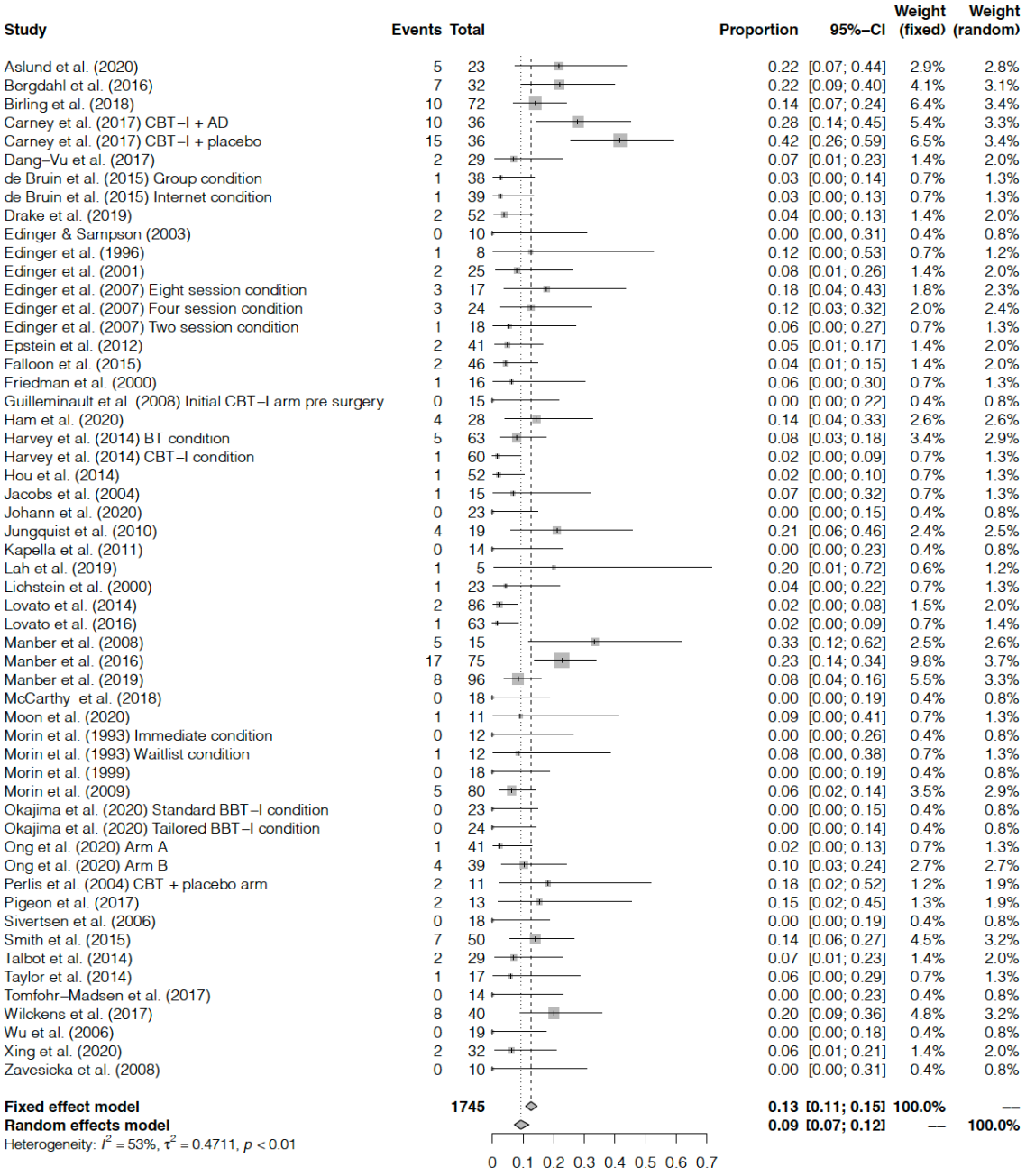


Figure 2.4 Forest plot of dropout rates excluding low quality studies



CHAPTER THREE

Bridging Chapter

Bridging Chapter

The systematic review and meta-analysis presented in chapter two aimed to explore some of the key factors in how effective and tolerable Cognitive Behavioural Therapy for Insomnia (CBT-I) is. Rates of dropout, attendance, refusal, and adhering to homework tasks were calculated, where possible. Assessing these factors within CBT-I is important, as it is the recommended first line treatment for chronic insomnia (Riemann et al., 2017; Qaseem et al., 2016) and is often preferred by patients to medication (Vincent & Lionberg, 2001). CBT-I also has superior effectiveness longer term, when compared to medication alone (Mitchell et al., 2012). Understanding these factors will help clinicians to adapt CBT-I where needed to reduce rates of dropout and refusal, and increase attendance and adherence. Poor adherence leads to poorer healthcare outcomes and increased costs, whereas improving adherence increases healthcare effectiveness and patient safety (Sabaté & Sabaté, 2003).

To the authors knowledge, this study was the first to provide a comprehensive systematic review and meta-analysis of dropout and attendance in CBT-I, as well as further adding to the literature around refusal and adherence to treatment. The results of the systematic review indicated that CBT-I is generally well tolerated and acceptable when considering that dropout rates were low and favourable when compared to other forms of CBT, and attendance was generally high. However, there may be changes that researchers can make to reduce dropout and refusal further, and increase attendance and adherence. In order to further improve the acceptability of CBT-I interventions, researchers should consider that participants often find CBT-I to be too time consuming and burdensome, and that certain subgroups had higher rates of dropout than others.

When assessing the effectiveness of CBT-I, data from sleep and insomnia measures are not the only outcomes that should be considered. The findings from the systematic review indicate that there is a significant need for dropout, attendance, refusal, and adherence to be routinely recorded and reported in research findings. This would further enhance our understanding of treatment acceptability and help to reach a consensus around defining, measuring, and reporting adherence in CBT-I studies. Furthermore, research has indicated that mental health outcomes should also be measured and reported in CBT-I studies, as evidence shows that CBT-I can improve symptoms of depression and anxiety, without directly targeting symptoms within treatment (Freeman et al., 2017; Gee et al., 2019; Cunningham & Shapiro, 2018; Belleville et al., 2011).

The links between poor sleep and mental health are well established. However, previous studies exploring adolescent sleep and the links to mental health have not always used valid and reliable measures, instead creating their own questionnaires to measure poor sleep (e.g. Marks & Monroe, 1976) or mental health (e.g. Manni et al., 1998). Furthermore, studies often focus solely on total sleep time (e.g. Kalak et al., 2014; Kaneita et al., 2009; Liu & Zhou, 2002) or use total scores from a measure of poor sleep, rather than exploring the subscales. It is important to know which components of poor sleep are most highly correlated with mental health and wellbeing, in order to better understand the mechanisms underlying the relationship between them. This information could be used to adapt CBT-I interventions to more effectively target and improve both poor sleep and mental health simultaneously. Additionally, the construct of wellbeing in poor sleep and insomnia is less well researched than symptoms of anxiety and depression.

The empirical study presented in chapter four aims to add to the current literature exploring the links between poor sleep and mental health in a UK adolescent sample. A survey was administered in local sixth form schools and colleges to explore correlations between components of poor sleep, mental health, and wellbeing. The study aimed to extend previous research by using valid and reliable measures, as well as deconstructing poor sleep and exploring which components correlate most highly with measures of mental health and wellbeing.

CHAPTER FOUR

Empirical Study

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Exploring the Associations Between Subscales of Poor Sleep, Mental Health and Wellbeing in an Adolescent Sample

Hannah Cowie[a]*, Alex Staines[a], Laura Pass[a], Niall Broomfield[a], & Faith Orchard[b]

[a]*Department of Clinical Psychology and Psychological Therapies, University of East Anglia, Norwich Research Park, Norwich, Norfolk, NR4 7TJ, United Kingdom*

[b]*School of Psychology, University of Sussex, Falmer, East Sussex, BN1 9QH, United Kingdom*

*Corresponding author: h.cowie@uea.ac.uk

Exploring the Associations Between Subscales of Poor Sleep, Mental Health and Wellbeing in an Adolescent Sample

Abstract

Background

Insomnia and poor sleep are prevalent within the adolescent population, with wide reaching consequences. Many studies have previously indicated that sleep and mental health are closely linked. This study aimed to add to the literature exploring the associations between mental health and sleep in an adolescent sample. More specifically, to explore which components of poor sleep correlate most highly with symptoms of anxiety and depression, and wellbeing.

Method

A survey was conducted within schools and colleges with 16-18-year olds (N = 64). Questionnaires about sleep quality, insomnia, mental health, and wellbeing were administered. Data were analysed using bootstrapped Pearson's r correlation.

Results

The results indicated that anxiety symptoms were significantly positively correlated with sleep disturbance, daytime dysfunction and insomnia severity. Depression symptoms were significantly positively correlated with sleep disturbance, sleep latency, daytime dysfunction, sleep quality, and insomnia severity. Wellbeing was significantly negatively correlated with daytime dysfunction and insomnia severity.

Conclusions

The results of this study not only add to the evidence base for the links between sleep and mental health in a UK adolescent sample, but also demonstrate

that mental health and wellbeing may correlate more highly to certain components of poor sleep and insomnia.

Keywords: Insomnia, sleep, adolescent, anxiety, depression, wellbeing.

What is known?

Sleep difficulties appear to be common within adolescents, with an estimated lifetime prevalence of insomnia at around 10.7%. Strong links have been found between poor sleep and increased mental health difficulties, such as anxiety and depression within adolescent samples.

What is new?

Within this study, poor sleep is broken down into component parts, and correlations are explored with symptoms of anxiety and depression, and overall wellbeing within an adolescent sample. The components of poor sleep explored are; subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, daytime dysfunction, and insomnia severity.

What is significant for clinical practice?

The findings indicate that, although insomnia and poor sleep are most commonly measured by sleep duration and sleep latency, other components of sleep may be more important when considering a sleep intervention that also improves mental health and wellbeing such as daytime dysfunction. Furthermore, sleep quality and insomnia should both be measured within studies, as the results indicate that insomnia severity is more highly correlated to mental health and wellbeing. In addition, it may be important to consider gender differences in sleep and mental health difficulties when designing and implementing sleep interventions for an adolescent sample that might also improve mental health outcomes.

Word Count: 5581

Introduction

Adolescence, defined by The World Health Organisation as ages 10-19 (World Health Organisation [WHO], 2015), is an important period of biological, neurological, and psychosocial development (WHO, 2015). The average adolescent requires eight to ten hours of sleep per night (Paruthi et al., 2016), however, sleep difficulties appear to be relatively common in this age group, with the lifetime prevalence of insomnia estimated at 10.7% within a sample of 1,014 US adolescents (Johnson et al., 2006). In both adult and adolescent samples, females tend to report higher levels of insomnia than males (e.g. Zhang & Wing, 2006; Hysing et al., 2013; Johnson et al., 2006).

Sleep difficulties during adolescence can be better understood using the Perfect Storm Model (Carskadon, 2011; Crowley et al., 2018). The model suggests that biological changes happen, for example, slowed build-up of sleep pressure, an unconscious biological response that makes us want to sleep, and changes in circadian rhythms. These changes, combined with psychosocial factors, such bedtime autonomy, academic pressure, screen time, and social media use, often mean that adolescents go to bed later. This is in direct conflict with early school start times, resulting in adolescents often getting an insufficient amount of sleep. Despite this decreasing total sleep time on school days, a study found that there was no decrease in total sleep time on non-school days, indicating that adolescents are catching up on their sleep at the weekend. Therefore, it is likely that the changes seen in total sleep time are driven by environmental factors, rather than a reduction in sleep need (Ohayon et al., 2004).

The impact of poor sleep can be far reaching. Short term sleep deprivation in adults has been shown to have a detrimental impact on a number of cognitive

domains, including attention, executive function, reward sensitivity, emotion regulation, learning, and memory (Tarokh, Saletin, & Carskadon, 2016). In one study, adolescents who got less than eight hours of sleep per night showed reduced motivation and scored lower on an intelligence task when compared to adolescents who got eight or more hours of sleep (Gradisar et al., 2008). Another study indicated that getting less than eight hours sleep per night in adolescence was associated with an increased risk of obesity, drunk driving, alcohol use, smoking, sexual risk taking, and fighting (Meldrum & Restivo, 2014).

Sleep and mental health difficulties are closely associated, with many mental health difficulties listing sleep disturbance symptoms in the Diagnostic and Statistical Manual 5th Edition (DSM-V; American Psychiatric Association [APA], 2013). A recent review by Freeman and colleagues (2020) suggested a bi-directional relationship between sleep and mental health across the lifespan, with the dominant path being from sleep difficulties to the occurrence of other mental health disorders (Freeman et al., 2020). In adolescent samples, chronic sleep deprivation has been shown to negatively affect both mood and emotion regulation (Tarokh et al., 2016), as well as being a predictor of developing depression (Lovato & Gradisar, 2014) and experiencing increased suicidality (de Zambotti et al., 2018).

Models of insomnia may provide some ideas of how mental health and insomnia are linked. The three-factor model (Spielman, Caruso, & Glovinsky, 1987) considers predisposing, precipitating and perpetuating factors in how insomnia occurs, becomes chronic and is self-perpetuating. The first two factors are based on the stress-diathesis conceptualisation of insomnia, and accounts for biopsychosocial factors as well as acute biopsychosocial stress. Mental health difficulties, such as anxiety and depression, could be considered under any one of the three factors as

both may have symptoms of sleep disturbance. Harvey (2002) proposed a cognitive model of the maintenance of insomnia, suggesting that individuals with insomnia tend to become overly worried about their sleep and the daytime consequences. This triggers autonomic arousal, with the individual in an anxious state, and emotional distress. Counterproductive safety behaviours, beliefs about sleep and worry, and the escalating anxiety all have the unintended consequence of maintaining the insomnia. The Attention-Intention-Effort pathway (Espie et al., 2006) considers the development of insomnia through attentional biases, developing a specific intention to sleep and putting in effort to sleep. Similar cognitive biases are found in anxiety disorders, so this may partly explain the links between insomnia and anxiety.

A large adolescent longitudinal study (Orchard et al., 2020) explored cross-sectional relationships for anxiety and depression with sleep difficulties. Primarily, the results indicated that adolescents with depression have poorer sleep quality (e.g. longer sleep onset latency, more awakenings at night, and increased daytime sleepiness) and sleeping patterns (e.g. longer sleep onset on school nights, and less total sleep on school nights and weekends) compared to adolescents with no anxiety or depression. Adolescents with anxiety only reported difficulties with sleep quality. Additionally, having a diagnosis of anxiety and depression at ages 17 and 24 was predicted by less total sleep time on weeknights, daytime sleepiness, night waking, and perception of whether sleep quantity was enough at age 15. Anxiety diagnoses at age 24 were predicted by sleep onset latency on school nights. Sleep patterns and sleep quality at age 15 were predictive of depression and anxiety symptoms at age 21.

Other studies have found similar results, for example, that adolescent poor sleep was positively correlated with symptoms of anxiety, stress, depression, and

sensitivity (Marks & Monroe, 1976). The period of adolescence has been associated with an increased risk in the development of mental health disorders, such as Major Depressive Disorder (MDD; Merikangas, Nakamura, & Kessler, 2009). Up to 90% of adolescents with depression also present with disturbed sleep (Goodyer at al., 2017) and those who experience sleep difficulties present with more severe symptoms of depression that those without (Liu et al., 2007). When considering gender differences, both adult and adolescent females tend to present with more severe anxiety and depression than males (e.g. Nolen-Hoeksema & Girgus, 1994; Lewinsohn et al., 1998; McClean et al., 2011). This indicates that the links between poor sleep and mental health difficulties need to be carefully considered in clinical and research environments, particularly during the period of adolescence.

Overall, managing sleep difficulties could be an important tool in reducing the severity and chronicity of mental health difficulties, or perhaps even to reduce the likelihood of them developing in the first place. Insomnia in adolescence is typically treated using cognitive behavioural interventions and/or pharmacotherapy (Nunes & Bruni, 2015). The first line treatment for adults is Cognitive Behavioural Therapy for Insomnia (CBT-I), which includes both cognitive, educational, and behavioural techniques to improve sleep (Riemann et al., 2017). Blake and colleagues' (2017) systematic review findings suggest treating adolescent insomnia using CBT-I is effective.

Thus far, research has indicated that evidence-based treatments for common mental health disorders are not effective in reducing sleep disturbances in young people, as this is the most common residual symptom (Kennard et al., 2006). However, there is evidence to suggest that solely treating sleep disturbances within a coexisting mental health disorder leads to an improvement in both difficulties (e.g.

Freeman et al., 2017; Gee et al., 2019), with small effect sizes in adolescent samples. There is a larger evidence base within adult samples, with reviews finding evidence that CBT-I improves depression outcomes (Cunningham & Shapiro, 2018) and concomitant anxiety (Belleville et al., 2011).

Studies often only measure total sleep time (e.g. Kalak et al., 2014; Kaneita et al., 2009; Liu & Zhou, 2002) or use total poor sleep scores, rather than exploring the subscales and breaking down poor sleep into components. It is important to know which components of poor sleep are most highly correlated with mental health and wellbeing to better understand the mechanisms underlying the relationship. This information could be used to adapt CBT-I interventions to most effectively and efficiently target both poor sleep and mental health.

This study aimed to add to the literature exploring the links between poor sleep and mental health in a UK adolescent sample and to extend previous research by deconstructing poor sleep to explore which components correlate most highly with measures of mental health and wellbeing.

Objectives

Research Question

Which components of poor sleep (sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbance, daytime dysfunction, and insomnia severity) as measured by the Pittsburgh Sleep Quality Index (PSQI) and the Insomnia Severity Index (ISI), correlate most highly with measures of anxiety, depression and wellbeing in a sample of adolescents aged 16-18 in education?

Method

Design

A survey containing measures of sleep, mental health, and wellbeing was administered in local sixth form schools and colleges. Initially, this was designed to be a two-stage study. The results reported here are from stage one, where the aim was to screen around 200 participants and then recruit some of these participants to take part in stage two, which was piloting an adolescent-specific sleep intervention within schools. Unfortunately, the study was greatly impacted by the COVID-19 pandemic and this limited recruitment for stage one screening and also meant that it was not possible to offer the stage two intervention due to school closures.

Participants

Participants ($N = 64$) were recruited from local sixth forms and colleges where students age 16-19 typically study for advanced school level-qualifications. As this was initially designed to be a screening phase, the eligibility criteria were broad.

Inclusion Criteria

- Age 11-18
- In full time education
- Able to read English well enough to understand and complete the questionnaires

Exclusion Criteria

- Refusal to give informed consent

Procedure

Local schools, sixth forms, and colleges (hereafter referred to as “schools”) in one UK county were contacted by the researchers to ascertain whether they would

be interested in taking part in the study. If yes, a meeting was arranged between a researcher and a member of staff at the school to explain the procedure. If schools then agreed to take part, it was discussed how best to distribute the surveys with minimal disruption to the timetable.

Participants were recruited from a school-linked sixth form school and college, both of whom agreed for the researchers to administer the questionnaires face to face during a lesson. Additionally, a small number of students completed the questionnaires online. Pupils were given a hard copy information sheet and consent form a minimum of two working days before the questionnaires were distributed.

Researchers then came into the agreed lesson, read through the information sheet with the students and answered any questions. Those who agreed to take part signed the consent form and completed the survey which took around 20 minutes on average. Those who did not consent to taking part were given the time to work on their coursework. Participants were then given a debrief sheet. A participant flow chart can be found in Figure 4.1.

As a thank you for taking part in the study, the researchers recorded a “Sleep Workshop” presentation which included sleep education and sleep hygiene tips. The workshop was emailed to the main contact within the school to disseminate.

Ethics

As part of the risk protocol, survey data were not collected anonymously, so that if any pupil scored above the clinical threshold on the mental health measures, or highlighted any risk issues, pastoral care teams were notified so that additional support could be offered. This was in line with the individual school’s safeguarding and risk policies and participants consented to this when agreeing to take part in the study. Data was anonymised once it was entered into the database.

Initially, surveys were administered to participants face to face. This ensured that consent was fully informed and allowed time for the participants to ask questions. It also allowed researchers to build a working relationship with the staff who were involved in the process. Therefore, if risk issues were highlighted in questionnaire responses then researchers were able to liaise with staff. Later in the study, ethical approval was gained to create an online version of the questionnaire to email to schools for distribution.

The study was approved by the University of East Anglia Faculty of Medicine and Health ethics committee (Reference 2019/20-001).

Measures

Demographic Information

Demographic information was collected from each participant regarding name, age, gender, ethnicity (options provided to select from), the school that they were attending, and their year group.

The Pittsburgh Sleep Quality Index (PSQI)

The PSQI (Buysee et al., 1989) is a 19-item self-report questionnaire that assesses sleep quality and disturbances over the past month (Buysee et al., 1989). The concept of subjective sleep quality is not clearly defined within the literature, and a more recent study indicated that, more specifically, the PSQI may measure sleep-related distress (Hartmann et al., 2015) in relation to subjective sleep quality. The PSQI can be divided into seven subscales; subjective sleep quality (e.g. “During the past month how would you rate your overall sleep quality?”), sleep latency (e.g. “During the past month, how long in minutes has it usually taken you to fall asleep each night?”), sleep duration (e.g. “During the past month, how many hours of actual sleep did you get at night?”), sleep efficiency (e.g. “During the past month, what

time have you usually gone to bed at night/gotten up in the morning?"), sleep disturbance (e.g. "During the past month, how often have you had trouble sleeping because you wake up in the middle of the night or early morning?"), use of sleep medication (e.g. "During the past month, how often have you taken medicine to help you sleep?"), and daytime dysfunction (e.g. "During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?").

Each subscale is rated 0 (*no difficulty*) to 3 (*severe difficulty*). A global PSQI score of 0-21 can be calculated by combining the subscales. A global score of over five is indicative of poor sleep quality. With adolescent samples, the PSQI has been found to have good internal reliability ($\alpha = .72$; De la Vega et al., 2015) and validity to discriminate between "good" and "poor" sleepers.

The Insomnia Severity Index (ISI)

The ISI is a seven-item self-report measure designed to assess the nature, severity and impact of insomnia in the last two weeks (Bastien, Vallières, & Morin, 2001). Each item (e.g. "How satisfied/dissatisfied are you with your current sleep pattern?") is scored from 0 (*no problem*) to 4 (*very severe problem*) with a total score of up to 28. The ISI has shown adequate internal consistency ($\alpha = .74$), reliability, and validity (Bastien et al., 2001). The ISI has been validated for use in adolescents (Chung, Kan, & Yeung, 2011).

The Short Warwick-Edinburgh Mental Well-being Scale (SWEMWBS)

The SWEMWBS (Tennant et al., 2007) is a seven item self-report scale that measures overall well-being. Each item (e.g. "I've been feeling useful") is scored one (*none of the time*) to five (*all of the time*), with a total possible score of 35. There are no agreed clinical cut-offs, however higher scores indicate better well-being. The SWEMWBS is recommended as suitable for use in secondary school ages in the

wellbeing measurement framework (Evidence Based Practice Unit, 2017) as well as being suitable for adult samples (Haver et al., 2015). The SWEMWBS has shown adequate internal consistency and reliability (α = .84-.86; Haver et al., 2015).

Revised Child Anxiety and Depression Scale (RCADS)

The RCADS (Chorpita et al., 2000) is a 47-item self-report questionnaire assessing symptoms of depression and anxiety in 8-18 year olds. Each item is rated 0 (*never*), 1 (*sometimes*), 2 (*often*), or 3 (*always*). The RCADS includes subscales for separation anxiety, social phobia, generalised anxiety, panic disorder, obsessive compulsive disorder, total anxiety, and major depressive disorder (MDD; Chorpita et al., 2000).

The RCADS subscales have shown good internal consistency (α = .78, .87, .84, .88, .82, .87 respectively) and convergent and discriminant validity (Chorpita, Moffitt, & Gray, 2005). Clinical cut-off scores are also available for each subscale based on school year and gender.

Statistical Analyses

Data were analysed using IBM SPSS version 27. For the sleep measures, the PSQI total and subscale scores were calculated, as was the ISI total score. The PSQI subscale for "Use of Sleep Medication" was used to calculate the total score but was not included in the analyses as this was not a variable of interest and a large number of correlations were already being conducted. For the mental health measures, the SWEMWBS total score was calculated, and the RCADS subscales and total scores were calculated using the raw data. For this study, only the RCADS MDD and anxiety subscales and the SWEMWBS total score were included as the authors were most interested in these variables.

Z-scores were calculated for each variable and no outliers were indicated. Checking of test assumptions was conducted through visual inspection of histograms and Q-Q plots, and running the Shapiro-Wilk test on each variable. Visually, data appeared to be normally distributed, and skew and kurtosis values were within acceptable limits, however the Shapiro-Wilk test indicated that none of the variables were normally distributed aside from the SWEMWBS. Therefore, as the data did not meet the assumptions to conduct parametric analyses, one-tailed Pearson's *r* correlational analyses were run with bootstrapping (1000 samples). Multiple comparisons were corrected for, using the Holm-Bonferroni method (Holm, 1979). Missing data was dealt with as suggested by the authors of each measure, leaving 1.44% of the data missing. The final sample size for each subscale and measure can be found in Table 4.2.

Results

Participant Characteristics

Participants were between the ages of 16 to 18. The mean age of participants was 16.67 years (*SD* = .67), and the majority of the participants were age 17 (39.1%), in year 12 (82.8%), male (68.8%), and White British (85.9%). See Table 4.1 for full details of participant characteristics.

The majority of participants scored over five (65.60%) on the PSQI, indicating poor sleep quality. A higher percentage of females than males scored over five. The majority of participants scored within the lowest range on the ISI indicating no clinically significant insomnia. Again, a higher percentage of females scored within the subclinical and clinical insomnia range when compared to the males in the sample. Please see Table 4.2 for detailed results from the PSQI and ISI total scores.

None of the participants reported using sleep medication in the demographics section, however 12.5% of participants did not respond to this question. One participant stated that they were receiving therapy to help their sleep, however, the same 12.5% participants from the sleep medication question also did not respond to this question.

Table 4.3 provides T-score data for the RCADS anxiety and MDD subscales, and the total score. The majority of participants scored in the non-clinical categories for each scale. The RCADS MDD subscale saw largest majority of participants scoring in the clinical range. When exploring the RCADS raw data by gender, the females had a higher mean score than the males on the RCADS anxiety (female M = 30.40, SD = 16.56; male M = 22.56, SD = 15.99) and MDD (female M = 9.53, SD = 4.79; male M = 8.41, SD = 5.19) subscales, indicating higher symptoms of anxiety and depression. Furthermore, the female sample scored lower on the SWEMWBS than the male sample (female M = 21.60, SD = 3.66; male M = 24.72, SD = 4.60), indicating lower overall wellbeing.

Research Question

The objective of this study was to explore which components of poor sleep, as measured by the PSQI and ISI, correlate most highly with anxiety, depression, and wellbeing. One-tailed Pearson's r correlations were run for the PSQI and ISI total scores, as well as the PSQI subscales against the SWEMWBS total, and the RCADS anxiety and MDD subscales. Descriptive statistics for these variables are reported in Table 4.4. Furthermore, the RCADS anxiety and MDD subscales and the SWEMWBS were correlated with one another, and the results of this are reported in Table 4.5. The PSQI and ISI totals were also correlated, and the results are reported in Table 4.6. The anxiety and depression subscales and the SWEMWBS appear to be

correlated with one another, as do the two sleep measures, as would be expected, however they were not so highly correlated that including multiple measures of sleep and mental health was not warranted.

The full results of the analyses run and Bias Corrected and Accelerated (BCa) 95% confidence intervals are reported in Table 4.7. Sleep duration was not significantly correlated with the RCADS anxiety or MDD subscales, or the SWEMWBS. A significant positive correlation was found between sleep disturbance and the RCADS anxiety and MDD subscales, both indicating a medium effect size, but not with the SWEMWBS. Sleep latency was significantly positively correlated with the RCADS MDD scores with a medium effect size, but not with the RCADS anxiety or SWEMWBS scores. Daytime dysfunction scores were significantly positively correlated with the RCADS anxiety subscale with a medium effect size, and MDD scores with a large effect size, and significantly negatively correlated with the SWEMWBS with a medium effect size. Sleep efficiency scores were not significantly correlated with anxiety, MDD or wellbeing scores. Sleep quality was significantly positively correlated the RCADS MDD scores, but not with the anxiety subscale or the SWEMWBS. Furthermore, the total PSQI score was significantly positively correlated with the RCADS MDD scores with a large effect size, but not with the anxiety subscale or the SWEMWBS total. Finally, the ISI total scores were significantly positively correlated with the RCADS anxiety and MDD subscales, both with large effect sizes, and significantly negatively correlated with the SWEMWBS scores with a medium effect size. From the results that had significant p-values, none of the BCa confidence intervals crossed zero, which is an important consideration when using bootstrapping. Overall, the effect sizes for correlations

between the sleep and MDD subscales were larger than those for the anxiety subscale and the SWEMWBS.

Discussion

The objective of this study was to explore which aspects of poor sleep, as measured by the PSQI and the ISI, correlate most highly with anxiety, depression, and wellbeing in a UK adolescent sample. The links are already well established within the adult literature (e.g. Freeman et al., 2020), and growing within adolescent samples (e.g. Marks & Monroe, 1976; Lovato & Gradisar, 2014; Orchard et al., 2020). Therefore, this study aimed to add to the evidence base by using valid and reliable measures of sleep, mental health, and wellbeing. Furthermore, this study aimed to deconstruct poor sleep into component parts using the PSQI and ISI to explore which components correlate most highly to symptoms of anxiety and depression, and wellbeing.

The results indicated that poorer sleep quality, as measured by the PSQI total score, was significantly associated with increased symptoms of depression, but was not significantly associated with symptoms of anxiety or overall wellbeing. The ISI also measures sleep disturbance, but more specifically in the form of insomnia. Within this study, increased symptoms of insomnia were significantly associated with increased symptoms of anxiety and depression, and lower overall wellbeing. This indicates that insomnia severity may be important to explore further in future sleep and mental health studies.

Sleep duration and sleep onset latency are two of the most frequently measured components of poor sleep when exploring associations with mental health (e.g. Kalak et al., 2014; Kaneita et al., 2009; Liu & Zhou, 2002). Within this sample, sleep duration was not significantly correlated with symptoms of anxiety and

depression or overall wellbeing. Sleep latency was significantly positively associated only with symptoms of depression, indicating that taking longer to get to sleep is associated with increased symptoms of low mood. The less frequently researched components of poor sleep include sleep disturbance, daytime dysfunction, sleep efficiency, and sleep quality. Increased sleep disturbance was significantly correlated with higher anxiety and depression scores, but not wellbeing. An increase in daytime dysfunction was significantly correlated with increased symptoms of anxiety and depression, and lower overall wellbeing. Sleep efficiency, a target for many cognitive behavioural sleep interventions that use sleep restriction therapy to increase sleep efficiency, was not significantly positively correlated to anxiety, depression, or wellbeing. Finally, poorer sleep quality was significantly associated with higher depression scores.

Overall, larger effect sizes were found for the poor sleep and MDD subscale correlations than those with anxiety or wellbeing scores. This fits with previous research findings that indicated strong associations between poor sleep and depression (e.g. Goodyer et al., 2017; Liu et al., 2007). These results also partially support other previous research findings exploring the links between poor sleep and symptoms of depression (Orchard et al., 2020; Marks & Monroe, 1976). Anxiety symptoms were correlated with less of the sleep subscales, and significant associations had smaller effect sizes.

When considering the Three-Factor Model of insomnia (Spielman et al., 1987) mental health difficulties could be a factor in the onset of the disorder. In this study, symptoms of anxiety and depression and poorer wellbeing were correlated with insomnia severity. The cognitive maintenance model of insomnia (Harvey, 2002) suggests that worries about sleep and the consequences of poor sleep triggers

autonomic arousal (anxiety) and emotional distress within an individual. The Attention-Intention-Effort Pathway (Espie et al., 2006) also focuses more on anxiety-related symptoms. Within this study less associations were found between anxiety symptoms and poor sleep when compared to depression symptoms. This is possibly due to the sample size and statistical power. However, this study may provide some support for the role of emotional distress in insomnia through the associations found. Associations between anxiety symptoms, insomnia severity, sleep disturbance, and daytime dysfunction provide possible areas of exploration for future research.

Over half the sample indicated poor sleep quality on the PSQI total, but only 30.16% scored within the range for subthreshold symptoms of insomnia, and only 7.94% scored within a clinical range for insomnia. This indicates that although many of our adolescent sample suffered with poor sleep quality, the majority did not meet the clinical cut-off for insomnia or were perhaps suffering with a different sleep disorder. Previous research found a lifetime prevalence of 10.7% for insomnia within an adolescent sample (Johnson et al., 2006). Additionally, a higher percentage of females than males within the sample indicated clinically relevant symptoms of insomnia (in the sub-clinical or clinical range on the ISI) and poor sleep quality (scoring over five on the PSQI). These findings are in line with the literature (e.g. Zhang & Wing, 2006; Hysing et al., 2013; Johnson et al., 2006).

It is interesting that a majority of the sample indicated poor sleep on the PSQI total but the majority did not indicate clinical levels of insomnia. Correlations were examined between the two scales which indicated that they were correlated, but not so highly correlated that including two sleep measures was not warranted, as they were originally designed to measure slightly different components of poor

sleep. The ISI measures a participant's subjective feelings about their insomnia symptoms and insomnia severity, whereas the PSQI measures subjective general sleep quality. It has been previously noted that the concept of general sleep quality is less well defined, but that the PSQI appears to measure sleep-related distress (Hartmann et al., 2015), which may partially explain the difference in results. Previous research has also found that the ISI is a more appropriate outcome measure to use within CBT-I research, when compared to the PSQI (Chen, Jan, & Yang, 2017), but conversely, both have been found to have comparable diagnostic properties when screening for insomnia (Chiu et al., 2016). The PSQI is now routinely used in research as an insomnia screening tool, despite not being originally designed for this purpose (Chiu et al., 2016; Buysee et al., 1989). As the research findings are conflicting, as are the results from this study, it may be helpful to consider using multiple sleep measures in future research to ensure the construct of poor sleep is fully covered within the outcome measures.

Furthermore, although the majority of participants did not score in the clinical range for symptoms of anxiety or depression, the female participants within the sample scored higher on average on these measures than the male participants, indicating higher levels of anxiety and depression, and poorer overall wellbeing. Again, these findings are in line with the current literature on gender differences in anxiety and depression in both adolescent and adult samples (e.g. Nolen-Hoeksema & Girgus, 1994; Lewinsohn et al., 1998; McClean et al., 2011). However, any results indicating gender differences in sleep and mental health outcomes within this study must be interpreted with caution due to the small number of female participants who took part.

Implications

The findings from this study indicate that, although poor sleep is commonly measured by a shorter sleep duration and increased sleep latency, other components may be equally or more important when considering a sleep intervention that also has a positive impact on mental health and wellbeing, such as daytime dysfunction. Daytime dysfunction is also a criterion for diagnosing insomnia in the DSM-V (APA, 2013), so including a measure of this within future sleep research could be beneficial. The results may also indicate that these components play a vital role in mental health improving following a sleep intervention, as opposed to improvements being solely related to an increase in sleep efficiency and total sleep duration.

The findings also highlight that it is important not only to assess for poor sleep quality in sleep research, but also to use more specific measures to assess whether someone is suffering from insomnia, such as the ISI, as this appears to be a key factor impacting on mental health and wellbeing. Furthermore, the results indicate that it may be important to consider gender differences when researching sleep difficulties and the links to mental health outcomes in adolescents, and that samples should strive to be as representative as possible. In addition, it may be important to consider gender differences in sleep and mental health difficulties when designing and implementing sleep interventions for adolescents that might also improve mental health outcomes. However, as previously highlighted, any results indicating gender differences in sleep and mental health outcomes within this study must be interpreted with caution.

Overall, the results from this study indicate that more work is needed to explore whether treatments for insomnia adequately improve the components of poor sleep that were significantly correlated with anxiety, depression, and wellbeing.

Strengths and Limitations

This study aimed to add to current sleep and mental health literature in adolescent samples by exploring which components of poor sleep and insomnia correlate most highly with measures of mental health and wellbeing. Furthermore, correlations between sleep and wellbeing are less well researched. This study used valid, reliable, and comprehensive measures for each construct. Some interesting correlations were found in the results, with some medium and large effect sizes. These results could be built upon by future research and used to tailor sleep interventions to effectively and efficiently improve both sleep and mental health outcomes. This is particularly relevant within NHS services, where time and resources are often stretched and limited.

There are several limitations to note. Firstly, this study was a correlational design and therefore no conclusions about causation can be drawn. Suggestions have been made about the possibilities for future research to explore causation. Caution is also recommended before interpreting and generalising significant results without also considering effect sizes as there may be limited statistical power within the study. Additionally, there may be an element of response bias within the study. For example, social desirability bias may be present, as researchers were nearby when the majority of questionnaires were being completed. Furthermore, completing questionnaires for twenty minutes during a school day may have produced boredom or fatigue within participants. Both of these factors may have impacted on participant's responses.

Furthermore, no measure of other sleep disorders, such as sleep apnoea or periodic limb movement disorder were included, and therefore these were not excluded or controlled for if present within the sample. These disorders could have influenced a participant's scores on the sleep measures, making it harder to draw

conclusions that it was poor sleep quality or insomnia severity alone that were associated with the measures of mental health and wellbeing. However, the prevalence rates for obstructive sleep apnoea (9.1%; Andersen, Holm, & Homøe, 2019), restless leg syndrome (2%; Picchetti et al., 2007) and periodic leg movements in sleep (5.6%; Kirk & Bohn, 2004) are estimated as being relatively low in normal weight, child and adolescent samples.

Additionally, these results may not be generalisable due to the sample. The total sample size was relatively small, none of the participants scored within the severe clinical insomnia range on the ISI, only a small number scored within the moderate range and the majority of the sample comprised of males (68.8%). The large majority of males within the sample may have influenced the descriptive statistics indicating gender differences in sleep difficulties and therefore these results have to be interpreted with caution. There was also some missing data within the sample, meaning some cases had to be excluded from the final analysis. Future research would benefit from a larger and more representative sample, and should consider ways of reducing the likelihood of missing data.

Conclusion

The results of this study add to the evidence base for the links between poor sleep and mental health in a UK adolescent sample, and demonstrate that mental health and wellbeing may correlate more highly to certain components of poor sleep and insomnia. The findings indicate that, although poor sleep is commonly measured by a shorter sleep duration and increased sleep latency, other components may be equally or more important when considering a sleep intervention that also has a positive impact on mental health and wellbeing, such as daytime dysfunction.

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Conflicts of Interest: The authors have declared that they have no competing or potential conflicts of interest.

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Table 4.1

Participant characteristics

Characteristic	*n* (%)
Age	
16	24 (37.5)
17	25 (39.1)
18	6 (9.4)
No response	9 (14.1)
Year group	
12	53 (82.8)
13	4 (6.3)
No response	7 (10.9)
Gender	
Male	44 (68.8)
Female	15 (23.4)
No response	5 (7.8)
Ethnicity	
White British	55 (85.9)
White and Black Caribbean	1 (1.6)
Any other White	1 (1.6)
No response	7 (10.9)
Medication	
Yes	0
No	56 (87.5)
No response	8 (12.5)
Talking therapy	
Yes	1 (1.6)
No	55 (85.9)
No response	8 (12.5)

Table 4.2

Results from the PSQI and ISI sleep measures

Measure	Total sample	F	M
	n (%)	*n* (%)	*n* (%)
PSQI			
≤ 5	21 (34.42)	4 (26.67)	16 (39.02)
> 5	40 (65.60)	11 (73.33)	25 (60.98)
ISI			
No clinical insomnia	39 (61.90)	8 (53.33)	27 (62.79)
Subthreshold insomnia	19 (30.16)	5 (33.33)	13 (30.23)
Clinical insomnia (moderate)	5 (7.94)	2 (13.33)	3 (6.98)
Clinical insomnia (severe)	0	0	0

Note. PSQI total sample $n = 61$, ISI total sample $n = 63$, PSQI and ISI female sample $n = 15$, PSQI male sample $n = 41$, ISI male sample $n = 43$.

Table 4.3

RCADS T-Score data

T Score Interpretation	MDD subscale	Anxiety subscale	Total score
	n (%)	*n* (%)	*n* (%)
Non-clinical	55 (85.94)	61 (95.31)	61 (95.31)
Borderline clinical	2 (3.13)	1 (1.56)	1 (1.56)
Clinical	6 (9.38)	1 (1.56)	1 (1.56)
Missing	1 (1.56)	1 (1.56)	1 (1.56)
Total	64	64	64

Note. T-scores adjust for age and gender.

Table 4.4

Descriptive statistics of the main variables

Measure	*M*	*SD*	*SE*	*N*	Missing
PSQI					
Duration	0.95	0.97	0.12	64	0
Disturbance	1.00	0.48	0.06	62	2
Latency	1.48	0.99	0.12	64	0
Daytime dysfunction	1.39	0.85	0.11	64	0
Sleep efficiency	0.70	1.16	0.15	64	0
Sleep quality	1.22	0.68	0.07	63	1
Total	6.80	3.78	0.48	61	3
ISI					
Total	6.81	4.89	0.62	63	1
RCADS					
Anxiety	24.98	16.19	2.04	63	1
MDD	8.41	5.16	0.65	63	1
SWEMWBS					
Total	23.70	4.57	0.58	63	1

Table 4.5

Bootstrapped Pearson's r correlation matrix between mental health and wellbeing scales

Measure	RCADS Anxiety	RCADS MDD	SWEMWBS
RCADS Anxiety	-	-	-
RCADS MDD	.632	-	-
SWEMWBS	-.578	-.617	-

Table 4.6

Bootstrapped Pearson's r correlation matrix between the ISI and PSQI

Measure	PSQI	ISI
PSQI	-	-
ISI	.740	-

Table 4.7

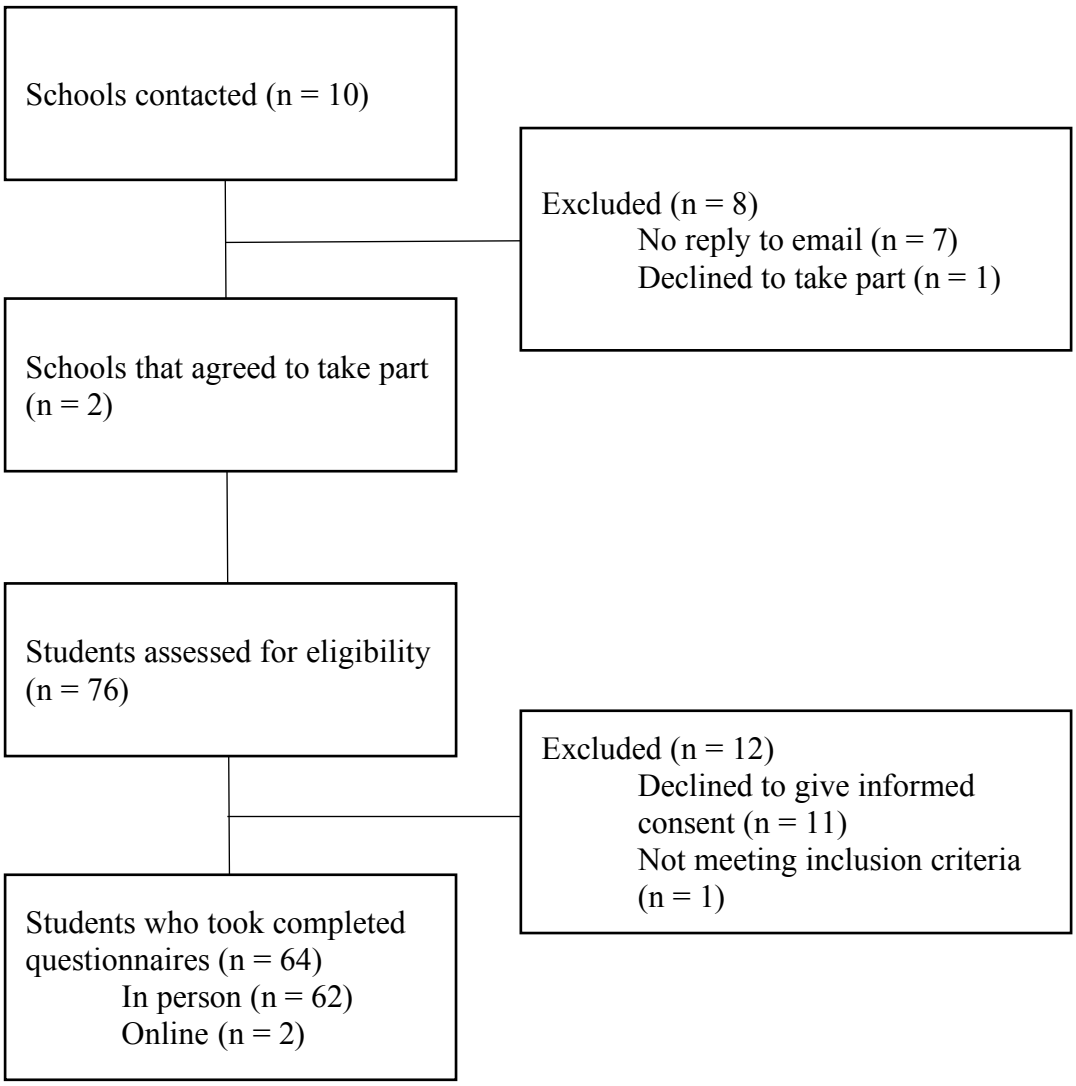
Pearson's r Correlation coefficients with bootstrapped data

Measure	RCADS Anxiety			RCADS MDD			SWEMWBS		
	r	*p*	BCa 95% CI	*r*	*p*	BCa 95% CI	*r*	*p*	BCa 95% CI
PSQI									
Duration	-.111	.201	[-.362, .161]	.197	.068	[-.075, .451]	.040	.381	[-.251, .334]
Disturbance	.353	.003*	[.107, .564]	.462	.000*	[.227, .670]	-.305	.009	[-.540, .040]
Latency	.338	.004	[.115, .538]	.384	.001*	[.180, .558]	-.267	.021	[-.492, .006]
Daytime dysfunction	.390	.001*	[.149, .539]	.651	.000*	[.468, .795]	-.409	.001*	[-.650, -.106]
Sleep efficiency	-.067	.307	[-.277, .179]	.336	.005	[.107, .547]	-.014	.458	[-.284, .281]
Sleep quality	.309	.009	[.081, .514]	.589	.000*	[.426, .728]	-.271	.019	[-.602, .090]
Total	.229	.040	[.000, .439]	.560	.000*	[.385, .702]	-.248	.029	[-.538, .105]
ISI									
Total	.504	.000*	[.206, .639]	.701	.000*	[.525, .817]	-.467	.000*	[-.640, -.248]

Note. Bootstrap results are based on 1000 bootstrap samples. * = significant to the corrected p value based on the Holm-Bonferroni method

Figure 4.1

Participant flow



CHAPTER FIVE

Additional Methodology

This chapter contains information about the methodology of the empirical study that could not be included within the publication due to restrictions on journals

Additional Methodology

Design

This study was conducted jointly by two Trainee Clinical Psychologists. Originally this study was designed to have two stages. Stage one involved a survey being administered in schools and colleges to collect data on sleep, mental health, wellbeing, and sleep-related thought processes in an adolescent sample. The data exploring associations between poor sleep and sleep-related thought processes are analysed and reported in the second Trainee's thesis portfolio. Details of these measures can be found in the "Additional Measures" section. This survey took an average of 20 minutes to complete in total and was designed to be a screening survey to assess eligibility for stage two of the study. The results from the stage one data exploring associations between poor sleep, mental health, and wellbeing are reported in the empirical paper in chapter four.

At stage two, poor sleepers, identified at stage one as displaying significant symptoms of insomnia, were going to be invited to take part in an adolescent-specific sleep intervention based on Cognitive Behavioural Therapy for Insomnia (CBT-I). However, due to the COVID-19 pandemic, schools in the UK were closed for the large parts of 2020 and 2021. Several schools were approached to take part in stage one of the study but did not respond to the emails. Furthermore, some students who were eligible for stage two were approached but did not respond to the contacts made. Due to time restrictions, and reduced opportunities for recruitment, this meant that it was not possible to carry out stage two of the study. It is likely that schools were focused on providing online teaching and supporting their students during a difficult time.

The stage one survey data was not collected anonymously as part of the risk procedure. This meant that if any pupils scored above a clinical threshold on the mental health measures, or highlighted any risk issues, the researchers were able to notify the pastoral care team so that additional support could be offered. This was in line with the individual schools safeguarding and risk policies. Data were anonymised once entered into the database. Participant and parent's contact details were also gathered as part of the risk procedure, as parental involvement was mandatory in stage two.

Ethical Considerations

Informed Consent

For stage one, participants were provided with the information sheet at the earliest opportunity, ensuring that they had at least 24 hours to read it. Children over the age of 16 were able to self-consent to taking part in the survey. It was highlighted throughout that taking part was voluntary, and that participants could withdraw at any time by not completing the measures. Participants were informed that they could request for their data to be removed from the study at a later date.

Confidentiality and Data Storage

The stage one survey data was not collected anonymously as part of the risk procedure. Following General Data Protection Regulation guidelines (GDPR; General Data Protection Regulation, 2018), only data that was relevant and necessary to the study was collected. Additionally, in line with GDPR, participant data was securely transferred from schools to the university by encrypted memory stick and lockable briefcases. Paper data and electronic data were given a unique identifier number and stored separately to identifiable data in locked drawers.

No personally identifiable information was used in the study data files. Any data that requires the participant to be identified (e.g. consent forms) were stored in locked drawers or encrypted memory sticks, separate to the study data. Confidentiality and data protection were discussed with participants at each stage of the study and included on consent forms. All information collected for the project was kept confidential and destroyed when no longer required. The consent forms will be kept for five years before disposal.

Safeguarding and Risk

Given that the study involved working with participants who may be experiencing some level of distress (e.g. insomnia) and may be vulnerable to other mental health difficulties, efforts were made to safeguard for and manage any risk issues that arose from responses to the survey. It was clearly stated that if there are any concerns around risk to self or others, action would be taken collaboratively to safeguard relevant parties in line with university policies and The Children Act (2004) and participants explicitly consented to this. Any risk issues were highlighted to the relevant school staff so that support could be provided. Information was provided about relevant services on the debrief sheet, and participants were encouraged to use this. Researchers met regularly with qualified clinical psychologists for supervision to manage risk effectively.

Debriefing

Participants were provided with a debrief sheet that reiterated the study aims and highlighted useful resources for further support. Contact information for the researchers was provided, should participants have had any questions or wish to see their data, which would be shared with them. Participants were given the option to receive the study findings.

Additional Measures

Sleep Anticipatory Anxiety Questionnaire-Adolescent Version (SAAQ-A)

The SAAQ (Bootzin et al, 1994) is a 10-item self-report tool comprising of five questions surrounding somatic symptoms and five surrounding specific sleep-related cognitions. This has been adapted for adolescents (SAAQ-A) and includes five additional questions surrounding non-sleep rehearsal and planning cognitions (e.g., ‘‘I can’t stop thinking about what happened during the day’’; Hiller et al, 2014). This 15-item self-report scale provides respondents with four response options; 0 (*strongly disagree*), 1 (*disagree*), 2 (*agree*), and 3 (*strongly agree*). Higher scores suggest higher sleep anticipatory anxiety.

The SAAQ-A has been used in adolescent samples (Dohnt et al., 2012; Hiller et al., 2014). The revised scale has shown good internal consistency, comparable to the original 10-item scale ($\alpha = 0.84$, Hiller et al, 2014; $\alpha = 0.86$, Heath et al, 2018) and the three subscales also have shown acceptable reliability (somatic, $\alpha = 0.80$; sleep cognitions, $\alpha = 0.82$; planning and rehearsal, $\alpha = 0.84$; Hiller et al, 2014) in adolescent samples.

Glasgow Sleep Effort Scale (GSES)

The GSES is a seven-item self-report questionnaire which measures sleep effort (e.g. “I feel I should be able to control my sleep” and “I worry about not sleeping if I cannot sleep”), which is a combined cognitive and behavioural component of insomniac patients (Broomfield & Espie, 2005). The tool is a Likert-type scale with responses ranging from “very much”, “to some extent” and “not at all”. The tool uses a cut-off score of 2 where participants who are “low effort” sleepers score 0, 1 or 2, and “high effort” sleepers score 3 or more.

In the adult literature, this measure has shown good internal consistency (α = 0.77 in the insomnia patient group) and is able to adequately discriminate between insomnia sufferers, and good sleepers (Broomfield & Espie, 2005). Additionally, the GSES has found to have good concurrent validity with the Dysfunctional Beliefs and Attitudes towards Sleep (DBAS) scale ($r = .50$, $p < 0.001$) (Broomfield & Espie, 2005).

Dysfunctional Beliefs and Attitudes towards Sleep (DBAS) Scale

The DBAS scale for children and adolescents (Blunden et al., 2013) is a short, 10 item self-report scale completed by children and adolescents. This tool has been widely used in the child and adolescent sleep literature. This tool measures key sleep-related thought processes about beliefs and attitudes towards sleep, specifically; beliefs about the immediate negative consequences of insomnia, beliefs about the long-term negative consequences of insomnia, and the need to control insomnia. The DBAS-C10 has been found to have moderate internal consistency (α = .71; Blunden et al., 2013).

Analysis

Although the "Use of Sleep Medication" subscale was not used as part of the correlation analyses, it was used to calculate the PSQI total score. It was noted that one participant gave a conflicting answer to this question "During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?" (answering "less than once per week") and the demographic question "Do you currently take any tablets or medication to help you sleep?" (answering "No"). It was decided to still include this participant as the two answers were not necessarily mutually exclusive.

Missing Data

The ISI total cannot be calculated with any missing data points, therefore those with missing data were excluded from the analysis (n = 1). Missing data from the PSQI was dealt with in the same way as the ISI (n = 3) as suggested by the authors of the measure. The RCADS was scored using an automated scoring programme. The programme deals with missing data in the following way; missing data for raw scores is handled by prorating the remaining items within a scale. Scales with more than two missing items are not scored. The total anxiety score can have up to 10 missing items, but only if each subscale has no more than two missing; and the total anxiety and MDD score can have up to 12 missing items, but, again, only if each subscale has no more than two missing items. Scale scores are estimated by taking the sum of the completed items within that scale and dividing that by the number of items completed, then multiple by the total number of items in that scale, and then rounding the result. Only one participant (n = 1) had enough missing data that total anxiety and MDD subscales could not be calculated. Finally, the SWEMWBS guidelines suggest that as long as the majority of questions have been answered (no more than three missing data points) it is acceptable to use generic missing data guidance to estimate the missing data point. One participant (n = 1) had one missing data point, therefore this point was replaced by taking the mean of the answered questions (rounded up). One participant (n = 1) did not complete the SWEMWBS and was therefore excluded from the analysis.

CHAPTER SIX

Additional Results

This chapter contains results from the empirical study that could not be included within the publication due to restrictions on journals

Additional Results

RCADS by Gender

When separated by gender, the female sample had a higher mean score than the male sample on the RCADS anxiety (Female $M = 30.40$, $SD = 16.56$; Male $M = 22.56$, $SD = 15.99$) and MDD (Female $M = 9.53$, $SD = 4.79$; Male $M = 8.41$, $SD = 5.19$) subscales, indicating higher symptoms of anxiety and depression. Furthermore, the female sample scored lower on the SWEMWBS than the male sample (Female $M = 21.60$, $SD = 3.66$; Male $M = 24.72$, $SD = 4.60$), indicating poorer overall wellbeing.

Feasibility

This study was originally designed to be a two-stage study. Unfortunately, stage two was not able to go ahead due to school closures during the COVID-19 pandemic. Feasibility outcomes and researchers' experiences of administering a survey and setting up for an intervention within a school setting are reported below in the hope that this will be informative for future adolescent sleep research. Feasibility data, as suggested by Bowen and colleagues (2009) and the CONSORT 2010 guidelines (Eldridge et al., 2016), are discussed below. The relevant areas covered will include practicality, implementation, and demand.

Research Question

- What was the feasibility of accessing schools to administer a survey and future school-based sleep interventions?

Practicality

Recruitment of schools and colleges to take part in both stages of the study was conducted by the first two researchers initially between September 2019 and March 2020. Five schools were contacted directly by the researchers by sending an

email to the generic school email address provided on their website, or to the school's research department if applicable. A local school nurse who worked in five different schools was also approached, and the nurse agreed to contact the schools about taking part in the study. Therefore, 10 schools were contacted in total. From the 10 schools contacted, three responded to the email, and from those three, two agreed (20% of those contacted) to take part in the study. One was a large sixth form school in a local town, where students completed A-Levels and other courses such as BTECs. The second was a smaller college in a rural area where students were able to retake their GCSE examinations, or take practical courses such as beauty or woodwork. The majority of participants were recruited from the large sixth form during a lesson.

Recruitment began early in the Autumn term to try to avoid school holidays or examinations. Unfortunately, this process took longer than initially expected and did not get fully underway until December. The schools that declined to take part primarily gave the reason that it was "not the right time", either due to the upcoming holidays or mock examinations. The final recruitment attempt was in early March 2020. Unfortunately, shortly after this, all schools and colleges in England were required to close due to the COVID-19 pandemic. At this point, recruitment was paused. Recruitment for the two-stage study was attempted a final time in May 2020. Schools declined at this stage and reported that they were not having as much contact with the students and the summer holidays were approaching. As schools were due to remain closed for the rest of the academic year, it was agreed at this point that stage two of the study was no longer feasible. A second round of recruitment was attempted in September 2020 for the stage one survey once the schools had reopened. Both the sixth form school and the college that had agreed to

take part initially were contacted again to assess whether additional classes could be contacted and the survey distributed. As it was not possible to administer surveys face to face at that time, an online version was distributed to several other classes within the large sixth form school. From this, two additional participants completed the survey.

Initially, surveys were administered to participants face to face. This was for several reasons, firstly so that the researchers could ensure that consent was fully informed and allowed time for the participants to ask questions. Secondly, it allowed researchers to build working relationships with school staff. This was helpful when risk issues were highlighted in some questionnaire responses and researchers were able to liaise with staff about how this could be managed within school policies and support structures. Administering questionnaires face to face allowed data to be gathered from whole classes at a time, but it was difficult to arrange times that suited everyone involved in the process. Later in the study an online version of the questionnaire was created that could be emailed around to schools that had consented to take part. However, the uptake rate was very low.

Demand

When the questionnaires were administered face to face, 65 participants consented to, and completed the questionnaires. Eleven students in the class did not consent to taking part. Out of the participants who did consent and completed the questionnaires, one participant was later excluded from the main analysis due to being outside of the specified age criteria (age 19). 31 participants (48%) stated that they would be interested in taking part in the sleep intervention offered within stage two.

Implementation

Of the 31 participants that stated they would be interested in taking part in the sleep intervention, 13 (42% of those interested) were eligible for stage two based on the main inclusion criteria (PSQI total score over five and ISI total score of eight or over). Initially, eight of the eligible participants were approached via email to take part in stage two in early March 2020, as part of a staggered recruitment process. None of these participants responded to the email invitation. The researchers had planned to follow-up by phone call and invite the remaining participants to take part, however shortly after this schools closed and it was no longer feasible to offer the intervention face to face as originally planned, so no follow-up calls were made.

Initially the intervention was set up to be delivered as both face to face and telephone appointments. After the initial school closures but before it was agreed that stage two would not be conducted, ethical approval was gained to deliver the intervention using video calling software instead. However, schools were no longer able to support this during the school closures.

CHAPTER SEVEN

Discussion and Critical Evaluation

Discussion and Critical Evaluation

The overarching aim of this thesis was to address gaps within the sleep literature. The first aim was to add to the evidence exploring the links between poor sleep and mental health difficulties in an adolescent sample through an empirical study using questionnaire data. More specifically, this study deconstructed poor sleep into components to explore whether certain components were more highly associated with mental health difficulties and poorer wellbeing. The second aim of this thesis portfolio was to explore rates of dropout, refusal, attendance, and adherence to CBT-I treatments through a systematic review and meta-analysis. The evidence has indicated that treating insomnia using CBT-I is effective, and can also improve symptoms of depression and anxiety without directly targetting them within treatment. Therefore, it is important that CBT-I is not only effective, but also tolerable for service users with low rates of dropout and refusal, and high rates of attendance and adherence.

This thesis includes the first comprehensive systematic review and meta-analysis of dropout and attendance in CBT-I, as well as adding to the literature around refusal and adherence to treatment. The review findings indicated that dropout from CBT-I is minimal compared to other formats of CBT, and attendance was high. The most common reasons given for refusal of and dropout from CBT-I were related to the time commitment required. This warrants further exploration and should be taken into consideration by researchers when designing CBT-I interventions and offering the treatment to participants.

Within the review 7.5% of studies were excluded for reporting no data relating to dropout, refusal, attendance, or adherence. However, this number is likely higher, as reasons for excluding a study were reported as the first exclusion criteria

that the researchers found. Dropout was most commonly reported (61 of the 62 included studies), but only 27 studies reported reasons given for dropout. Only 16 of the included studies reported attendance, five studies reported refusal, and 19 measured and/or reported adherence data. Therefore, the findings indicated that there is a significant need for dropout, attendance, refusal, and adherence to be routinely recorded and reported in research findings to further enhance understanding of treatment acceptability and to reach a consensus around defining, measuring, and reporting adherence in CBT-I studies.

The empirical study results indicated that symptoms of insomnia were significantly positively correlated to symptoms of depression and anxiety, and negatively correlated with wellbeing. When breaking down poor sleep into components, sleep duration and sleep onset latency are commonly used as outcomes to measure improvement within research. Within this study, sleep duration was not significantly correlated with symptoms of anxiety and depression, or overall wellbeing. Conversely, sleep latency was significantly positively correlated with symptoms of depression. When examining the less frequently researched components of poor sleep, the results indicated that sleep disturbance was significantly correlated with higher anxiety and depression scores, daytime dysfunction was significantly correlated with increased symptoms of anxiety and depression, and lower overall wellbeing, sleep efficiency was not significantly correlated to any mental health measures, and finally, higher scores on the poor sleep quality subscale were significantly associated with higher depression scores. Moreover, overall, larger effect sizes were found for the poor sleep and depression correlations than those with anxiety or wellbeing.

These findings fit with previous research findings indicating strong associations between poor sleep and depression (e.g. Goodyer et al., 2017; Liu et al., 2007). These results also partially support other previous research findings exploring the links between poor sleep and symptoms of depression (Orchard et al., 2020a; Marks & Monroe, 1976), however a similar pattern of associations was not found for those with anxiety symptoms within this sample. This is possibly due to the differences in sample sizes and statistical power.

The secondary objective of the empirical study was to explore the prevalence of sleep difficulties within the sample. Over half the sample (65.60%) indicated poor sleep quality, but only 30.16% scored within the range for subthreshold symptoms of insomnia, and only 7.94% scored within a clinical range for insomnia. Previous research found a lifetime prevalence of 10.7% for insomnia within an adolescent sample (Johnson et al., 2006).

The feasibility data from the additional chapters provides some useful information when considering the feasibility of accessing and recruiting participants from schools. Overall, recruitment was difficult and hindered by a number of factors outside of the researcher's control. Administering the questionnaires face to face within classrooms was effective, albeit time consuming. The COVID-19 pandemic and school closures meant that recruitment stopped, and for a number of reasons, schools were no longer able to host the study. Just under half of the sample stated that they would be interested in taking part in a sleep intervention, and 42% of those were eligible to take part.

Strengths and Limitations of the Thesis Portfolio

The thesis portfolio has a number of strengths. Firstly, the findings from both papers add to the current sleep evidence base, as well as addressing gaps within the

literature. The systematic review in particular addresses areas within the CBT-I literature that have not yet been explored using meta-analytic techniques. Conducting a systematic review and meta-analysis is another strength in itself, as they are often thought of as being at the top of the evidence hierarchy (Paul & Leibovici, 2014) due to their ability to bring together large numbers of studies exploring the same concept. Furthermore, the systematic review within this portfolio addresses an area in the CBT-I literature that has not yet been explored using this methodology, and provides several important suggestions for future sleep research.

The findings from the systematic review can be used, alongside other studies, to reach a consensus around defining, measuring, and reporting adherence within CBT-I studies, something which is missing currently. The empirical study within this portfolio used valid and reliable measures to explore the links between poor sleep and mental health in more detail than previous research, by breaking down the construct of poor sleep and examining each component in turn in an adolescent sample. The findings of this study can be used to adapt adolescent CBT-I interventions to ensure that the constructs of poor sleep that are most highly correlated with anxiety, depression, and wellbeing are effectively targeted within treatment. This will ensure that CBT-I is as efficacious as possible in improving both sleep and mental health outcomes.

There are several limitations to this thesis portfolio. Firstly, although the overall number of participants included within the systematic review was large, it is important to note that a number of the studies included were research trials of CBT-I. This means that participants were recruited or volunteered to take part, compared to a naturalistic NHS setting where people would often self-refer or be referred to a primary care service. This may have influenced the outcomes explored within the

review, as participants signed up to a research trial may have been more motivated to complete the intervention than those within primary care settings. Furthermore, participants in research trials may be less likely to refuse an intervention, and more likely to attend sessions and adhere to treatment protocols. Therapist adherence to the CBT-I protocol in a research trial may also be more rigorous than the CBT-I provided within a busy NHS service with limited resources. It is important that future research into CBT-I is carried out within primary care settings where possible to get a more accurate representation of these outcomes in practice.

Both of these studies were planned prior to the COVID-19 pandemic. The systematic review was slightly impacted by restrictions, in that it was not possible to obtain copies of four papers that may have been relevant to the study. These papers were not available online, only as physical copies, and the university library was not able to provide these at the time of the review due to lockdown restrictions. Unfortunately, this meant that some of those four papers may have been eligible to be included within the review, although this is not known. Furthermore, due to limitations with both time and resources of the second author, the systematic review methodology was not as rigorous as it could have been when compared to other similar studies. For example, it is often suggested within textbooks that screening of studies and data extraction is completed by two independent researchers, and the results compared, with any disagreements resolved by discussion (e.g. Cuijpers, 2016), but this was not possible within the scope of the review.

The empirical study was significantly impacted by COVID-19, specifically by the school closures. Originally, the empirical study was planned to be a two-stage study, with the second stage offering a CBT-I intervention that was adapted for an adolescent sample. When schools closed in March 2020, it became clear that the

schools that had been recruited from would not be able to support the research in the way that had been planned and agreed originally. This meant that it was not possible to run the intervention, and the empirical study had to be adapted to ensure that meaningful data could still be collected in line with COVID-19 restrictions. Stage one was originally planned to be a screening phase to assess whether a participant was eligible for stage two. However, the data was instead used to explore the links between poor sleep and mental health within the sample. This meant that the study did overlap somewhat with previous evidence, but it was possible to make unique contributions through the outcomes measured.

Furthermore, due to the school closures, it was not possible to get the sample size that was specified a priori. Due to the limitations placed on participant recruitment by the school closures, it was only possible to recruit for a short period of time and only from sixth forms and colleges, meaning the sample consisted of older adolescents, rather than being representative of the entire age span of adolescence. It also needs to be considered that the sample were all in full-time education, whereas there may be differences in the results for adolescents who are no longer in education, for example those undertaking an apprenticeship. Additionally, it was only possible to recruit from one county within the UK, whereas it would have been preferable to recruit from several areas. Furthermore, only a small percentage of the sample reached clinically significant levels of insomnia on the ISI. Overall, this means that the sample within the empirical study is not likely to be representative and therefore can only be generalised from with caution.

It is important to note some limitations regarding the measures used to assess poor sleep and insomnia within the empirical project. This study relied on the Pittsburgh Sleep Quality Index (PSQI; Buysee et al., 1989) and the Insomnia

Severity Index (ISI; Bastien et al., 2001), which are both subjective sleep measures. As stage one was originally designed to be screening for stage two, it was not possible to use more objective measures, such as actigraphy, or the more typically used sleep diaries. Consensus sleep diaries (Carney et al., 2012) would have been used within stage two as a more in-depth measure of sleep. Furthermore, there are limitations to the PSQI, as the concept of poor sleep is not clearly defined, and some evidence suggests that the PSQI may measure sleep-related distress (Hartmann et al., 2015). Future studies should consider using multiple sources to assess sleep quality, including sleep diaries and objective measures where possible.

Clinical and Theoretical Implications of the Thesis Portfolio

When evaluating the effectiveness of CBT-I, data from sleep and insomnia measures are not the only outcomes that should be considered. The findings from the systematic review indicate that there is a significant need for dropout, attendance, refusal, and adherence to be routinely recorded and reported in research findings. This would further enhance understanding of treatment acceptability and help to reach a consensus around defining, measuring, and reporting adherence in CBT-I studies. Furthermore, research has indicated that mental health outcomes should also be measured and reported in CBT-I studies, as evidence shows that CBT-I can improve symptoms of depression and anxiety, without this being directly targeted within treatment (Freeman et al., 2017; Gee et al., 2019; Cunningham & Shapiro, 2018; Belleville et al., 2011). The results from the empirical study support these findings in an adolescent sample, as significant correlations were found between poor sleep and symptoms of anxiety, depression, and poorer wellbeing. Larger effect sizes were found between poor sleep and symptoms of depression.

The feasibility data provided in the additional chapters highlighted several important issues. This data, along with considerations from the COVID-19 pandemic as a whole, have indicated the importance of not relying solely on face to face contact. This is relevant for recruiting to studies, by providing accessible online options for completing surveys, but also for delivering interventions and having options of using video calling software. The feasibility data also indicated a demand for an adolescent-specific sleep intervention. It is also important to note that just under half of the participants stated that they were interested in taking part, but only 42% of those interested were eligible based on strict inclusion criteria. It may be important to consider offering adolescent specific sleep interventions more widely, and not only to those who have clinically significant levels of insomnia and poor sleep (e.g. Orchard et al., 2020b).

The findings from this thesis portfolio indicate a possible need for a change in mental health service provision within the UK. Poor sleep and insomnia should be routinely assessed when a service user first comes into contact with a service, and treating sleep difficulties should be seen as a priority. If those who present with comorbid insomnia and anxiety or depression are offered CBT-I as a first step, it could improve both sleep and mental health difficulties. This could increase the effectiveness and efficiency of services as further CBT for anxiety and depression may not be required, or only a shorter second course needed. Additionally, more service users could be seen at step two within Improving Access to Psychological Therapies (IAPT) services, rather than requiring step three provisions or even a referral to secondary care. This may require more practitioners to be trained in delivering CBT-I, or more accessible options offered, such as computerised CBT-I or CBT-I via a mobile application. Treating mental health difficulties alone does not

always improve sleep difficulties, as this is the most commonly reported residual symptom after evidence-based treatment for common mental health difficulties (Kennard et al., 2006), therefore it is important that CBT-I is seen as a priority.

Furthermore, when considering increasing CBT-I provisions, dropout, refusal, attendance, adherence, and mental health outcomes should all be routinely recorded and reported in both research trials and NHS services. Alternatively, additional funding could be put towards sleep and mental health research. Increasing understanding around dropout, attendance, refusal, and adherence to CBT-I would provide opportunities to adapt interventions to reduce the rates of dropout and refusal, and increase attendance and adherence. This would allow for CBT-I to be maximally effective when offered to a service user. Additionally, adding to the evidence base that mental health outcomes improve following CBT-I without being directly targeted within treatment would further strengthen the case for offering CBT-I more routinely within services.

Conclusion

The overarching aim of this thesis was to address gaps in the evidence base within the sleep literature. The aim of the empirical study was to add to the evidence exploring the links between poor sleep and mental health difficulties in an adolescent sample. More specifically, poor sleep was broken down into components to explore whether certain components were more highly associated with mental health difficulties and poorer wellbeing. The second aim of this thesis portfolio was to explore rates of dropout, refusal, attendance, and adherence to CBT-I treatments through a systematic review and meta-analysis. The results indicate that mental health outcomes, as well as rates of dropout, refusal, attendance, and adherence to treatment should be routinely recorded and reported within CBT-I studies to inform

clinical practice and improve the acceptability, efficacy, and efficiency of the intervention.

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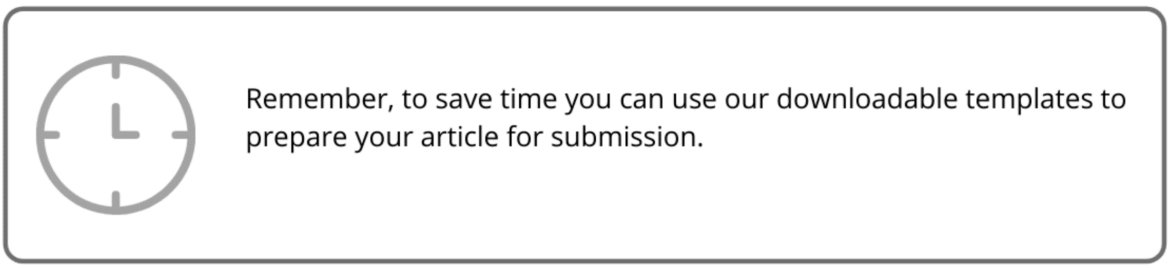

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Published translation	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the journal article: Subtitle (A. A. Translator, B. B. Translator, & C. C. Translator, Trans.). *Journal Title*, *##*(#), ####–####. https://doi.org/DOI (Original work published yyyy) Reference example Kariagina, T. D., & Ivanova, A. V. (2017). Empathy as an ability: Structure and development during training in psychological counseling (S. Shabad, Trans.). *Journal of Russian & East European Psychology*, *54*(6), 470–497. https://doi.org/10.1080/10610405.2017.1448180 (Original work published 2013) Citation examples Kariagina and Ivanova (2013/2017) [narrative]; (Kariagina & Ivanova, 2013/2017) [parenthetical]
Advance online publication	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the journal article: Subtitle. *Journal Title*. Advance online publication. https://doi.org/DOI Reference example Young, C., Durham, P., Miller, M., Rasinski, T. V., & Lane, F. (2019). Improving reading comprehension with readers theater. *The Journal of Educational Research*. Advance online publication. https://doi.org/10.1080/00220671.2019.1649240 Citation examples Young et al. (2019) [narrative]; (Young et al., 2019) [parenthetical]

In-press article	Reference format Author, A. A., Author, B. B., & Author, C. C. (in press). Title of the journal article: Subtitle. *Journal Title*. Reference example Watermeyer, B., Hunt, X., Swartz, L., & Rohleder, P. (in press). Navigating the relational psychic economy of disability: The case of M. *Psychoanalytic Dialogues*. Citation examples Watermeyer et al. (in press) [narrative]; (Watermeyer et al., in press) [parenthetical]
Article with e-location	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the journal article: Subtitle. *Journal Title*, *##*(#), Article ######. https://doi.org/DOI Reference example Björk, A., Rönngren, Y., Selander, J., Vinberg, S., Hellzen, O., & Olofsson, N. (2018). Health, lifestyle habits, and physical fitness among adults with ADHD compared with a random sample of a Swedish general population. *Society, Health & Vulnerability*, *9*(1), Article 1553916. https://doi.org/10.1080/20021518.2018.1553916 Citation examples Björk et al. (2018) [narrative]; (Björk et al., 2018) [parenthetical]
Article from supplement	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the journal article: Subtitle. *Journal Title*, *##*(Suppl. #), ####–####. https://doi.org/DOI Reference example Burlando, B., Palmero, S., & Cornara, L. (2018). Nutritional and medicinal properties of underexploited legume trees from West Africa. *Critical Reviews in Food Science and Nutrition*, *59*(Suppl. 1), S178–S188. https://doi.org/10.1080/10408398.2018.1551776 Citation examples Burlando et al. (2018) [narrative]; Burlando et al. [parenthetical]
Abstract from compiled abstract issue	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the abstract: Subtitle [Abstract]. *Journal Title*, *##*(#), ####. https://doi.org/DOI Reference example Buckley, A. F. (2017). Mitochondrial disorders: The need for precision ultrastructural analysis in clinical diagnosis [Abstract]. *Ultrastructural Pathology*, *41*(1), 76. https://doi.org/10.1080/01913123.2016.1269482

	Citation examples Buckley (2017) [narrative]; (Buckley, 2017) [parenthetical]
Review without original title	Reference format Reviewer, A. A., Reviewer, B. B., & Reviewer, C. C. (yyyy). [Review of the book *Title of the book: Subtitle,* by Z. A. Author, Z. B. Author, & Z. C. Author]. *Journal Title*, *##*(#), ####–####. https://doi.org/DOI Reference example McCully, A. (2019). [Review of the book *Teacher preparation in Ireland: History, policy and future directions,* by T. O'Donoghue, J. Harford, & T. O'Doherty]. *History of Education*, *48*(5), 700–702. https://doi.org/10.1080/0046760X.2018.1502366 Citation examples McCully (2019) [narrative]; (McCully, 2019) [parenthetical]
Special issue, cited in full	Reference format Editor, A. A., Editor, B. B., & Editor, C. C. (Eds.). (yyyy). Title of the special issue: Subtitle [Special issue]. *Journal Title*, *##*(#). Reference example McCone, D. R., Thomsen, C. J., & Laurence, J. H. (Eds.) (2018). Sexual harassment and sexual assault in the US military [Special issue]. *Military Psychology*, *30*(3). Citation examples McCone et al. (2018) [narrative]; (McCone et al., 2018) [parenthetical]

Book models	
One author	Reference format Author, A. A. (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Gibson, J. J. (1966). *The senses considered as perceptual systems.* Houghton Mifflin. Citation examples Gibson (1966) [narrative]; (Gibson, 1966) [parenthetical]

Two authors	Reference format Author, A. A., & Author, B. B. (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Lindsey, B., & Teles, S. M. (2017). *The captured economy: How the powerful enrich themselves, slow down growth, and increase inequality*. Oxford University Press. Citation examples Lindsey and Teles (2017) [narrative]; (Lindsey & Teles, 2017) [parenthetical]
Three to 20 authors	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Bale, T., Webb, P., & Poletti, M. (2020). *Footsoldiers: Political party membership in the 21st century*. Routledge. Citation examples Bale et al. (2020) [narrative]; (Bale et al., 2020) [parenthetical]
No credited author	Reference format *Title of the book: Subtitle*. (yyyy). Publisher Name. Reference example *The dual disorders recovery book: A twelve step program for those of us with addiction and emotional or psychiatric illness*. (1993). Hazelden Foundation. Citation examples *The Dual Disorders Recovery Book* (1993) [narrative]; (*Dual Disorders Recovery Book*, 1993) [parenthetical]
Nonprimary author ("with")	Reference format Author, A. A., Author, B. B., & Author, C. C. (with Author, A. B.). (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Todorovic, M. (with Bakir, A.). (2016). *Rethinking strategy for creative industries: Innovation and interaction*. Routledge. Citation examples Todorovic (2016) [narrative]; (Todorovic, 2016) [parenthetical]

Nonprimary author ("with")	Reference format Author, A. A., Author, B. B., & Author, C. C. (with Author, A. B.). (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Todorovic, M. (with Bakir, A.). (2016). *Rethinking strategy for creative industries: Innovation and interaction*. Routledge. Citation examples Todorovic (2016) [narrative]; (Todorovic, 2016) [parenthetical]
Editor in author role	Reference format Editor, A. A. (Ed.). (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Goodwin, P. (Ed.). (2005). *The literate classroom*. David Fulton. Citation examples Goodwin (2005) [narrative]; (Goodwin, 2005) [parenthetical]
Multiple editors in author role	Reference format Editor, A. A., Editor, B. B., & Editor, C. C. (Eds.). (yyyy). *Title of the book: Subtitle*. Publisher Name. Reference example Malici, A., & Smith, E. S. (Eds.). (2018). *Political science research in practice*. Routledge. Citation examples Malici and Smith (2005) [narrative]; (Malici & Smith, 2005) [parenthetical]
Authored with editor	Reference format Author, A. A. (yyyy). *Title of the book: Subtitle* (A. A. Editor, Ed.) Publisher Name. Reference example Arendt, H. (1978). *The life of the mind* (M. McCarthy, Ed.). Harcourt. Citation examples Arendt (1978) [narrative]; (Arendt, 1978) [parenthetical]
Republication	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the book: Subtitle*. Publisher Name. (Original work published yyyy)

	Reference example Dewey, J. (1997). *Democracy and education*. Free Press. (Original work published 1916) Citation examples Dewey (1916/1997) [narrative]; (Dewey, 1916/1997) [parenthetical]
Edition included	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the book: Subtitle* (# ed.). Publisher Name. Reference example Love, R. J., & Webb, W. G. (1992). *Neurology for the speech-language pathologist* (2nd ed.). Butterworth–Heinemann. Citation examples Love and Webb (1992) [narrative]; (Love & Webb, 1992)
Author-supplied English translation of non-English title	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the book in the original language: Subtitle* [English translation of the title]. Publisher Name. Reference example Hupfer, P. (1996). *Unsere Umwelt: Das Klima—Globale und lokale Aspekte* [Our environment: The climate—Global and local aspects]. Teubner Verlag. Citation examples Hupfer (1996) [narrative]; (Hupfer, 1996) [parenthetical]
Published translation, edition included	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the book: Subtitle* (A. A. Translator, B. B. Translator, & C. C. Translator, Trans.; # ed.). Publisher Name. (Original work published yyyy) Reference example Wittgenstein, L. (2009). *Philosophical investigations* (G. E. M. Anscombe, P. M. S. Hacker, & J. Schulte, Trans.; 4th rev. ed.). Wiley–Blackwell. (Original work published 1953) Citation examples Wittgenstein (1953/2009) [narrative]; (Wittgenstein, 1953/2009) [parenthetical]
Published translation with editor	Reference format Author, A. A. (yyyy). *Title of the book: Subtitle* (A. A. Editor, Ed.; A. A. Translator & B. B. Translator, Trans.). Publisher Name. (Original work published yyyy)

	Reference example Weber, M. (1947). *The theory of social and economic* organization (T. Parsons, Ed.; A. M. Henderson & T. Parsons, Trans.). Free Press. (Original work published 1915) Citation examples Weber (1915/1947) [narrative]; (Weber, 1915/1947) [parenthetical]
Published translation with editor-translator	Reference format Author, A. A. (yyyy). *Title of the book: Subtitle* (A. A. Editor, Ed. & Trans.). Publisher Name. (Original work published yyyy) Reference example Freud, S. (1989). *Jokes and their relation to the unconscious* (J. Strachey, Ed. & Trans.). W. W. Norton & Company. (Original work published 1905) Citation examples Freud (1905/1989) [narrative]; (Freud 1905/1989) [parenthetical]
Untitled volume, edition included	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the multivolume work: Subtitle* (# ed., Vol. #). Publisher Name. Reference example Taussig, F. W. (1921). *Principles of economics* (3rd rev. ed., Vol. 2). Macmillan. Citation examples Taussig (1921) [narrative]; (Taussig, 1921) [parenthetical]
Titled volume, edition included	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the multivolume work: Subtitle: Vol. #. Volume title* (# ed.). Publisher Name. Reference example Bowlby, J. (1982). *Attachment and loss: Vol. 3. Loss: Sadness and depression* (3rd ed.). Basic Books. Citation examples Bowlby (1982) [narrative]; (Bowlby, 1982) [parenthetical]
Religious work in published translation	Reference format *Title of the Religious Work: Subtitle* (A. A. Translator, B. B. Translator, & C. C. Translator, Trans.). (yyyy). Publisher Name. Reference example *The Qur'an* (T. Khalidi, Trans.). (2009). Penguin.

	Citation examples *The Qur'an* (2009) [narrative]; (*The Qur'an*, 2009) [parenthetical]

	Book chapter models
One editor	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the book chapter: Subtitle. In A. A. Editor (Ed.), *Title of the book: Subtitle* (pp. ####–####). Publisher Name. Reference example Saks Berman, J. (1995). From Chicago to Rainbow Bridge: In search of changing woman. In E. F. Williams (Ed.), *Voices of feminist therapy* (pp. 11–25). Harwood Academic Publishers. Citation examples Saks Berman (1995) [narrative]; (Saks Berman, 1995) [parenthetical]
Two editors	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the book chapter: Subtitle. In A. A. Editor & B. B. Editor (Eds.), *Title of the book: Subtitle* (pp. ####–####). Publisher Name. Reference example Schwab, B., & Finocchiaro, S. (2018). "Don't fix it!": The role of player empowerment in the prevention of match-fixing. In S. Steele & H. Opie (Eds.), *Match-fixing in sport: Comparative studies from Australia, Japan, Korea, and beyond* (pp. 135–150). Routledge. Citation examples Schwab and Finocchiaro (2018) [narrative]; (Schwab & Finocchiaro, 2018) [parenthetical]
Three to 20 editors	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the book chapter: Subtitle. In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the book: Subtitle* (pp. ####–####). Publisher Name. Reference example Adams, Z., Füss, R., & Kaiser, D. G. (2008). Macroeconomic determinants of commodity futures returns. In F. J. Fabozzi, R. Füss, & D. G. Kaiser (Eds.), *The handbook of commodity investing* (pp. 87–112). Wiley.

	Citation examples Adams et al. (2008) [narrative]; (Adams et al., 2008) [parenthetical]
No credited author and republication	Reference format Title of the book chapter: Subtitle. (yyyy). In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the book: Subtitle* (pp. ####–####). Publisher Name. (Original work published yyyy) Reference example The Putney debates: The debate on the franchise. (2003). In D. Wootton (Ed.), *Divine right and democracy: An anthology of political writing in Stuart England* (pp. 285–316). Hackett. (Original work published 1647) Citation examples "The Putney Debates" (1647/2003) [narrative]; ("Putney Debates," 1647/2003) [parenthetical]
Author-supplied English translation of non-English title	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of book chapter in the original language: Subtitle [English translation of the title]. In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the book: Subtitle* (pp. ####–####). Publisher Name. Reference example Rey, B. (2006). Le savoir universitaire: Un savoir sans problème? [University knowledge: Problem-free knowledge?]. In M. Fabre & E. Vellas (Eds.), *Situations de formation et problématisation* (pp. 143–158). De Boeck. Citation examples Rey (2006) [narrative]; (Rey, 2006) [parenthetical]
Published translation	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the book chapter: Subtitle (A. A. Translator, B. B. Translator, & C. C. Translator, Trans.). In A. A. Editor (Ed.), *Title of the book: Subtitle* (pp. ####–####). Publisher Name. (Original work published yyyy) Reference example Piaget, J. (1995). Logical operators and social life (W. Mays, Trans.). In L. Smith (Ed.), *Sociological studies* (pp. 134–157). Routledge. (Original work published 1945) Citation examples Piaget (1945/1995) [narrative]; (Piaget, 1945/1995) [parenthetical]

Untitled volume, edition included	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the book chapter: Subtitle. In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the book: Subtitle* (# ed., Vol. #, pp. ####–####). Publisher Name. Reference example Remael, A. (2012). Audiovisual translation. In Y. Gambier & L. van Dooorslaer (Eds.), *Handbook of translation studies* (2nd ed., Vol. 1, pp. 12–17). John Benjamins. Citation examples Remael (2012) [narrative]; (Remael, 2012) [parenthetical]
Titled volume	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the book chapter: Subtitle. In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the multivolume work: Subtitle: Vol. #. Volume title* (pp. ####–####). Publisher Name. Reference example Ali, A., Caplan, P. J., & Fagnant, R. (2010). Gender stereotypes in diagnostic criteria. In J. C. Chrisler & D. R. McCreary (Eds.), *Handbook of gender research in psychology: Vol. 2. Gender research in social and applied psychology* (pp. 91–110). Springer. Citation examples Ali et al. (2010) [narrative]; (Ali et al., 2010) [parenthetical]
No credited author (encyclopedia)	Reference format Title of the entry. (yyyy). In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the reference book: Subtitle* (pp. ####–####). Publisher Name. Reference example Mexico. (2003). In E. Cortés & M. Barrea-Marlys (Eds.), *Encyclopedia of Latin American theater* (pp. 278–327). Greenwood. Citation examples “Mexico” (2003) [narrative]; (“Mexico,” 2003) [parenthetical]

Conference models	
Serial conference proceedings	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of the paper presentation: Subtitle. *Serial Proceedings/Journal Title*, *##*(#), ####–####. https://doi.org/DOI Reference example Albright, M. (1991). The role of the United States in Central Europe. *Proceedings of the Academy of Political Science*, *38*(1), 71–84. https://doi.org/10.2307/1173814 Citation examples Albright (1991) [narrative]; (Albright, 1991) [parenthetical]
Nonserial conference proceedings	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). Title of paper presentation: Subtitle. In A. A. Editor, B. B. Editor, & C. C. Editor (Eds.), *Title of the proceedings volume: Subtitle* (pp. ####–####). Publisher Name. Reference example Shupe, A. D., Jr., Hardin, B. L., & Bromley, D. G. (1983). A comparison of anti-cult movements in the United States and West Germany. In E. Barker (Ed.), *Of gods and men: New religious movements in the West—Proceedings of 1981 Annual Conference of the British Sociological Association Sociology of Religion Study Group* (pp. 177–194). Mercer University Press. Citation examples Shupe et al. (1983) [narrative]; (Shupe et al., 1983) [parenthetical]
Paper presentation	Reference format Presenter, A. A., Presenter, B. B., & Presenter, C. C. (yyyy, Month dd–dd). *Title of the paper presentation: Subtitle* [Paper presentation]. Conference Name, Conference City, {Conference Province/State Abbr,} Conference Country. { } = for US, Canada, Australia locations Reference example Schack, E. O., Dueber, D., Norris Thomas, J., Fisher, M. H., & Jong, C. (2019, April 5–9). *Computer-programmed decision trees for assessing teacher noticing* [Paper presentation]. American Educational Research Association Annual Meeting, Toronto, ON, Canada. Citation examples Schack et al. (2019) [narrative]; (Schack et al., 2019) [parenthetical]

Poster presentation	Reference format Presenter, A. A., Presenter, B. B., & Presenter, C. C. (yyyy, Month dd–dd*). Title of the poster presentation: Subtitle* [Poster presentation]. Conference Name, Conference City, {Conference Province/State Abbr,} Country. { } = for US, Canada, Australia locations Reference example Egan, O. (2019, April 6–9). *Suicide in Maori youth—Reflections on the aetioogy and evolving management responses* [Poster presentation]. European Psychiatric Association 27th Congress, Warsaw, Poland. Citation examples Egan (2019) [narrative]; (Egan, 2019) [parenthetical]

Dissertation and thesis models	
Unpublished doctoral dissertation	Reference format Author, A. A. (yyyy). *Title of the dissertation: Subtitle* [Unpublished doctoral dissertation]. Institution Name. Reference example Zaragoza, K. (2005). *A moral psychology of blame* [Unpublished doctoral dissertation]. Princeton University. Citation examples Zaragoza (2005) [narrative]; (Zaragoza, 2005) [parenthetical]
Unpublished master's thesis	Reference format Author, A. A. (yyyy). *Title of the thesis: Subtitle* [Unpublished master's thesis]. Institution Name. Reference example Niraula, K. (2015). *Addressing the neglect of local peacebuilding practices through documentaries: A case of everyday Gandhis* [Unpublished master's thesis]. University of Notre Dame. Citation examples Niraula (2015) [narrative]; (Niraula, 2015) [parenthetical]

Doctoral dissertation, published in online repository	Reference format Author, A. A. (yyyy). *Title of the dissertation: Subtitle* [Doctoral dissertation, Institution Name]. Repository Name. https://URL Reference example Boudreaux, C. M. (2015). *The city framed: A photographic examination of space and violence in Ciudad Juarez* [Doctoral dissertation, Tulane University]. Tulane University Theses and Dissertations Archive. https://digitallibrary.tulane.edu/islandora/object/tulane%3A27939/datastream Citation examples Boudreaux (2015) [narrative]; (Boudreaux, 2015) [parenthetical]
Master's thesis, published in online repository	Reference format Author, A. A. (yyyy). *Title of the thesis: Subtitle* [Master's thesis, Institution Name]. Repository Name. https://URL Reference example Choppy, P. T. (2018). *Attitudes to slavery and race in Seychellois Creole oral literature* [Master's thesis, University of Birmingham]. University of Birmingham eTheses Repository. http://etheses.bham.ac.uk//id/eprint/8082/7/Choppy18MARes.pdf Citation examples Choppy (2018) [narrative]; (Choppy, 2018) [parenthetical]

Report models	
Multiple authors	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the report: Subtitle* (Report No.|Tech. Rep. No.|Publication No. ########). Agency Name. Reference example Lempert, R. J., Norling, P., Pernin, C. G., Resetar, S. A., & Mahnovski, S. (2003). *Next generation environmental technologies: Benefits and barriers* (Report No. MR-1682-OSTP). RAND. Citation examples Lempert et al. (2003) [narrative]; (Lempert et al., 2003) [parenthetical]

Organizational author, the same as publishing agency	Reference format Organizational Author. (yyyy). *Title of the report: Subtitle* (Report No.|Tech. Rep. No.|Publication No. ########). Reference example Amnesty International. (2019). *Fragmented and unequal: A justice system that fails survivors of intimate partner violence in Louisiana, USA* (Report No. AMR 51/1160/2019). Citation examples Amnesty International (AI, 2019) [narrative]; (Amnesty International [AI], 2019) [parenthetical]
Online publication	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the report: Subtitle* (Report No.|Tech. Rep. No.|Publication No. ########). Agency Name. https://URL Reference example Warner-Griffin, C., Liu, H., Tadler, C., Herget, D., & Dalton, B. (2017). *Reading achievement of U.S. fourth-grade students in an international context: First look at the Progress in International Reading Literacy Study (PIRLS) and ePIRLS 2016* (NCES Report No. 2018-017). Institute of Education Sciences, National Center for Educational Statistics. https://nces.ed.gov/pubs2018/2018017.pdf Citation examples Warner-Griffin et al. (2018) [narrative]; (Warner-Griffin et al., 2018) [parenthetical]

Newspaper models	
Print	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). Title of the newspaper article: Subtitle. *Newspaper Title*, ###, ###. Reference example Lewis, A. E. (1972, June 18). 5 held in plot to bug Democrats' office here. *The Washington Post*, A1, A22. Citation examples Lewis (1972) [narrative]; (Lewis, 1972) [parenthetical]

Online	**Reference format** Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). Title of the newspaper article: Subtitle. *Newspaper Title*. https://URL **Reference example** Klein, J. (2018, May 8). How the father of computer science decoded nature's mysterious patterns. *The New York Times*. https://www.nytimes.com/2018/05/08/science/alan-turing-desalination.html **Citation examples** Klein (2018) [narrative]; (Klein, 2018) [parenthetical]
Editorial (online)	**Reference format** Title of the newspaper editorial: Subtitle [Editorial]. (yyyy, Month dd). *Newspaper Title*. https://URL **Reference example** The *Guardian* view on the rise in domestic killings: Figures to shock politicians to act [Editorial]. (2019, September 13). *The Guardian*. https://www.theguardian.com/commentisfree/2019/sep/13/the-guardian-view-on-the-rise-in-domestic-killings-figures-to-shock-politicians-to-act **Citation examples** "The *Guardian* View on the Rise in Domestic Killing" (2019) [narrative]; ("*Guardian* View on the Rise in Domestic Killing," 2019) [parenthetical]

Magazine models	
Print with volume and issue	**Reference format** Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). Title of magazine article: Subtitle. *Magazine Title*, *##*(#), ####–####. **Reference example** Hersey, J. (1946, August 31). Hiroshima. *The New Yorker*, *22*(33), 15–68. **Citation examples** Hersey (1946) [narrative]; (Hersey, 1946) [parenthetical]
Print without volume and issue	**Reference format** Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month). Title of the magazine article: Subtitle. *Magazine Title*, ####–####.

	Reference example Garber, M. (2002, December). Our genius problem. *The Atlantic,* 64–72. Citation examples Garber (2002) [narrative]; (Garber, 2002) [parenthetical]
Online with volume and issue	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). Title of the magazine article: Subtitle. *Magazine Title*, ##(#). https://URL Reference example Ruff, C. (2016, February 5). Computer science, meet humanities: In new majors, opposites attract. *The Chronicle of Higher Education*, *62*(21). https://www.chronicle.com/article/Computer-Science-Meet/235075/ Citation examples Ruff (2016) [narrative]; (Ruff, 2016) [parenthetical]

Web models	
Web page with multiple authors	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). *Title of the webpage: Subtitle*. Website Publisher Name. https://URL Reference example Harris, B., & Zucker, S. (2015, August 9). *Haussmann the demolisher and the creation of modern Paris*. Smarthistory. https://smarthistory.org/haussmann-the-demolisher-and-the-creation-of-modern-paris Citation examples Harris and Zucker (2015) [narrative]; (Harris & Zucker, 2015) [parenthetical]
Web page with no date (n.d.) and organizational author, the same as website publisher	Reference format Organizational Author. (n.d.). *Title of the webpage: Subtitle*. https://URL Reference example Pitt Rivers Museum. (n.d.). *Conservation case study: Noh theatre masks*. https://www.prm.ox.ac.uk/conservation-case-study-noh-theatre-masks Citation examples Pitt Rivers Museum (n.d.) [narrative]; (Pitt Rivers Museum, n.d.) [parenthetical]

Web page with periodically updated content (retrieval date required)	Reference format Author, A. A. (yyyy, Month dd). *Title of the webpage: Subtitle.* Publisher Name. Retrieved Month dd, yyyy, from https://URL Reference example Clement, T. (2019, September 30). *Adopt-a-book activity*. OER Commons. Retrieved October 4, 2019, from https://www.oercommons.org/authoring/58499-adopt-a-book-activity/view Citation examples Clement (2019) [narrative]; (Clement, 2019) [parenthetical]
Blog post	Reference format Author, A. A. (yyyy, Month dd). Title of the blog post: Subtitle. *Blog Title.* https://URL Reference example Price, D. (2018, October 7). On using archives and Freedom of Information Act for anthropological research. *Anthro{dendum}*. https://anthrodendum.org/2018/10/07/on-using-archives-and-freedom-of-information-act-for-anthropological-research Citation examples Price (2018) [narrative]; (Price, 2018) [parenthetical]
Tweet	Reference format Author, A. A. [@Handle]. (yyyy, Month dd). *First 20 words of the tweet, including hashtags and emojis* [Image attached|Video attached|Thumbnail with link attached] [Tweet]. Twitter. https://URL Reference example Singer, P. [@PeterSinger]. (2019, May 1). *Why are animal rights activists the orphans of the left? Will Kymlicka offers some answers* [Thumbnail with link attached] [Tweet]. Twitter. https://twitter.com/PeterSinger/status/1123555871198412800 Citation examples Singer (2019) [narrative]; (Singer, 2019) [parenthetical]
Facebook post	Reference format Author, A. A. (yyyy, Month dd). *First 20 words of the post, including hashtags and emojis* [Image attached|Video attached|Thumbnail with link attached]. Facebook. https://URL

	Reference example Thunberg, G. (2019, November 9). *Climate strike is named 2019 word of the year! #climatestrike* [Thumbnail with link attached]. Facebook. https://www.facebook.com/gretathunbergsweden/posts/970039473363873 Citation examples Thunberg (2019) [narrative]; (Thunberg, 2019) [parenthetical]

Software, app, and data set models	
Packaged	Reference format Developer, A. A. (yyyy). *Title of the software: Subtitle* (Version #.#) [Computer software]. Producer Name. Reference example Greene, W. H. (2016). *NLOGIT* (Version 6) [Computer software]. Econometric Software. Citation examples Greene (2016) [narrative]; (Greene, 2016) [parenthetical]
Downloaded	Reference format Developer, A. A., Developer, B. B., & Developer, C. C. (yyyy). *Title of the software: Subtitle* (Version #.#) [Computer software]. https://URL Reference example Paszke, A., Gross, S., Chintala, S., & Chanan, G. (2019). *PyTorch* (Version 1.3.0) [Computer software]. https://pytorch.org/ Citation examples Paszke et al. (2019) [narrative]; (Paszke et al., 2019) [parenthetical]
Mobile app by individual developer	Reference format Developer, A. A. (yyyy). *Title of the mobile app: Subtitle* (Version #.#) [Mobile app]. Provider Name. https://URL Reference example Steindorf, J. (2019). *Baseball statistics* (Version 2.0.2) [Mobile app]. App Store. https://apps.apple.com/us/app/baseball-statistics/id1019047563 Citation examples Steindorf (2019) [narrative]; (Steindorf, 2019) [parenthetical]

Mobile app entry by organizational developer	Reference format Organizational Developer. (yyyy). Title of the mobile app entry: Subtitle. In *Title of the mobile app: Subtitle* (Version #.#) [Mobile app]. App Name. https://URL Reference example American Red Cross. (2019). Distress. In *First aid: American Red Cross* (Version 2.7.3) [Mobile app]. App Store. https://apps.apple.com/us/app/first-aid-american-red-cross/id529160691 Citation examples American Red Cross (ARC, 2019) [narrative]; (American Red Cross [ARC], 2019) [parenthetical]
Data set	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the data set: Subtitle* [Data set]. Archive Name. https:/doi.org.DOI Reference example Kesson, M., Sarkol, V., & Mesoudi, A. (2017). *Experimental priming of independent and interdependent activity does not affect culturally-variable psychological processes* [Data set]. Dryad. https://doi.org/10.5061/dryad.7j270 Citation examples Kesson et al. (2017) [narrative]; (Kesson et al., 2017) [parenthetical]

Audiovisual models	
Film	Reference format Director, A. A. (Director). (yyyy). *Title of the film: Subtitle* [Film]. Production Company Name_A; Production Company Name_B; Production Company Name_C. Reference example Bogdanovich, P. (Director). (1971). *The last picture show* [Film]. Columbia Pictures; BBS Productions; Last Picture Show Productions. Citation examples Bogdanovich (1971) [narrative]; (Bogdanovich, 1971) [parenthetical]
Television series	Reference format Producer, A. A., Producer, B. B., & Producer, C. C. (Executive Producers). (yyyy–yyyy). *Title of the television series* [TV series]. Production Company Name_A; Production Company Name_B; Production Company Name_C.

	Reference example Chibnall, C., & Featherstone, J. (Executive Producers). (2013–2017). *Broadchurch* [TV series]. Kudos Film and Television; Imaginary Friends; ITV–Independent Television. **Citation examples** Chibnall and Featherstone (2013–2017) [narrative]; (Chibnall & Featherstone, 2013–2017) [parenthetical]
Television episode	**Reference format** Writer, A. A. (Writer), Writer, B. B. (Writer), Writer, C. C. (Writer), & Director, A. A. (Director). (yyyy). Title of the television episode: Subtitle (Season #, Episode #) [TV series episode]. In A. A. Producer, B. B. Producer, & C. C. Producer (Executive Producers), *Title of the television series: Subtitle*. Production Company Name_A; Production Company Name_B; Production Company Name_C. **Reference example** Stahl, J. (Writer), Frost, M. (Writer), Peyton, H. (Writer), Engels, R. (Writer), & Holland, T. (Director). (1990). Laura's secret diary (Season 2, Episode 4) [TV series episode]. In M. Frost & D. Lynch (Executive Producers), *Twin Peaks*. Lynch/Frost Productions; Propaganda Films; Spelling Entertainment. **Citation examples** Stahl et al. (1990) [narrative]; (Stahl et al., 1990) [parenthetical]
Classical song	**Reference format** Composer, A. A. (yyyy). Title of the song: Subtitle [Song recorded by A. A. Artist]. On *Title of the album: Subtitle*. Production Company Name_A; Production Company Name_B; Production Company Name_C. (Original work published yyyy) **Reference example** Cage, J. (1994). In a landscape [Song recorded by S. Drury]. On *In a landscape: Piano music of John Cage*. BMG. (Original work published 1948) **Citation examples** Cage (1948/1994) [narrative]; (Cage, 1948/1994) [parenthetical]
Nonclassical song	**Reference format** Artist, A. A. (yyyy) Title of the song: Subtitle [Song]. On *Title of the album: Subtitle*. Production Company Name_A; Production Company Name_B; Production Company Name_C. **Reference example** Monk, T. (1957). 'Round midnight [Song]. On *Thelonious himself*. Riverside.

	Citation examples Monk (1957) [narrative]; (Monk, 1957) [parenthetical]
Artwork	Reference format Artist, A. A. (yyyy). *Title of the artwork: Subtitle* [Artwork type]. Institution Name, Institution City, {Institution Province/State Abbr,} Institution Country. https://URL { } = for US, Canada, Australia locations Reference example Wiley, K. (2008). *Three wise men greeting entry into Lagos* [Painting]. Pennsylvania Academy of the Fine Arts, Philadelphia, PA, United States. https://www.pafa.org/sites/default/files/artworkpics/2009_20_l.jpg Citation examples Wiley (2008) [narrative]; (Wiley, 2008) [parenthetical]
Streaming video	Reference format Creator, A. A. (yyyy, Month dd). *Title of the video: Subtitle* [Video]. Media Platform Name. https://URL Reference example Hamilton, D. (2019, February 26). *Dr. Diane Hamilton interviews Dr. Albert Bandura* [Video]. YouTube. https://www.youtube.com/watch?v=TWCEwilJWeA Citation examples Hamilton (2019) [narrative]; (Hamilton, 2019) [parenthetical]
Podcast episode	Reference format Host, A. A. (Host). (yyyy, Month dd). Title of the podcast episode: Subtitle (No. #) [Audio podcast episode]. In *Title of the podcast: Subtitle*. Production Company Name_A; Production Company Name_B; Production Company Name_C. https://URL Reference example Giddens, R. (Host). (2019, January 23). Mozart's Queen of the Night: Outrage out of this world (No. 8) [Audio podcast episode]. In *Aria code*. The Metropolitan Opera; WQXR; WNYC Studios. https://www.wnycstudios.org/podcasts/aria-code/episodes/aria-code-mozart-magic-flute-kathryn-lewek Citation examples Giddens (2019) [narrative]; (Giddens, 2019) [parenthetical]

Unpublished and informally published model	
Manuscript	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy). *Title of the unpublished manuscript: Subtitle* [Unpublished manuscript|Manuscript in preparation|Manuscript submitted for publication]. Department Name, Institution Name. Reference example Swanson, K. W. (2006). *Hog heaven or hell's kitchen? Abbau and landscape in Upton Sinclair's* The Jungle [Unpublished manuscript]. Department of English, Tulane University. Citation examples Swanson (2006) [narrative]; (Swanson, 2006) [parenthetical]

Archival material models	
Titled document	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). *Title of the document: Subtitle*. Collection Name (Accession ####), Institution Name, Institution City, {Institution Province/State Abbr,} Institution Country. { } = for US, Canada, Australia locations Reference example Garrick, D. (1778, September 24). *Near contemporary copy of the will of David Garrick*. David Garrick Collection, 1778–1779 (DR32/1), The Shakespeare Center, Shakespeare Birthplace Trust, Stratford-upon-Avon, United Kingdom. Citation examples Garrick (1778) [narrative]; (Garrick, 1778) [parenthetical]
Titled document, with approximate (circa, "ca.") dates	Reference format Author, A. A., Author, B. B., & Author, C. C. (ca. yyyy–yyyy). *Title of the document: Subtitle*. Collection Name (Accession ####), Institution Name, Institution City, {Institution Province/State Abbr,} Institution Country. { } = for US, Canada, Australia locations

	Reference example Berendt, C. H. (ca. 1864–1873). *Miscellanae Maya*. Berendt-Brinton Linguistic Collection (Item 179), Kislak Center for Special Collections, Rare Books and Manuscripts, University of Pennsylvania, Philadelphia, PA, United States. Citation examples Berendt (ca. 1864–1873) [narrative]; (Berendt, ca. 1864–1873) [parenthetical]
Untitled document or letter	Reference format Author, A. A., Author, B. B., & Author, C. C. (yyyy, Month dd). [Document or letter details]. Collection Name (Accession ####), Institution Name, Institution City, Archive Country. Reference example Elgar, E. (1917, October 20). [Letter to Sidney Colvin]. Sir Sidney Colvin Archive (Colvin/Elgar/2), Fitzwilliam Museum, University of Cambridge, Cambridge, United Kingdom. Citation examples Elgar (1917) [narrative]; (Elgar, 1917) [parenthetical]

Patent, legal case, and statute models	
Patent	Reference format Inventor, A. A., inventor, B. B., & Inventor, C. C. (yyyy). *Title of the patent: Subtitle* (Patent No. #,###,###). Patent Office Name. https://URL Reference example Pfeifer, A., Muhs, A., Pihlgren, M., Adolfsson, O., & Van Leuven, F. (2017). *Humanized tau antibody* (U.S. Patent No. 9,657,091). U.S. Patent and Trademark Office. http://patft.uspto.gov/netacgi/nph-Parser?patentnumber=9,657,091 Citation examples Pfeifer et al. (2017) [narrative]; (Pfeifer et al., 2017) [parenthetical]
U.S. Supreme Court case	Reference format Name v. Name, ### U.S. #### (yyyy). https://URL Reference example Cherokee Nation of Oklahoma v. Leavitt, 543 U.S. 631 (2005). https://supreme.justia.com/cases/federal/us/543/631/

	Citation examples *Cherokee Nation of Oklahoma v. Leavitt* (2005) [narrative]; (*Cherokee Nation of Oklahoma v. Leavitt,* 2005) [parenthetical]
U.S. state supreme court case	Reference format Name v. Name, ### State Reporter Abbr._A ####, ### State Reporter Abbr._B ####, ### State Reporter Abbr._C #### (yyyy). https://URL Reference example People v. Diaz, 51 Cal. 4th 84, 244 P.3d 501, 119 Cal. Rptr. 3d 105 (2011). https://scocal.stanford.edu/opinion/people-v-diaz-33928 Citation examples *People v. Diaz* (2011) [narrative]; (*People v. Diaz*, 2011) [parenthetical]
U.K. Supreme Court case (neutral citation)	Reference format Name v. Name, U.K.S.C. ### (yyyy). (Jurisdiction Abbr.). https://URL Reference example Patel v. Mirza, U.K.S.C. 42 (2016). (Eng.). https://www.bailii.org/uk/cases/UKSC/2016/42.html Citation examples *Patel v. Mirza* (2016) [narrative]; (*Patel v. Mirza*, 2016) [parenthetical]
U.K. High Court, Queen's Bench case (neutral citation)	Reference format Name v. Name, E.W.H.C. (Q.B.) ### (yyyy). (Jurisdiction Abbr.). https://URL Reference example Murphy v. Ministry of Defence, E.W.H.C. (Q.B.) 3 (2016). (Eng.). https://www.bailii.org/ew/cases/EWHC/QB/2016/3.html Citation examples *Murphy v. Ministry of Defence* (2016) [narrative]; (*Murphy v. Ministry of Defence,* 2016) [parenthetical]
U.S. federal statute from *United States Codes*	Reference format Title of the Statute: Subtitle, ## U.S.C. § #### (yyyy). https://URL Reference example Federal Food, Drug, and Cosmetic Act, 21 U.S.C. § 387 (1938). https://uscode.house.gov/view.xhtml?path=/prelim@title21/chapter9/subchapter9&edition=prelim

	Citation examples Federal Food, Drug, and Cosmetic Act (1938) [narrative]; (Federal Food, Drug, and Cosmetic Act, 1938) [parenthetical]
U.S. federal statute from *United States Statutes at Large*	Reference format Title of the Statute: Subtitle, Pub. L. No. ###-###, ## Stat. ## (yyyy). https://URL Reference example James Zadroga 9/11 Health and Compensation Act of 2010, Pub. L. No. 111-347, 124 Stat. 3623 (2011). https://www.congress.gov/bill/111th-congress/house-bill/847/text Citation examples James Zadroga 9/11 Health and Compensation Act (2011) [narrative]; (James Zadroga 9/11 Health and Compensation Act, 2011) [parenthetical]
U.K. statute, enacted before 1963	Reference format Title of the Statute: Subtitle, ## & ## Regnal Abbr. c. ## (yyyy). (Jurisdiction Abbr.). Reference example Church of England Assembly (Powers) Act, 9 & 10 Geo. 5 c. 76 (1919). (Eng.). Citation examples Church of England Assembly (Powers) Act (1919) [narrative]; (Church of England Assembly [Powers] Act, 1919) [parenthetical]
U.K. statute, enacted after 1963	Reference format Title of the Statute: Subtitle, c. ## (yyyy). (Jurisdiction Abbr.). https://URL Reference example Climate Change Act, c. 27 (2008). (Eng.). http://www.legislation.gov.uk/ukpga/2008/27/contents Citation examples Climate Change Act (2008) [narrative]; (Climate Change Act, 2008) [parenthetical]

Appendix B: Additional Systematic Review References

(Those included in the systematic review/meta-analysis)

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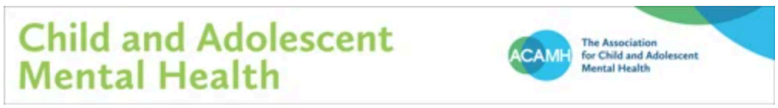
Appendix C: Journal of Child and Adolescent Mental Health Author Guidelines



Author Guidelines

Why submit to *Child and Adolescent Mental Health*?

- An international journal with a growing reputation for publishing work of clinical relevance to multidisciplinary practitioners in child and adolescent mental health
- Ranked in ISI: 2018: 75/124 (Pediatrics); 109/146 (Psychiatry); 93/142 (Psychiatry, Social Science); 78/130 (Psychology, Clinical).
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- All articles published in CAMH are eligible for Panel A: Psychology, Psychiatry and Neuroscience in the Research Excellence Framework (REF)

1. Contributions from any discipline that further clinical knowledge of the mental life and behaviour of children are welcomed. Papers need to clearly draw out the clinical implications for mental health practitioners. Papers are published in English. As an international journal, submissions are welcomed from any country. Contributions should be of a standard that merits presentation before an international readership. Papers may assume any of the following forms: Original Articles; Review

Articles; Innovations in Practice; Narrative Matters; Debate Articles.

Authors are asked to remember that CAMH is an international journal and therefore clarification should be provided for any references that are made in submitted papers to the practice within the authors' own country. This is to ensure that the meaning is clearly understandable for our diverse readership. Authors should make their papers as broadly applicable as possible for a global audience.

Original Articles: Original Articles make an original contribution to empirical knowledge, to the theoretical understanding of the subject, or to the development of clinical research and practice.

Review Articles: These papers offer a critical perspective on a key body of current research relevant to child and adolescent mental health. The journal requires the pre-registration of review protocols on any publicly accessible platform (e.g. The International Prospective Register of Systematic Reviews, or PROSPERO).

Innovations in Practice: These papers report on any new and innovative development that could have a major impact on evidence-based practice, intervention and service models.

Narrative Matters: These papers describe important topics and issues relevant to those working in child and adolescent mental health but considered from within the context and framework of the Humanities and Social Sciences.

Debate Articles: These papers express opposing points of view or opinions, highlighting current evidence-based issues, or discuss differences in clinical practice

2. Submission of a paper to *Child and Adolescent Mental Health* will be held to imply that it represents an original submission, not previously published; that it is not being considered for publication elsewhere; and that if accepted for publication it will not be published elsewhere without the consent of the Editors.

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Authors are reminded that the *Journal* adheres to the ethics of scientific publication as detailed in the ***Ethical principles of psychologists and code of conduct*** (American Psychological Association, 2010). These principles also imply that the piecemeal, or fragmented publication of small amounts of data from the same study is not acceptable. The Journal also generally conforms to the Uniform Requirements for Manuscripts of the International Committee of Medical Journal Editors (**ICJME**) and is also a member and subscribes to the principles of the Committee on Publication Ethics (**COPE**).

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The Equator Network is recommended as a resource on the above and other reporting guidelines for which the editors will expect studies of all methodologies to follow. Of particular note are the guidelines on qualitative work http://www.equator-network.org/reporting-guidelines/evolving-guidelines-for-publication-of-qualitative-research-studies-in-psychology-and-related-fields and on quasi-experimental http://www.equator-network.org/reporting-guidelines/the-quality-of-mixed-methods-studies-in-health-services-research and mixed method designs http://www.equator-network-or/reporting-guidelines/guidelines-for-conducting-and-reporting-mixed-research-in-the-field-of-counseling-and-beyond

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Summary: Authors should include a structured Abstract not exceeding 250 words under the sub-headings: Background; Method; Results; Conclusions.

Key Practitioner Message: Below the Abstract, please provide 1-2 bullet points answering each of the following questions:

- **What is known?** - What is the relevant background knowledge base to your study? This may also include areas of uncertainty or ignorance.
- **What is new?** - What does your study tell us that we didn't already know or is novel regarding its design?
- **What is significant for clinical practice?** - Based on your findings, what should practitioners do differently or, if your study is of a preliminary nature, why should more research be devoted to this particular study?

Keywords: Please provide 4-6 keywords use **MeSH Browser** for suggestions

6. Papers submitted should be concise and written in English in a readily understandable style, avoiding sexist and racist language. Articles should adhere to journal guidelines and include a word count of their paper; occasionally, longer article may be accepted after negotiation with the Editors.

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Contributorships: Please state any elements of authorship for which particular authors are responsible, where contributorships differ between author group. (All authors must share responsibility for the final version of the work submitted and published; if the study include original data, at least one author must confirm that he or she had full access to all the data in the study and takes responsibility for the integrity of the data in the study and the accuracy of the data analysis). Contributions from others outside the author group should also be acknowledged (e.g. study assistance or statistical advice) and collaborators and study participants may also be thanked.

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12. Figures: Any figures, charts or diagrams should be originated in a drawing package and saved within the Word file or as an EPS or TIFF file. See http://authorservices.wiley.com/bauthor/illustration.asp for further guidelines on preparing and submitting artwork. Titles or captions should be clear and easy to read. These should appear at the end of the main text.

13. Footnotes should be avoided, but end notes may be used on a limited basis.

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Review Articles

Research Articles offer our readers a critical perspective on a key body of current research relevant to child and adolescent mental health and maintain high standards of scientific practice by conforming to systematic guidelines as set out in the **PRISMA statement**. These articles should aim to inform readers of any important or controversial issues/findings, as well as the relevant conceptual and theoretical models, and provide them with sufficient information to evaluate the principal arguments involved. All review articles should also make clear the relevancy of the research covered, and any findings, for clinical practice.

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These articles are both submissions and directly commissioned papers. They will be peer-reviewed. The articles should be on a humanities topic relevant to those working in child and adolescent mental health. The topics can include but are not restricted to: aspects of child mental health service history; representations of abnormal mental states or mental illness in children and teenagers in film, literature or drama; depictions of child mental health clinicians within popular culture; ethical dilemmas in the speciality. Interest and originality are valued. If in doubt, please contact the section editor: Gordon.Bates@covwarkpt.nhs.uk. The essays should be between 1500 and 2000 words and written for an audience of child mental health professionals. For publishing reasons, there is an upper limit of 8 references for the article. Additional references may be given in the text if necessary.

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University of East Anglia

Hannah Cowie and Alex Staines
Doctoral Programme in Clinical Psychology
Norwich Medical School
University of East Anglia
Norwich
NR4 7TJ

NORWICH MEDICAL SCHOOL
Bob Champion Research & Educational Building
James Watson Road
University of East Anglia
Norwich Research Park
Norwich NR4 7UQ

Email: fmh.ethics@uea.ac.uk
www.med.uea.ac.uk

20th December 2019

Dear Hannah and Alex

Piloting a brief sleep intervention for adolescents with insomnia symptoms
Reference: 001 2019/20

Thank you for your email of 12th December 2019 notifying us of the amendment you would like to make to your above proposal. This has been considered and I can confirm that your amendment has been approved.

Please can you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance, and that any adverse events which occur during your project are reported to the Committee.

Approval by the FMH Research Committee should not be taken as evidence that your study is compliant with GDPR and the Data Protection Act 2018. If you need guidance on how to make your study GDPR compliant, please contact your institution's Data Protection Officer.

Please can you arrange to send us a report once your project is completed.

Yours sincerely

Prof Alastair Forbes
Chair
FMH Research Ethics Committee

Faculty of Medicine and Health Sciences Research Ethics Committee

University of East Anglia

NORWICH MEDICAL SCHOOL
Bob Champion Research & Educational Building
James Watson Road
University of East Anglia
Norwich Research Park
Norwich NR4 7UQ

Email: fmh.ethics@uea.ac.uk
www.med.uea.ac.uk

Hannah Cowie and Alex Staines
Doctoral Programme in Clinical Psychology
Norwich Medical School
University of East Anglia
Norwich
NR4 7TJ

30th April 2020

Dear Hannah and Alex

Piloting a brief sleep intervention for adolescents with insomnia symptoms
Reference: 2019/20-001

Thank you for your email of 20th March 2020 notifying us of the amendments you would like to make to your above proposal. These have been considered and I can confirm that your amendments have been approved.

Please can you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance, and that any adverse events which occur during your project are reported to the Committee.

Approval by the FMH Research Ethics Committee should not be taken as evidence that your study is compliant with GDPR and the Data Protection Act 2018. If you need guidance on how to make your study GDPR compliant, please contact your institution's Data Protection Officer.

Please can you arrange to send us a report once your project is completed.

Yours sincerely

Prof Alastair Forbes
Chair
FMH Research Ethics Committee

COVID-19: *The FMH Research Ethics Committee procedures remain as normal. Please note that our decisions as to the ethics of your application take no account of Government measures and UEA guidelines relating to the coronavirus pandemic and all approvals granted are, of course, subject to these. If your research is COVID-19 related it will naturally be expedited. If the current situation means that you will have to alter your study, please submit an application for an amendment in the usual way.*

Appendix E: Participant Information Sheet

Stage 1: Sleep Survey
Young Person Information Sheet

Hello, we are inviting you to take part in our research project!

What is it for? What is your aim?

We, the researchers, want to understand what young people's sleep is like at your school/college, so the right kind of support can be offered.

What will I have to do?

We, the researchers, will arrange a time to meet with you in school/college to complete the study which will take around 1 hour. During this time:

1) We will give you a chance to ask any questions, so that you can decide if you would like to take part.
2) We will then ask you to fill in a sheet which asks you some basic details (including name & contact details), and a consent form (***if you are under 16***, *we will need to check that it is ok for you to take part with your parent/guardian. They can opt you out of the study by filling in our "opt out form" which will be sent to them too. Your parent will also get a Parent Information sheet, just like this one.* ***If you are 16-18*** *you can consent to take part yourself)*
3) We would then like you to complete some brief questionnaires about your sleep, feelings, wellbeing and thinking styles. There will be opportunities for breaks if needed.

Will I have the same researcher from start to finish?

Yes.

Do I have to go ahead with it?

No. You do not have to take part unless you want to. Also, if you decide to take part and then change your mind, this won't matter at all. You can withdraw from the study at any point, without giving a reason. You can do this by contacting us, the researchers, using the details below.

What could it do to me? Is it definitely safe?

Some of the questions ask about how you have been feeling recently, and sometimes this makes people feel good, or upset, depending on whether they can relate to the questions. This is very normal so if you need to take a break at any point or want to stop then that is completely fine. We can talk about this or you might want to talk to your friends, or a teacher or parent about it.

Will there be any more projects?

On the basis of the answers you gave us on the questionnaires, some young people may be asked to take part in a second project offering some support with sleep. If this happens, we will contact you and your parent/guardian.

What if I have more questions or want to take part?

If you have any questions about this study, either now or later or want to take part, please feel free to email us or phone to speak to us. You can also contact Student Services at your college.

Alex Staines & Hannah Cowie

Contact number: 07935377292

Sleeping.better@uea.ac.uk

NORWICH MEDICAL SCHOOL
FACULTY OF MEDICINE AND
HEALTH SCIENCES
UNIVERSITY OF EAST ANGLIA
NORWICH
NR4 7TJ

If you would like to make a formal complaint, please contact the head of department at the UEA, Professor Niall Broomfield:
n.broomfield@uea.ac.uk

Appendix F: Consent Form

Faculty of Medicine and Health Sciences
Norwich Medical School
University of East Anglia
Norwich NR4 7TJ
United Kingdom
Email: sleeping.better@uea.ac.uk
Tel: 07935377292
Web: www.uea.ac.uk

University of East Anglia

Sleep Survey Consent Form for Young Persons

You should only say 'yes' to being in the study if you know what it is about and you want to be in it. If you don't want to be in the study, don't sign the form.

If your answer is YES to each question, please put your initials in each box:

Have you read (or had read to you) the information about this project?	
Has somebody explained this project to you?	
Do you understand what this project is about?	
Have you asked all the questions you want?	
Have you had your questions answered in a way you understand?	
Do you understand it's OK to stop taking part at any time?	
Are you happy to take part?	
Do you understand that the researchers won't tell anyone what you answer in the survey, unless you talk about being hurt by someone, or hurting yourself or someone else? If this happens, do you understand that we will notify your school so that they can offer you some support?	
Do you understand that if you're answers indicate that you may be struggling with your mental health that we will ask your school to provide you with some support, or suggest services that could help?	
If you are eligible, would you be happy for the researchers to contact you about a second study exploring the helpfulness of a sleep programme designed for young people?	

If you **do** want to take part, please write your name and today's date:
Your name: _____

Date:_____

Are you happy to be contacted about a future study? (This just means you will be asked, you do not have to take part!) YES / NO

If yes, please write your email address here:_____
If you don't have an email address, can we contact you through school? YES / NO
Do you want us to tell you what we **learnt** in the study? YES / NO

(For researchers only) UNIQUE ID: ___

Appendix G: Debrief Sheet

Faculty of Medicine and Health Sciences
Norwich Medical School
University of East Anglia
Norwich NR4 7TJ
United Kingdom
Email: sleeping.better@uea.ac.uk
Tel: 07935377292
Web: www.uea.ac.uk

Sleeping Better Programme

Young Person Debrief Sheet

Thank you for taking part in our survey! The aim of this study was to get some information about people's sleep and see if there were any similarities or differences between those who sleep well, and those who don't sleep as well. We are also looking for people to take part in a second study, so you may be contacted about this in the future.

Your results will be anonymously compared with those of other participants taking part in the study. If at any point you wish to withdraw your results or ask any questions about this study please email Hannah Cowie or Alex Staines on sleeping.better@uea.ac.uk.

The questionnaires tell us about your sleep, as well as how you have been feeling. Everyone's feelings go up and down from time to time. This is perfectly normal and nothing to worry about.

Sometimes we do go through times when we feel upset or down for quite a while. Usually people you already know can help; for example, parents, other family, a member of staff at school, or a friend. Sometimes it's useful to talk to someone else or read some information so we have suggested some useful resources below.

Thank you very much for helping us with this research. We hope you have found it interesting. We will be feeding back what we've found to the school once we have the results!

Support & Advice

Staff at your school
If you are having problems at school, whether it's keeping up in lessons, managing your homework, or getting on with others in your class, your Head of Year can help. They will talk to you about what you're finding difficult, and think about what could help. You can also speak to any staff member at school who can point you in the right direction.
Your General Practitioner (GP) (contact details vary)
Your GP will be able to offer support and advice on possible treatment options for any mental health difficulties. It can be helpful to take someone with you if you are not used to talking to them.

Books

Am I depressed? And what can I do about it? A CBT self-help guide for teenagers experiencing low mood and depression. Authors: Shirley Reynolds, & Monika Parkinson (2015). Publishers: Constable & Robinson. This book is written for teenagers, and is available on Amazon.
Overcoming Low Self-Esteem: A self-help guide using cognitive behavioural techniques. Author: Melanie Fennell (1999). Publisher: Constable & Robinson.
This book is a really easy to read guide on how to overcome difficulties with low self-esteem, a common problem for many young people.

Websites

Young Minds: www.youngminds.org.uk/
Young Minds is a charity committed to improving the mental health of young people. The website has information leaflets and ways to get support.
Northumberland self-help: https://www.ntw.nhs.uk/pic/selfhelp/
This website has some great free to download self-help leaflets, including ones on anxiety, depression, anger, and self-harm.
Mood Juice: http://www.moodjuice.scot.nhs.uk/
A self-help site full of resources for dealing with depression, anxiety and other difficulties.
Mood Gym: https://moodgym.anu.edu.au
Free web-based Cognitive-Behaviour Therapy (CBT) programme.
Childline: www.childline.org.uk
Lots of useful information. You can also email or speak to a counsellor online:
http://www.childline.org.uk/talk/chat/pages/onlinechat.aspx
Papyrus: http://www.papyrus-uk.org Advice and support for young people dealing with self-harm and emotional distress and for those who are worried about them.

Helplines

Childline: 0800 11 11
Free confidential 24hr helpline for young people up to 19yrs old.
Samaritans: 08457 90 90 90
Free confidential 24 hour helpline.
Papyrus HOPELineUK 0800 068 41 41
Free confidential helpline for anyone concerned about a young person at risk of harming themselves. Open weekdays 10am – 5pm, 7pm – 10pm; weekends 2pm – 5pm.
Get Connected: 0808 808 4994
Free, confidential help for a wide range of issues for young people under 25. They also have a website:
http://www.getconnected.org.uk/

Study leads:

Alex Staines

Hannah Cowie

07935377292

Contact:
Sleeping.better@uea.ac.uk

If you would like to make a formal complaint, please contact the head of department at the UEA, Prof Niall Broomfield: n.broomfield@uea.ac.uk

Appendix H: Demographic Information

Faculty of Medicine and Health Sciences
Norwich Medical School
University of East Anglia
Norwich NR4 7TJ
United Kingdom
Email: sleeping.better@uea.ac.uk
Tel: 07935377292
Web: www.uea.ac.uk

University of East Anglia

Demographics Questionnaire

If you need help answering any of these questions, please discuss this with one of the researchers who will be happy to answer any questions that you might have.

Name:	
Date of Birth:	_____/_____/_____
Home Address:	
Mobile Number: *(We will use this to contact you if you are eligible to take part in the sleep study)*	
Email Address:	
School/college:	
Year Group:	
Gender:	
Please tick the box that best describes you:	**White British** ☐ **White Irish** ☐ **Any other White background** ☐ **White and Black Caribbean** ☐ **White and Black African** ☐ **White and Asian** ☐ **Any other mixed background** ☐ **Indian or Indian British** ☐ **Pakistani or Pakistani British** ☐ **Bangladeshi or Bangladeshi British** ☐ **Any other Asian background** ☐ **Caribbean or Caribbean British** ☐ **African or African British** ☐ **Any other Black background** ☐ **Chinese** ☐ **Any other ethnic group** ☐ **I don't want to say** ☐
Do you currently take any tablets or medication to help you sleep?	*Please circle:* **YES / NO** *(If yes, please specify which medications if you know the name):*
Are you currently having any help from another adult (such as a counsellor, school nurse or therapist) for your sleep, mental health or any other worries?	**YES / NO** *(If yes, please specify):*
Would you like some help to improve your sleep?	**YES / NO**
To take part in this study we also require your parent/carer's contact details	
Parent/carer/guardian's name(s):	
Parent/carer/guardian's contact number/email address:	

(For researchers only) UNIQUE ID: ___

Appendix I: Pittsburgh Sleep Quality Index

PITTSBURGH SLEEP QUALITY INDEX (PSQI)

INSTRUCTIONS: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, when have you usually gone to bed at night?

   USUAL BED TIME _____

2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?

   NUMBER OF MINUTES _____

3. During the past month, when have you usually gotten up in the morning?

   USUAL GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)

   HOURS OF SLEEP PER NIGHT _____

INSTRUCTIONS: For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...cannot get to sleep within 30 minutes	☐	☐	☐	☐
(b) ...wake up in the middle of the night or early morning	☐	☐	☐	☐
(c) ...have to get up to use the bathroom	☐	☐	☐	☐
(d ...cannot breathe comfortably	☐	☐	☐	☐
(e) ...cough or snore loudly	☐	☐	☐	☐
(f) ...feel too cold	☐	☐	☐	☐
(g) ...feel too hot	☐	☐	☐	☐
(h) ...had bad dreams	☐	☐	☐	☐
(i) ...have pain	☐	☐	☐	☐
(j) Other reason(s), please describe _____ _____				
How often during the past month have you had trouble sleeping because of this?	☐	☐	☐	☐

PSQI Page 1

	Very good	Fairly good	Fairly bad	very bad
6. During the past month, how would you rate your sleep quality overall?	☐	☐	☐	☐

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	☐	☐	☐	☐
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	☐	☐	☐	☐

	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

	No bed partner or roommate	Partner/ roommate in other room	Partner in same room, but not same bed	Partner in same bed
10. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

If you have a roommate or bed partner, ask him/her how often in the past month you have had...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...loud snoring	☐	☐	☐	☐
(b) ...long pauses between breaths while asleep	☐	☐	☐	☐
(c) ...legs twitching or jerking while you sleep	☐	☐	☐	☐
(d) ...episodes of disorientation or confusion during sleep	☐	☐	☐	☐
(e) Other restlessness while you sleep; please describe	☐	☐	☐	☐

_____

_____

Appendix J: Insomnia Severity Index

Insomnia Severity Index

The Insomnia Severity Index has seven questions. The seven answers are added up to get a total score. When you have your total score, look at the 'Guidelines for Scoring/Interpretation' below to see where your sleep difficulty fits.

For each question, please CIRCLE the number that best describes your answer.

Please rate the CURRENT (i.e. LAST 2 WEEKS) SEVERITY of your insomnia problem(s).

Insomnia Problem	None	Mild	Moderate	Severe	Very Severe
1. Difficulty falling asleep	0	1	2	3	4
2. Difficulty staying asleep	0	1	2	3	4
3. Problems waking up too early	0	1	2	3	4

4. How SATISFIED/DISSATISFIED are you with your CURRENT sleep pattern?

Very Satisfied	Satisfied	Moderately Satisfied	Dissatisfied	Very Dissatisfied
0	1	2	3	4

5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life?

Not at all Noticeable	A Little	Somewhat	Much	Very Much Noticeable
0	1	2	3	4

6. How WORRIED/DISTRESSED are you about your current sleep problem?

Not at all Worried	A Little	Somewhat	Much	Very Much Worried
0	1	2	3	4

7. To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY?

Not at all Interfering	A Little	Somewhat	Much	Very Much Interfering
0	1	2	3	4

Appendix K: Revised Child Anxiety and Depression Scale

Date: _____ **Name/ID:** _____

RCADS

Please put a circle around the word that shows how often each of these things happens to you. There are no right or wrong answers.

1. I worry about things	Never	Sometimes	Often	Always
2. I feel sad or empty	Never	Sometimes	Often	Always
3. When I have a problem, I get a funny feeling in my stomach	Never	Sometimes	Often	Always
4. I worry when I think I have done poorly at something	Never	Sometimes	Often	Always
5. I would feel afraid of being on my own at home	Never	Sometimes	Often	Always
6. Nothing is much fun anymore	Never	Sometimes	Often	Always
7. I feel scared when I have to take a test	Never	Sometimes	Often	Always
8. I feel worried when I think someone is angry with me	Never	Sometimes	Often	Always
9. I worry about being away from my parents	Never	Sometimes	Often	Always
10. I get bothered by bad or silly thoughts or pictures in my mind	Never	Sometimes	Often	Always
11. I have trouble sleeping	Never	Sometimes	Often	Always
12. I worry that I will do badly at my school work	Never	Sometimes	Often	Always
13. I worry that something awful will happen to someone in my family	Never	Sometimes	Often	Always
14. I suddenly feel as if I can't breathe when there is no reason for this	Never	Sometimes	Often	Always
15. I have problems with my appetite	Never	Sometimes	Often	Always
16. I have to keep checking that I have done things right (like the switch is off, or the door is locked)	Never	Sometimes	Often	Always
17. I feel scared if I have to sleep on my own	Never	Sometimes	Often	Always
18. I have trouble going to school in the mornings because I feel nervous or afraid	Never	Sometimes	Often	Always
19. I have no energy for things	Never	Sometimes	Often	Always
20. I worry I might look foolish	Never	Sometimes	Often	Always
21. I am tired a lot	Never	Sometimes	Often	Always
22. I worry that bad things will happen to me	Never	Sometimes	Often	Always

23. I can't seem to get bad or silly thoughts out of my head	Never	Sometimes	Often	Always
24. When I have a problem, my heart beats really fast	Never	Sometimes	Often	Always
25. I cannot think clearly	Never	Sometimes	Often	Always
26. I suddenly start to tremble or shake when there is no reason for this	Never	Sometimes	Often	Always
27. I worry that something bad will happen to me	Never	Sometimes	Often	Always
28. When I have a problem, I feel shaky	Never	Sometimes	Often	Always
29. I feel worthless	Never	Sometimes	Often	Always
30. I worry about making mistakes	Never	Sometimes	Often	Always
31. I have to think of special thoughts (like numbers or words) to stop bad things from happening	Never	Sometimes	Often	Always
32. I worry what other people think of me	Never	Sometimes	Often	Always
33. I am afraid of being in crowded places (like shopping centers, the movies, buses, busy playgrounds)	Never	Sometimes	Often	Always
34. All of a sudden I feel really scared for no reason at all	Never	Sometimes	Often	Always
35. I worry about what is going to happen	Never	Sometimes	Often	Always
36. I suddenly become dizzy or faint when there is no reason for this	Never	Sometimes	Often	Always
37. I think about death	Never	Sometimes	Often	Always
38. I feel afraid if I have to talk in front of my class	Never	Sometimes	Often	Always
39. My heart suddenly starts to beat too quickly for no reason	Never	Sometimes	Often	Always
40. I feel like I don't want to move	Never	Sometimes	Often	Always
41. I worry that I will suddenly get a scared feeling when there is nothing to be afraid of	Never	Sometimes	Often	Always
42. I have to do some things over and over again (like washing my hands, cleaning or putting things in a certain order)	Never	Sometimes	Often	Always
43. I feel afraid that I will make a fool of myself in front of people	Never	Sometimes	Often	Always
44. I have to do some things in just the right way to stop bad things from happening	Never	Sometimes	Often	Always
45. I worry when I go to bed at night	Never	Sometimes	Often	Always
46. I would feel scared if I had to stay away from home overnight	Never	Sometimes	Often	Always
47. I feel restless	Never	Sometimes	Often	Always

Appendix L: The Short Warwick-Edinburgh Mental Well-being Scale

The Short Warwick–Edinburgh Mental Well-being Scale (SWEMWBS)

Below are some statements about feelings and thoughts.
Please tick the box that best describes your experience of each over the last 2 weeks

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5

no-reply@warwick.ac.uk Inbox - Exchange 27 June 2019 at 09:10
Submission (ID: 496627163) receipt for the submission of /fac/sci/med/research/platform/wemwbs/using/register
To: Hannah Cowie

Thank you – this email confirms you have permission to use (S)WEMWBS in accordance with the details entered in your registration shown below. We suggest you bookmark this page for future reference: https://eur01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwarwick.ac.uk%2Ffac%2Fsci%2Fmed%2Fresearch%2Fplatform%2Fwemwbs%2Fusing%2Fregister%2Fresources&data=02%7C01%7Ch.cowie%40uea.ac.uk%7Cab27da92cbdb49c4ea7308d6fad6efab%7Cc65f8795ba3d43518a070865e5d8f090%7C0%7C1%7C636972198379964405&sdata=pLOMFixSxTPZVhZ5xevkbQnrBvcKuPRZYF4J675EHok%3D&reserved=0
If you have any questions please feel free to contact us via email: ventures@warwick.ac.uk

Appendix M: Dysfunctional Beliefs and Attitudes about Sleep Questionnaire for Children and Adolescents

Dysfunctional Beliefs and Attitudes about Sleep Questionnaire for Children and adolescents

Sentences about some people's beliefs and attitudes about sleep are listed below. Please show me how much you agree or disagree with each sentence. There is no right or wrong answer. For each sentence, circle the number to show what you think.

1 = Strongly disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly agree

1. **I must always have at least 9 hours sleep to function well or do well during the day.**
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

2. **When I don't get the sleep I need on a particular night, I must catch up the next day by napping or by sleeping longer the next night.**
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

3. **I am really worried that difficulty falling or staying asleep over a long period of time, might affect my physical appearance.**
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

4. **When I have trouble getting to sleep, I should stay in bed and try harder.**
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

5. **When I have trouble getting to sleep, it makes me worry that I may stop being able to sleep.**
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

6. **When I don't get the sleep I need, I know that it will really affect the things that I do the next day.**
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

(For researchers only) UNIQUE ID: ___

7. **When I feel annoyed, sad, or worried during the day, it is always because I didn't get the sleep I needed the night before.**

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

8. **When I don't get the sleep I need on one night, I know it will disturb the way I sleep for the whole week.**

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

9. **When I feel tired, have no energy, or just seem to do badly during the day, it is always because I didn't get the sleep I needed the night before.**

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

10. **When I have lots of thoughts at night, I usually feel that I cannot control all these thoughts that I am having.**

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Neutral
☐ (4) Agree
☐ (5) Strongly agree

Appendix N: Sleep Anticipatory Anxiety Questionnaire

Sleep Anticipatory Anxiety Questionnaire - Adolescent Version

Circle the one phrase for each item that best represents the extent to which you agree with the item.

Strongly Disagree (1)
Disagree (2)
Agree (3)
Strongly Agree (4)

When I try to fall asleep at night:

1. **My muscles are tense**

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

2. **My heart is beating rapidly**

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

3. I feel "shaky"/trembling
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

4. I become short of breath
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

5. I become aware of my body (feeling itches, sweat, pain, nausea)

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

6. I can't stop my mind racing

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

7. I worry that I won't be able to fall asleep
☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

8. I worry that I won't get enough sleep

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

9. I worry that I won't be able to function the next day if I don't sleep

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

10. I worry that I will be tired and irritable the next day if I don't sleep

☐ (1) Strongly disagree

☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

11. I worry about my school work

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

12. I can't stop thinking about what I have to do tomorrow

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

13. I can't stop thinking about what happened during the day

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

14. I worry about my relationship (e.g., with my boyfriend/girlfriend/parents)

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

15. I worry about my friendships

☐ (1) Strongly disagree
☐ (2) Disagree
☐ (3) Agree
☐ (4) Strongly agree

Appendix O: Glasgow Sleep Effort Scale (GSES)

Glasgow Sleep Effort Scale

The following seven statements relate to your night-time sleep pattern in the past week. Please indicate by circling one response how true each statement is for you.

Very much (1)
To some extent (2)
Not at all (3)

1. **I put too much effort into sleeping when it should come naturally**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all

2. **I feel I should be able to control my sleep**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all

3. **I put off going to bed at night for fear of not being able to sleep**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all

4. **I worry about not sleeping if I cannot sleep**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all

5. **I am no good at sleeping**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all

6. **I get anxious about sleeping before I go to bed**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all

7. **I worry about the consequences of not sleeping**

☐ (1) Very much
☐ (2) To some extent
☐ (3) Not at all