Published in final edited form as:

Curr Psychiatry Rep. 2014 September ; 16(9): 471. doi:10.1007/s11920-014-0471-y.

Insomnia as a Transdiagnostic Process in Psychiatric Disorders

Emily A. Dolsen, BA,

Lauren D. Asarnow, MA,

Allison G. Harvey, PhD

University of California, Berkeley

Abstract

Insomnia is a major public health concern, and is highly comorbid with a broad range of psychiatric disorders. Although insomnia has historically been considered a symptom of other disorders, this perspective has shifted. Epidemiological and experimental studies suggest that insomnia is related to the onset and course of several psychiatric disorders. Furthermore, several randomized controlled trials show that cognitive behavioral therapy for insomnia delivered to individuals who meet diagnostic criteria for insomnia and another psychiatric disorder improves the insomnia as well as the symptoms of the comorbid psychiatric disorder. Taken together, these results encompassing a range of methodologies have provided encouraging evidence and point toward insomnia as a transdiagnostic process in psychiatric disorders.

Keywords

Insomnia; Transdiagnostic; Mechanisms; Comorbidity; Cognitive behavioral therapy; Psychiatric disorders; Treatment; Psychotherapy; Major depressive disorder; Generalized anxiety disorder; Bipolar disorder; Posttraumatic stress disorder; Schizophrenia

Introduction

Insomnia is a widespread problem that affects one-third of the general population [1,2]. Insomnia can include difficulties falling asleep, staying asleep, or waking earlier than intended and results in impairment or dysfunction [3]. In the DSM5, insomnia is both listed as a distinct condition (Insomnia Disorder) and in the diagnostic criteria for a variety of psychiatric disorders, and is also commonly observed in other disorders that do not include insomnia in the diagnostic criteria. Comorbidity between insomnia and psychiatric disorders is 41-53%, and is even higher when insomnia is broadly defined [4]. As such, the goal of this paper is to consider whether insomnia is an important transdiagnostic process in psychiatric disorders.

Please address correspondence concerning the manuscript to Allison G. Harvey, PhD, University of California, Berkeley, Department of Psychology, 2205 Tolman Hall #1650, Berkeley, CA 94720-1650, United States. Phone: (510) 642-7138. aharvey@berkeley.edu.

Compliance with Ethics Guidelines

Conflict of Interest

Emily A. Dolsen, Lauren D. Asarnow, and Allison G. Harvey declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

The transdiagnostic perspective has gained momentum in recent years, and is now a foundational aspect of the National Institute of Mental Health's (NIMH) Research Domain Criteria (RDoC) program [5]. RDoC aims to investigate underlying processes (e.g. genes related to threat, attention circuitry, or reward learning behaviors) across traditional psychiatric disorders. Similarly, a transdiagnostic perspective considers common processes that cut across single psychiatric disorders [6–9]. Within the transdiagnostic perspective, a process can either be descriptive or mechanistic [8]. A descriptive transdiagnostic process simply co-occurs with other psychiatric disorders whereas a mechanistic transdiagnostic process is causally or bidirectionally related to the psychiatric disorder.

There are a number of advantages to clinicians and researchers taking a transdiagnostic perspective. First and foremost, individuals experiencing psychiatric illnesses typically experience comorbidity. Thus, it can be challenging for a clinician to decide which disorder to treat first. According to a transdiagnostic perspective, treatment would target a mechanistic transdiagnostic process as opposed to the disorder. Treatments are being developed to target transdiagnostic processes across a range of psychiatric disorders including depression [10], anxiety disorders [11–13], bipolar disorder [14], schizophrenia [15], and also sleep problems [16]. One such treatment is cognitive behavioral therapy for insomnia (CBT-I), which has been shown to not only successfully treat insomnia [17,18], but to also effectively treat other comorbid disorders including depression [19], bipolar disorder [20,21], PTSD [22,23], and schizophrenia [24]. CBT-I is a multicomponent treatment that targets sleep interfering behaviors and cognitions.

The behavioral component of CBT-I is typically comprised of stimulus control and sleep restriction, which both have a strong evidence base [25,26]. Stimulus control proposes that classical conditioning is responsible for symptoms of insomnia. When the sleep environment becomes associated with sleeplessness, symptoms of insomnia are reinforced. In order to recondition these behaviors utilizing stimulus control, individuals with insomnia are asked to reserve the bedroom only for sleep, to attempt to fall asleep only when tired, and to leave the bedroom if unable to fall asleep [27]. Also, individuals with insomnia spend an excessive amount of time in bed, which can result in homeostatic imbalance of the sleep and circadian system; this imbalance is likely responsible for long sleep onset latency and low sleep efficiency. Sleep restriction involves limiting the available time in bed by delaying the bedtime of the individual with insomnia. Once adequate sleep efficiency is achieved, time in bed is increased by advancing bedtime until the desired total sleep time is reached [28,29].

The cognitive component of CBT-I posits that insomnia symptoms occur as a result of a cascade of worries, arousal and distress, selective attention and monitoring, and misperception of sleep deficits [30–33]. Worries trigger the sympathetic nervous system resulting in arousal and distress. Next, attention is directed to internal and external cues (e.g. body sensations or innocuous sounds) that interfere with sleep and cause worry. Finally, sleep latency is inaccurately estimated, which results in subjective reports of inadequate sleep. Additional cognitive processes are implicated in insomnia such as inaccurate beliefs about sleep (e.g. “I can't feel rested if I don't get 8 hours of sleep” or “I can't sleep well without a drink before bed”) [34]. CBT-I traditionally utilizes psychoeducation to treat maladaptive cognitions about sleep [17], although more recently other cognitive therapy

techniques have been used such as behavioral experiments, guided discovery, negative automatic thought forms, and Socratic questioning [31,35,36].

Aim

Insomnia has already been highlighted as a biologically [37] and theoretically [38] plausible transdiagnostic contributor to psychiatric disorders. The aim of the present paper is to extend this prior work by reviewing the evidence pointing to insomnia as both descriptively and mechanistically transdiagnostic. This review will focus on insomnia within major depressive disorder, generalized anxiety disorder, bipolar disorder, posttraumatic stress disorder, and schizophrenia. To support the claim that insomnia is mechanistically transdiagnostic, this paper will discuss (1) the relationship between insomnia and the onset and maintenance of psychiatric disorders and (2) the influence of insomnia on the treatment of the disorders and the effect of CBT-I on the disorders.

Two methodological notes should be made regarding this review. First, for the purposes of this paper, insomnia will be defined as subjective sleep disturbance related to difficulties falling asleep, staying asleep, or waking earlier than intended that results in impairment. Other aspects of sleep disturbance that are related to insomnia and psychiatric disorders (e.g. circadian rhythm disturbance or hypersomnia) are beyond the scope of this paper. Second, while this paper will focus on evidence supporting the efficacy of CBT-I, there is also evidence supporting the use of benzodiazepine receptor agonists in the treatment of insomnia [39–41]. The discussion of the effectiveness of these medications is also beyond the scope of this paper.

Insomnia in Psychiatric Disorders

Major Depressive Disorder

Comorbidity between insomnia and major depressive disorder (MDD) has been estimated to be between 10% and 60%, depending on the criteria used [2]. Insomnia is included in the diagnostic criteria for MDD [3]. Multiple epidemiological studies have reported that insomnia contributes to the onset and course of MDD (for a review see [42]). For example, the National Institute of Mental Health Epidemiologic Catchment Area study found that adults with current insomnia had a much higher risk of developing MDD compared to those whose insomnia had remitted [43]. Similar results have been reported for elderly patients with insomnia, who were six times more likely to experience a major depressive episode compared to those without insomnia [44]. There is also evidence that indicates that insomnia is a maintaining factor in MDD. Liu et al. [45] considered whether children and adolescents with insomnia, hypersomnia, or both demonstrated differences in depressive symptoms. Findings from this study indicate that, compared to children with no sleep disturbance, children with insomnia demonstrated increased depressed mood, diurnal variation of depressed mood, and agitation. Additionally, children with insomnia experienced more feelings of worthlessness compared to those with only hypersomnia.

Treatment studies of MDD indicate that current insomnia symptoms predict worse treatment outcomes for elderly patients with MDD [46]. Additionally, residual insomnia is common

after pharmacotherapy and psychotherapy for MDD, which is concerning given that insomnia is associated with greater risk of relapse [47]. Symptoms of both insomnia and depression can be effectively treated by cognitive behavioral therapy for insomnia (CBT-I) combined with other treatments for depression. One study examined the effectiveness of CBT-I compared to placebo psychotherapy in a sample of patients with MDD prescribed escitalopram. Patients who received CBT-I and escitalopram experienced reduced symptoms of insomnia and depression compared to patients who received escitalopram and control therapy [19]. Moreover, a related study considered whether depression severity influenced CBT-I treatment outcomes for those with MDD and comorbid insomnia. Response to CBT-I was not statistically different based upon depressive symptom severity [48].

Overall, the evidence suggests that insomnia is both a descriptive and mechanistic transdiagnostic process in MDD. There is strong evidence from epidemiological studies that insomnia co-occurs with MDD and is related to the onset and maintenance of MDD symptoms. Treatment studies indicate that treatment of insomnia combined with other depression treatments can lead to favorable outcomes in MDD, which also supports the claim that insomnia is a mechanistic transdiagnostic process in MDD.

Generalized Anxiety Disorder

Comorbidity between generalized anxiety disorder (GAD) and insomnia is estimated to be 70% [49]. Nearly three-quarters (74%) of primary care patients with GAD report symptoms of insomnia, such as difficulty falling asleep and sleep discontinuity [50]. Longitudinal studies that assess GAD and insomnia indicate that anxiety precedes insomnia in the majority of comorbid cases [51]. Worry is a core feature of GAD, and is a common experience for those with insomnia during the pre-sleep period [30]. Furthermore, sleep quality can be the object of worry, which may further contribute to sleeplessness [52]. Research indicates that fear of poor sleep quality can lead to symptoms of insomnia and these symptoms can then exacerbate worries related to sleep [30].

Few studies have considered the influence of comorbid insomnia on treatment outcomes in GAD. One meta-analysis reported that out of 1205 studies evaluating cognitive behavior therapy (CBT) for anxiety disorders (not only GAD), only 25 of these studies measured sleep [53]. The authors conclude that treatment of anxiety has a moderate effect on sleep outcomes. A similar meta-analysis was conducted that examined the effect of CBT-I on anxiety symptoms [54]. The study analyzed 29 CBT-I trials that included anxiety questionnaires as an outcome measure, and concluded that CBT-I has a moderate effect on reducing symptoms of anxiety. To the best of our knowledge, no CBT-I trials have considered the effect of treating insomnia in GAD.

Insomnia is a descriptive transdiagnostic process in GAD given the high rate of cooccurrence between GAD and insomnia. There is a moderate amount evidence from a meta-analysis of treatment studies that insomnia is a mechanistic transdiagnostic process in symptoms of anxiety. Relative to the other disorders reviewed, the evidence for insomnia as a mechanistic factor in GAD is less strong, mainly because there are several studies not consistent with the hypothesis.

Bipolar Disorder

Sleep disturbance is a central feature of bipolar disorder, and is associated with both manic and depressive symptoms. The diagnostic criteria indicate that reduced need for sleep can be present during episodes of mania, and insomnia and hypersomnia may be present during episodes of depression [3]. Winokur, Clayton, and Reich's [55] classic studies on bipolar disorder indicate that 34% of those with mania and potentially 100% of those with bipolar depression experience insomnia. Insomnia is an important prodromal symptom of mania. Indeed, in a review of 11 studies, sleep disturbance was the primary prodrome of mania and was endorsed by 77% of patients [56]. Reduced total sleep time and early morning awakening is related to the onset of symptoms of hypomania and mania [57,58]. Furthermore, a study examining the bidirectional relationship between sleep and mood provides support for a transdiagnostic process between bipolar disorder and insomnia [59]. Sleep disturbance, increased negative mood, and a positive association between negative mood and disrupted sleep were observed in both the bipolar disorder and insomnia groups.

There is evidence to suggest a relationship between insomnia and bipolar disorder treatment outcomes [60]. One study examined patients admitted to a hospital with a bipolar disorder diagnosis, and found that those who had longer total sleep time (TST) during their first night of hospitalization had improved symptoms and were discharged earlier than those with shorter TST [61]. Due to the high co-occurrence of insomnia (or sleep disturbance, in general) and bipolar disorder, and the relationship between sleep disturbance and onset of mania symptoms, treating insomnia within bipolar disorder is a priority. Some concern has been expressed for using CBT-I within bipolar disorder given the importance of stimulus control and sleep restriction in CBT-I and the potential risk of developing hypomania or mania symptoms as a result of treatment-related mild sleep deprivation [62]. However, CBT-I has been evaluated within bipolar disorder and results from this study indicate that neither stimulus control nor sleep restriction resulted in hypomania or mania symptom [20]. Moreover, the intervention reduced insomnia symptoms and increased sleep efficiency when compared to a sleep psychoeducation condition. Furthermore, a randomized controlled trial pilot study was also conducted and found that treating insomnia in bipolar disorder improved sleep, mood, and inter-episode functioning bipolar disorder [21].

Taken together, insomnia is both a descriptive and mechanistic transdiagnostic process in bipolar disorder. There is strong evidence that insomnia co-occurs with bipolar disorder. Longitudinal and experimental evidence supports the claim that insomnia is a mechanistic transdiagnostic process in bipolar disorder. Although few insomnia treatment studies have been conducted within bipolar disorder, extant studies provide support that insomnia is a mechanistic transdiagnostic process in bipolar disorder.

Posttraumatic Stress Disorder

Comorbidity between insomnia and posttraumatic stress disorder (PTSD) is approximately 70% [63]. These comorbidity estimates are likely high due to the fact that insomnia is explicitly included in the diagnostic criteria for PTSD [3]. Furthermore, nightmares are a common feature of PTSD [64], and are related to symptoms of insomnia [65]. Although insomnia is listed in the diagnostic criteria as a symptom of PTSD, there is evidence

suggesting that insomnia may be a predisposing factor as well. One study utilized a longitudinal design to evaluate whether insomnia or PTSD symptoms account for more variance in future insomnia or PTSD symptoms in Iraq combat veterans [66]. Data was collected four and eight months after the soldiers returned from a 12-month deployment to Iraq. Insomnia significantly predicted future PTSD. However, symptoms of PTSD did not predict symptoms of insomnia [66]. Further evidence from a study of fire evacuees found that insomnia, along with sleep disordered breathing and nightmares, accounted for 37% of the variance in PTSD symptoms [67].

Nearly half (48%) of those who receive CBT for PTSD experience residual insomnia symptoms post treatment [68]. The majority of these patients continued to experience insomnia despite the cessation of nightmares and night-time hypervigilance. This is perhaps unsurprising given the lack of emphasis on sleep with empirically supported treatments for PTSD [65]. CBT-I for PTSD has been shown to be an effective treatment for managing sleep difficulties including insomnia [69]. One study compared CBT-I combined with imagery rehearsal therapy (a treatment that focuses on cognitive restructuring of nightmares combined with psychoeducation related to nightmares) to treatment as usual in a sample of veterans with PTSD [70]. This study reported decreased insomnia severity and PTSD symptoms compared to the treatment as usual condition. Another study compared the effectiveness of prazosin (an alpha-1 antagonist that has been shown to treat sleep problems and PTSD symptoms) and a behavioral sleep intervention based on key CBT-I principles (e.g. stimulus control and sleep restriction) [71]. Results from this study indicated that both treatments resulted in significant improvement in insomnia severity and daytime PTSD symptoms.

These studies provide evidence that insomnia is both a descriptive and mechanistic transdiagnostic process in PTSD. There is strong evidence that insomnia co-occurs with PTSD. Longitudinal and treatment studies provide evidence that insomnia is a mechanistic transdiagnostic process in PTSD.

Schizophrenia

Insomnia is common in schizophrenia and can severely diminish quality of life. The prevalence of insomnia among individuals with schizophrenia is understudied. However, comorbidity estimates range between 36%-52% [72,73]. Also, paranoid thinking (a key symptom of schizophrenia) appears to be related to insomnia. A series of studies examining this question has suggested that insomnia symptoms confer up to three times the risk of also experiencing paranoid thinking [74,75]. Insomnia has also been linked to a worsening of symptoms of schizophrenia including increased psychosis [72]. Additionally, increased positive symptoms are related to insomnia in patients with schizophrenia who had discontinued antipsychotic medication treatment [76].

While sleep disturbance can be a side effect of medication for schizophrenia, residual insomnia can persist after utilization of best-practice medication interventions for schizophrenia [77]. Given the effectiveness of CBT-I for other psychiatric disorders and the favorable side effect profile, CBT-I may be a viable option for reducing insomnia in schizophrenia. Indeed, a pilot study was conducted to examine whether brief CBT-I reduces

insomnia and persecutory delusions within psychotic disorders [24]. Results from this study demonstrated that half of the participants experienced reduced persecutory delusions and two-thirds experienced reduced insomnia symptoms. To extend these findings, a large randomized controlled trial is in progress. This study further investigates the efficacy of using CBT-I to not only reduce insomnia, but also to reduce positive schizophrenia symptoms [78].

Overall, the evidence reviewed suggest that insomnia is both a descriptive and mechanistic transdiagnostic process in schizophrenia. Although the prevalence of insomnia in schizophrenia is understudied, insomnia strongly co-occurs with schizophrenia. Experimental studies and one treatment study also provides evidence that insomnia is a mechanistic transdiagnostic process in schizophrenia.

Conclusions

Research on the relationship between insomnia and psychiatric disorders demonstrates that insomnia is both a descriptive and mechanistic transdiagnostic process related to the onset and maintenance of major depressive disorder, generalized anxiety disorder, bipolar disorder, posttraumatic stress disorder, and schizophrenia. Insomnia not only interferes with the treatment of these disorders, but it persists after the effective treatment of these disorders. The evidence indicates that cognitive behavioral therapy for insomnia can effectively reduce symptoms of both insomnia and the comorbid disorder. Notably, much of the research conducted on insomnia and psychiatric disorders has been conducted in university settings. Hence, future efforts will be necessary to understand whether insomnia is a transdiagnostic process in community and underserved populations and across the lifespan (e.g. children and youth). Additionally, future studies will be needed to evaluate the extent to which insomnia is a transdiagnostic process in other psychiatric disorders.

References

Papers of particular interest, published recently, have been highlighted as:

- Of importance

- Of major importance

1. Ancoli-Israel S, Roth T. Characteristics of insomnia in the United States: results of the 1991 National Sleep Foundation Survey. I. Sleep. 1999; 22: S347–53. [PubMed: 10394606]
2. Ohayon MM. Epidemiology of insomnia: what we know and what we still need to learn. Sleep Med. Rev. 2002; 6: 97–111. [PubMed: 12531146]
3. American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed.. American Psychiatric Publishing; Arlington, VA: 2013.
4. Harvey AG. Insomnia: symptom or diagnosis? Clin. Psychol. Rev. 2001; 21: 1037–59. [PubMed: 11584515]
5. Insel, T, Cuthbert, B, Garvey, M, Heinssen, R, Pine, DS, Quinn, K. , et al. Am. J. Psychiatry. Vol. 167. American Psychiatric Association; 2010. Research domain criteria (RDoC): toward a new classification framework for research on mental disorders.; 748–51.
6. Barlow DH, Allen LB, Choate ML. Toward a unified treatment for emotional disorders. Behav. Ther. 2004; 35: 205–30.

7. Mansell, W, Harvey, AG, Watkins, E, Shafran, R. J. Cogn. Psychother. Vol. 23. Springer Publishing Company; 2009. Conceptual Foundations of the Transdiagnostic Approach to CBT.; 6–19.
8. Harvey, AG, Watkins, E, Mansell, W, Shafran, R. Cognitive Behavioural Processes across Psychological Disorders: A Transdiagnostic Approach to Research and Treatment. Oxford University Press; 2004.
9. Fairburn CG, Cooper Z, Shafran R. Cognitive behaviour therapy for eating disorders: a “transdiagnostic” theory and treatment. *Behav. Res. Ther.* 2003; 41: 509–28. [PubMed: 12711261]
- 10•. Titov N, Dear BF, Schwencke G, Andrews G, Johnston L, Craske MG, et al. Transdiagnostic internet treatment for anxiety and depression: a randomised controlled trial. *Behav Res Ther.* 2011; 49 (8) 441–52. [PubMed: 21679925] [This study provides preliminary evidence for the use of a transdiagnostic internet cognitive behavioral therapy (iCBT) protocol for treating depression and anxiety disorders.]
11. McManus F, Shafran R, Cooper Z. What does a transdiagnostic approach have to offer the treatment of anxiety disorders? *Br. J. Clin. Psychol.* 2010; 49: 491–505. [PubMed: 19878622]
12. Norton PJ. An open trial of a transdiagnostic cognitive-behavioral group therapy for anxiety disorder. *Behav. Ther.* 2008; 39: 242–50. [PubMed: 18721638]
- 13•. Farchione TJ, Fairholme CP, Ellard KK, Boisseau CL, Thompson-Hollands J, Carl JR, et al. Unified protocol for transdiagnostic treatment of emotional disorders: a randomized controlled trial. *Behav Ther.* 2012; 43 (3) 666–78. [PubMed: 22697453] [This randomized controlled trial demonstrates that the Unified Protocol for Transdiagnostic Treatment of Emotional Disorders (UP) can effectively treat psychiatric disorders.]
- 14•. Ellard KK, Deckersbach T, Sylvia LG, Nierenberg AA, Barlow DH. Transdiagnostic treatment of bipolar disorder and comorbid anxiety with the unified protocol: a clinical replication series. *Behav Modif.* 2012; 36 (4) 482–508. [PubMed: 22822175] [The Unified Protocol for Transdiagnostic Treatment of Emotional Disorders (UP) can treat bipolar disorder with comorbid anxiety.]
15. Bentall RP, Rowse G, Shryane N, Kinderman P, Howard R, Blackwood N, et al. The cognitive and affective structure of paranoid delusions: a transdiagnostic investigation of patients with schizophrenia spectrum disorders and depression. *Arch. Gen. Psychiatry.* 2009; 66: 236–47. [PubMed: 19255373]
16. Harvey AG. A transdiagnostic approach to treating sleep disturbance in psychiatric disorders. *Cogn. Behav. Ther.* Routledge. 2009; 38: 35–42.
17. Edinger JD, Wohlgemuth WK, Radtke RA, Marsh GR, Quillian RE. Cognitive Behavioral Therapy for Treatment of Chronic Primary Insomnia. *JAMA. American Medical Association.* 2001; 285: 1856.
18. Morin CM, Bootzin RR, Buysse DJ, Edinger JD, Espie CA, Lichstein KL. Psychological and behavioral treatment of insomnia:update of the recent evidence (1998-2004). *Sleep.* 2006; 29: 1398–414. [PubMed: 17162986]
19. Manber R, Edinger JD, Gress JL, San Pedro-Salcedo MG, Kuo TF, Kalista T. Cognitive behavioral therapy for insomnia enhances depression outcome in patients with comorbid major depressive disorder and insomnia. *Sleep.* 2008; 31: 489–95. [PubMed: 18457236]
- 20•. Kaplan KA, Harvey AG. Behavioral treatment of insomnia in bipolar disorder. *Am J Psychiatry.* 2013; 170 (7) 716–20. [PubMed: 23820830] [Sleep restriction and stimulus control can safely and effectively be used to treat insomnia in patients with bipolar disorder.]
- 21•. Harvey, AG; Soehner, AM; Kaplan, KA; Hein, K; Lee, J; Kanady, J; , et al. Treating insomnia improves sleep, mood and functioning in bipolar disorder: A pilot randomized controlled trial.. Presented at the 26th Annual Meeting of the American Academy of Sleep Medicine; 2012; [This randomized controlled trial pilot study indicates that treating insomnia in bipolar disorder improves sleep, mood, and inter-episode functioning.]
22. Germain A, Shear MK, Hall M, Buysse DJ. Effects of a brief behavioral treatment for PTSD-related sleep disturbances: a pilot study. *Behav. Res. Ther.* 2007; 45: 627–32. [PubMed: 16777060]
- 23•. Margolies SO, Rybarczyk B, Vrana SR, Leszczyszyn DJ, Lynch J. Efficacy of a cognitive-behavioral treatment for insomnia and nightmares in Afghanistan and Iraq veterans with PTSD. *J*

- Clin Psychol. 2013; 69 (10) 1026–42. [PubMed: 23629959] [CBT-I combined with IRT reduces both insomnia and PTSD symptoms.]
- 24•. Myers E, Startup H, Freeman D. Cognitive behavioural treatment of insomnia in individuals with persistent persecutory delusions: a pilot trial. *J Behav Ther Exp Psychiatry*. 2011; 42 (3) 330–6. [PubMed: 21367359] [This pilot trial reports that CBT-I can reduce insomnia and persecutory delusions for patients with a psychotic disorder.]
 25. Edinger JD, Means MK. Cognitive-behavioral therapy for primary insomnia. *Clin. Psychol. Rev*. 2005; 25: 539–58. [PubMed: 15951083]
 26. Morin, CM, Culbert, JP, Schwartz, SM. *Am. J. Psychiatry*. Vol. 151. American Psychiatric Association; 1994. Nonpharmacological interventions for insomnia: a meta-analysis of treatment efficacy.; 1172–80.
 27. Bootzin, RR. A stimulus control treatment for insomnia.. *Proceedings of the 80th Annual Convention of the American Psychological Association*; 1972.
 28. Spielman AJ, Saskin P, Thorpy MJ. Treatment of chronic insomnia by restriction of time in bed. *Sleep*. 1987; 10 (1) 45–56. [PubMed: 3563247]
 29. Morin CM, Kowatch RA, O'Shanick G. Sleep restriction for the inpatient treatment of insomnia. *Sleep*. 1990; 13 (2) 183–6. [PubMed: 2330476]
 30. Harvey AG. A cognitive model of insomnia. *Behav Res Ther*. 2002; 40 (8) 869–893. [PubMed: 12186352]
 31. Harvey AG. A cognitive theory and therapy for chronic insomnia. *J Cogn Psychother*. 2005; 19 (1) 41.
 32. Morin, CM. *Insomnia: psychological assessment and management*. Guilford Publications; 1993.
 33. Espie, CA. *The psychological treatment of insomnia*. Wiley; 1991.
 34. Morin CM, Stone J, Trinkle D, Mercer J, Remsberg S. Dysfunctional beliefs and attitudes about sleep among older adults with and without insomnia complaints. *Psychol Aging*. 1993; 8 (3) 463–7. [PubMed: 8216967]
 35. Ree, M, Harvey, AG. *Insomnia.. In: Bennett-Levy, J, Butler, G, Fennell, M, Hackman, A, Mueller, M, Westbrook, D, editors. Oxford guide to behavioural experiments in cognitive therapy*. Oxford University Press; Oxford: 2004. 287–305.
 - 36•. Harvey AG, Bélanger L, Talbot L, Eidelman P, Beaulieu-Bonneau S, Fortier-Brochu É, et al. Comparative efficacy of behavior therapy, cognitive therapy, and cognitive behavior therapy for chronic insomnia: a randomized controlled trial. *J Consult Clin Psychol*. [This study compared behavior therapy (BT) and cognitive therapy (CT) relative to cognitive behavior therapy (CBT) for persistent insomnia. The study reports that CBT is the treatment of choice for persistent insomnia, and that BT and CT are also effective.]
 - 37•. Harvey AG, Murray G, Chandler RA, Soehner AM. Sleep disturbance as transdiagnostic: consideration of neurobiological mechanisms. *Clin Psychol Rev*. 2011; 31 (2) 225–35. [PubMed: 20471738] [This paper reviews evidence that sleep disturbance is related to psychiatric illness through emotion regulation interacting with genetics and dopaminergic and serotonergic function.]
 38. Harvey AG. Insomnia, psychiatric disorders, and the transdiagnostic perspective. *Curr Dir Psychol Sci*. 2008; 17 (5) 299–303.
 39. Riemann D, Perlis ML. The treatments of chronic insomnia: a review of benzodiazepine receptor agonists and psychological and behavioral therapies. *Sleep Med. Rev*. 2009; 13: 205–14. [PubMed: 19201632]
 40. Smith, MT, Perlis, ML, Park, A, Smith, M, Pennington, J, Giles, DE, et al. *Am. J. Psychiatry*. Vol. 159. American Psychiatric Association; 2002. Comparative meta-analysis of pharmacotherapy and behavior therapy for persistent insomnia.; 5–11.
 41. NIH State-of-the-Science Conference Statement on Manifestations and Management of Chronic Insomnia in Adults. *NIH Consens Sci Statements*. 2005; 22: 1–30.
 42. Riemann D, Voderholzer U. Primary insomnia: a risk factor to develop depression? *J. Affect. Disord*. 2003; 76: 255–9. [PubMed: 12943956]
 43. Ford DE, Kamerow DB. Epidemiologic Study of Sleep Disturbances and Psychiatric Disorders. *JAMA*. American Medical Association. 1989; 262: 1479.

44. Perlis ML, Smith LJ, Lyness JM, Matteson SR, Pigeon WR, Jungquist CR, et al. Insomnia as a risk factor for onset of depression in the elderly. *Behav. Sleep Med.* 2006; 4: 104–13. [PubMed: 16579719]
45. Liu X, Buysse DJ, Gentzler AL, Kiss E, Mayer L, Kapornai K, et al. Insomnia and hypersomnia associated with depressive phenomenology and comorbidity in childhood depression. *Sleep.* 2007; 30: 83–90. [PubMed: 17310868]
46. Pigeon WR, Hegel M, Unützer J, Fan M-Y, Sateia MJ, Lyness JM, et al. Is insomnia a perpetuating factor for late-life depression in the IMPACT cohort? *Sleep.* 2008; 31: 481–8. [PubMed: 18457235]
47. Carney CE, Segal Z V, Edinger JD, Krystal AD. A comparison of rates of residual insomnia symptoms following pharmacotherapy or cognitive-behavioral therapy for major depressive disorder. *J. Clin. Psychiatry.* 2007; 68: 254–60. [PubMed: 17335324]
- 48•. Manber R, Bernert RA, Suh S, Nowakowski S, Siebern AT, Ong JC. CBT for insomnia in patients with high and low depressive symptom severity: adherence and clinical outcomes. *J Clin Sleep Med.* 2011; 7 (6) 645–52. [PubMed: 22171204] [The effectiveness of CBT-I reducing symptoms of insomnia and depression is not differentially affected by depression severity.]
49. Monti JM, Monti D. Sleep disturbance in generalized anxiety disorder and its treatment. *Sleep Med. Rev.* 2000; 4: 263–76. [PubMed: 12531169]
50. Marcks BA, Weisberg RB, Edelen MO, Keller MB. The relationship between sleep disturbance and the course of anxiety disorders in primary care patients. *Psychiatry Res.* 2010; 178: 487–92. [PubMed: 20537716]
51. Johnson EO, Roth T, Breslau N. The association of insomnia with anxiety disorders and depression: exploration of the direction of risk. *J. Psychiatr. Res.* 2006; 40: 700–8. [PubMed: 16978649]
52. Jansson M, Linton SJ. The development of insomnia within the first year: a focus on worry. *Br. J. Health Psychol.* 2006; 11: 501–11. [PubMed: 16870058]
53. Belleville G, Cousineau H, Levrier K, St-Pierre-Delorme M-E, Marchand A. The impact of cognitive-behavior therapy for anxiety disorders on concomitant sleep disturbances: a meta-analysis. *J. Anxiety Disord.* 2010; 24: 379–86. [PubMed: 20369395]
- 54•. Belleville G, Cousineau H, Levrier K, St-Pierre-Delorme M-È. Meta-analytic review of the impact of cognitive-behavior therapy for insomnia on concomitant anxiety. *Clin Psychol Rev.* 2011; 31 (4) 638–52. [PubMed: 21482322] [A recent meta-analysis that examined the effect of CBT I on anxiety symptoms and reported that CBT-I has a moderate impact on anxiety.]
55. Winokur, G, Clayton PJ, RT. Manic depressive illness. C. V. Mosby; St. Louis, MO: 1969.
56. Jackson A, Cavanagh J, Scott J. A systematic review of manic and depressive prodromes. *J. Affect. Disord.* 2003; 74: 209–17. [PubMed: 12738039]
57. Colombo C, Benedetti F, Barbini B, Campori E, Smeraldi E. Rate of switch from depression into mania after therapeutic sleep deprivation in bipolar depression. *Psychiatry Res.* 1999; 86: 267–70. [PubMed: 10482346]
58. Leibenluft E, Albert PS, Rosenthal NE, Wehr TA. Relationship between sleep and mood in patients with rapid-cycling bipolar disorder. *Psychiatry Res.* 1996; 63: 161–8. [PubMed: 8878312]
- 59•. Talbot LS, Stone S, Gruber J, Hairston IS, Eidelman P, Harvey AG. A test of the bidirectional association between sleep and mood in bipolar disorder and insomnia. *J Abnorm Psychol.* 2012; 121 (1) 39–50. [PubMed: 21842957] [This study provides support for a bidirectional relationship between sleep and daytime mood in bipolar disorder and insomnia.]
60. Plante, DT, Winkelman, JW. Am. J. Psychiatry. Vol. 165. American Psychiatric Association; 2008. Sleep disturbance in bipolar disorder: therapeutic implications.; 830–43.
61. Nowlin-Finch NL, Altshuler LL, Szuba MP, Mintz J. Rapid resolution of first episodes of mania: sleep related? *J. Clin. Psychiatry.* 1994; 55: 26–9. [PubMed: 7904994]
62. Smith MT, Huang MI, Manber R. Cognitive behavior therapy for chronic insomnia occurring within the context of medical and psychiatric disorders. *Clin. Psychol. Rev.* 2005; 25: 559–92. [PubMed: 15970367]

63. Ohayon MM, Shapiro CM. Sleep disturbances and psychiatric disorders associated with posttraumatic stress disorder in the general population. *Compr. Psychiatry*. 2000; 41: 469–78. [PubMed: 11086154]
64. Ross RJ, Ball WA, Sullivan KA, Caroff SN. Sleep disturbance as the hallmark of posttraumatic stress disorder. *Am. J. Psychiatry*. 1989; 146: 697–707. [PubMed: 2658624]
65. Spoormaker VI, Montgomery P. Disturbed sleep in post-traumatic stress disorder: secondary symptom or core feature? *Sleep Med. Rev.* 2008; 12: 169–84. [PubMed: 18424196]
- 66•. Wright KM, Britt TW, Bliese PD, Adler AB, Picchioni D, Moore D. Insomnia as predictor versus outcome of PTSD and depression among Iraq combat veterans. *J Clin Psychol*. 2011; 67 (12) 1240–58. [PubMed: 22065464] [Insomnia may be implicated in the development and course of posttraumatic stress disorder symptoms.]
67. Krakow B, Haynes PL, Warner TD, Santana E, Melendrez D, Johnston L, et al. Nightmares, insomnia, and sleep-disordered breathing in fire evacuees seeking treatment for posttraumatic sleep disturbance. *J. Trauma. Stress*. 2004; 17: 257–68. [PubMed: 15253098]
68. Zayfert C, DeViva JC. Residual insomnia following cognitive behavioral therapy for PTSD. *J. Trauma. Stress*. 2004; 17: 69–73. [PubMed: 15027796]
69. Swanson LM, Favorite TK, Horin E, Arndt JT. A combined group treatment for nightmares and insomnia in combat veterans: a pilot study. *J. Trauma. Stress*. 2009; 22: 639–42. [PubMed: 19908322]
- 70•. Ulmer CS, Edinger JD, Calhoun PS. A multi-component cognitive-behavioral intervention for sleep disturbance in veterans with PTSD: a pilot study. *J Clin Sleep Med*. 2011; 7 (1) 57–68. [PubMed: 21344046] [This pilot study reports that CBT-I targeting trauma-related sleep disturbance can reduce insomnia and posttraumatic stress disorder symptoms.]
- 71••. Germain A, Richardson R, Moul DE, Mammen O, Haas G, Forman SD, et al. Placebo-controlled comparison of prazosin and cognitive-behavioral treatments for sleep disturbances in US Military Veterans. *J Psychosom Res*. 2012; 72 (2) 89–96. [PubMed: 22281448] [Both prazosin and a behavioral sleep intervention are related to improvement in insomnia and posttraumatic stress disorder symptoms.]
- 72•. Palmese LB, DeGeorge PC, Ratliff JC, Srihari VH, Wexler BE, Krystal AD, et al. Insomnia is frequent in schizophrenia and associated with night eating and obesity. *Schizophr Res*. 2011; 133 (1-3) 238–43. [PubMed: 21856129] [Insomnia is highly prevalent in schizophrenia and is related to lower quality of life, including obesity.]
73. Xiang Y-T, Weng Y-Z, Leung C-M, Tang W-K, Lai KYC, Ungvari GS. Prevalence and correlates of insomnia and its impact on quality of life in Chinese schizophrenia patients. *Sleep*. 2009; 32: 105–9. [PubMed: 19189785]
74. Freeman D, Brugha T, Meltzer H, Jenkins R, Stahl D, Bebbington P. Persecutory ideation and insomnia: findings from the second British National Survey of Psychiatric Morbidity. *J. Psychiatr. Res*. 2010; 44: 1021–6. [PubMed: 20434169]
- 75•. Freeman D, Stahl D, McManus S, Meltzer H, Brugha T, Wiles N, et al. Insomnia, worry, anxiety and depression as predictors of the occurrence and persistence of paranoid thinking. *Soc Psychiatry Psychiatr Epidemiol*. 2012; 47 (8) 1195–203. [PubMed: 21928153] [Insomnia, as well as worry, anxiety and depression, are risk factors for developing paranoid thinking.]
76. Chemerinski E, Ho B-C, Flaum M, Arndt S, Fleming F, Andreasen NC. Insomnia as a predictor for symptom worsening following antipsychotic withdrawal in schizophrenia. *Compr. Psychiatry*. 2002; 43: 393–6. [PubMed: 12216015]
- 77•. Baandrup L, Jennum P, Lublin H, Glenthoj B. Treatment options for residual insomnia in schizophrenia. *Acta Psychiatr Scand*. 2013; 127 (1) 81–2. [PubMed: 23106614] [This discussion paper reports that residual insomnia is common after treatment for schizophrenia, and discusses possible treatment options.]
- 78•. Freeman D, Startup H, Myers E, Harvey AG, Geddes J, Yu L-M, et al. The effects of using cognitive behavioural therapy to improve sleep for patients with delusions and hallucinations (the BEST study): study protocol for a randomized controlled trial. *Trials*.