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REVIEW ARTICLE



Personality and insomnia: A systematic review and narrative synthesis

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Summary

The inherent nature of personality serves as a predisposing, and possible maintaining, factor of insomnia. However, methodological differences limit the ability to draw causal conclusions regarding the specific traits involved in the aetiology of the disorder. This systematic review of the relationship between insomnia and personality provides a narrative synthesis of the literature to date. Here, we identified $N = 76$ studies meeting the inclusion/exclusion criteria. The outcomes reliably evidenced the experience of insomnia to be associated with personality traits that are typically considered to be negative or maladaptive in nature. More specifically, insomnia was related to neuroticism, introversion, perfectionistic doubts and concerns, elevated personal standards, negative affect, social inhibition and avoidance, hysteria, hypochondriasis, psychasthenia, impulsive behaviour, anger, hostility, and psychopathic tendencies, schizotypal and borderline traits, reduced conscientiousness and self-directedness, and negatively perceived perception of the self. Several studies examined the role that personality plays in predicting the treatment efficacy and adherence of CBTi. Moving forward, longitudinal research, methodological consistency, the mediating role of treatment outcomes and adherence, and clinical and population representative samples should be prioritised. Methodological strengths and limitations of the literature are discussed alongside the next steps that should be taken to advance our understanding of the literature.

KEYWORDS

insomnia, personality, review, sleep, traits

INTRODUCTION

Perhaps the most prevalent sleep disorder, the experience of insomnia, presents significant deficits to key functional domains related to social, occupational, and academic functioning. The prolonged (i.e. chronic) experience of insomnia typically encumbers personal burden in relation to: diminished quality of life (Kyle et al., 2010);

impaired neuropsychological function (Fortier-Brochu et al., 2010; Wardle-Pinkston et al., 2019); disturbed mood and risk for depression (Baglioni et al., 2011; Breslau et al., 1996); deficits in self-regulation/perception and socioemotional functioning (Beattie et al., 2015; Baglioni et al., 2014; Ypsilanti et al., 2018); greater absenteeism, physical and mental exhaustion, and impaired productivity (Daley, Morin, LeBlanc, Grégoire, & Savard, 2009). Consequently, it is

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perhaps no surprise that insomnia presents a public health concern (Morin et al., 2013). Indeed, given that occupational consequences account for more than 90% of insomnia-related costs (Daley, Morin, LeBlanc, Grégoire, Savard, & Baillargeon, 2009), the disorder's most crucial impacts presumably occur within the diurnal, rather than the nocturnal, period (Buysse et al., 2006; Morin, 2003). Despite this, the pre-sleep and nocturnal experience of insomnia remains the focal point of examination. Therefore, to gain a more holistic view, we must look beyond proximal symptoms and contextually consider the psychosocial nature of the individual patient experience (Armstrong et al., 2007; Kyle et al., 2010). Here, re-examining the crucial predisposing, and potentially perpetuating, role of personality may provide a greater understanding of the aetiology of insomnia (Spielman & Glovinsky, 1991).

Personality is consistently evidenced to increase the risk of many psychopathologies (Sellbom et al., 2020), whilst also mediating the extent of treatment outcomes in many psychiatric disorders including insomnia (Ellis et al., 2021; Johann et al., 2023; Quilty et al., 2008; Sellbom et al., 2020). From a stress–diathesis approach, disorder vulnerability may be accentuated by the expression of predisposing traits that interact with significantly stressful life events to precipitate the onset of insomnia (Spielman & Glovinsky, 1991). Whilst a generally supported notion, several studies note that insomnia may predict personality alterations (Akram et al., 2015; Jansson-Fröjmark & Linton; Danielsson et al., 2010). In this work, we systematically review the relevant literature that examines the role of personality in insomnia; more specifically, we evaluate the methodological features and provide a narrative synthesis of the literature base.

METHODS

The current protocol followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines for searching and reporting. The initial search and independent screening of all titles/abstracts were performed by UA. The second screening for each of the yielded results was conducted by AJ, SA, MG, and JS, and conflicts were resolved by UA, SA, and MG. The full texts of those meeting the criteria for inclusion were subsequently reviewed for final inclusion by UA and MG. In addition, reference lists of the included studies were screened by UA and JS, with any new studies meeting inclusion criteria being further reviewed. The results were synthesised by UA.

Literature search strategies and data extraction

The following databases were searched for articles from all years until 30 December 2022: Web of Science; PubMed; Scopus; PsychINFO; Medline; and ScienceDirect. The following Boolean terms were used for searching titles and abstracts: ('poor sleep' OR 'insomnia') AND ('personality' OR 'big five' OR 'five factor model' OR 'extraversion' OR 'introversion' OR 'neuroticism' OR 'emotional stability' OR

'openness' OR 'agreeableness' OR 'conscientiousness' OR 'type-d' OR 'social inhibition' OR 'negative affect' OR 'dark triads' OR 'psychopathy' OR 'narcissism' OR 'Machiavellianism' OR 'schizotypal' OR 'borderline' OR 'perfectionism' OR 'temperament' OR 'internalisation' OR 'internalisation' OR 'MMPI' OR 'MMPI-2' OR 'Minnesota Multiphasic Personality Inventory' OR 'Neuroticism Extraversion Openness Five Factor Inventory' OR 'NEO FFI' OR 'Karolinska Scales of Personality' OR 'KSP' OR 'Eysenck personality inventory' OR 'EPI' OR 'Cattell Personality Factor Questionnaire' OR 'International Personality Item Pool' OR 'IPIP'). Definitions of key personality traits are provided in Table 1. The outcomes for each database were uploaded to Covidence (Veritas Health Innovation, Melbourne, Australia), a web-based collaboration software platform that streamlines the production of systematic literature reviews.

Study inclusion and exclusion criteria

Where article titles and abstract summaries indicated the assessment between personality and insomnia or insomnia symptoms, the full article was assessed for inclusion. Conference abstracts, case studies, reviews, opinions, pre-prints, and duplicates were omitted. Where studies failed to report enough information, the authors of the study were contacted for clarification. Studies were excluded if the authors did not respond or could not provide a detailed breakdown of sample demographics. The inclusion criteria for studies were: (a) peer-reviewed research; (b) samples comprising a non-clinical population where the experience of insomnia symptoms was determined using a validated questionnaire measure; or comparison of good/normal sleepers and individuals meeting a relevant diagnostic criterion for insomnia disorder; (c) the assessment of at least one personality trait (identified through validated questionnaires); and (d) studies sampling an adult population. The exclusion criteria comprised: (i) studies examining sleep quality but not insomnia; (ii) studies examining a sleep-disorder other than insomnia; (iii) studies not in English; (iv) systematic reviews, editorials, opinion pieces, and case reports; and (v) studies of a qualitative design. However, where a mixed-methods approach met the inclusion criteria, the quantitative data were extracted and synthesised.

RESULTS

The initial database search yielded $N = 20,923$ potentially relevant studies. $N = 1750$ duplicates were identified and subsequently removed by the system, leaving $N = 19,139$ for screening. After reading the titles and abstracts, and excluding additional duplicates, $N = 135$ articles were accessed in full and considered for inclusion. Here, examination of full texts led to exclusion of $N = 73$ studies. Next, an updated and manual review of the final included studies yielded $N = 14$ additional studies for inclusion resulting subsequently in a final sample of $N = 76$ studies, which fulfilled the a priori inclusion criteria (see Figure 1).

TABLE 1 Definitions of key personality traits and relevant subscales and multidimensional facets

Trait	Definition
Five Factor Model	
Agreeableness	The extent of an individual's inquisitiveness, thoughtfulness, and propensity for intellectually challenging tasks
Conscientiousness	The ability to regulate impulse control and subsequently facilitate goal-directed behaviour. Assesses the tendency to be reliable, well-organised and hardworking
Emotional stability (neuroticism)	Describes the overall emotional stability of an individual through how they perceive the world. It considers how likely a person is to interpret events as threatening or difficult. Also includes the propensity to experience negative emotions. Previously referred to as neuroticism
Extraversion	The tendency and intensity to which someone seeks interaction with their environment, particularly socially. It encompasses the comfort and assertiveness levels of people in social situations
Openness to experience	One's willingness to try new things as well as engage in imaginative and intellectual activities. It includes the ability to "think outside of the box"
Multidimensional perfectionism	
Doubts about action	The tendency to doubt one's own performance and actions
Concern over mistakes	The propensity to be concerned over and react negatively to mistakes
Personal standards	The tendency to set and maintain high personal standards
Organisation	The propensity to maintain a high standard of order and organisation
Parental criticism	The perception that one's parents are overly critical towards them
Parental expectations	The perception that one's parents have high expectations of them
Self-oriented perfectionism	Unrealistic standards for the self
Socially prescribed perfectionism	The belief that others expect unrealistically high standards from them
Other oriented perfectionism	Unrealistic standards expected of others
Type-D: NA × SI	
	Indicates a joint tendency to experience negative emotions whilst also inhibiting self-expression in social interaction due to a fear of rejection or disapproval by others
Negative affect	Tendency to experience negative emotions including the experience of: dysphoria, anxious apprehension, and irritability across time and situations
Social inhibition	Propensity to feel tense and insecure whilst attenuating the expression of emotions and behaviours when in social situations
Dark triad	
Psychopathy	Psychopathic individuals lack self-control, are highly impulsive, adventurous, present deficits in affect (i.e. callousness) and interpersonal antagonism
Machiavellianism	Machiavellian individuals are generally manipulative, callous, superficial, and strategic, yet their self-presentation is positively orientated to be perceived as charming and attractive in terms of personality
Narcissism	Narcissistic individuals typically crave positive attention and present increased entitlement, superiority, dominance, self-love, and an egocentric attitude
MMPI profiles	
Hypochondriasis	Encompasses anything related to complaints about body functioning, typically focussed on the back and abdomen and they persist even when medical tests come back negative or inconclusive
Depression ^a	Evaluates whether an individual has clinical depression, which is marked by low morale, lack of hope in the future, a disinterest in previously enjoyed activities, feelings of worthlessness, difficulties with attention, and an overall dissatisfaction with life
Hysteria	The hysteria scale examines five different components – poor physical health, shyness, cynicism, headaches, and neuroticism
Psychopathic deviate	General social maladjustment in addition to any absence of strongly pleasant experiences. The specific items investigate complaints about family and authority figures, self and social alienation, and boredom
Masculinity/femininity ^a	The Masculinity/Femininity scale surveys interests, hobbies, aesthetic preferences, and personal sensitivity to determine conformity to traditionally stereotyped masculine and feminine roles
Paranoia	Examines interpersonal sensitivity, moral self-righteousness, and suspiciousness. Specifically psychotic symptoms, acknowledging the existence of paranoid and delusional thoughts and beliefs, extreme suspicion of other people, grandiose thinking, and feelings of being persecuted by society

(Continues)

TABLE 1 (Continued)

Trait	Definition
Psychasthenia	Examines inability to resist certain thoughts or actions. Considered an outdated term used to describe obsessive-compulsive order tendencies. This scale observes compulsive behaviours, abnormal fears, self-criticisms, difficulties in concentration, anxiety, and guilt feelings
Schizophrenia	Examines whether a person experiences hallucinations and delusions and is likely to develop schizophrenia. Specifically, it measures whether the patient has bizarre thoughts, peculiar perceptions, poor familial relationships, difficulties in concentration, impulse control, lack of deep interests, questions of self-worth, sexual difficulties, and experiences of social alienation
Hypomania	Evaluate degrees of excitement, marked by an elated yet unstable mood, psychomotor excitement, such as shaky hands, and a string of never-ending ideas. This dimension looks at both behavioural and cognitive overactivity, grandiosity, impulsivity, rapid speech, irritability, and egocentricity
Social introversion	Examines the extent of social introversion or extraversion of a person. Social introverts may choose to avoid social interactions and prefer to be alone or with a small group of friends
Additional traits	
Avoidant	Experience of extreme anxiety (nervousness) and fear in social settings and relationships, leading to avoidance of activities involving others
Antisocial	Characterised by impulsive, irresponsible, and often criminal behaviour. Often manipulative, deceitful and reckless, and disregard for the feelings of others
Borderline	Diminished ability to adequately regulate one's emotions. Occurring alongside impulsive affective dysregulation, cognitive and perceptual distortions concerning the self and others, intense unstable relationships with others.
Impulsivity	Impulsivity (or impulsiveness) is a tendency to act on a whim, displaying behaviour characterised by little or no forethought, reflection, or consideration of the consequences
Internalisation	The integration of attitudes, values, standards and the opinions of others into one's own identity or sense of self
Histrionic	Typically characterised as being flirtatious, seductive, charming, manipulative, impulsive, and lively
Hyperthymia	An exceptionally, or in some cases, abnormally positive mood and disposition, generally defined by increased energy, vividness and enthusiasm for life
Paranoia	The tendency to be on guard, with the belief that others are constantly trying to demean, harm or threaten them
Optimism	Reflects a disposition for beliefs and hopes regarding the outcome of a specific endeavour, or outcomes in general, to be positive, favourable, and desirable
Positive affect	Experience of positive affects (sensations, emotions, sentiments); and as a consequence how they interact with others and with their surroundings
Reward dependence	Marked response to signals of reward, particularly to verbal signals of social approval, social support, and sentiment
Schizotypal	Experience of a consistent pattern of intense discomfort with close relationships and social interactions
Self-criticism	Tendency to engage in negative self-evaluation that results in feelings of worthlessness, failure, and guilt when expectations are not met
Uncertainty intolerance	Tendency to perceive uncertain situations as aversive and stressful and respond with behavioural inhibition and negative expectations about their possible consequences

^aThese items were not examined in the current review due to the colloquial nature of gender norms and frequent comorbidity between depression and insomnia.

Study characteristics

Details of study characteristics are presented in Table 2. Data from $N = 55,247$ participants were included in this review. The weighted mean age across the studies was 37.9 ± 13.5 years (range 18.00–76.86). The weighted mean percentage of females across all studies was 65% (range 6%–100%). Overall, the sample size variation of reviewed studies involved small sample sizes ranging from 31 to 192 participants. Most studies collected cross-sectional data, with $N = 10$ employing a longitudinal design (Akram et al., 2015; Dørheim

et al., 2016; Ellis et al., 2021; Husson et al., 2015; Jansson-Fröjmark & Linton, 2007; Larsgård & Saksvik-Lehouillier, 2017; Reeve et al., 2018; Singareddy et al., 2012; Sørengaard et al. 2022; Trudel-Fitzgerald et al., 2017). Moreover, $N = 15$ studies restricted sampling to students (Brand et al., 2015; Emert et al., 2017; Fabbri et al., 2022; Lauriola et al., 2019; Lukowski & Tsukerman, 2021; Ma et al., 2020; Polner et al., 2018; Zamani Sani et al., 2023; Schmidt et al., 2010, 2018; Scott et al., 2017; Shealy et al., 1980; Yuksel et al., 2022; Uygur et al., 2023). Most studies ($N = 44$) sampled individuals experiencing symptoms of insomnia, whereas the remaining sampled

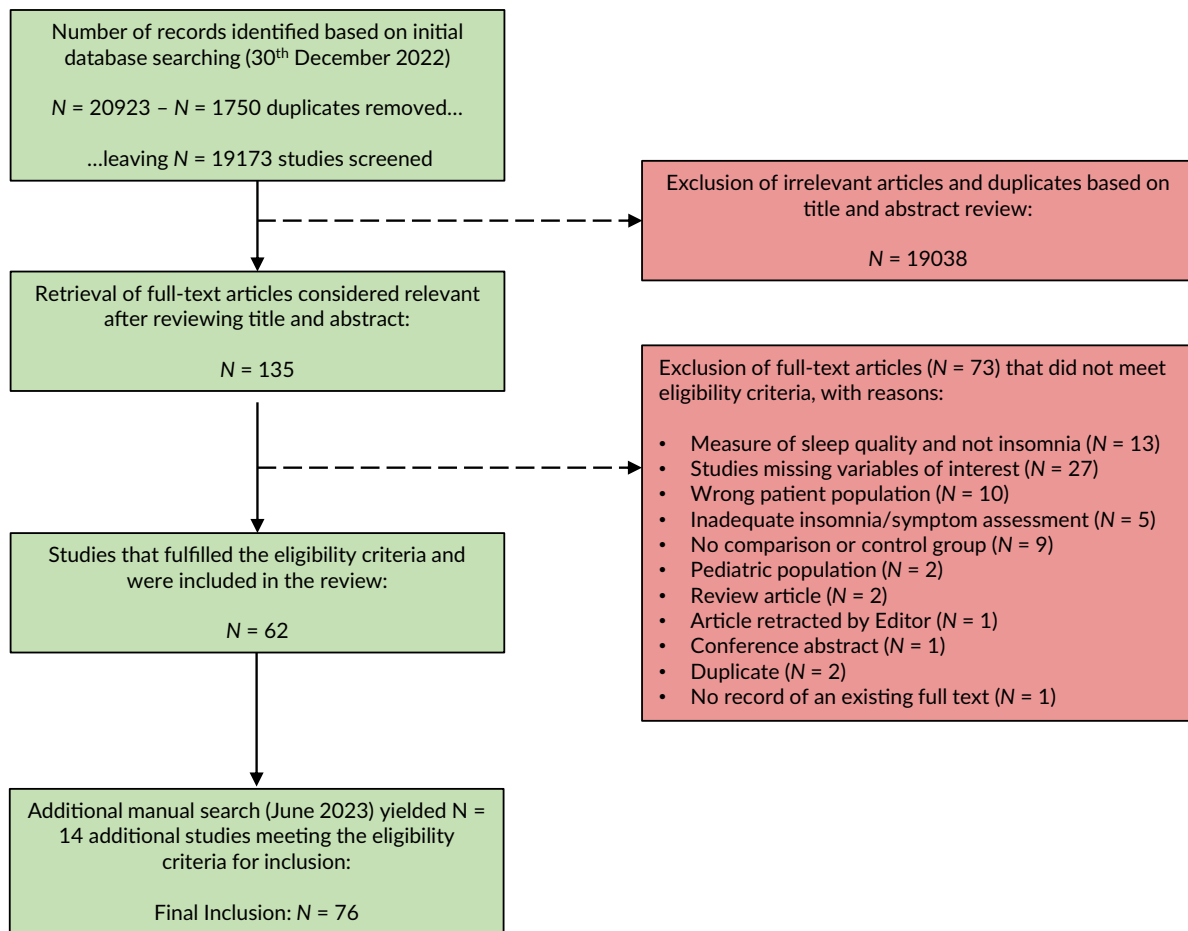


FIGURE 1 Flowchart presenting the literature search and selection process.

individuals meeting the appropriate diagnostic criterion for insomnia at the time of data collection ($N = 32$) and deployed questionnaires assessing insomnia-symptoms. The geographical location of the studies varied widely with the majority of ($N = 26$) studies conducted in North America. The remaining studies were largely conducted in Europe: United Kingdom ($N = 11$), Norway ($N = 5$), Netherlands ($N = 4$), Italy ($N = 4$), Switzerland ($N = 4$), Sweden ($N = 3$), France ($N = 2$), Poland ($N = 2$), Austria ($N = 1$), Hungary ($N = 1$). However, few studies were conducted in remaining parts of the world: China ($N = 5$), Iran ($N = 3$), South Korea ($N = 3$), Turkey ($N = 1$), Australia ($N = 1$).

The relationship between personality traits and insomnia

This section provides an overview of the included studies.

Five factor model

One of the most prominent models of personality is the five-factor model (also known as the Big-5; Goldberg, 1993), comprised five traits: extroversion, agreeableness, conscientiousness, emotional stability

(or neuroticism), and openness to new experiences (Gosling et al., 2003). Accordingly, many studies have examined the relationship between the full spectrum of these traits in the context of insomnia both at a disorder and symptoms level. To date, studies evidence at least one trait as being related to the symptoms of insomnia. In particular, the experience of insomnia and/or insomnia symptoms appears to be consistently related to reduced levels of emotional stability, extraversion, and conscientiousness (Akram et al., 2019; Dekker et al., 2017; DeShong & Tucker, 2019; Dørheim et al., 2016; Ellis et al., 2021; Evren et al., 2019; Fabbri et al., 2022; Gurtman et al., 2014; Khazaie et al., 2019; LeBlanc et al., 2007, 2009; Larsgård & Saksvik-Lehouillier, 2017; Ren et al., 2019; Rojo-Wissar et al., 2021; Sassoone et al., 2014; Sørengaard et al., 2022; Van de Laar et al., 2017; Yuksel et al., 2022). Here, of the $N = 19$ studies yielded, insomnia symptoms were related to reduced emotional stability in $N = 18$, reduced conscientiousness in $N = 11$, and reduced extraversion in $N = 10$. Whilst less consistent, insomnia and related symptoms are associated with greater reports of openness to new experiences ($N = 5$: Ellis et al., 2021; Emert et al., 2017; Gurtman et al., 2014), with only one study highlighting a negative relationship ($N = 1$: Dekker et al., 2017). Several studies ($N = 4$) found insomnia symptoms to be related to agreeableness. However, directionality concerning this particular trait remains inconclusive with half of the outcomes indicating a positive relationship (Dekker et al., 2017; Yuksel et al., 2022) and the remainder yielding a

TABLE 2 Outcomes and characteristics from reviewed studies examining insomnia and the five-factor model of personality

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
LeBlanc et al., 2007	Canada	Data from larger study, N = 953. Grouped based on ISI, PSQI, and sleep medication history into three groups: insomnia syndrome (N = 147, 70% female); insomnia symptoms (N = 308, 59% female); good sleepers (N = 493, 58% female)	ISI, PSQI	NEO-FFI, CISS	Insomnia was related to a dose response increase in neuroticism and reduction in extraversion
LeBlanc et al., 2009	Canada	Data from larger study, N = 404. Grouped based on ISI, PSQI, and sleep medication history: insomnia syndrome (N = 32, 44.52 \pm 12.4 years, 75% female); insomnia symptoms (N = 130, 43.91 \pm 14.3, 60% female); good sleepers (N = 275, 42.36 \pm 13.76, 55% female)	ISI	NEO-FFI	Relative to good sleepers, those experiencing insomnia syndrome or insomnia symptoms were significantly more introverted
Gurtman et al., 2014	Australia	Clinical outpatients, N = 88 (35.19 \pm 11.97).	ISI, DASS-21, DBAS, PSAS	NEO-FFI-3	Insomnia was related to elevated neuroticism and openness, reduced conscientiousness. Path analysis determined that negative affect, pre-sleep arousal and dysfunctional sleep-related cognitions mediated the relationship between neuroticism and insomnia severity
Sassoon et al., 2014	USA	Peri- (42.9 \pm 2.9 years) and postmenopausal (49.2 \pm 2.8) women, N = 35	Diagnostic interview to confirm diagnosis of insomnia disorder based on DSM-5 criteria	NEO-FFI	Relative to postmenopausal insomnia patients, those in the perimenopausal period reported reduced conscientiousness, agreeableness, and increased neuroticism
Dørheim et al., 2016	Norway	Pregnant outpatients, N = 3177, (31.1 \pm 4.7 years)	BIS, PSQI	Mini-IPIP	At week 32 of pregnancy, insomnia symptoms were significantly related to increased neuroticism and reduced conscientiousness. This pattern of results remained consistent 8 weeks postpartum with the addition of a negative relationship between extraversion and insomnia symptomology
Emert et al., 2017	USA	Psychology undergraduates, N = 553, (18.8 \pm 1.7 years), 77% female	ISI, RSQ	BFI-44, TEIQ-SF	Insomnia symptoms were positively related to neuroticism and openness to experience, and negatively related to conscientiousness after controlling for age, gender, and ethnicity
Dekker et al., 2017	Netherlands	Data obtained through Netherlands Sleep Registry, N = 2089, (51.7 \pm 13.6 years)	ISI	MINI-IPIP	Insomnia severity was significantly related to increased neuroticism, agreeableness, and reduced openness to experience
Larsgård & Saksvik-Lehoullier, 2017	Norway	Shift workers, N = 327, 72% female	BIS	MINI-IPIP	Increased neuroticism and reduced extraversion at baseline predicted insomnia symptoms at 6-month follow-up

TABLE 2 (Continued)

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Van de Laar et al., 2017	Netherlands	Sleep clinic outpatients, N = 218 (44.0 \pm 11.2 years) individuals without a history of psychiatric illness or shift work. 66% female	Diagnostic interview to determine insomnia, ISI	NEO-FFI	Here, participants reported a respective dose response reduction in conscientiousness, emotional stability and extraversion when grouped by insomnia severity
Akram et al., 2019	UK	N = 557, (24.40 \pm 11.46 years), 75% female	ISI, Sleep-50 to exclude other sleep disorders, HADS	TIPI	Insomnia symptoms were negatively related to increased levels of agreeableness, conscientiousness, and extraversion, and reduced emotional stability. When accounting for shared variance and controlling for age and sex, regression analysis determines only conscientiousness and emotional stability to remain significant predictors of insomnia symptoms
DeShong & Tucker, 2019	USA	Recruited from Amazon's Mechanical Turk, N = 281 (37.99 \pm 9.87), 46% female	ISI	FFBI-SF	Insomnia symptoms were related to the five-factor borderline inventory
Evren et al., 2019	Turkey	Professional E-Sport Gamers, N = 1010. Probable insomnia: N = 200 (21.51 \pm 2.88), 75% female. Control: N = 810 (21.93 \pm 3.50), 59% female	ISI	EPQ: Only neuroticism was examined.	Gamers experiencing clinically significant insomnia symptoms (>14 ISI) displayed reduced emotional stability relative to normal-sleepers. The insomnia group also more inattentive and impulsive
Khazaie et al., 2019	Iran	Earthquake survivors, N = 999, (30.68 \pm 11.0 years), 43% female	ISI, DBAS	ZKPQ	Subjects statistically clustered based on increased reports of neuroticism, experimental avoidance, emotional dysregulation, and dysfunctional sleep-related cognition experienced significantly higher insomnia severity relative to a characteristically opposing group
Ren et al., 2019	China	Breast cancer patients, N = 749, (48.13 \pm 8.38)	ISI	Neuroticism subscale: NEO-FFI, ASI-3	Neuroticism, anxiety sensitivity and optimism significantly predicted insomnia symptoms
Ellis et al., 2021	UK	General population, N = 877, 73% female. Normal Sleepers: N = 737, (26.74 \pm 10.67). Acute insomnia: N = 140, (31.91 \pm 12.47)	Diagnostic interview, ISI, PSQI	NEO-FFI	At baseline, individuals with acute insomnia presented greater introversion, openness to experience, neuroticism, and reduced conscientiousness relative to normal sleepers
Rojo-Wissar et al., 2021	USA	Community-dwelling older adults, N = 1049, (76.86 \pm 8.6 years), 51% female	WHIRS	NEO-PI-R	Insomnia symptoms were related to reduced conscientiousness, emotional stability, and extraversion
Fabbri et al., 2022	Italy	N = 400 Psychology students, (36.88 \pm 13.29), 57% female	ISI	BFI-10	Overall, insomnia symptoms were negatively related to extraversion, emotional stability, and conscientiousness. When grouped, individuals with insomnia demonstrated reduced conscientiousness and extraversion relative to normal sleepers
Sørengaard et al., 2022	Norway	Cohort study of nurses, N = 1516 (38 \pm 8.3 years), 91% female	BIS	Mini-IPIP	Symptoms of insomnia were positively associated with neuroticism, and negatively associated with conscientiousness and extraversion. When accounting for shared variance between these three traits, neuroticism remained the only significant predictor of insomnia

(Continues)

TABLE 2 (Continued)

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Sørrenggaard et al., 2022	Norway	N = 206 Police officers: (42.48 \pm 10.74), 48% female	BIS	NEO-FFI	Baseline insomnia symptoms were associated with greater over commitment, neuroticism, and introversion. In addition, these traits predicted insomnia at 6-month follow-up
Yuksel et al., 2022	USA	N = 95 Students (18 \pm 0.95 years), 62% female	Diagnostic interview to confirm diagnosis of insomnia disorder based on DSM-5 criteria., ISI	NEO-FFI	Overall, individuals with insomnia demonstrated greater levels of neuroticism, agreeableness, and openness relative to normal sleeping controls. Agreeableness was most prominent in females with insomnia

Abbreviations: ASI-3, anxiety sensitivity scale; BFI-10, Brief Big Five personality inventory; DASS-21, depression, anxiety and stress scale; ISI, insomnia severity index; MINI-IPIP, Mini Five factor personality scale; NEO-FFI, Neo Five factor inventory; RSQ, relationships scale questionnaire; SCID-II, structured clinical interview for DSM-IV Axis II personality disorders; TIPI, Ten item personality inventory; WHIRS, women's health initiative insomnia rating scale; ZKPQ, Zuckerman-Kuhlman personality questionnaire.

negative relationship (Akram et al., 2019; Sassooson et al., 2014). See Table 2 for full study details.

When sampling clinical outpatients meeting a diagnostic criterion for insomnia, Gurtman et al. (2014) determined insomnia to be characterised by elevated neuroticism and openness, and reduced conscientiousness. Additional path analysis determined that negative affect, pre-sleep arousal, and dysfunctional sleep-related cognitions mediated the relationship between neuroticism and insomnia severity. Likewise, Van de Laar and colleagues (2014) yielded similar outcomes such that participants reported a respective dose response reduction in conscientiousness, emotional stability, and extraversion when grouped by insomnia severity. When comparing normal-sleepers and individuals meeting the DSM-5 criteria for acute insomnia, Ellis et al. (2021) determined that acute insomnia is characterised by greater reports of introversion, openness to experience, neuroticism, and reduced conscientiousness relative to normal sleepers. Finally, when comparing post- and perimenopausal women with insomnia disorder, Sassooson et al. (2014) found that those in the perimenopausal period reported reduced conscientiousness, agreeableness, and increased neuroticism.

The methodological approach substantially varied across the yielded studies, particularly in relation to the sample population, design, and measurement of five factor traits. Crucially, few studies have sampled individuals meeting a formal insomnia diagnosis (Ellis et al., 2021; Gurtman et al., 2014; Sassooson et al., 2014; Van de Laar et al., 2017) or examined the role of insomnia symptoms in the general (Akram et al., 2019; DeShong & Tucker, 2019; LeBlanc et al., 2007, 2009) or student population(s) (Emert et al., 2019; Fabbri et al., 2022; Yuksel et al., 2022). The remaining studies sampled shift workers (Larsgård & Saksvik-Lehouillier, 2017), earthquake survivors (Khazaie et al., 2019), pregnant women (Dørheim et al., 2016), breast cancer patients (Ren et al., 2019), police officers (Sørrenggaard et al., 2022), and older adults (Rojo-Wissar et al., 2021; Sørrenggaard et al., 2022). Assessment of the five factor traits mainly involved iterations of the NEO Five Factor Inventory (NEO-FFI: Costa & McCrae, 1989) or the Mini International Personality Item Pool (MINI-IPIP: Donnellan et al., 2006). Interestingly, two studies only examined the role of neuroticism in relation to insomnia (Evren et al., 2019; Ren et al., 2019). Only Larsgård and colleagues (2017) deployed a longitudinal design, demonstrating that baseline introversion and neuroticism significantly predicted insomnia symptoms at 6-month follow-up (Larsgård & Saksvik-Lehouillier, 2017).

Multidimensional perfectionism

The experience of perfectionism involves overly critical self-evaluation and the inordinate tendency to set and maintain excessively high self-standards (Frost et al., 1990). From a theoretical perspective, perfectionistic individuals become overly concerned with the daytime consequences (e.g. fatigue, impaired concentration) of acute sleep-loss (Lundh & Broman, 2000). In the pre-sleep period, this may fuel a negative thought cycle comprising worry, rumination, and dysfunctional beliefs concerning sleep, resulting in increased pre-sleep arousal. In turn, this may eventually lead to

difficulty in sleep initiation and maintenance, facilitating the transition from an acute to chronic sleep disturbance (Lundh & Broman, 2000).

Most studies exclusively examined the role of Frost et al.'s (1990) multidimensional conceptualisation of perfectionism. Here, six dimensions characterise the construct of perfectionism: the propensity to be concerned over and react negatively to mistakes (concern over mistakes); doubt one's own performance and actions (doubts about action); perceive one's parents to have high expectations of them (parental expectations); perceive one's parents as overly critical towards them (parental criticism); maintain a high standard of order and organisation (organisation); set and maintain high personal standards (personal standards). Of these, the experience of insomnia appears consistently related to increased reports of doubts about action, concern over mistakes and parental criticism (Akram et al., 2015, 2017, 2020; Andersson et al., 2005; Brand et al., 2015; Jansson-Fröjmark & Linton, 2007; Lundh et al., 1994; Schmidt et al., 2018; Trudel-Fitzgerald et al., 2017; Vincent & Walker, 2000). Only two studies have examined the role of Hewitt and Flett's (1991) conceptualisation of perfectionism, both failing to yield any relationships between perfectionism and insomnia (Akram et al., 2015; Vincent & Walker, 2000).

Correlational studies sampling Swiss university students evidence perfectionistic doubts and concerns to be associated with the symptoms of insomnia (Brand et al., 2015; Schmidt et al., 2018). Schmidt et al. (2018) also found insomnia symptoms to be associated with organisational behaviour. In contrast, Brand et al. (2015) reported that university students experiencing insomnia symptoms showed increased personal standards and parental evaluation. Likewise, in members of the UK general population, symptoms of insomnia appear to be related to doubts about action, concern over mistakes, personal standards, and parental criticism (Akram et al., 2015, 2020). Furthermore, tinnitus patients are evidenced to present relationships between insomnia symptoms and perfectionistic concern over mistakes and parental criticism (Andersson et al., 2005).

To date, only three studies have sampled individuals meeting the diagnostic criteria for insomnia (Akram et al., 2017; Lundh et al., 1994; Vincent & Walker, 2000). Lundh et al. (1994) demonstrated that insomnia patients from a sleep disorders clinic reported greater concern over mistakes, doubts about action, and personal standards relative to members of the Swedish general population. However, it should be noted that only these three dimensions of perfectionism were examined. Nevertheless, these findings have partially been replicated in two studies, each demonstrating that individuals with insomnia report increased concern over mistakes, doubts about action and parental criticism when compared with normal-sleeping controls (Akram et al., 2017; Vincent & Walker, 2000). Several longitudinal studies have sought to address limitations of causality and directionality (Akram et al., 2015; Jansson-Fröjmark & Linton, 2007; Trudel-Fitzgerald et al., 2017). Here, Jansson-Fröjmark and Linton (2007) demonstrated that concern over mistakes appears to be significantly related to pre-existing and future insomnia, characterised by sleep initiation or maintenance difficulties. However, it is relevant to note that

the authors only collected data for the two subscales: concern over mistakes and personal standards. Sampling French-Canadian cancer patients, Trudel-Fitzgerald et al. (2017) evidenced symptoms of insomnia to predict increased levels of perfectionistic doubts and concerns after 2 months. In contrast, Akram et al. (2015) found that the experience of insomnia symptoms predicted a future increase in perfectionistic doubts about action and parental criticism. Finally, the relationship between perfectionism and insomnia has been reported to be mediated by emotional distress (Jansson-Fröjmark & Linton, 2007), stress perception and emotion regulation (Brand et al., 2015; Molnar et al., 2020), counterfactual thinking (Schmidt et al., 2018), symptoms of anxiety (Akram et al., 2015, 2017), and dysfunctional sleep-related cognition (Akram et al., 2020). See Table 3 for full study details.

Type-D personality

Type-D personality, also known as the distressed personality, indicates a joint tendency to experience negative emotions whilst also inhibiting self-expression in social interaction due to a fear of rejection or disapproval by others. This personality type is characterised by the two stable traits: negative affectivity (NA) and social inhibition (SI). In the UK general population, Type-D personality has been related to symptoms of insomnia, both as a categorical and dimensional construct (Akram, Allen, et al., 2018; Akram, McCarty, et al., 2018). After accounting for comorbid sleep disorder symptoms, Akram and colleagues (2018) observed increased insomnia severity amongst Type-D relative to non-Type D individuals. Whilst negative affect and social inhibition were independently related to insomnia symptoms, negative affect emerged to be the most prominent predictor of insomnia when accounting for shared variance. These outcomes are partially replicated amongst Turkish university students (Uygur et al., 2023) and Polish high-school teachers (Domagalska et al., 2021) where increased reports of insomnia symptoms were observed in those being characterised as Type-D individuals. Likewise, North American students meeting the diagnostic criteria for insomnia demonstrated increased negative affect and social avoidance compared with normal sleeping controls (Yuksel et al., 2022). While the relative roles of NA and SI remained unexamined, behavioural sleep effort and vulnerability to stress-related sleep disturbances were associated with the experience of Type-D personality (Uygur et al., 2023). In survivors of colorectal cancer, individuals characterised as Type-D presented a twofold increase in symptoms of insomnia relative to non-Type-D controls after controlling for sociodemographic factors, time since diagnosis, chemotherapy, and depression (Husson et al., 2015). In particular, those displaying negative affect, but not social inhibition, reported the highest level of insomnia symptomatology when compared with controls and Type-D individuals.

Other studies have independently examined the traits which underlie Type-D personality. In a sample of UK university students, Scott et al. (2017) determined symptoms of sleep-onset insomnia and sleep maintenance difficulties to be associated with increased reports of negative affect. In other work, after identifying subtypes of insomnia based

TABLE 3 Outcomes and characteristics from reviewed studies examining insomnia and dimensions of perfectionism

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Lundh et al., 1994	Sweden	N = 70 Insomnia patients: (52.2 \pm 11.73), 73% female. N = 383 healthy controls: 55% female	Insomnia: Sleep clinic outpatients with confirmed diagnosis	Three F-MPS subscales: Doubts about action; Concern over mistakes; Personal Standards	Those with insomnia indicated greater reports of doubts about action, concern over mistakes and personal standards relative to controls
Vincent et al. 2000	Canada	N = 58 community volunteers. N = 32 Chronic insomnia: (46.91 \pm 10.04 years), 94% female. N = 26 healthy controls: (39.65 \pm 11.49 years), 94% female	Diagnostic interview to confirm diagnosis of insomnia disorder based on DSM-IV criteria	F-MPS, HF-MPS	Individuals with chronic insomnia reported significantly greater doubts about action, concern over mistakes and parental criticism
Andersson et al., 2005	Sweden	Audiology outpatients approached via postal questionnaire. N = 256 completed and returned (51 \pm 13.6 years), 43% female	ISI	F-MPS	Insomnia symptoms were related to increased reports of concerns over mistakes and parental criticism
Jansson-Fröjmark & Linton, 2007	Sweden	Data from Orebro Insomnia Cohort Study. N = 1936 provided complete data at baseline and follow-up (1 year)	NSQ, ISI	Two FMPS subscales: Concern over mistakes; Personal standards	Concern over mistakes were related to pre-existing insomnia at baseline whilst also predicting the future onset of insomnia
Akram et al., 2015	UK	General population. N = 76 at baseline (25.3 \pm 10.36 years), 80% female. N = 57 providing complete data at follow up (26.11 \pm 9.29), 84% female	Screening questionnaire controlling for sleep disorders other than insomnia, ISI, HADS	F-MPS, HF-MPS	At baseline, insomnia symptoms were associated with doubts about action and parental criticism. Longitudinal analysis determined baseline symptoms of insomnia predicted future doubts about action and parental criticism. This latter outcome was partially mediated by anxiety
Brand et al., 2015	Switzerland	N = 346 Psychology and Medical students: (23.87 \pm 1.93 years), 55% female	ISI	F-MPS	Insomnia symptoms were positively related to increased concerns over mistakes and doubts, personal standards, and parental expectations and criticism
Akram et al., 2017	UK	General population. N = 39 Insomnia disorder: (22.18 \pm 5.37 years), 87% female; N = 39 Normal-sleepers: (24.03 \pm 6.25 years), 70% female	Diagnostic screening questionnaire for DSM_5 criteria for insomnia disorder, ISI, HADS	F-MPS, HF-MPS	Compared with normal-sleepers, individuals with insomnia presented increased greater concern over mistakes, doubts about action, and parental criticism. These differences were partially mediated by symptoms of anxiety, but not depression
Trudel-Fitzgerald et al., 2017	Canada	N = 853 Individuals with a diagnosis of non-metastatic cancer schooled to receive curative surgery: (56.9 \pm 9.8 years), 65% female	ISI	F-MPS	Insomnia symptoms predicted increased perfectionistic doubts and concerns after 2 months
Schmidt et al., 2018	Switzerland	N = 180 Psychology undergraduates: (21.85 \pm 3.56 years), 85% female	ISI	F-MPS	Insomnia symptoms were related to greater reports of doubts about action and concern over mistakes, but reduced organisation

TABLE 3 (Continued)

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Akram et al., 2020	UK	General population. N = 624 complete responses (24.00 \pm 10.85) 75% female, 67% student	ISI, DBAS, HADS	F-MPS	After controlling for age and sex, insomnia symptoms were significantly related to doubts about action, organisation, parental expectations, and parental criticism. Regression-based mediation analyses further showed that both dysfunctional sleep-related cognition and anxiety significantly mediated the associations between insomnia symptoms and three perfectionism dimensions (i.e. doubts about action, parental expectations, and parental criticism)

Abbreviations: DBAS, dysfunctional beliefs about sleep questionnaire; F-MPS, Frost multidimensional perfectionism scale; HADS, hospital anxiety and depression scale; HF-MPS, Hewitt & Flett multidimensional perfectionism scale; ISI, insomnia severity index; NSQ, Nordic sleep questionnaire; USI, Uppsala sleep inventory.

on affective traits and increased distress, negative affect appeared to increase in a dose response manner (Blanken et al., 2019). Oltmanns et al. (2014) evidenced a significant relationship between symptoms of insomnia and social avoidance amongst a sample of the US general population. Furthermore, when accounting for sociodemographic factors, physical activity, body mass index and dietary health, the experience of Type-D personality appears to predict the onset of insomnia in patients with coronary heart disease (Frøjd et al., 2021). Additional research comprehensively examined the relationship between affective temperaments and insomnia symptoms in healthy members of the Polish general population (Oniszczenko et al., 2019). Here, the experience of insomnia was related to increased reports of cyclothymia, irritability, and reduced hyperthymia. However, after accounting for shared variance in the prediction of insomnia symptoms, irritability no longer remained significant (Oniszczenko et al., 2019). Whilst Somma et al. (2020) failed to evidence differences in negative affect between insomnia outpatients and community dwelling adults, those with insomnia experienced greater levels of disinhibition. Finally, negative affect appears to mediate the relationship between insomnia symptoms and paranoid thinking in patients with non-affective psychotic disorder (Reeve et al., 2018). See Table 4 for full study details.

MMPI profiles

The Minnesota Multiphasic Personality Inventory (MMPI: Hathaway & McKinley, 1951) takes a cognitive behavioural approach to examining personality and psychopathology, comprising 10 dimensions: hypochondriasis (concern with bodily symptoms), depression, hysteria (awareness of vulnerabilities), psychopathic deviate (conflict, struggle, and anger in respect for societal rules), masculinity/femininity (stereotypical gender oriented behaviours and interests at the time of development), paranoia (extent of trust, suspiciousness, and sensitivity), psychasthenia (worry, anxiety, tension, doubts, obsessiveness), schizophrenia (odd thinking and social alienation), hypomania (increased excitability), and social introversion (social avoidance). See Table 1 for more comprehensive trait definitions.

In 64% of the $N = 14$ cross-sectional studies yielded, insomnia appears most prominently characterised by increased hypochondriasis, psychasthenia and hysteria relative to control subjects (Bonnet & Arand, 1995, 1997; Coursey et al., 1975; Fernandez-Mendoza et al., 2011; Freedman & Sattler, 1982; Kales et al., 1983; Lamarche & Ogilvie, 1997; Levin et al., 1984; Schneider-Helmert, 1986; Seidel et al., 1984; Shealy et al., 1980; Vgontzas et al., 2001). In contrast, the evidence base presents mixed outcomes concerning schizophrenia, paranoia, psychopathic tendencies, and social introversion, with approximately a third of studies evidencing these traits to be elevated in insomnia populations (Bonnet & Arand, 1997; Coursey et al., 1975; Freedman & Sattler, 1982; Kales et al., 1983; Schneider-Helmert, 1986; Seidel et al., 1984; Vgontzas et al., 2001). These results were partially extrapolated to students experiencing sleep-onset insomnia who presented increased hypochondriasis, paranoia, psychasthenia, and schizophrenia (Shealy et al., 1980) and paradoxical insomnia patients reporting elevated

TABLE 4 Outcomes and characteristics from reviewed studies examining insomnia and dimensions of type-d personality

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Oltmanns et al., 2014	USA	Community sample. N = 633 (62.3 \pm 2.8 years), 57% female	ISI, PSQI	SIDP-IV, MAPP	Insomnia symptoms were related to increased reports of social avoidance
Husson et al., 2015	Netherlands	Longitudinal data from PROFILES registry. N = 2625 at baseline; N = 1643 at second time-point, N = 1458 at follow-up	EORTC QLQ-C30	DS-14	Individuals characterised as Type-D presented a twofold increase in symptoms of insomnia relative to non-Type-D controls after controlling for sociodemographic factors, time since diagnosis, chemotherapy, and depression
Scott et al., 2017	UK	N = 348 University population volunteers (36.49 \pm 12.76 years), 76% female	SLEEP-50	DASS, GPTS-B	Symptoms of sleep-onset insomnia and sleep maintenance difficulties were associated with increased reports of negative affect
Reeve et al., 2018	UK	N = 29 Non-affective psychotic disorder patients: (23.55 \pm 3.8 years), 55% female	DASS-21, SPEQ	SLEEP-50	Negative affect mediated the longitudinal relationship between baseline insomnia symptoms and future paranoid thinking at 3-month follow-up
Akram, Allen, et al., 2018	UK	N = 392, (23.22 \pm 9.87 years), 75% female	ISI, Sleep-50 to exclude other sleep disorders	DS14: Type D, Negative Affect, Social Inhibition	Type-D individuals indicated increased reports of insomnia symptoms relative to normal sleepers. Moreover, whilst negative affectivity and social inhibition were positively associated with insomnia severity, only the former remained a significant predictor after accounting for shared variance
Blanken et al., 2019	Netherlands	N = 2224 Netherlands sleep registry participants with probable insomnia disorder (51.1 \pm 13.7 years), 78% female. 2098 controls (47.52 \pm 15.8 years), 74% female	ISI	ITQ	After identifying subtypes of insomnia based on affective traits and increased distress, negative affect appeared to increase in a dose response manner
Oniszczenko et al., 2019	Poland	N = 659 adults from a nonclinical population: (30.97 \pm 10.86), 64% female	AIS	TEMPS-A	Insomnia symptoms were positively related to irritability, cyclothymia, energetic and tense arousal, and negatively related to hyperthymia
Somma et al., 2020	Italy	Insomnia outpatients: N = 30, 50% female; Community dwelling adults: N = 30, 50% female	Diagnostic interview, ISI, PSQI	PID-5	No group differences in negative affect were observed. However, those with insomnia experience greater levels of disinhibition
Domagalska et al., 2021	Poland	N = 412 High school teachers in Poland, 71% female	AIS	DS-14	Teachers characterised as type-d presented greater reports of insomnia symptoms
Frøjd et al., 2021	Norway	N = 488 with insomnia: (60.2 \pm 9.9 years), 27% female; N = 594 without insomnia: (62.5 \pm 9.3 years), 16% female	BIS	TDS	Type-D personality was significantly more prominent in those with insomnia relative to controls
Lukowski & Tsukerman, 2021	USA	N = 167 university students: 20.35 \pm 1.3 years, 62% female	ISI	ATQ	Symptoms of insomnia were related to increased negative affect due to fear and sadness. In contrast, insomnia was related to diminished effortful control (i.e. activation, attentional and inhibitory)
Yuksel et al., 2022	USA	N = 95 Students (18 \pm 0.95 years), 62% female	Diagnostic interview based on DSM-5 criteria for insomnia, ISI	GTCI, TCQI-R	Individuals with insomnia demonstrated increased negative affect and social avoidance compared with normal sleeping controls

TABLE 4 (Continued)

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Uygur et al., 2023	Turkey	N = 474 university students (21.22 \pm 2.22), 82% female	ISI	DS-14	Insomnia symptoms were positively related to type-D personality in the whole sample. More crucially, those grouped as having type-D personality experienced significantly greater insomnia symptoms severity relative to their non-type-D counterparts

Abbreviations: AIS, Athens insomnia scale; ATQ, adult temperament questionnaire; DASS-21, depression, anxiety and stress scale; EORTC QLQ-C30, European Organisation for Research and Treatment of Cancer; A Quality of Life Instrument; GPTS-B, Part B of Green Paranoid Thoughts Scale; GTCI, Global Talent Competitiveness Index; ISI, insomnia severity index; ITQ, insomnia type questionnaire; MAPP, multi source assessment of personality pathology; PSQI, Pittsburgh sleep quality index; SCIDP-IV, structured clinical interview for DSM-IV axis 1 disorder; SLEEP-50, SLEEP-50 Questionnaire; SPEQ, psychotic experiences questionnaire; TCQI-R, thought control questionnaire insomnia revised; TDS, Type D scale; TEMPS-A, temperament evaluation of Memphis, Pisa, Paris and Santiago questionnaire.

levels of hysteria, psychasthenia, and schizophrenia (Bonnet & Arand, 1997). Interestingly, Hauri and Fisher (1986) found only greater levels of hysteria when comparing insomnia patients and controls. However, this might be explained by the nature of the control group who were recruited via sleep clinic bulletin boards or were acquaintances of staff members. Finally, taking a longitudinal approach, Singareddy et al. (2012) determined that social introversion at baseline predicted the onset of insomnia at follow-up (7.5 years). See Table 5 for full study details.

Whilst early studies employing the MMPI largely sampled well screened clinical outpatients and matched controls, sample sizes remained rather small in the range $N = 12$ –44 participants. This might be attributed to the extensive methodological nature of screening (diagnostic interviews, polysomnography, 2-week-sleep diaries), the labourious nature of the $N = 550$ item MMPI, often a secondary outcome to a larger research question. Furthermore, apart from one study conducted in Switzerland (Schneider-Helmert, 1986), the remaining were geographically limited to North America.

Dark triad and antisocial traits

To date, three studies have examined the relationship between insomnia and the dark triad traits (Akram, Allen, et al., 2018; Akram, McCarty, et al., 2018; Sabouri et al., 2016; Zamani Sani et al., 2023). Sampling young Iranian adults, Sabouri et al. (2016) determined that symptoms of insomnia were independently correlated with greater reports of psychopathy and Machiavellianism, but not narcissism. Whilst these relationships were replicated amongst a sample of the UK general population using a measure of insomnia symptomology, only psychopathy predicted insomnia symptoms when shared variance between dark triad traits was controlled for (Akram, Allen, et al., 2018; Akram, McCarty, et al., 2018). Recent data sampling Iranian student athletes found psychopathic tendencies, but not Machiavellianism or narcissism, to be associated with symptoms of insomnia after controlling for perceived stress (Zamani Sani et al., 2023). See Table 6 for full study details.

Other studies have independently examined the traits either underlying or related to the dark triad. In a sample of depressed outpatients and healthy controls recruited from a medical hospital in China, the symptoms of insomnia were significantly related to increased reports of passive aggressive and narcissistic, but not to antisocial personality traits (Chen et al., 2021). More crucially, insomnia symptoms mediated the relationships between borderline personality and the experience of passive aggression as predictors of depression. In a community-dwelling sample of older North American adults, Oltmanns et al. (2014) determined that increased symptoms of insomnia were significantly related with antisocial and narcissistic personality traits. Relative to healthy controls, insomnia outpatients from a Chinese hospital displayed increased impulsivity and neurotic anxiety (Wang et al., 2001). However, stratifying those with insomnia patients into those presenting with sleep onset difficulties or early morning awakenings and unrefreshing sleep, the latter group indicated significantly greater reports of aggression and hostility. Comparing insomnia patients with members of the Italian general population, Somma et al. (2018) found increased levels of

TABLE 5 Outcomes and characteristics from reviewed studies examining insomnia and MMPI Profiles

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Coursey et al., 1975	USA	N = 18 Chronic insomnia patients and N = 18 age and sex matched normal-sleeping controls	Diagnostic interview to determine insomnia and normal-sleeper status	MMPI	Chronic insomnia was characterised by increased neuroticism, hysteria, psychasthenia and hypochondriasis relative to controls. In contrast, the insomnia group presented reduced social desirability and sensation-seeking
Shealy et al., 1980	USA	Undergraduate students: N = 40 Individuals with sleep-onset insomnia (21.2 years) N = 20 controls (22 years)	Screening questionnaire confirmed group status. Those receiving talking or hypnotic treatment were excluded	MMPI	Relative to controls, those with sleep-onset insomnia displayed significantly greater reports of hypochondriasis, paranoia, psychasthenia, and schizophrenia
Freedman & Sattler, 1982	USA	N = 12 Individuals with sleep-onset insomnia (31.75 years), 92% female; N = 12 normal-sleepers (27.75 years), 67% female	Diagnostic interview and polysomnography	MMPI	The insomnia group displayed significantly greater levels of hysteria, psychasthenia, and schizophrenia when compared with controls
Kales et al., 1983	USA	N = 277 Insomnia outpatients (43.1 \pm 0.09 years), 57% female; N = 100 normal-sleeping controls (40.9 \pm 1.5 years), 59% female	Diagnostic interview demined group status	MMPI	The insomnia group displayed significantly greater levels of hypochondriasis, hysteria, psychopathy, paranoia, psychasthenia and schizophrenia
Levin et al., 1984	USA	N = 100 (39 years); N = 74 individuals with insomnia; N = 26 good sleepers	Diagnostic interview demined group status	MMPI	Relative to normal sleepers, those with insomnia reported elevated levels of hypochondriasis, hysteria, psychopathic tendencies, and psychasthenia
Mendelson et al., 1984	USA	N = 10 Insomnia patients (35.1 \pm 7.3 years), 90% female; N = 10 Controls (35.4 \pm 6.5 years), 100% female	Diagnostic interview and polysomnography	MMPI	Compared with controls, those with insomnia presented significantly increased social introversion
Seidel et al., 1984	USA	N = 138 Chronic insomnia patients; (57 \pm 17 years), 69% female. N = 89 normal-sleepers: (26 \pm 4.8), 45% female	Diagnostic interview demined group status	MMPI	Relative to normal sleepers, those with insomnia displayed marginally elevated levels of hypochondriasis, hysteria, and psychasthenia
Hauri & Fisher, 1986	USA	N = 22 Psychophysiological insomnia patients: (45.1 \pm 10.4 years), 73% female. N = 22 Controls: 73% female (42.6 \pm 9.4 years)	Diagnostic interview demined group status	MMPI	Compared with controls, those with insomnia presented significantly greater levels of hysteria
Schneider-Helmert 1987	Switzerland	Sleep clinic outpatients with insomnia: N = 16 (46.1 years), 56% female; Controls: N = 16 (46.7 years), 56% female	Diagnostic interview demined group status	MMPI	The insomnia group displayed significantly greater levels of hypochondriasis, hysteria, psychopathy, paranoia, psychasthenia and schizophrenia when compared with controls
Bonnet & Arand, 1995	USA	N = 10 Chronic insomnia patients (38.3 \pm 7.1 years) and N = 10 normal-sleepers (38.6 \pm 6.8 years)	Diagnostic screening questionnaire and polysomnography	MMPI	Compared with normal sleeping controls, those with insomnia presented significantly greater levels of hysteria
Bonnet & Arand, 1997	USA	N = 9 Paradoxical insomnia patients (31.7 \pm 8.4) and N = 9 normal-sleeping controls (32.6 \pm 6.2)	Diagnostic interview demined group status	MMPI	Relative to normal sleepers, those with paradoxical insomnia reported elevated levels of hysteria, psychasthenia, and schizophrenia

TABLE 5 (Continued)

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Lamarche & Ogilvie, 1997	Canada	N = 6 individuals with psychophysiological insomnia (27.81 \pm 10.28 years), 50% female; N = 6 individuals with insomnia and comorbid psychiatric symptoms (31.52 \pm 10.21 years), 50% female; N = 6 controls (27.84 \pm 9.6, 34% female)	SDQ, BSIQ	MMPI-2	The psychophysiological insomnia group reported significantly higher levels of hypochondriasis, social introversion, psychasthenia and schizophrenia when compared with controls. Insomnia and comorbid psychiatric symptoms evidenced higher scores on all MMPI-2 subscales relative to the psychophysiological insomnia and control groups
Vgontzas et al., 2001	USA	N = 11 insomnia patients (31.4 \pm 6.7 years), 45% female and N = 13 BMI matched healthy controls (27.7 \pm 6.8 years), 31% female	Diagnostic interview and polysomnography to confirmed group status	MMPI-2	Individuals with insomnia displayed significantly higher levels of hypochondriasis, conversion hysteria, psychopathic deviation, paranoia and psychasthenia when compared with controls
Fernandez-Mendoza et al., 2011	USA	N = 866 (50.0 \pm 0.05 years), 58% female; Insomnia group: N = 142 (50.5 \pm 1.04 years), 73% female; Normal-sleeping controls (50.0 \pm 0.51), 45% female	Diagnostic screening for insomnia status	MMPI-2	Individuals with insomnia displayed higher overall MMPI-2 total scores relative to controls. Moreover, those with insomnia displayed elevated levels of hypochondriasis, hysteria, psychopathy, paranoia, and introversion
Singareddy et al., 2012	USA	Longitudinal design. N = 1246 normal-sleepers at baseline. Demographic data not reported	Screening questionnaire, structured telephone interview, polysomnography	MMPI-2	Social introversion at baseline predicted the onset of insomnia at follow-up (7.5 years)

Abbreviations: BSIQ, Brock sleep and insomnia questionnaire; MMPI, Minnesota multiphasic personality inventory; MMPI-2, Minnesota multiphasic personality inventory revised; SDQ, sleep disorders questionnaire.

TABLE 6 Outcomes and characteristics from reviewed studies examining insomnia and dark triad traits

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Chauvin et al., 2015	France	N = 159 Insomnia patients: (49.6 \pm 13.7 years), 72% female; N = 159 healthy controls: (48.7 \pm 13.0 years), 72% female	DSM-IV-R Criteria for Insomnia	NEO-PI	Relative to controls, individuals with insomnia reported greater levels of anger-hostility, and reduced self-consciousness and vulnerability
Sabouri et al., 2016	Iran	N = 341 members of the general population recruited via social media: (29.00 \pm 6.58 years), 52% female	ISI	MACH-IV, NPI, SRP-II	Symptoms of insomnia were correlated with greater reports of psychopathy and Machiavellianism, but not narcissism
Oltmanns et al., 2014	US	Community sample. N = 633 (62.3 \pm 2.8 years), 57% female	ISI, PSQI	SIDP-IV, MAPP	Insomnia symptoms were related to increased symptoms of borderline, schizotypal, dependant, schizoid, obsessive-compulsive, antisocial, histrionic and narcissistic traits
Akram, McCarty, et al., 2018	UK	N = 475 members of the general population after excluding participants with a possible sleep disorder other than insomnia: (24.40 \pm 11.46 years), 75% female, 74% university students	ISI, SLEEP-50	SD3	Symptoms of insomnia were related to Machiavellianism and psychopathy, but not narcissism. Linear regression analysis determined psychopathy and sex, but not Machiavellianism, to be associated with increased insomnia symptoms
Somma et al., 2018	Italy	N = 171 age and sex matched psychotherapy outpatients attending a sleep disorders clinic	Diagnostic interview to confirm ICSD-3 criteria for insomnia	SCID-II	Increased levels of narcissism were observed in the insomnia group. However, no differences in antisocial behaviour emerged
Wang et al., 2001	China	N = 23 Insomnia outpatients: (30.2 \pm 7.0 years), 52% female; N = 28 healthy controls: (27.2 \pm 5.0), 68% female	Diagnostic interview confirming DSM-IV criteria for insomnia	SSS, ZKPQ	Individuals with insomnia reported greater levels of impulsivity and neurotic anxiety
Chen et al., 2021	China	N = 69 Inpatients with depression: (33.06 \pm 13.68 years); N = 69 Controls (35.23 \pm 12.18 years)	AIS	PDQ-4	Symptoms of insomnia were significantly related to increased reports of passive aggressive and narcissistic, but not antisocial personality traits
Zamani Sani et al., 2023	Iran	N = 464 Iranian student athletes: (23.15 \pm 1.63 years), 57% female	ISI	DTS	Only psychopathy was related to increased insomnia symptoms

Abbreviations: DTS, dark triad scale; ISI, insomnia severity index; MACH-IV, Machiavellianism scale; NEO-FFI, NEO five factor inventory; NEO-PI, narcissistic personality inventory; NPI, narcissistic personality inventory; PDQ-4, personality diagnostic questionnaire; SCID-II, structured clinical interview for DSM-IV Axis I personality disorders; SD3, short item dark triad questionnaire; SRP-II, self-reported psychopathy scale II; SSS, Zuckerman's sensation seeking scale; ZKPQ, Zuckerman-Kuhlman personality questionnaire.

TABLE 7 Outcomes and characteristics from reviewed studies examining insomnia and additional personality traits.

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
De Saint Hilaire et al., 2005	France	N = 32, (66% female) Sleep clinic outpatients meeting the ICDSD classification for chronic insomnia and N = 216 normal-sleeping controls	Diagnostic interview and polysomnography	TCI	Individuals with chronic insomnia indicated greater reports of harm avoidance and reduced self-directedness relative to controls
Freeman et al., 2010	UK	Community sample with no history of mental illness. N = 300 adults (37.7 \pm 12.5), 54% female. Clinical group, NHS outpatients reporting the presence of a current persecutory delusion, and a clinical diagnosis of schizophrenia, schizoaffective disorder or delusional disorder: N = 30 (44.2 \pm 11.7), 40% female	ISI, SLEEP-50, G-PTS, DASS	Clinical diagnosis, G-PTS	Those in the psychiatrically healthy community group evidence a significant positive relationship between insomnia symptoms and reports of paranoid thinking. This outcome may be partially mediated by depressive symptoms. The prevalence of insomnia in the clinical group 27% (n = 8) severe clinical insomnia, 27% (n = 8) clinical insomnia of moderate severity, and 30% (n = 9) subthreshold insomnia. Only 17% (n = 5) had no clinically significant insomnia
Freeman et al., 2010	UK	Data were gathered from the second British National Survey of Psychiatric Morbidity. N = 15,804 individuals aged between 16 and 74 provided complete data	CIS-R	SCID-II, PSQ	The experience of insomnia symptoms was significantly related to increased paranoia, and subscales measuring paranoid thoughts, paranoid ideation, and irritability. In contrast, a reverse dose response reduction was observed in relation to reward dependence, self-directedness, and cooperativeness
Schmidt et al. (2010)	Switzerland	N = 391 Students. 79% female. N = 350 undergraduate psychology students. N = 41 students from other faculties. No other demographics provided	ISI	UPPS	Insomnia symptoms were positively related to impulsive behaviours including urgency and sensation seeking
Na et al., 2011	South Korea	N = 101 panic disorder outpatients meeting the DSM-IV-TR criteria (41.5 \pm 10.0 years, 43% female), split by comorbid insomnia status. N = 81 panic disorder with insomnia (41.4 \pm 10.5 years); N = 20 patients without comorbid insomnia (43.5 \pm 9.9 years)	HAM-D Insomnia subscales	PDSS, TCI-RS	No differences in novelty seeking, harm avoidance, reward dependence, persistence, self-directedness, cooperativeness, or self-transcendence were observed between groups
An et al., 2012	South Korea	Recruited from sleep clinic. N = 44 primary insomnia diagnosis (54.3 \pm 12.0) 61% female; N = 37 normal-sleeping controls (51.3 \pm 6.9) 65% female	Diagnostic interview confirming group status, ISI, DBAS, HADS	TCI	Relative to normal-sleepers, the primary insomnia group displayed increased reports of harm avoidance and self-transcendence; alongside significantly lower reward dependence and cooperativeness
Lee et al. 2012	South Korea	N = 33 Primary insomnia (51.67 \pm 14.03 years), 60% female; N = 30 Primary insomnia and comorbid depression (45.05 \pm 10.72 years) 68% female; N = 30 Depression without insomnia (44.93 \pm 14.36 years), 80% female; N = 314 Healthy controls (42.54 \pm 13.94 years), 60% female	SCID-IV, ICD-10 criteria for insomnia	TCI	A significant dose response increase in harm avoidance was observed: in the increasing order of normal control, primary insomnia, MDD without insomnia, and MDD with insomnia

(Continues)

TABLE 7 (Continued)

Study	Country	Population, N, mean age \pm SD, % gender	Insomnia and control measure(s)	Personality measure(s)	Main outcome
Ruiter et al., 2012	USA	N = 84 hypnotic dependant adults (52.6 \pm 11.4 years), 76% female	ISI	SCID-II-PQ	Insomnia severity was related to increased avoidant dependant, obsessive-compulsive, schizotypal and schizoid personality traits
Polner et al., 2018	Hungary	Students participated in return for course credit. N = 182 provided complete data (22.2 \pm 4.2), 58% female	AIS, GH-12	CAQ, SO-LIFE	Increase insomnia symptoms were related to dimensions of schizotypy (unusual experiences, cognitive disorganisation, introverted anhedonia, impulsive non-conformity) and reduced rational ability and engagement
Lauriola et al., 2019	Italy	N = 300 undergraduate students: (21.38 \pm 4.02 years), 80% female	ISI	ASI-3, IUS-12, IUI-A	Insomnia symptoms were positively related to intolerance of uncertainty (IUS-12 & IUI-A)
Weitzer et al., 2021	Austria	N = 1004 adults from the general population completing the Australian Sleep Survey: (42.0 \pm 4.5), 51% female	ICSD-3	LOT-R	In those who were more optimistic, chronic insomnia risk was lower compared with those less optimistic
Cheng et al., 2020	China	N = 653 older adults (55.62 \pm 9.51 years, 45–90 years) without major mental illness. N = 323 indicating insomnia, N = 330 without insomnia	AIS	CD-RISC	The insomnia group reported greater levels of self-blame. Analysis of all participants evidenced insomnia symptoms to be negatively related to resilience, and positively associated with self-blame and acceptance
Oltmanns & Widiger, 2021	USA	Wave 1: N = 1060 (69.8 \pm 2.9), 68% female. Wave 2: N = 849 (65.8 \pm 2.9), 55% female	ISI	NEO-PI-R, FFMPD	Insomnia symptoms were related to anxious uncertainty, dysregulated anger, despondency, self-disturbance, behavioural dysregulation, disassociation, distrustfulness, and impulsiveness
Ma et al., 2020	China	N = 2626 First year medical students (18.34 \pm 0.83), 61% female	ISI	SPQ, TAS-20	Insomnia symptoms were positively related to reports of alexithymia alongside positive, negative and disorganised schizotypal traits

Abbreviations: AIS, Athens insomnia scale; BIS-II, Barratt impulsiveness scale; CD-RISC, Davidson resilience scale; CIS-R, clinical interview schedule revised; FFMPDS, five factor model personality disorder scales; GQ-6, gratitude questionnaire & ICD-10, international classification of diseases 10th Edition; ISI, insomnia severity index; IUS-12, IUI-A, = intolerance of uncertainty scale; MAAS, mindfulness attention awareness scale; NEO-PI-R, neo personality inventory revised; PDSS, panic disorder severity scale; PSQ, paranoia suspiciousness questionnaire; SCID-II-PQ, structured clinical interview for DSM-5 personality questionnaire; SCID-IV, structured clinical interview for DSM-IV axis 1 disorder; SPQ, schizotypal personality scale; TAS-20, Toronto alexithymia scale; TCI, temperament and character inventory; UPPS, impulsive behaviour scale.

narcissism in the insomnia group. However, no differences in antisocial behaviour were observed. Finally, several studies using the MMPI evidenced increased psychopathic deviance in those with insomnia when compared with normal-sleepers (Fernandez-Mendoza et al., 2011; Kales et al., 1983; Levin et al., 1984; Schneider-Helmert, 1986; Vgontzas et al., 2001).

Additional traits

Individuals meeting the diagnostic criteria for insomnia appear to report greater levels of harm avoidance relative to normal sleepers. De Saint Hilaire and colleagues (2005) determined individuals with chronic insomnia presented greater reports of harm avoidance and reduced self-directedness relative to controls. Likewise, relative to normal-sleeping controls, primary insomnia patients reported increased harm avoidance and self-transcendence alongside reduced reward dependence (An et al., 2012). Whilst Lee and colleagues evidenced increased harm avoidance amongst individuals with primary insomnia when compared with controls, this trait was significantly more prominent in those with comorbid and isolated depression (Lee et al., 2012). In contrast, when comparing panic disorder patients with and without comorbid insomnia, Na and colleagues failed to evidence differences in novelty seeking, harm avoidance, reward dependence, persistence, self-directedness, cooperativeness, or self-transcendence. In line with studies examining MMPI profiles, several additional studies yielded evidence of increased paranoia and schizotypal traits to be associated with insomnia when sampling members of the general and student populations (Freeman et al., 2010; Ma et al., 2020; Polner et al., 2018; Rüter et al., 2012). In addition, the experience of insomnia has been associated with uncooperativeness (An et al., 2012; Freeman et al., 2010; Polner et al., 2018), impulsiveness (Oltmanns & Widiger, 2021; Polner et al., 2018; Schmidt et al., 2010), intolerance of uncertainty (Lauriola et al., 2019; Oltmanns & Widiger, 2021), reduced optimism (Weitzer et al., 2021), and poor resilience (Cheng et al., 2020). See Table 7 for full study details.

Personality and treatment response

Several studies examined the potential influence of personality in predicting patient response to cognitive behavioural therapy for insomnia (CBTi). In the context of temperament and character, high reward dependence has been found to predict greater treatment response amongst insomnia patients receiving CBTi (An et al., 2012). Relatedly, in patients receiving CBTi, Johann et al. (2023) observed elevated levels of perfectionistic organisation and personal standards on completion of treatment when compared with baseline. In a sample of patients with hypnotic dependant insomnia, Petrov and colleagues (2018) examined the role of obsessive-compulsive features in predicting the response to behavioural therapy for insomnia. Here, obsessive-compulsive features (based on cluster C personality disorders) failed to predict treatment outcomes based on subjective reports of symptoms severity following

treatment and 1-year follow-up. Nevertheless, following examination of objectively observed sleep using polysomnography, those initially indicating obsessive-compulsive traits evidenced shorter sleep duration and greater sleep disruption relative to controls a year later (Lee et al., 2012). Here, traits such as obsessive-compulsiveness may predict a deterioration in sleep continuity following successful treatment for insomnia, perhaps contributing to an increased risk of relapse (Lee et al., 2012). In contrast, potentially adaptive dimensions of perfectionism (i.e. greater organisation and personal standards) alongside positive response to verbally projected sentiment and reward signals (i.e. reward dependence) predict facilitation of treatment engagement, adherence, and reduced risk of dropout (Lee et al., 2012; Johann et al., 2023).

Early work evidenced that pre-treatment MMPI scores predicted the efficacy (61% prediction accuracy) or failure (77%) of behaviour therapy for insomnia in improving sleep-onset latency and emotional stability (i.e. neuroticism) in patients with acute and chronic insomnia (Shealy et al., 1980). Interestingly, the observation of greater MMPI validity scores in acute versus chronic patients offers a novel insight regarding the developmental course of insomnia. According to the authors, the onset of insomnia activates an initial overconcern and exaggeration of symptom severity, an effect which chronologically declines with acceptance of the problem (Shealy et al., 1980). Conversely, after observing individuals with acute insomnia over the course of a month, recent work failed to show a predictive role of the five-factor traits in determining natural remission or persistence of the disorder (Ellis et al., 2021). Beyond the predisposing role of the Spielman and Glovinsky (1991) model, the latter work questions the relevance of personality once insomnia becomes a chronic condition. That said, the persistent changes in the duration of symptom presentation required for the diagnosis of acute and chronic insomnia may account for differential outcomes between studies.

DISCUSSION

The current work systematically identified studies that examined the relationship between personality and insomnia from both a diagnostic and a symptom level. The outcomes reliably showed that the experience of insomnia is associated with personality traits which are typically considered to be negative or maladaptive in nature. More specifically, the experience of insomnia appears consistently related with neuroticism, introversion, perfectionistic doubts and concerns, elevated personal standards, negative affect, social inhibition and avoidance, hysteria, hypochondriasis, psychasthenia, impulsive behaviour, anger, hostility and psychopathic tendencies, schizotypal and borderline traits, reduced conscientiousness and self-directedness, and negatively perceived perception of the self.

The role of personality from a theoretical perspective of insomnia

There are two prominent models which may help to further understand the interaction between personality and insomnia. From a

stress-diathesis approach, disorder vulnerability may be accentuated by the expression of predisposing traits that interact with significantly stressful life events to precipitate the onset of insomnia (Spielman & Glovinsky, 1991). According to Spielman and colleagues' (1987) 3-P-model, a series of predisposing, precipitating, and perpetuating factors influence the course of insomnia, personality traits such as perfectionism and neuroticism are understood to be predisposing factors that make the onset of insomnia more likely. Also underscoring the role of personal traits in their contribution to the development and maintenance of the disorder, the Lundh and Broman (2000) model integrates sleep-interfering and sleep-interpreting processes. According to the authors, physiological, emotional, and cognitive arousal, a key component of insomnia, is influenced by arousability and interpersonal relations. Here, arousal is influenced by emotional sensitivity and the (slow) pace of habituation, whereas interpersonal relations are affected by conflicts and emotional involvements.

There is evidence suggesting that personality is a predisposing and possibly an accentuating and perpetuating factor for insomnia. In particular, we observed a clear pattern of results where the experience of insomnia is mainly linked with maladaptive personality variables and traits. Studies deploying the Goldberg (1993) Big Five model consistently reported that insomnia symptoms are associated with reduced emotional stability, extraversion, conscientiousness, and to a lesser extent – agreeableness. Studies examining the role of multidimensional perfectionism found that insomnia is associated with doubts about action, concern over mistakes, and parental criticism (Akram et al., 2015, 2017, 2020; Andersson et al., 2005; Brand et al., 2015; Jansson-Fröjmark & Linton, 2007; Lundh et al., 1994; Schmidt et al., 2018; Trudel-Fitzgerald et al., 2017; Vincent & Walker, 2000). Moreover, when investigating individuals with Type-D personality, negative affect emerges as the main predictor of insomnia at the disorder level with social inhibition being also independently related to insomnia symptoms (Akram, Allen, et al., 2018; Akram, McCarty, et al., 2018; Domagalska et al., 2021; Uygur et al., 2023). Employing the MMPI to examine personality and psychopathology found that insomnia is linked to higher levels of hypochondriasis, psychasthenia, and hysteria. Furthermore, using the dark triad approach yielded mixed evidence regarding the relationship of insomnia with narcissism and antisocial personality traits (Akram, Allen, et al., 2018; Akram, McCarty, et al., 2018; Sabouri et al., 2016; Zamani Sani et al., 2023). Against this background, it can be reasonably argued that maladaptive personality traits are important for understanding the development and maintenance of insomnia.

In relation to the precipitating event and situational variability, maladaptive trait(s) may impair the ability to deploy necessary adaptation and coping skills, where favourable safeguarding approaches include increased sleep effort, extended time in bed, and elevated cognitive activity; each key factor implicated in the development and maintenance of insomnia (Espie et al., 2006; Harvey, 2002). Here, persistence of these behaviours in those with certain traits may increase the possibility of an acute bout of sleep-disturbance transitioning into insomnia. Furthermore, the nature of personality may predict the likelihood of emerging cognitive and/or behavioural factors. With that in

mind, those experiencing perfectionistic doubts and concerns, and an unrealistic level of personal standards may alter behavioural strategies to compensate for their sleep deficit and consequently aim to perfect sleep through increased sleep-efforts (i.e. increased time in bed through napping or attempting to sleep earlier than normal). This maladaptive behaviour may cause individuals to experience sleep loss during the night and deficits during daytime, which helps to fuel the vicious circle of insomnia, especially when paired with possible mediating factors including dysfunctional sleep-related cognition and pre-sleep arousal (Akram et al., 2020; Schmidt et al., 2018).

Does personality influence treatment response?

To date, outcomes concerning the insomnia-personality relationship provide important evidence that personality plays a role in the treatment of insomnia in terms of efficacy and long-term success. A randomised controlled trial showed that patients receiving CBTi presented with increased levels of perfectionistic organisation and personal standards after completion of therapy (Johann et al., 2023). Alterations of this nature may reflect the very structured nature of CBT-I where patients are instructed to strictly adhere to the agreed bedtimes and methods of stimulus control whilst receiving weekly feedback on their progress. Accordingly, future studies should examine whether such changes (i.e. elevated levels of perfectionistic organisation and personal standards) are temporary side effects of CBT-I. In the context of temperament and character, high reward dependence (i.e. positive response to verbally projected sentiment and reward signals) have also been found to predict greater treatment response amongst insomnia patients receiving CBTi (An et al., 2012).

Methodological considerations

Nevertheless, the findings of this review identified several key limitations of the literature to date. Of the studies reviewed in the current work, very few examined possible longitudinal relationships between personality and insomnia (Akram et al., 2015; Jansson-Fröjmark & Linton, 2007; Lee et al., 2012; Trudel-Fitzgerald et al., 2017; Singareddy et al., 2012). This disproportionate reliance on cross-sectional data inherently limits any tangible conclusion to be drawn in relation to cause-and-effect. Numerous studies have failed to identify the required sample size using a power analysis calculation to ensure reliability of results. In addition, substantial variation between sample populations and inclusion criteria limits the extent that each study outcome may be extrapolated to clinical or wider populations. Indeed, many studies drew upon members of the general population completing self-report measures of insomnia symptom severity. While the relationship between insomnia symptoms and personality traits may certainly provide valuable insights, generalisability to insomnia patients remains limited. Finally, age, ethnicity, and gender have not been sufficiently investigated yet. As subtle changes in personality traits are observed across the lifespan and, additional work should

examine the possible mediating role age which may influence insomnia differently in various stages of life (Costa Jr et al., 2019; Lucas & Donnellan, 2011; McCrae et al., 1999).

Moving forward, we offer suggestions for future research which may improve and expand upon the literature to date. Addressing the fundamental limitations discussed (i.e. longitudinal data, cross cultural research, adequate control variables, consideration of age and gender) should remain the priority. Whilst the current picture confirms negatively oriented traits to be typically associated with insomnia, given the lack of prospective research, the precise and most prominently predictive traits related to the onset of insomnia remains unclear. Likewise, it remains unclear whether the experience of insomnia eventually accentuates the presentation of otherwise stable traits. As such, future work should seek to provide a well-defined portrayal of directional causality. This knowledge would allow for crucial questions to be explored: could therapeutic work in relation to the most prominent traits function to curb associated behaviours which perpetuate insomnia in the face of an acute sleep disturbance? These may include traits characteristic of social withdrawal and isolation (e.g. social introversion, social inhibition, negative affect), those related to reduced structure and punctuality (e.g. conscientiousness, perfectionistic organisation, and personal standards), and related difficulties in emotion regulation and self-critical emphasis (e.g. self-disgust: Ypsilanti et al., 2018).

Between 50% and 93% of individuals with a personality disorder present at least one key feature of insomnia (Kamphuis et al., 2013; Selby, 2013; Semiz et al., 2008), whereas approximately 50% of individuals with insomnia also display key features of at least one personality disorder (Somma et al., 2018). In the former scenario, individuals seeking cognitive behavioural treatment for their personality disorder may benefit from a CBTi session. Certainly, by providing individuals with the correct information about sleep we may prevent acute sleep difficulty from transitioning into a long-term problem by preventing dysfunctional cognitions which facilitate increased behavioural efforts to sleep. Indeed, as evidenced recently, this may be achieved through a single session of CBT-I supplemented with a self-help guide (Ellis et al. 2015). Against the backdrop that personality appears to play a substantial role in insomnia and its treatment, future studies should also examine how CBT-I might be tailored to a patient's personality. More tailor-made approaches to CBT-I might help to better reach the target population, increase treatment adherence, and reduce dropout. This way it might be possible to increase treatment success and prevent relapse.

Strengths and limitations of current review

A number of strengths and limitations of the current work should be noted. To the best of the authors knowledge, this is the first review concerning the relationship between personality and insomnia since the diagnostic paradigm shift away from primary, secondary, and additional subtypes of insomnia in favour of a more

practical and causal free classification of insomnia disorder. Indeed, prior reviews of the current topic largely examined the role of personality in the identification of insomnia subtypes (Van de Laar et al., 2010). Here, target assessments for inclusion (i.e. NEO FFI, MMPI, MMPI-II, KSP, EPI, TCI, ZKPQ, F-MPS) yielded substantial degree trait overlap for greater reliability of subtype identification. Expanding upon this approach, the current work used more comprehensive search terms related to conceptualisations of personality, individual traits, and subdimensions.

Several studies were excluded from the final analysis due to the use of non-validated measures or with an exclusive focus on sleep quality rather than the experience of insomnia specific symptoms. The ongoing and problematic inclusion of sleep quality serves to convolute outcomes of reviews that specifically pertain to the experience of insomnia. Likewise, single item or bespoke in-house scales to fail to adequately capture the true extent of symptom experience, often leading to exagurated prevalence statistics and misrepresentation of the captured problem. Future work should aim to consistently use validated measures directly related to the research question. Next, whilst a comprehensive search was undertaken, the results may not be fully representative of the actual relation due to missing manuscripts. Finally, the review included only studies published in English language, and thus studies in other languages may provide different results to those reported here.

CONCLUSION

The inherent nature of personality serves as a predisposing, and possible maintaining factor of insomnia. When exploring the outcomes of $N = 76$ reviewed studies, the literature evidenced insomnia and/or the experience of insomnia symptoms to be reliably associated with negatively oriented and maladaptive personality traits. However, methodological differences limit the ability to draw causal conclusions regarding the specific traits involved in the aetiology of insomnia. In addition, our findings highlight methodological factors related to study design, sample population, and discrepant use of personality measures which may influence outcome variation. Moreover, given the absence of longitudinal data, we cannot infer causal influence on the development and maintenance of insomnia. Nevertheless, personality traits should be considered when assessing insomnia in research and in a clinical context and additional work should clarify the role of personality in predicting treatment outcomes and adherence.

AUTHOR CONTRIBUTIONS

Umair Akram: Conceptualization; methodology; data curation; investigation; writing – original draft; writing – review and editing; project administration; resources. **Jodie Stevenson C:** Investigation; data curation. **Maria Gardani:** Investigation; data curation. **Sarah Allen:** Investigation; data curation. **Anna Johann F:** Conceptualization; investigation; writing – original draft; writing – review and editing; methodology; project administration; data curation; resources.

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CONFLICT OF INTEREST STATEMENT

No conflicts of interest were declared in relation to this paper.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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