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## ARTICLE

# Associations between sleep variables and ostensibly paranormal experiences and paranormal beliefs: A scoping review

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## Abstract

Night-time is a period of great significance for many people who report paranormal experiences. However, there is limited understanding of the associations between sleep variables and seemingly paranormal experiences and/or beliefs. The aim of this review is to improve our understanding of these associations while unifying a currently fragmented literature-base into a structured, practical review. In this pre-registered scoping review, we searched for relevant studies in MEDLINE (PubMed), PsycINFO (EBSCO), Web of Science and EMBASE using terms related to sleep and ostensibly paranormal experiences and beliefs. Forty-four studies met all inclusion criteria. All were cross-sectional and most investigated sleep paralysis and/or lucid dreaming in relation to ostensibly paranormal experiences and paranormal beliefs. Overall, there were positive associations between many sleep variables (including sleep paralysis, lucid dreams, nightmares, and hypnagogic hallucinations) and ostensibly paranormal experiences and paranormal beliefs (including those of ghosts, spirits, and near-death experiences). The findings of this review have potential clinical implications such as reducing misdiagnosis and treatment development and provide foundations for further research. Our findings also highlight the importance of understanding why so many people report ‘things that go bump in the night’.

## KEYWORDS

anomalous, lucid dreaming, parasomnias, sleep disturbance, sleep paralysis, supernatural

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## BACKGROUND

Night-time is a period of great significance for many people who report paranormal experiences. Individuals have previously reported seeing ghosts, demons, ghouls and other grotesque creatures during the night (French & Stone, 2013; Wing et al., 1994). People have also reported being unable to move or speak, and strange sensations of presence in the room (French et al., 2002). Research shows that different aspects of sleep, including sleep paralysis (SP; Drinkwater et al., 2020), sleep quality (Schaffler et al., 2016) and nightmares (Young et al., 2013), may be associated with these unpleasant events. A previous systematic review found an association between paranormal beliefs and SP (Denis et al., 2018), but more research is needed due to the distressing nature of the experiences (Jalal, Sevde Eskici, et al., 2021). To better understand these occurrences, this scoping review aims to bring together the available evidence regarding the associations between ostensibly paranormal experiences, paranormal beliefs (OPEPB) and sleep variables with the hope of making this information more accessible to other researchers—with long-term consequences for healthcare providers and decision makers.

Believing in the paranormal is common, with as many as 39% of British adults between the ages 18 and 34 endorsing beliefs in ghosts, ghouls and other types of paranormal activity (Varrella, 2021). Many reporting these phenomenological events describe them as vivid sensory experiences (Luhmann et al., 2021). Evidence suggests that some of those who report ostensibly paranormal events sometimes consider themselves to have psychological difficulties (Persinger, 1993). Some seemingly paranormal occurrences can induce negative reactions such as confusion (Montanelli & Parra, 2002) and symptoms of psychopathology including anxiety and post-traumatic stress disorder (Jalal & Hinton, 2013).

Today, some ostensibly paranormal experiences (e.g. seeing a ghost or creature at night) are sometimes recognized as likely attributable to parasomnias (Waters et al., 2017). Parasomnias are described as sleep disorders that cause abnormal behaviours during sleep (Sateia, 2014), and may occur as the brain transitions in and out of sleep, or between rapid eye movement (REM) and non-REM sleep cycles (Castelnovo et al., 2018). As just one example, SP—a temporary inability to move that may occur at sleep onset or upon awakening (Santomauro & French, 2009)—is a relatively common phenomenon that results from the admixture of wakefulness and REM sleep (Singh et al., 2018). Another parasomnia, exploding head syndrome (EHS), is a phenomenon characterized by sudden, loud imagined noise or explosion-like sensations in the head as the individual is drifting off to sleep or upon awakening (Sateia, 2014). Although the cause of EHS remains unclear, one theory suggests that the ‘bang’ is likely to be caused by neuronal dysfunction in the brainstem during the transition from wakefulness to sleep (Sharpless, 2014).

Explanations for many sleep-related phenomena, including SP and EHS, have been multifactorial. For example, references to SP are scattered throughout history, and this sometimes vivid and terrifying experience has often been attributed to paranormal factors (French et al., 2002), including Kanashibari—a being bound in metal shackles—the Old Hag—a witch riding on the chest of the victim (Sharpless & Doghramji, 2015), jinn—a supernatural being that victimizes and intimidates its victims (Jalal & Hinton, 2013), and Pandafeche, which is an evil witch or terrifying humanoid cat (Jalal et al., 2015). Others believe that SP is caused by physiological risk factors such as stress and anxiety (Jalal & Hinton, 2013). Similar paranormal attributions have been applied to EHS which some experiencers believe is due to the result of ‘something supernatural’ (Sharpless et al., 2020). These findings suggest that attributing anomalous experiences to scientifically proven phenomena is relatively prevalent in society today. Other sleep variables, such as nightmares, sleep terrors, and hallucinations caused by missing out of sleep could also be interpreted within the framework of the paranormal (Drinkwater et al., 2020; Ohayon et al., 1996).

Many healthcare professionals do not counsel their patients on sleep (Grandner & Malhotra, 2015) and may therefore underestimate the potential impact that these night-time events have on their patients. It is therefore imperative to describe and synthesize the evidence concerning sleep and ostensibly paranormal variables in order to gain a global understanding of the associations. This, in turn, may stimulate further research and eventually result in clinicians being better equipped to care for and counsel patients reporting such events. Physician–patient communication has been linked to various positive outcomes (Rocque & Leanza, 2015), such as increased patient satisfaction and adherence to treatment plans (Johnson, 2019).

This scoping review aims to better our current understanding of ‘things that go bump in the night’, expose knowledge gaps, stimulate research to fill in the gaps (Munn et al., 2018) and make this knowledge easily accessible to other researchers, educators, sleep professionals and healthcare providers. Our objective is to enable an improved, comprehensive understanding of the associations between different sleep variables (not only limited to parasomnias) and OPEPB while unifying a currently fragmented literature base into a structured, practical review.

## METHODS

This pre-registered scoping review ([https://osf.io/4zuhn/?view\\_only=cf0da6c9a4824471b-0576d56a824abf3](https://osf.io/4zuhn/?view_only=cf0da6c9a4824471b-0576d56a824abf3)) was conducted in accordance with published guidelines (Levac et al., 2010; Peters et al., 2020). We followed these steps:

### Stage 1: Identifying the research question

Our research question is: what are the associations between sleep variables and ostensibly paranormal experiences and paranormal beliefs?

### Stage 2: Identifying relevant studies

We conducted a comprehensive search of the literature using the following databases: MEDLINE (PubMed), PsycINFO (EBSCO), Web of Science and EMBASE. Search terms and strings were developed by the research team in consultation with a subject librarian and tailored for each database (see [Supporting Information](#) for search strategies for all databases).

### Stage 3: Study selection

Citations retrieved through the electronic database searches were imported into Zotero (5.0.96.3) and duplicates were identified and removed. The first author (BR) and two psychology undergraduate students (EW and NA) independently screened studies based on titles and abstracts to determine if they met the inclusion criteria for full-text screening. An additional author (JJM-V) reviewed screening decisions to resolve disagreements via consensus. Studies that were retrieved for full text were further reviewed by two authors (BR and HF) and any disagreements were resolved by a third author (JJM-V) via consensus. Authors were contacted twice via email if their papers were inaccessible online. The inclusion criteria were (1) a peer-reviewed article published in English and (2) reporting on a quantitative association between sleep (subjective and/or objective) and OPEPB in humans.

We defined sleep as any sleep-related phenomena including (but not limited to) sleep restriction or deprivation, sleep quality, insomnia, nightmares, sleep terrors, SP, and EHS (Sateia, 2014). Ostensibly paranormal experiences were defined as experiences that appear to be, in the view of the individual having the experience and/or a substantial proportion of the wider population, beyond explanation in terms of currently accepted scientific concepts. Paranormal beliefs are here defined as an endorsement of the paranormal nature of such experiences (Betsch et al., 2020).

### Stage 4: Data charting process

Two authors (BR and HF) independently extracted the following data items: general data (author(s) and date, journal, study location); methodological data (study aims/objectives, study design, type of evidence,

sample characteristics); study data (sleep variable(s), measure(s) of sleep variable(s), ostensibly paranormal experiences/beliefs, measure(s) of paranormal variable(s), results).

## Stage 5: Summarizing results

The results were organized under the following categories: studies, population, concept, context, SP and OPEPB, lucid dreams and OPEPB, nightmares and OPEPB, hypnagogic hallucinations and OPEPB, sleep quality and OPEPB, dreams and OPEPB, EHS and OPEPB, other sleep variables and OPEPB. We reported the review in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis guidelines—an extension for scoping review (Tricco et al., 2018).

## Deviation from pre-registered protocol

To maintain the feasibility of the review, we decided to exclude studies concerning precognition. This is because although precognition—the ability to see into the future (French & Stone, 2013) is usually classified as a paranormal experience, it is often treated as an independent topic (Rattet & Bursik, 2001). Precognition is an umbrella term that includes several subcategories, including premonition (i.e. warning in advance) and presentiment (i.e., feeling in advance; Mossbridge & Radin, 2018), and is therefore broad enough to be investigated on its own.

## Quality assessment

In line with scoping review guidelines (Levac et al., 2010), we exclude quality assessment of individual studies. Methodological characteristics and heterogeneity of the overall evidence are considered in the discussion.

## RESULTS

Forty-four studies (reported in 44 articles) met our inclusion criteria (Figure 1). Where correlations are reported, we interpret them as negligible (0.00–0.10), weak (0.10–0.39), moderate (0.40–0.69), strong (0.70–0.89) and very strong (0.90–1.00; Schober et al., 2018).

## Included studies

Study characteristics are presented in Table 1. These included studies were all cross-sectional and published between 1982 and 2021. The studies were conducted by diverse research groups, providing an international and cross-cultural sample.

### Population

Based on the studies reporting associations between sleep and paranormal variables, data from a total of 27,130 people were reported in this review (50% male, 48% female, mean age = 33.7; range 10–98).

### Concept

Numerous sleep variables were investigated across the 44 included studies. SP was the most investigated sleep variable (18/44, 41%), followed by lucid dreams (11/44, 25%), nightmares (5/44, 11%), hypnagogic

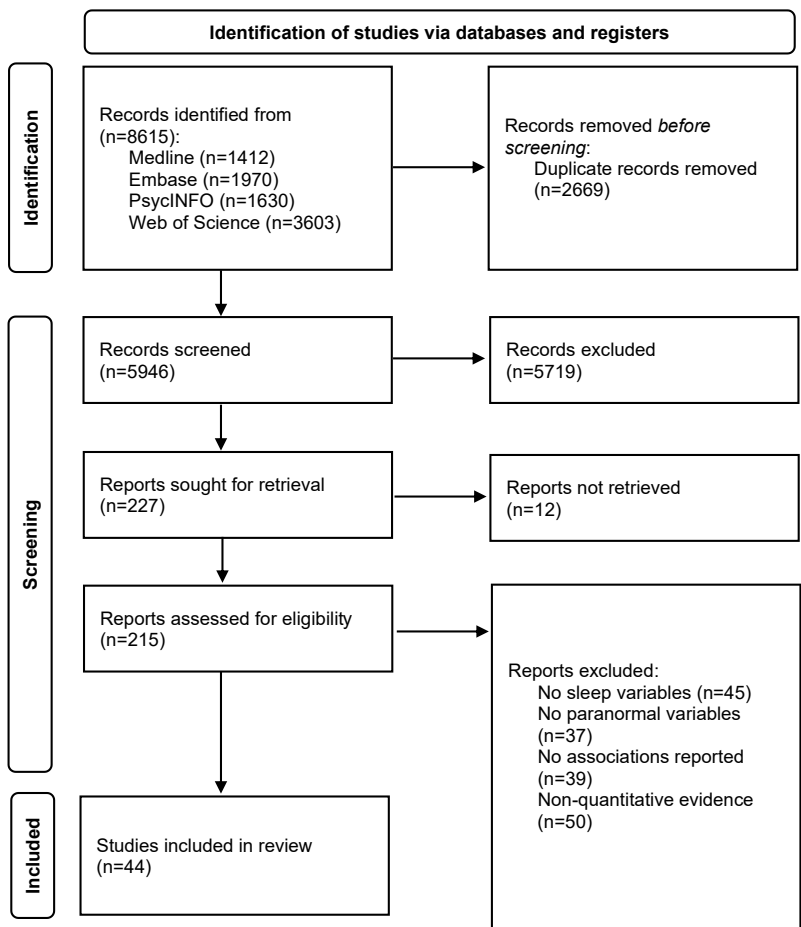


FIGURE 1 Preferred reporting items for systematic reviews and meta-analyses flow diagram of the study.

hallucinations (4/44, 9%), sleep quality (3/44, 8%) and dreams (3/44, 6%). Several studies investigated more than one sleep variable (Bastos et al., 2020; Britton & Bootzin, 2004; Cheyne et al., 1999; Drinkwater et al., 2020; Glicksohn, 1990; Sherwood, 1999; Young et al., 2013). Sleep variables and their OPEPB associations are listed in Table 2.

A wide range of OPEPB was reported (Table 1). Evil spirits, ghosts and/or creatures (14/44, 32%) were most common, followed by out-of-body experiences (OBEs; 12/44, 27%). Of the studies that reported evil spirits, ghosts and creatures, five included other definitions of what would be translated to evil spirits/creatures in the English language such as attacks by the Pandafeche (an evil witch or terrifying humanoid cat), Jinn (supernatural being intimidating its victims), Dab tsog (frightening night-spirit) and Karabasan (spirit-like creature).

Sleep measures ranged from single items to well-validated and reliable survey scales to polysomnograms. Most studies used validated and reliable measures of paranormal experiences/beliefs. Self-designed questionnaires were also used.

## Context

The studies took place in various contextual settings, including universities (12/44, 27%), online (5/44, 11%), psychiatric/mental health clinics (4/44, 9%) and conferences (1/44, 2%).

**TABLE 1** Overview characteristics of included studies ( $N=44$ ).

Study	Population	<i>N</i> (% female)	Mean ( <i>SD</i> , age range)	Sleep variable (measure type/name of the number of items)	Paranormal variable (measure type/name or number of items)	Location
Alvarado (1998)	Graduate psychology students	nr	nr	Sleepwalking (1 item)	Parapsychological experiences (5 items)	Puerto Rico
Alvarado and Zingrone (2007)	Ibero-American readers (majority Spanish) of a popular publication on paranormal topics	492 (68.0)	nr	LD (2 items)	OBEs (7 items)	US
Bastos et al. (2020)	Medium group vs. control group	32 (100.0)	53.3	Subjective sleep quality, Sleep latency, Sleep duration, Sleep efficiency and Sleep disturbance (PSQI)	Psychophonic mediumship, that is speaking under the influence of spirits (questionnaire)	Brazil
Blackmore (1982)	Students undertaking a parapsychology course	157 (nr)	nr	LD (questionnaire)	OBEs (questionnaire)	UK
Blackmore (1983)	Most were members of psychology and parapsychology adult education classes	234 (68.0)	35.3	LD (7 items)	OBEs (2 items)	UK
Blackmore (1984)	Randomly selected people from the Bristol Electoral Register	321 (52.9)	44.6 (18–87)	LD (questionnaire)	OBEs (questionnaire)	UK
Blackmore (1986)	People who attended parapsychology conferences	97 (35.1)	46.7 (17.1)	LD (questionnaire)	OBEs (questionnaire)	UK
Britton and Bootzin (2004)	Individuals reporting experiencing NDEs during life-threatening events vs. controls	43 (69.8)	53.0 (25–71)	Sleep duration, REM sleep latency (Polysomnography)	NDEs (DES)	US
Cheyne and Girard (2009)	Worldwide population (majority in the US)	11,385 (37.0)	29.2 (10.1)	SP (WUSEQ)	OBEs	International
De Foe et al. (2013)	Participants recruited via university social media and online psychology newsletters	370 (57.0)	37 (18–65)	Sleep onset (nr)	OBEs (multiple questions about OBEs)	Australia
Denis and Poerio (2017)	Participants were invited to take part through university mailing listing and on SP and LD websites/forums	1928 (53.0)	34.2 (13.6; 18–82)	SP (WQ), LD (1 item), Sleep quality (SCI)	Paranormal beliefs (PBS)	UK

TABLE 1 (Continued)

Study	Population	N (% female)	Mean (SD, age range)	Sleep variable (measure type/name of the number of items)	Paranormal variable (measure type/name or number of items)	Location
Drinkwater et al. (2020)	UK-based online sample	455 (75.8)	34.5 (15.7)	Nightmares, SP, Lucid dreams (2 items for nightmares, 1 item for SP, 4 items for LD)	Paranormal beliefs and Paranormal experiences (MMU-N and a series of items)	UK
French et al. (2008)	People who had claimed to have had extra-terrestrial contact vs. control group	19 (58.0)	45 (13.7; 23–72)	SP (NEC)	Contact with Aliens (AEI)	UK
Fukuda et al. (1987)	College students	635 (39.0)	19.6 (18–26)	SP (questionnaire) referred to as Kanashibari	Spirits (questionnaire)	Japan
Glicksohn and Barrett (2003)	Mainly undergraduates	656 (64.0)	Median = 23 (13–78)	LD (SEQ)	OBEs (SEQ)	Israel
Glicksohn (1990)	Students undertaking introductory psychology courses at a University	72 (40.0)	nr (20–47)	LD and Hypnagogic imagery (10-item questionnaire)	Subjective paranormal experience (10 items)	Israel
Hinton et al. (2005)	Psychiatric population of Cambodian refugees	42 (68.0)	49.1 (5.3)	SP (SP frequency questionnaire)	Soul scared from body, fatal spirit attack (SP-CCQ)	US
Hinton et al. (2009)	Cambodian refugees attending a psychiatric clinic	100 (60.0)	47.2 (6.2)	Nightmares (1 item from SCID)	Soul dislocation	US
Hinton et al. (2013)	Treatment-seeking Cambodian refugees	100 (65.0)	54.2 (7.5)	Dreams (The Dream Frequency Scales)	Visitations	US
Hinton et al. (2020)	Cambodian refugees	70 (60.0)	nr	Dreams (nr)	Ghost (1 item)	US
Jalal et al. (2014)	(1) Egyptian nationals (2) Egyptian students at the American Uni of Cairo	(1) 89 (34.0) (2) 44 (68.0)	(1) 28.2 (8.6; 18–67) (2) 29 (1.5; 18–24)	SP (questionnaire)	(1) Jinn/Shaitan assault (2) Jinn assault	Egypt
Jalal et al. (2015)	Italian nationals	68 (49.0)	41 (17.9; 20–81)	SP (SP-EPQ)	Pandafeche	Italy
Jalal, Romanelli, and Hinton (2021)	General population in Italy	67 (49.0)	41.2 (17.9; 20–81)	SP (SP-EPQ)	Pandafeche	Italy
Jalal, Sevdı Eskici, et al. (2021)	Turkish undergraduate students with at least one SP episode	59 (75.0)	23.2 (2.9; 20–37)	SP (SP-EPQ)	Karabasan attack	Turkey

(Continues)



TABLE 1 (Continued)

Study	Population	N (% female)	Mean (SD, age range)	Sleep variable (measure type/name of the number of items)	Paranormal variable (measure type/name or number of items)	Location
Kondziella et al. (2019)	Lay people from 35 different countries	1034 (59.0)	32.7 (11.3)	REM sleep intrusion (4 items)	NDEs (Greyson NDE scale)	International
Kunzendorf et al. (2007)	Students taking General Psychology	160 (44.4)	18.8 (1.5; 18–28)	Dreams	Visitations by the deceased (Dream visitation survey)	US
Levitan et al. (1999)	Undergraduate students in an introductory psychology course and readers of the NightLight	604 (45.0)	30	LD (questionnaire with 12 different frequency levels for LD)	OBEs (questionnaire with 12 different frequency levels for OBEs)	US
McNally and Clancy (2005)	1. People with continuous memories of childhood sexual abuse vs. control group 2. People reporting alien abduction	36 (77.8) 10 (60.0)	39.7 (10.2) nr	SP (Sleep Experiences Questionnaire) SP (Sleep Experiences Questionnaire)	Ghost (The Absorption Scale) Aliens	US US
Nelson et al. (2006)	North American volunteers with NDEs vs. control	110 (65.0)	54.2 (31–76)	Rem intrusion	NDEs (Greyson criteria)	US
Ohaeri et al. (2004)	Members of the general population of a university town	110 (55.5)	30.9 (10.5; 18–62)	SP (24-item SP questionnaire)	Supernatural (witches/spiritual attack/evil spirit)	Nigeria
Oluwole (2010)	Participants were recruited from a Hall of Residence in a large University	276 (41.7)	25 (3; 19–35)	Sleep (a 29-item background questionnaire)	Aliens (incidence questionnaire)	Nigeria
Raduga et al. (2020)	People on the streets of Moscow	974 (54.0)	29 (15; 10–87)	SP (Live survey)	OBEs	Russia
Ramsawh et al. (2008)	African American/Afro-Caribbean individuals	36 (73.6)	24.9 (9.1)	ISP (The ISP questionnaire)	Ghost/evil spirit (nr)	US
Schaffler et al. (2016)	Vodou practitioners with or without spirit possession	85 (55.0)	35.9 (11.6)	Sleep quality (1 item from SDQ-5)	Spirit possession (SPQ-DR)	Dominican Republic
Sharpless and Kliková (2019)	People with at least one SP episode	513 (67.6)	19.7	ISP (expanded FISPI)	Ghost, Spirit (expanded FISPI)	US
Sharpless et al. (2020)	People reporting at least one EHS episode	3286 (66.0)	47 (15.3; 18–89)	EHS (EHSI)	‘Something supernatural’	International (mainly UK)
Sherwood (1999)	Users of the WWW computer network	108 (64.0)	30.3 (11.4; 18–71)	EHS, LD, Sleep terrors, Nightmares, REM sleep behaviour disorder, Hypnagogic and Hypnopompic imagery (questionnaire)	Anomalous experiences (questionnaire)	International

TABLE 1 (Continued)

Study	Population	N (% female)	Mean (SD, age range)	Sleep variable (measure type/name of the number of items)	Paranormal variable (measure type/name or number of items)	Location
Spanos et al. (1993)	UFO reporters	49 (28.6)	37.2 (11.7)	Sleep-related (nr)	UFO (semi-structured interview)	Canada
Spanos et al. (1995)	Psychology students with SP vs. control group	190 (61.0)	nr	SP (questionnaire)	OBEs (4-point likert-type scale)	Canada
Terhune (2009)	Participants were recruited through postings on public pages of WWW sites for a study on “unusual experiences”	420 (81.0)	32.1 (11.5; 18–76)	Hypnagogia (ISES)	OBEs (1 item)	International (most residing in the US)
Thaibourne and Delin (1999)	Predominately university students	116 (62.9)	25.5 (10.6)	Nightmares (1 item)	Paranormal beliefs (MEQ)	Australia
Wing et al. (1994)	Chinese students in Hong Kong	603 (42.0)	20.6 (1.2; 17–32)	SP (16 items – SP and Ghost oppression used interchangeably)	Ghost oppression (16 items)	China
Wing et al. (1999)	Chinese elderly	158 (58.0)	80.3 (6.5; 70–98)	SP (questionnaire – SP and Ghost oppression used interchangeably)	Ghost oppression (questionnaire)	China
Young et al. (2013)	Hmong immigrants	747 (38.0)	40 (13; 18–86)	SP, hypnagogic hallucinations, nightmares, difficulty getting to sleep, restless sleep, weak knees, sleep apnoea (a semi-qualitative scale; polysomnogram for sleep apnoea)	Dab tsog (multiple questions)	US

*Note:* All included studies were cross-sectional. Age indices (e.g. means, standard deviation and/or age range) were not reported in nine studies.

Abbreviations: AEI, anomalous experiences inventory; DES, dissociative experiences scale; EHS, exploding head syndrome; EHSI, exploding head syndrome interview; FISPI, fearful isolated sleep paralysis interview; ISES, Iowa sleep experiences survey. Information about sleep and paranormal questionnaires is presented where available; ISP, isolated sleep paralysis; LD, lucid dream; MEQ, the mystical experience questionnaire; MMU-N, Manchester metropolitan university new; NDEs, near-death experiences; NEC, nocturnal experiences questionnaire; nr, not reported; OBEs, out-of-body experiences; PBS, paranormal belief scale; PSQI, Pittsburgh sleep quality index; SCI, sleep condition indicator; SCID, structured clinical interview for DSM disorders; SDQ-5, somatoform dissociation questionnaire; SEQ, the subjective experience questionnaire; SP, sleep paralysis; SP, standard deviation; SP-CCQ, sleep paralysis catastrophic cognitions questionnaire; SP-EPQ, sleep paralysis experiences and phenomenology; SPQ-DR, spirit possession questionnaire-Dominican republic; uni, university; WQ, Waterloo usual sleep experiences questionnaire-VIIa; WUSEQ, Waterloo unusual sleep experiences questionnaire.

**TABLE 2** Results of included studies ( $N = 44$ ).

Associated OPEPB	Study results <sup>a</sup>
Section A: Studies of (Isolated) Sleep Paralysis	
Ghost/(evil) spirit/witch/soul-related	<p>356 (56%) of 635 ps answered 'yes' or 'perhaps yes' to a relationship between Kanashibari and spirits (Fukuda et al., 1987)</p> <p>39 (93%) of 42ps believed that their SP was the 'soul scared from the body', and 38 (91%) of 42ps believed that their SP was due to a fatal spirit attack (Hinton et al., 2005)</p> <p>43 (48%) and 20 (22%) of 89 ps from the general population in Egypt believed that their SP was caused by Jinn or Shaitan, respectively (Jalal et al., 2014)</p> <p>5 (11%) of 44 students in Cairo believed that their SP was caused by the Jinn (Jalal et al., 2014)</p> <p>26 (38%) of 68ps reported that their SP was possibly due to pandafeche (Jalal et al., 2015)</p> <p>4 (6%) of ps with SP called it the 'pandafeche attack' (Jalal, Romanelli, &amp; Hinton, 2021)</p> <p>10 (17%) of 59ps believed that their SP was possibly caused by the Karabasan (Jalal, Sevde Eskici, et al., 2021)</p> <p>5 (29.4) of 17ps thought that their SP was caused by a ghost (McNally &amp; Clancy, 2005)</p> <p>43 (39%) of 110 ps believed that their ISP had supernatural causation (Ohaeri et al., 2004)</p> <p>2 (5.6%) of 36ps believed that their ISP was caused by a ghost/evil spirit (Ramsawh et al., 2008) 8 (4.2%) of 191 ps with ISP attributed their episode to a ghost/spirit (Sharpless &amp; Kliková, 2019)</p> <p>Non-SP (vs. SP group) group were more likely to believe that SP represented ghost possession (<math>\chi^2 = 11.52, p &lt; .003</math>; Wing et al., 1994)</p> <p>Ps with SP (vs. non-SP) were more likely to believe that SP might be related to ghost oppression (<math>\chi^2 = 5.11, p = .04</math>, Fisher's exact test; Wing et al., 1999)</p> <p>Ps who reported experiencing dab tsog (vs. those who did not) were more likely to experience SP (OR = 3.01, <math>p &lt; .001</math>; Young et al., 2013)</p>
OBEs	<p>Ps with SP (vs. non-SP) often experienced OBEs more regularly (<math>\chi^2[25, N = 974] = 44.65, p = .009</math>; Raduga et al., 2020)</p> <p>4440 (39%) of 11,385ps with SP reported OBEs (Cheyne &amp; Girard, 2009) SP ps (<math>M = .19, SD = .39</math>) scored higher on OBEs than controls (<math>M = .08, SD = .27</math>), <math>p &lt; .01</math> (Spanos et al., 1995)</p>
Unspecified PB/PE	<p>SP and paranormal beliefs correlated positively (<math>r = .06, p &lt; .05</math>; Denis &amp; Poerio, 2017)</p> <p>Paranormal beliefs (<math>r = .09, p &lt; .05, N = 453</math>) and paranormal experiences (<math>r = .18, p &lt; .01, N = 453</math>) correlated positively with SP (Drinkwater et al., 2020)</p>
Alien	<p>Ps who reported memories of alien contact (vs. control) had a higher self-reported incidence of SP (<math>U = 83, p = .002, N = 35</math>; French et al., 2008)</p> <p>10 (100%) of 10ps who reported alien abduction also reported episodes of SP (McNally &amp; Clancy, 2005)</p>
Section B: Studies of Lucid Dreams	
Unspecified PB/PE	<p>Lucid dream frequency correlated with paranormal beliefs (<math>r = .13, p &lt; .01</math>; Denis &amp; Poerio, 2017)</p> <p>Paranormal experiences correlated with lucid dreams (<math>N = 453, r = .11, p &lt; .05</math>; Drinkwater et al., 2020)</p> <p>Paranormal experiences correlated with lucid dreams (<math>r = .28, p &lt; .05</math>; Glicksohn, 1990)</p> <p>Paranormal experiences correlated with lucid dreams (<math>r = .27, p &lt; .01</math>; Sherwood, 1999)</p>

TABLE 2 (Continued)

Associated OPEPB	Study results <sup>a</sup>
OBEs	<p>Significant positive correlation between lucid dreams and OBEs (<math>r = .33, p &lt; .001</math>; Alvarado &amp; Zingrone, 2007)</p> <p>Significant relationship between OBEs and lucid dreams (<math>\chi^2[2, N = 157] = 6.72, p &lt; .01</math>; Blackmore, 1982)</p> <p>Significant relationship between lucid dreams and OBEs (<math>\chi^2 = 1, df = 1, p = .008, r = .19</math>; Blackmore, 1983)</p> <p>Those reporting OBEs (vs. non-OBEs) also tended to report more lucid dreams (<math>\chi^2[1] = 10.0, p = .002</math>; Blackmore, 1984)</p> <p>Significant relationship between OBEs and lucid dreams (<math>\chi^2[1, N = 196] = 4.4, p &lt; .05</math>; Blackmore, 1986)</p> <p>Lucid dreams correlated with OBE frequency (<math>r = .18, t = 4.34, p &lt; .0001</math>; Levitan &amp; DeGracia, 1999)</p>
Section C: Studies of Nightmares	
Ghost/(evil) spirit/witch/soul-related	<p>82 (82%) of 100 ps who reported having nightmares in the previous month believed that their nightmares were caused by soul dislocation (Hinton et al., 2009)</p> <p>Increased odds of nightmares in those reporting dab tsog (vs. no dab tsog; OR = 4.07, <math>p &lt; .001</math>; Young et al., 2013)</p>
Unspecified PB/PE	<p>Paranormal beliefs (<math>N = 453, r = .18, p &lt; .01</math>) and paranormal experiences (<math>N = 453, r = .12, p &lt; .05</math>) correlated positively with nightmares (Drinkwater et al., 2020)</p> <p>Positive correlation between paranormal experiences and nightmares (<math>r = .28, p &lt; .01</math>; Sherwood, 1999)</p> <p>Paranormal beliefs and frequency of nightmares correlated positively (<math>r = .19, p &lt; .05</math>; Thaibourne &amp; Delin, 1999)</p>
Section D: Studies of Hypnagogic Hallucinations (HHs)	
Ghost/(evil) spirit/witch/soul-related	<p>Increased odds of HHs in those reporting dab tsog (vs. no dab tsog; OR = 3.69, <math>p &lt; .001</math>; Young et al., 2013)</p>
Unspecified PB/PE	<p>Negative correlation between paranormal experiences and HHs (<math>r = -.22, p &lt; .05</math>; Glicksohn, 1990)</p> <p>Positive correlation between paranormal experiences and HHs (<math>r = .39, p &lt; .001</math>; Sherwood, 1999)</p>
OBEs	<p>Ps reporting OBEs (vs. non-OBEs) yielded higher HHs scores (<math>F = 14.76, p &lt; .001, n_2p = .04</math>; Terhune, 2009)</p>
Section E: Studies of Sleep Quality (SQ)	
Ghost/(evil) spirit/witch/soul-related	<p>Ps reporting spirit possession (vs. ps with no spirit possession) scored lower on SQ (<math>p &lt; .05</math>, effect size .08; Schaffler et al., 2016)</p>
Unspecified PB/PE	<p>No significant correlation between SQ and paranormal beliefs (<math>r = -.01, p &gt; .05</math>; Denis &amp; Poerio, 2017)</p>
Mediumship	<p>No significant differences in SQ between mediums and controls (Bastos et al., 2020)</p>
Section F: Studies of Dreams	
Ghost/(evil) spirit/witch/soul-related	<p>42 (60%) of 70 ps had dreams about being chased by a ghost (Hinton et al., 2020)</p>
Dream visitations	<p>62 (62%) of 100 reported visitations in their dreams (Hinton et al., 2013)</p> <p>94 (59%) of 160 ps believed that the deceased can visit us in dream (Kunzendorf et al., 2007)</p>
Section G: Studies of Exploding Head Syndrome (EHS)	
Unspecified PB/PE	<p>92 (3%) of 3286 ps believed that the aetiology of EHS was ‘something supernatural’ (Sharpless et al., 2020)</p> <p>Positive correlation between paranormal experiences and EHS (<math>r = .35, p &lt; .001</math>; Sherwood, 1999)</p>
Section H: Studies of REM sleep intrusion	

(Continues)

TABLE 2 (Continued)

Associated OPEPB	Study results <sup>a</sup>
NDEs	Ps with REM sleep intrusion (vs. ps without) were more likely to exhibit NDEs (OR 2.85, $p < .001$ ; 95% CI [1.68–4.88]; Kondziella et al., 2019) Ps with NDEs ( $n = 33$ , 60%) reported greater REM intrusion than matched control ( $n = 13$ , 24%), $p < .001$ (Nelson et al., 2006)
Section I: Studies of other sleep variables (including hypnopompic imagery, sleep apnoea and sleepwalking)	
Ghost/(evil) spirit/witch/soul-related	Increased odds of restless sleep (OR = 1.46, $p < .05$ ), and sleep (OR = 4.17, $p < .001$ ) and excessive daytime sleepiness (OR = 3.18, $p < .001$ ) in ps reporting dab tsog vs. ps not reporting dab tsog (Young et al., 2013)
Unspecified PB/PE	Sleepwalkers are more likely to have parapsychological experiences than non-sleepwalkers ( $M = 2.60$ vs. $M = 1.94$ , respectively), $t(117) = 1.70$ , $p < .05$ , $r = .25$ (Alvarado, 1998) Positive correlation between paranormal experiences and hypnopompic imagery ( $r = .26$ , $p < .001$ ), sleep terrors ( $r = .31$ , $p < .01$ ) and REM sleep behaviour disorder ( $r = .25$ , $p < .05$ ; Sherwood, 1999)
NDEs	REM sleep latency longer for NDE group ( $M = 109.1$ min, $SD = 53.0$ ) than control ( $M = 77.3$ min, $SD = 27.9$ ), $p < .05$ . Shorter sleep duration in NDE group ( $M = 355.6$ min, $SD = 85.3$ ) than control ( $M = 404$ min, $SD = 63.3$ ), $p < .05$ (Britton & Bootzin, 2004)
Aliens	7 (4.3) of 163 ps reported the presence of aliens in the room in relation to night sleep (Oluwole, 2010) UFO-intense ps (e.g. seeing/communicating with aliens) reported that their experiences were sleep related significantly more often than did non-intense UFO ps (e.g. seeing lights; $\chi^2[1, N = 18] = 7.38$ ), $p < .01$ (Spanos et al., 1993)
Mediumship	No significant differences in sleep latency, sleep duration, sleep efficiency and sleep disturbance between mediums and controls (Bastos et al., 2020)

Note. OPEPB, ostensibly paranormal experiences and paranormal beliefs; The studies reported on the associations between sleep and paranormal variables using a wide range of methods of analysis including frequencies, chi-square, t tests and so on. Ps, participants; SP, sleep paralysis; ISP, isolated sleep paralysis; M, mean; SD, standard deviation; OR, odds ratio; Pandafeche = evil witch/ghost-like spirit; Jinn = a certain type of spirit in Islam; Shaitan = evil spirit in Islam; Dab tsog = Hmong word for evil spirit; Karabasan = spirit-like creature rooted in Turkish folk tradition; Kanashibari = Japanese term for sleep paralysis; U = Mann–Whitney U test; OBEs, out-of-body experiences; NDEs, near-death experiences; Unspecified PB/PE, unspecified paranormal beliefs and paranormal experiences. The number of participants included in each analysis is reported where available.

<sup>a</sup>Results appear in alphabetical order in each category.

## SP and OPEPB

The associations between SP and OPEPB ( $n = 19/44$ ) are shown in Table 2.

### SP, ghosts, spirits, witches, souls and visitations

In total, 13 studies reported on the associations between SP and different creatures, visitations and soul-related phenomena, of which 10 reported solely frequencies (Fukuda et al., 1987; Hinton et al., 2005; Jalal et al., 2014, 2015; Jalal, Romanelli, & Hinton, 2021; Jalal, Sevde Eskici, et al., 2021; McNally & Clancy, 2005; Ohaeri et al., 2004; Ramsawh et al., 2008; Sharpless & Kliková, 2019), ranging from 6 to 93% with the lowest frequencies reported in the general population in Italy (Jalal, Romanelli, & Hinton, 2021) and highest reported in a psychiatric refugee population (Hinton et al., 2005).

The remaining three studies (Wing et al., 1994, 1999; Young et al., 2013) were comparative. Two of these three studies yielded mixed results regarding SP and ghost oppression (i.e. the belief that one is being oppressed by a ghost at night and paralysed) in an SP and non-SP group. One found that those reporting having experienced SP (vs. non-SP) were significantly more likely to believe that SP represented ghost oppression (Wing et al., 1994). The results of the other study suggested that those reporting SP (vs.

non-SP) were significantly less likely to believe episodes were due to ghost oppression (Wing et al., 1999). The third study found that people reporting experiencing the nocturnal pressing spirit dab tsog (vs. those who did not) were significantly more likely to experience SP (Young et al., 2013).

## SP and out-of-body experiences (OBEs)

OBEs in relation to SP were reported in three studies. One study found that 39% of the participants who reported SP also reported having experienced OBEs (Cheyne & Girard, 2009). The other two studies used comparative analysis in which both revealed that OBEs were significantly more common in the SP group compared to a non-SP group (Raduga et al., 2020; Spanos et al., 1995). Together, these three studies suggest that there is a positive association between SP and OBEs.

## SP and aliens

Two studies reported an association between SP and contact with aliens. One study found that all 10 participants who reported alien abduction also reported episodes of SP (McNally & Clancy, 2005). Similarly, in a comparative analysis, SP was reported significantly more frequently in people reporting contact with aliens in comparison to an age- and gender-matched control group (French et al., 2008). Based on these two studies, there seems to be an association between experiencing SP and reporting alien contact.

## SP, paranormal beliefs and experiences

Associations between SP and unspecified paranormal beliefs and experiences were identified in two studies. The studies found that the frequency of SP episodes had significantly weak positive correlation with belief in the paranormal (Denis & Poerio, 2017; Drinkwater et al., 2020) and paranormal experiences (Drinkwater et al., 2020).

These studies together show that [unspecified] paranormal beliefs and experiences are weakly positively associated with SP.

## Lucid dreams and OPEPB

### Lucid dreams and OBEs

Associations between lucid dreams and ostensibly paranormal experiences and paranormal beliefs are shown in Table 2. Significant positive correlations between lucid dreams and OBEs were found in all the seven studies that reported on these associations. Five of seven studies were of comparative nature and found that those who reported (vs. not reported) OBEs were more likely to also report lucid dreams (Blackmore, 1982, 1983, 1984, 1986; Glicksohn & Barrett, 2003). These five studies primarily included students as their participants, and together suggest an association between OBEs and lucid dreams. Two additional studies also found weak significant positive correlations between lucid dreams and OBEs (Alvarado & Zingrone, 2007; Levitan & DeGracia, 1999).

### Lucid dreams, paranormal beliefs and experiences

Three correlational studies investigated lucid dreams and unspecified paranormal experiences and found positive weak significant correlations (Drinkwater et al., 2020; Glicksohn, 1990; Sherwood, 1999). Another

study found a weak significant positive correlation between lucid dreams and paranormal beliefs, although the correlation was not significant in multiple regression when several psychological and physiological factors were added (Denis & Poerio, 2017). Overall, there seems to be a weak positive association between experiencing lucid dreams and endorsing paranormal beliefs and experiences.

## Nightmares and OPEPB

### Nightmares and soul-related beliefs, dab tsog and paranormal beliefs and experiences

Five studies reported on the associations between nightmares and OPEPB. A comparative study found that those reporting dab tsog reported significantly increased odds of nightmares compared to those who did not report dab tsog (Young et al., 2013). Another study found that 82 of 100 participants who reported experiencing nightmares in the previous month believed that their nightmares were causing soul dislocation (i.e. the soul being displaced from the body; Hinton et al., 2009). Three correlational studies found statistically significant positive weak correlations between nightmares and unspecified paranormal beliefs (Drinkwater et al., 2020; Thaibourne & Delin, 1999) and paranormal experiences (Drinkwater et al., 2020; Sherwood, 1999). Together the studies show that nightmares and OPEPB (e.g. evil spirits, soul dislocation) are positively associated.

## Hypnagogic hallucinations and OPEPB

Four studies reported on the associations between hypnagogic hallucinations and OPEPB. Two comparative studies found that hypnagogic hallucinations were significantly more common in the dab tsog group (vs. no-dab tsog group; Young et al., 2013) and in those reporting OBEs (vs. non-OBEs; Terhune, 2009). The remaining two correlational studies reported on the associations between hypnagogic hallucinations and unspecified paranormal experiences. One study found a weak-to-moderate significant positive association between the two (Sherwood, 1999), whereas the other study found a weak negatively significant correlation between hypnagogic hallucinations and paranormal experiences, suggesting that greater hypnagogic hallucinations were associated with fewer paranormal experiences (Glicksohn, 1990). Despite the mixed findings, overall, hypnagogic hallucinations and OPEPB generally appear to be positively associated (shown in three out of four studies).

## Sleep quality and OPEPB

Associations between sleep quality and OPEPB show mixed results, with two studies finding no association (Bastos et al., 2020; Denis & Poerio, 2017). Only one study found a significant association between sleep quality and OPEPBs, showing that people who reported experiencing spirit possession also reported poorer sleep quality compared to those who did not experience spirit possession (Schaffler et al., 2016).

## Dreams and OPEPB

Frequency analysis reporting on the associations between dreams and OPEPB (Table 2) was identified in three papers. Specifically, two studies found that most of their participants (Cambodian refugees and psychology students; 62% and 59% respectively) believed that they were being visited by a deceased relative in their dreams (Hinton et al., 2013; Kunzendorf et al., 2007). Another study found that the majority of participants (60%) reported being visited by a ghost (Hinton et al., 2020). These findings indicate that the most common paranormal belief in relation to dreams is visitations.



## EHS and OPEPB

One study found a significant positive correlation between the incidence of adult anomalous experiences and the incidence of exploding head syndrome (Sherwood, 1999). Similarly, a more recent study found that a small proportion of participants (2.8%) believed that the aetiology of EHS was 'something supernatural' (Sharpless et al., 2020).

## Other sleep variables and OPEPB

### REM sleep and OPEPB

Four studies looked at the associations between different REM-related sleep variables and OPEPB, and all found significant associations. Specifically, one study using polysomnography found that people reporting near-death experiences had longer REM sleep latencies than the age and gender-matched control group (Britton & Bootzin, 2004). Another study found that persons reporting near-death experiences reported significantly greater total REM intrusion (i.e. going into REM sleep in the non-REM sleep cycle) on one or more elements (i.e. visual, auditory, SP or cataplexy) compared to a matched control group (Nelson et al., 2006). This was also found in a bigger, international study showing that people with REM intrusion (vs. those without) were more likely to report near-death experiences (Kondziella et al., 2019). Lastly, one study reported a weak significant positive correlation between REM sleep behaviour disorder (assessed using a self-reported questionnaire item) and adult anomalous experiences (Sherwood, 1999). All four studies suggest that REM sleep-related phenomena are associated with OPEPB, especially reports of near-death experiences, which is confirmed with both objective and subjective measures.

### Sleep onset latency, efficiency, duration, disturbances and OPEPB

Overall, the evidence on the associations between sleep onset latency, sleep efficiency, sleep duration, sleep disturbances and OPEPB is mixed. One comparative study noted a statistically significant association between experiencing a sensation of floating prior to sleep (experienced during sleep onset) and having an OBE (De Foe et al., 2013). Another study found no associations between sleep onset latency and mediums (reports of speaking under the influence of spirits; Bastos et al., 2020).

Two studies investigated sleep duration and OPEPB in which one found no associations between sleep duration and mediums (vs. control; Bastos et al., 2020). The other study found that persons who had experienced near-death experiences slept about an hour less than an age and gender-matched control group (Britton & Bootzin, 2004). No associations were found between sleep disturbance and sleep efficiency and mediumship (medium vs. non-medium controls; Bastos et al., 2020), which may be due to the small sample size.

### Restless sleep, sleep apnoea and dab tsog

One study found that those reporting restless sleep were significantly more likely to report experiences of dab tsog (Young et al., 2013). The same study found a significant association between symptoms of sleep apnea and dab tsog. More specifically, the frequency of breathing pauses and excessive daytime sleepiness were strongly associated with experiences of dab tsog (Young et al., 2013).

### Sleep terrors, hypnopompic imagery, sleepwalking and OPEPB

One study found a significant positive correlation between adult anomalous experiences and sleep terrors as well as hypnopompic imagery (i.e. hallucinations occurring upon awakening; Sherwood, 1999). Another



study investigated sleepwalking and parapsychological experiences (including OBEs) and found that those who replied affirmatively to a single question about somnambulism (sleepwalking) reported higher parapsychological experiences compared to those who replied negatively (Alvarado, 1998).

## Sleep and UFO experiences

Two studies reported on the association between sleep and UFO experiences (Oluwole, 2010; Spanos et al., 1993), of which one showed that people reporting UFO-intense experiences (i.e. those who reported seeing and communicating with aliens and missing time) reported that their experiences were sleep-related significantly more often than participants who reported non-intense UFO experiences (i.e. seeing lights and shapes in the sky; Spanos et al., 1993). The other study reported frequencies and found that 4.3% of participants experienced the presence of aliens in the room during night sleep (in the absence of SP; Oluwole, 2010). Based on these findings, some extra-terrestrial experiences could be connected to sleep.

## DISCUSSION

In this scoping review, we identified 44 studies concerning the associations between different sleep variables and ostensibly paranormal experiences and paranormal beliefs. Overall, the literature suggests positive associations between various sleep and paranormal variables. We found that the most investigated sleep variables were SP, lucid dreams, nightmares, REM sleep-related phenomena and hypnagogic hallucinations. The most commonly investigated OPEPB were OBEs, and reports of ghosts, and spirits. Specifically, SP was positively associated with a variety of OPEPB, most commonly the belief that it is caused by a ghost/evil witch or spirits. Lucid dreams were mostly researched in relation to OBEs, followed by unspecified paranormal experiences and beliefs, which all revealed positive associations. Similarly, nightmares were positively associated with spirits, soul-related phenomena and unspecified paranormal beliefs and experiences. Near-death experiences were positively associated with REM sleep-related phenomena (e.g. REM intrusion, REM sleep periods). These patterns were generally consistent across different countries, cultures and ethnicities.

Although the majority of studies identified associations between sleep and paranormal variables, some studies reported null associations. For example, in a small sample, Bastos and colleagues (2020) found no associations between a wide range of sleep variables and mediumship. A possible explanation for these null findings is that unlike the other OBEPBs included in this review, mediumship is regularly practised (Bastos et al., 2020), indicating that it is their reality. The other paranormal variables explored here might be more night-time related, whereas mediumship could span the 24-hour daily cycle.

Furthermore, while most studies on hypnagogic hallucinations reported positive associations with OPEPB, one found that as subjective paranormal experiences increased, hypnagogic hallucinations decreased. This is an interesting finding which is difficult to interpret, and future work needs to establish whether this is a replicable finding and if so, why this negative association might exist.

## Populations with greater susceptibility

Studies that involved populations who had experienced adversity (e.g. refugee status) all found associations between sleep variables (especially SP but also dreams and nightmares) and OPEPB. It is possible that stressful life experiences could play a role in the association between sleep and the paranormal, which may give researchers an indication about what areas their interventions should target. Previous studies have linked trauma to sleep disturbances (parasomnias in particular; Jalal & Hinton, 2013) and this relationship could exist due to the well-known sleep disruption in people with trauma.

All studies that included student samples found some form of association between OPEPB (OBEs in particular) and sleep variables (especially SP and lucid dreams). Attending university can be a demanding

time—and stress could also underlie this association. Future research teams might want to evaluate the potential role of stress in the association between OBEs, SP, and lucid dreams as well as assess group differences between potential groups that are ‘at risk’ and matched controls.

## Potential explanations of associations

Possible explanations can be proposed for the associations found in this review. For example, SP and EHS usually involve some form of hallucinations (Jalal, Sevde Eskici, et al., 2021; Sharpless, 2014) which might be considered unusual by many of those experiencing them. As a result, people may assign supernatural explanations to make sense of events that occur outside of their normal experiences. In addition, those who believe in the paranormal, including the existence of ghosts, evil spirits or aliens may experience sleep disturbances due to stress.

Certain associations between sleep and the paranormal (e.g. lucid dreams and OBEs; Blackmore, 1982, 1983, 1984, 1986; Glicksohn & Barrett, 2003) may be more readily explained than others. For example, SP, lucid dreams, OBEs and near-death experiences have all been associated with REM sleep (Levitan et al., 1999) and may have shared features. In fact, these phenomena in many cases overlap as one event can give rise to the other. As just one example, it has been proposed that certain types of OBEs have been claimed to originate from lucid dreams (Clerc, 1983). There may also be shared mechanisms underlying coexisting sleep and paranormal variables, respectively. For example, sleep variables including SP, lucid dreams and hypnagogic/hypnopompic hallucinations are all classified as REM sleep phenomena (Jalal & Hinton, 2013; Raduga et al., 2020). Likewise, ostensibly paranormal experiences and/or beliefs such as OBEs and perceived creature-like encounters may coincide given their mysterious and complex nature. For example, a person who perceives the world from a perspective outside their physical body may also be more likely than those who do not to be convinced that aliens exist.

Other sleep and paranormal associations appear more unique. For example, one study included in this review found that those reporting spirit possession also tended to report poorer sleep quality than those who did not report spirit possession (Schaffler et al., 2016). One potential explanation for this finding is that altered states of consciousness (in this case spirit possession) can cause distress, possibly affecting various areas of life, including one's sleep. Again, future research should consider the role of distress, along with other psychological states, when examining the association between sleep quality and spirit possession.

## Clinical and practice implications

This scoping review has potential implications for clinical practice. For example, findings reported herein might encourage clinicians to assess for relevant sleep disturbances when patients report ostensibly paranormal events—hence possibly reducing misdiagnosis. In addition, clinicians can potentially help normalize these experiences and provide alternative scientific explanations for ostensibly paranormal activity if appropriate. Primary treatment of some of these sleep experiences (e.g., EHS, ISP) may potentially decrease the prevalence of related ostensibly paranormal beliefs in the broader community. There is some evidence that psychoeducation about the nature of these disorders alone may decrease frequency (Sharpless, 2014). Further research is required before the full clinical implications are clear.

## Limitations

The review applied a systematic and rigorous search strategy to evaluate the literature concerning the associations between sleep variables and OPEPB as a whole. Whereas we only focused on articles published in English, this review provides a comprehensive idea of the associations since the included studies have

been conducted in various parts of the world. In addition, although several sleep variables have been highlighted throughout the review, many of them (e.g. sleep efficiency, sleep duration, sleepwalking) have only been investigated in one or two studies. Over 80% of studies included in this review assessed specific foci both regarding sleep (e.g. only SP and LD) and OPEPB (e.g. OBEs, spirits, near-death experiences). The sparse evidence for most sleep and OPEPB associations warrant replication in order to establish the robustness of reported associations.

In addition, whereas some studies focused on well-defined sleep/paranormal variables and were suitably powered, others focused on measures that had not been well-validated (e.g. sometimes designed for the purposes of the study or comprising single items) and recruited very small samples. If work in this domain is to be impactful, researchers need to pay careful attention to the measurement and ensure sample size is carefully considered prior to conducting work of this type.

The cross-sectional research conducted to date has been valuable in acknowledging the existence of associations between sleep and the paranormal. However, the causal direction of effects cannot be inferred and warrants further longitudinal and experimental research (Hill, 1965). One possibility is to test the effects of cognitive behavioural therapy for SP (CBT-SP; as proposed by Sharpless & Doghramji, 2015) on paranormal experiences/beliefs using an interventional design. This treatment has been shown to increase overall well-being by alleviating the anxiety and stress (Sharpless & Grom, 2016) that some participants in the studies included in this review report (Jalal, Sevde Eskici, et al., 2021; Wing et al., 1994, 1999).

## CONCLUSION

Despite mixed results, overall, there are positive associations between sleep variables and ostensibly paranormal experiences and paranormal beliefs. The two most investigated sleep variables were sleep paralysis and lucid dreams which were associated with various paranormal experiences and beliefs including ghosts, spirits and out-of-body experiences. These findings have potential clinical implications and may help reduce the likelihood of misdiagnosis when clinicians encounter patients endorsing ostensibly paranormal experiences and beliefs. The results offered here are a good starting point for sleep researchers and clinicians, globally, to understand the associations between sleep and ostensibly paranormal experiences and beliefs. Research is now required to investigate the mechanisms underlying these associations.

## AUTHOR CONTRIBUTIONS

**Betul Rauf:** Conceptualization; data curation; formal analysis; investigation; methodology; visualization; writing – original draft. **Rotem Perach:** Methodology; resources; supervision; writing – review and editing. **Juan J. Madrid-Valero:** Formal analysis; investigation; writing – review and editing. **Dan Denis:** Writing – review and editing. **Brian A. Sharpless:** Writing – review and editing. **Hope Farron:** Formal analysis; investigation. **Christopher C. French:** Conceptualization; resources; supervision; writing – review and editing. **Alice M. Gregory:** Conceptualization; funding acquisition; project administration; resources; supervision; validation; writing – review and editing.

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## CONFLICT OF INTEREST STATEMENT

Alice Gregory is an advisor for a project initially sponsored by Johnson's Baby. She is a consultant for Perrigo (2021+). She receives royalties for two books *Nodding Off* (Bloomsbury Sigma, 2018) and *The*

Sleepy Pebble (Flying Eye, 2019). She has another contract with Lawrence King Publishers (publication due 2023). She is a regular contributor to BBC Focus magazine and has contributed to other outlets (such as The Conversation, The Guardian and Balance Magazine). She occasionally receives sample products related to sleep (e.g. blue light-blocking glasses) and has given a paid talk to a business (Investec). She was the CEO of Sleep Universal LTD (2022). She is a specialist subject editor at JCPP (sleep) for which she receives a small honorarium. She has contributed a paid article to Neurodiem. Brian A. Sharpless receives royalties for three books published through Oxford University Press (*Sleep Paralysis*, 2015; *Unusual and Rare Psychological Disorders*, 2017 and *Psychodynamic Therapy Techniques*, 2019). He is currently under contract with Chicago Review Press for his fourth. He occasionally receives sample products related to sleep (e.g. blue light-blocking glasses) and frequently gives paid public lectures on sleep disorders and other clinical topics. Betul Rauf, Rotem Perach, Juan J. Madrid-Valero, Dan Denis, Hope Farron and Christopher C. French have no conflict of interest to declare.

## DATA AVAILABILITY STATEMENT

All the data presented in the review are available in academic publications or from the authors of those papers.

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## SUPPORTING INFORMATION

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