



CLINICAL REVIEW

Positive affect and sleep: A systematic review

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SUMMARY

A sizeable literature has implicated sleep in the phenomenological experience of various mood disorders, vulnerability to psychopathology, and overall poor psychological functioning. By contrast, positive affective states (e.g., joy, happiness, vigor, positive mood) that may contribute to sleep have been understudied. This systematic review integrates findings from cross-sectional, longitudinal, ambulatory, and experimental studies that investigate the association between positive affect and sleep. A comprehensive search for all available research on the topic was performed in three electronic bibliographic databases (PubMed, PsycINFO, CINAHL). Two independent reviewers extracted data on study characteristics and quality. From 10,853 retrieved articles, 44 fulfilled inclusion criteria and formed the base of the review. The majority of studies (68.2%, $n = 30$) were classified as weak or having high risk of bias. In general, the pattern of findings suggests that aggregate or trait measures provide the most consistent evidence of an association between positive affect and sleep in healthy populations. More limited empirical data exist on the association between positive affect and sleep in clinical populations. We conclude that more rigorous and theoretically informed research is needed before firm conclusions can be drawn about the possible beneficial impact of positive affect on sleep outcomes.

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Introduction

Extensive research has documented the importance of sleep for promoting restorative processes and protecting against impairments in a range of neurobehavioral functions, including emotion regulation, immune control, and memory consolidation [1–4]. Moreover, deficits in fundamental aspects of sleep, including sleep efficiency (i.e., initiating and maintaining sleep) and sleep quality (i.e., feeling rested and restored upon waking), can have profound health effects that contribute to increased risks for adult morbidity and all-cause mortality [5–8]. Given the significant role of sleep in psychiatric and health morbidities, it is important to advance understanding of the key factors that contribute to individual differences in sleep quality.

There is growing interest in associations between positive affect (PA) and health outcomes [9–12]. Positive affect can be defined as a state of pleasurable engagement with the environment that elicits

feelings, such as happiness, joy, excitement, enthusiasm, and contentment [13]. Encompassing both enduring moods (e.g., affective traits) as well as short-term emotions (e.g., dynamic states), PA has been found to be robustly associated with lower morbidity and reduced mortality in both healthy and clinical populations [13–16]. Moreover, growing evidence suggests that PA is an important factor affecting individuals' overall sleep. Adults who report high levels of PA exhibit improved sleep patterns [17,18]. In contrast, those who experience difficulties regulating PA report greater sleep disturbances [19].

How might PA influence sleep? Pressman and Cohen [9] propose two general mechanisms—*main effects* and *stress-buffering*—by which PA can promote health. In the main-effect model, PA impacts behaviors relevant to health in general, irrespective of its effects on stress responses. For example, individuals with high trait PA may be more likely to engage in restorative health practices such as getting sufficient and restful sleep [17]. By contrast, in the stress-buffering model, PA may act to reduce negative appraisals of stress and facilitate adaptive coping. Individuals with high trait PA may cope more effectively with stressors and, therefore, may not experience the adverse health consequences of stressor exposure vis-à-vis poor sleep quality [20]. Studies also

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Glossary of terms			
AIS-5	Athens insomnia scale	NA	negative affect
BCPQ	bedtime counterfactual processing questionnaire	PA	positive affect
BD	bipolar disorder	PANAS	positive and negative affect schedule
BFW/J	Bern well-being questionnaire for adolescents	PANAS-C	positive and negative affect schedule for children
CES-D	center for epidemiologic studies depression scale	PANAS-X	positive and negative affect schedule Extended
CSBS	children's sleep behavior scale	PghSD	Pittsburgh sleep diary
CSWS	children's sleep-wake scale	POMS	profile of mood states
DAS	dyadic adjustment scale	POMS-SF	profile of mood states—short form
DISS	daytime insomnia symptom scale	PSQI	Pittsburgh sleep quality index
EEG	electroencephalogram	SAW	sleep disturbance ascribed to worry scale
GQ-6	gratitude questionnaire-six-item form	SHS	subjective happiness scale
GSQS	Groningen sleep quality scale	SOL	sleep onset latency
HCL-32	hypomania check list	SPW	subjective psychological well-being
ISI	insomnia severity index	STAI	state-trait anxiety inventory
JES	job emotions scale	STAXI	state-trait anger expression inventory
JSPS	Jenkins sleep problem scale	SWS	slow-wave sleep
MASQ-SF	mood and anxiety symptoms questionnaire-short form	TST	total sleep time
mDES	modified differential emotions scale	TWT	total wake time
MSHS	multidimensional sense of humor scale	USI	Uppsala sleep inventory
MSRS	manic state rating scale (aka, Beigel scale)	WHIIRS	women's health initiative insomnia rating scale
		Y-BOCS	Yale–Brown obsessive compulsive scale
		YMRS	young mania rating scale

suggest that PA and sleep are associated through a bidirectional relationship [17,19]. For example, reciprocal inverse relations between vigor and insomnia were reported in a longitudinal study of working adults [21]. Regardless of whether PA influences sleep through direct, stress-buffering, or bidirectional effects, no systematic review has yet investigated the association between PA and sleep. Moreover, while a number of reviews have focused on links between general emotion and sleep [3,22], results to date have raised important methodological questions, such as the directionality of emotion effects, the equivalence of standard subjective and objective measures of sleep, the contribution of PA to both resilience-enhancing and vulnerability-inducing sleep outcomes, and the extent to which associations between PA and sleep are independent of negative affect (NA).

Scope and organization of the review

To gain greater insight into the role of PA in sleep, the review is narrative rather than quantitative. Our goal in this review was to summarize research that assessed the relationship between PA and sleep. We use systematic methods and standardized procedures [23,24] for locating and evaluating the relevance and quality of included studies. Specifically, the review includes investigations of the association between PA and sleep in healthy populations. We consider the association between disturbances in PA (e.g., chronically low/elevated PA) and sleep in clinical populations [25,26]; however, given the small number of studies, we place less emphasis on this literature. In addition to considering the direct contribution of PA to sleep, we review evidence regarding potential bidirectional and stress-buffering effects. We also discuss the role of behavioral and biological pathways in the association between PA and sleep. Lastly, we highlight important methodological limitations of extant studies and suggest key directions for future research.

To provide greater detail than presented in the text, the review includes corresponding tables with lists of all cross-sectional, longitudinal, ambulatory, and experimental studies that were located in the literature review. Cross-sectional studies examine the extent to which PA is associated with sleep outcomes. Longitudinal studies

explore whether previous levels of PA predict subsequent levels of sleep across more extended periods of time. Ambulatory studies, in comparison, use intensive repeated measures methodology (e.g., experience sampling) across several days or weeks to examine how within-person variation in PA relates to sleep quality and quantity. Finally, experimental studies determine the effects of induced transient PA on concurrent sleep outcomes.

Methods

Database sources and searches

The review was conducted using PRISMA (preferred reporting items for systematic reviews and meta-analyses) guidelines [23]. A comprehensive search for all available research on the topic was performed in three electronic bibliographic databases (MEDLINE in PubMed, PsycINFO, CINAHL) on 29th June 2015. No date limits were applied but search results were restricted to English. The search strategy included terms reflecting PA, PA disturbance, and sleep. PA search terms included variations of *happy, cheerful, joy, vigor, excited, elated, enthusiastic, energetic interest, content, amused, humor, calm, relaxed, grateful, satisfied, positive affect, positive emotions, and positive mood*. Search terms for PA disturbance included *bipolar disorder, anhedonia, and mania*. Sleep-related search terms included variations of *insomnia, narcolepsy, time in bed, early waking, night waking, sleep, sleep deprivation, and sleep disorders*. The complete PubMed, PsycINFO, and CINAHL search strategies are provided in [Appendix A](#). Additional studies were identified through cited reference searching of included articles and known reviews.

Study screening and selection

Study screening was carried out by two independent reviewers. Discrepancies were resolved by consensus. In a first step, screening was carried out to exclude articles that did not meet inclusion criteria based on the title and abstract. Full-text screening was performed on potentially relevant studies that were identified to meet inclusion criteria or for which criteria could not be

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