Journal of Psychosomatic Research 79 (2015) 428–434

Contents lists available at ScienceDirect

Journal of Psychosomatic Research

Bidirectional relationship between sleep and optimism with depressive mood as a mediator: A longitudinal study of Chinese working adults☆

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ARTICLE INFO

Article history:
Received 6 May 2015
Received in revised form 17 September 2015
Accepted 21 September 2015

Keywords:
Sleep quality
Attributional style
Chinese
Longitudinal study
Depression
Optimism

ABSTRACT

Objective: Sleep and optimism are important psycho-biological and personality constructs, respectively. However, very little work has examined the causal relationship between them, and none has examined the potential mechanisms operating in the relationship. This study aimed to understand whether sleep quality was a cause or an effect of optimism, and whether depressive mood could explain the relationship.
Method: Internet survey data were collected from 987 Chinese working adults (63.4% female, 92.4% full-time workers, 27.0% married, 90.2% Hong Kong residents, mean age = 32.59 at three time-points, spanning about 19 months). Measures included a Chinese attributional style questionnaire, the Pittsburgh Sleep Quality Index, and the Depression Anxiety Stress Scale.
Results: Cross-sectional analyses revealed moderate correlations among sleep quality, depressive mood, and optimism. Cross-lagged analyses showed a bidirectional causality between optimism and sleep. Path analysis demonstrated that depressive mood fully mediated the influence of optimism on sleep quality, and it partially mediated the influence of sleep quality on optimism.
Conclusion: Optimism improves sleep. Poor sleep makes a pessimist. The effects of sleep quality on optimism could not be fully explained by depressive mood, highlighting the unique role of sleep on optimism. Understanding the mechanisms of the feedback loop of sleep quality, mood, and optimism may provide insights for clinical interventions for individuals presented with mood-related problems.

Optimists sleep better than pessimists do (e.g., [20,26,49]). Three frameworks can be applied in understanding this correlation. One posits that optimism takes away worries that often interrupt sleep. Another is that sleep quality influences the way people look at the world. As one wakes up well rested, the world seems better than if one had trouble falling asleep the previous night. A third possibility is that the causation acts both ways. Since a theoretical connection between optimism and sleep has never been formulated before, in this paper we proposed a heuristic model on the possible causal relationships. We then described our attempt to verify those hypothesized relationships, as well as the potential role of depressive mood as a mediator in the optimism–sleep link.

Optimism is the generalized expectation that good things will be plentiful in the future and bad things will be scarce [46]. Pessimism, on the opposite end of the continuum, is the generalized expectation that bad things will abound in the future and good things will be rare. They can be operationalized as explanatory or attributional styles (AS) people use to explain events that occur to them [2].

As attributional styles have been associated with a number of physical and mental health outcomes, they deserve further scientific investigation and clinical attention. Pessimistic AS is related to negative outcomes such as poor physical health. Peterson, Seligman, and Vaillant [39] found that pessimistic people were more likely to experience poor health two to three decades later. This long-term effect is probably due to the pessimists' lower self-efficacy for self-care. Another explanation is that pessimists may be more at risk for social isolation, which predicts poor health [17]. On the contrary, optimism is related to positive outcomes. A meta-analysis of 84 studies showed a correlation of .17 between optimism and physical health [41].

Optimism and sleep

Optimism is associated with sleep. A recent study of several thousands of adults revealed that optimism was correlated with sleep quality and sleep sufficiency measured cross-sectionally as well as five years later [20]. The associations were attenuated after depressive symptoms were accounted for, but optimism was still associated with lowered risk

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http://dx.doi.org/10.1016/j.jpsychores.2015.09.010
0022-3999/

for self-reported sleep quality longitudinally. Another large-scale cross-sectional study also showed that optimism was negatively associated with insomnia symptoms as well as short (<6 h) and long (>9 h) sleep duration, after controlling depressive symptoms [26]. Additional empirical findings supporting the optimism-sleep link have been reported among children (e.g., [13,27]), Chinese college students [48,49], and young grandmothers [9]. The association between optimism and sleep could be understood from the widely-supported cognitive-behavioral model of insomnia. From a cognitive point of view, people who attribute bad events to causes that impact many aspects of life and that are not going to disappear would likely have negative expectations about their future; such worries or ruminations may lead to cognitive and physiological hyper-arousal at bedtime and consequently, sleep problems [16,35]. On the contrary, adopting an optimistic AS may free a person from worries, leading to better sleep. In addition, compared to pessimists, optimists may have more adaptive coping strategies, which may enhance sleep quality indirectly through effective problem-solving or directly through adaptive sleep habits. Building on previous correlational findings and the psychophysiological model of insomnia, we hypothesized and tested a causal link from optimism to sleep quality:

H1. : Optimism would be beneficial to sleep quality.

A reverse direction of causality is equally reasonable. For one thing, poor sleep has adverse impact on cognitive functions. Executive functions such as problem-solving are particularly vulnerable to the effects of poor sleep [36]. The lack of cognitive abilities in solving problems in life may lead to constant frustration and an eventual pessimistic outlook in life. For another, poor sleep has been found to result in daytime sleepiness and listlessness (e.g., [3]), which in turn may impair motivation to engage in daily activities and to overcome difficulties, hence reinforcing pessimism. A third pathway is through learned hopelessness, a primary component of pessimism [1]. A person who struggles with a seemingly untreatable chronic sleep problem may give up hope and become more pessimistic. Indeed, certain sleep quality variables predict global attribution for negative events [18]. Compared to those allowed to sleep for 8 h per night, participants allowed to sleep for only 4 h per night for 12 nights scored lower on an optimism/sociability adjective checklist [14]. While no previous studies have examined the role of sleep quality in optimism longitudinally, considering the preliminary evidence of the effects of sleep variables on optimism and the theoretical arguments above, we proposed the following for evaluation in parallel with H1 to address the research gap:

H2. : Sleep quality would strengthen optimistic AS.

Mediating role of depressive mood in the optimism–sleep link

Sleep and depressive mood

Clinical studies have shown that about three-quarters of depressed patients reported insomnia symptoms and poor sleep quality [50]. Reduced total sleep time, prolonged sleep latency, increased number of intermittent awakenings, reduced slow-wave sleep, and abnormal rapid eye movement (REM) features were reported in individuals with depression [38]. Persistent sleep abnormalities were associated with an increased risk of relapse and a negative treatment outcome in depression, suggesting the significant role of sleep in the prognosis of depressive disorders (e.g., [11]; S.X. [28]).

Epidemiological research indicates that sleep disturbances and depression are either causally related to each other or share some common causalities [50]. Riemann et al. [44] reported that isolated insomnia symptoms lasting for two weeks or longer are predictive of an increased depression risk in the following one to three years. A recent meta-analysis reported that people with insomnia had doubled chances to develop depression compared to those without insomnia [4]. Previous longitudinal studies revealed that poor sleep quality significantly predicted subsequent depressive mood [5,37,60].

Optimism/pessimism and depressive mood

Low optimism and high pessimism were associated with increased risk of depression and suicidal behavior [8] and of depressive symptoms postpartum [7]. Stable and global attributions about bad events were significant predictors of depression in a Chinese sample (Z. [29]). The association between pessimism and depression was supported in meta-analyses of adult [53] and children samples [23].

Depressive mood as a mediator between optimism and sleep

While previous studies of the associations between optimism and sleep mostly treated depressive symptoms as a potential confounding factor and therefore controlled for its effects, elucidation of the causal relationships among these three variables using a cross-lagged design can shed light on their theoretical associations and potential pathways for interventions. In view of the close relationships of depressive mood with optimism and with sleep, we specifically expected that:

H3. : Depressive mood would mediate the optimism–sleep link.

Method

Procedure and participants

The present study was part of a larger project from which several papers have been produced (authors and date masked for blind review). Participants were 8245 Chinese students and adults recruited through various channels (e.g., bulk emails through universities and churches in Hong Kong and Macau, social networks, and advertisements on social media). Although this is not a random sample, the use of different recruitment methods enhanced the variability among the participants. Data collection was approved by the Human Research Ethics Committee for Non-clinical Faculties at the University of Hong Kong. In obtaining consent, we told prospective participants that they would be invited to answer surveys on the internet during the next few years, and that they would have a 1 in 100 chance of winning a supermarket voucher that worths HK$100 (about US$12.50) each time they completed a survey. If they gave up this opportunity, HK$20 would be donated to a charity for poverty reduction. The data we used in the current study came from three waves of survey that began in February, 2010 (Wave 1), September, 2010 (Wave 2), and September, 2011 (Wave 3), respectively. To make up for participant attrition, a supplementary cohort was added a year later, using the same follow-up schedule. For the present study, the inclusion criteria were: (a) aged 18 or above; and (b) not full-time students, unemployed, retired, or homemakers during the six months prior to Wave 1 of the survey. The latter criterion was imposed because we were mindful of the possibility that students and those without employment had different sleep patterns that might confound the research results. In our sample of 987 working adults (63.4% female, 92.4% full-time workers, 27.0% married, 90.2% Hong Kong residents), the mean age was 32.59 years ($SD = 9.05$, range = 18 to 67) at Wave 1. About 40.3% reported a monthly household income under HK$20,000.

Measures

Optimism

The Attributional Style Questionnaire (ASQ; [40]) is one of the commonest measure of optimism vs. pessimism. It has been modified for use in different contexts (educational, sports, etc.) and cultures including Hong Kong Chinese [22] with good validity. Modestly correlated