The effect of optimism on depression: The mediating and moderating role of insomnia

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Abstract.

Objective: This paper aims to clarify if insomnia exerts a mediating or moderating effect on the optimism-depression association in Chinese college students. **Methods:** A total of 529 Chinese college students completed the Beck Depression Inventory (BDI-II), the Pittsburgh Sleep Quality Index (PSQI), the Revised Life Orientation Test (LOT-R), and the Multidimensional Scale of Social Support (MSPSS). **Results:** Results of multivariate regression analyses and Sobel tests failed to show any moderating effect by insomnia on the optimism-depression association. After adjustment for age, gender and social support, a mediating effect was observed for insomnia on the optimism-depression association (Standardized β = -0.31, 95% CI -0.87 to -0.52). **Conclusion:** Insomnia qualifies as a mediator between optimism and depression, suggesting considerable variance in depressive symptoms of college students could be due to change in their sleep status. Results of the present study suggested that future intervention can target on promoting sleep hygiene to improve sleep qualities thereby reducing depressive symptoms among college students.

Keywords: Insomnia; depression; optimism; mediation.

Introduction

The association of optimism with physical and psychological well-being has been well documented. Optimism was found to be associated with better emotional (Segerstrom, Taylor, Kemeny, et al., 1998; Katsunori, 1997) and physical (Brenes, Rapp, Rejeski, & Miller, 2002; Shen, McCreary, & Myers, 2004) well-being. Optimists also had a lower perceived disease severity (Shifren, 1996) and a faster rate of recovery from surgery (Carver, Pozo, Harris et al., 1993; Scheier, Matthews, Owens et al., 1989). Such positive association between optimism and well-being was consistently shown across different populations such as a disaster victim sample (Van Der Velden, Kleber, Fournier et al., 2007), a college freshman sample (Ruthing, Haynes, Stupnisky, & Perry, 2009) and among parents of children with cancer (Fotiadou, Barlow, Powell, & Langton, 2008).

One significant physical problem that has been found to be associated with optimism is insomnia. Insomnia is a major burden on society given its high level of psychiatric comorbidity. A wealth of data evidenced the association between poor mental health and insomnia (Breslau, Roth, Rosenthal, & Andreski, 1996; Chang, Ford, Mead et al., 1997; Ford & Kamerow, 1989; Roberts, Shema, & Kaplan, 2000; Wong & Fielding, in press). Between 50% and 90% of participants diagnosed with depression complain of poor sleep quality (Hetta & Rimon, 1985; Riemann & Berger, 2001). While insomnia has been widely considered as a major factor affecting the course of depression, there are data suggesting that it is likewise a risk factor for the development of depression (Breslau, Roth, Rosenthal, & Andreski, 1996; Chang, Ford, Mead et al., 1997; Ford & Kamerow, 1989; Roberts, Shema, & Kaplan, 2000). Results of a longitudinal study suggested that individuals with the diagnosis of insomnia at baseline had a greater risk of developing depression at 1-year follow-up and the risk was even 40 times greater when insomnia

was present at both interviews (Ford & Kamerow, 1989).

In addition to the adverse impacts of insomnia on mental health, the relationships of insomnia with optimism and other psychosocial factors are also documented. Optimistic grandmothers reported fewer depressive symptoms, lower hostility, and less sleep disturbances than those pessimistic grandmothers (Conway, Magai, Springer, & Jones, 2008). In a mixed sample of healthy individuals and patients with stress-related problems, higher scores on positive affect and lower scores on negative affect were associated with better sleep quality, lower levels of anxiety and depression, and a higher level of optimism. (Norlander, Johansson, & Bood, 2005) Among workers, stress was found to be associated with increased risk of sleep problems, and a significantly higher prevalence of insomnia was documented among physicians with burnout symptoms (Linton, 2004). In a sample of clinical patients, work-school stress, family, and health were found to be precipitating factors of insomnia (Bastien, Vallieres, & Morin, 2004).

Despite the links between depression, optimism, and insomnia, clarification of any optimism-insomnia interactions impacting depression is lacking. Specifically, the extent to which optimism and insomnia exert different effects on depression is unclear. In this study, we explored the relationships between optimism, insomnia, and depression, and tested the mediating and moderating roles for insomnia in the relationship between optimism and depression in a sample of Chinese college students. The moderating effect of insomnia was determined by evaluating whether insomnia buffered the impact of optimism on depression. The mediating effect of optimism was determined by examining whether optimism's association with depression is modified by insomnia.

Method

Subjects and procedures: Following IRB approval, a total of 529 full-time Chinese college

students were recruited from four universities in Hong Kong. Students participated in the study to fulfil course requirement and were assured of anonymity and the confidentiality of the data collected. The study was carried out in the third week of the semester to avoid possible confounding effects of academic stress (e.g., examination stress) on sleep pattern reporting. The mean age of the sample was 21.01 (*SD*=1.77) years and 54.3% of the sample were females.

Measures

Depression: The Beck Depression Inventory-II was a self-reported measure consisting of 21 items assessing depressive symptoms severity (Beck, Steer & Garbin, 1988). The scale possessed high internal consistency (α=0.91) and test-retest reliability (*r*=0.93) (Beck, Steer, Ball & Ranieri, 1996). The Chinese version of BDI-II (CBDI-II) obtained a good internal consistency (α=0.85-0.86) (Chan & Tsoi, 1984) and good construct validity with other psychological measures such as CES-D scale and the SDS scale, with correlation coefficients of 0.73 and 0.75 respectively (Chan, 1991).

Insomnia: The Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Timothy et al., 1989) was developed based on the ICD-10 (World Health Organization, 1992) and DSM IV (American Psychiatric Association, 1994) criteria for classification of insomnia. It was employed to assess insomnia in this study. The PSQI measures individuals' sleep quality on seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction, in the month prior to the study. Rating on a 4-point Likert Scale (0=Not during the past month; 3=Three or more times a week), the total PSQI score ranged from 0-21. Respondents were classified as having insomnia if they obtained a PSQI global score ≥5 (Buysse, Reynolds, Timothy et al., 1989; Buysse, Reynolds, Timothy et al., 1991; Tsai, Wang, Wang et al., 2005). The PSQI obtained an acceptable internal

consistency (α=0.83), validity and test-retest reliability among either sleep-disorder patients or healthy subjects (Tsai, Wang, Wang et al., 2005). The Chinese version of PSQI also obtained good reliability (α=0.82-0.83) for all subjects and for those who have primary insomnia (α=0.75) (Tsai, Wang, Wang et al., 2005).

Optimism: Respondents' level of optimism was assessed by the 6-item Revised-Life Orientation Test (LOT-R). Scoring on a 5-point Likert Scale (1=Strongly Disagree to 5= Strongly Agree), the LOT-R possessed good reliability (α=0.76) and test-retest correlation (*r*=0.79) (Scheier & Carver, 1985). The Chinese version (CLOT-R) also obtained satisfactory reliability (α=0.69) among college students and working adults' samples (Lai, 1997).

Social Support: Social support was also assessed in this study because previous studies evidenced optimists were more able to develop an extensive and supportive social network than pessimistic individuals (Brissette, Scheier & Carver, 2002; Carver, Kus & Scheier, 1994), thereby suggesting the potential confounding effect of social support on the optimism-insomnia-depression link. The Multidimensional Scale of Perceived Social Support (MSPSS) was employed to assess subjective assessment of social support adequacy (Zimet, Dahlem, Zimet et al., 1988). The 12-item MSPSS possessed good internal consistency (α=0.88) and validity (Zimet, Dahlem, Zimet et al., 1988). The Chinese version of MSPSS (MSPSS-C) (Chou, 2000) was reported to have good internal consistency reliability of 0.89 and construct validity with depression measure and social network measures such as the General Health Questionnaire and the Lubben Social Network Scale (Chou, 2000).

Statistical analysis

Descriptive statistics were used to examine sleep quality and patterns of the sample.

Independent-samples t-tests were used for assessing differences between two groups whereas chi-square tests were used to compare proportions. Results of univariate regression analyses showed age, gender and social support significantly predicted depression; these variables were therefore controlled in subsequent multivarite regression models. The mediation and moderation effect of sleep were tested according to the criteria suggested by previous research (Baron & Kenny, 1986). For sleep to be a mediator of optimism and depression, four criteria need to be met: (1) optimism should significantly predict depression, (2) sleep should significantly predict depression, (3) optimism should significantly predict sleep, and (4) controlling for sleep, the relationship between optimism and depression should be reduced or no longer significant. Sobel tests were then performed to examine the significance of the mediation effect. To examine the possible moderation pathway, depression was regressed on optimism and sleep to study the main effects, followed by the interaction effect, Optimism × Sleep. Data analyses were done by SPSS Windows 15.0.

Results

Sleep quality and pattern of the sample

As illustrated in Table 1, the mean PSQI global score was 6.01 (SD=2.78). About 60% of the subjects reported having excellent to good subjective sleep quality. Nearly 19% of them had sleep latency of more than 30 minutes. Results demonstrated 16.7% of the participants were short sleepers (≤6 hours). Sleep efficiency was fairly good, 86.2% of the participants had sleep efficiency over 75%.

About 86.2% of the sample revealed having no or less than once a week difficulties in falling/ staying asleep. About 97.5% of participants reported that they had never used or used less than once a week of sleeping medication to help reducing their sleep problems. The majority

(92.6%) reported having at least one occasion of daytime dysfunction because of lack of sleep. According to the cut-off value of the PSQI global score of ≥5, 68.6% of the current sample was classified as insomniac. Among the seven components of the PSQI, only the use of sleeping pills was found to have significant gender difference in which males significantly reported more use of medication than females *(χ^2=18.08; $p<0.01$).*

Insomnia as a mediator between optimism and depression

As shown in table 2, after controlling for age, gender, and social support, increased optimism significantly associated with decreased depression (β=-0.79, p<0.001) and decreased insomnia (β=-0.16, p<0.001). Insomnia significantly associated with depression (β=0.81, p<0.001). The four criteria were met and the standardized beta coefficient was reduced by 0.1 from -0.79 (without mediation) to -0.69 (with mediation controlled) (Figure 1), suggesting a partial mediation effect of insomnia between optimism and depression. Results of Sobel test also indicated insomnia's role as a mediation of optimism's effect on depression was significant (z=-3.58, p<0.001), with 12.7% of the effect of optimism on depression going through the mediator.

Insomnia as a moderator of the optimism-depression link

As also reported in Table 2, the main effect of optimism on depression was significant (β=-0.35, p<0.001) where insomnia also significantly predicted depression (β=0.27, p<0.001). However, the interaction term, Optimism × Insomnia, was not statistically significant, which ruled out the possibility that insomnia moderates the link between optimism and depression.

Discussion

The current study examined the nature of the relationship between optimism, sleep and depression in a Chinese college sample. Results indicated that optimism affects individuals' sleep and thus influences depression indirectly. Although it was revealed that insomnia did not qualify

as a moderator of the link between optimism and depression, indicating that sleep cannot buffer the effect of optimism on depression, our results demonstrated that sleep was a mediator on the link between optimism and depression. One possible underlying mechanism explaining these results is that when pessimists have sleep difficulties, due to their propensity to engage in negative thinking pattern and the lack of positive expectation about the future (Conway, Magai, Springer & Jones, 2008), would prone to worry and ruminate about the negative consequences of insufficient sleep, resulting increased sleep problems and aggravate depressive symptoms (Giltay, Zitman & Kromhout, 2006). Results of Sobel tests revealed that about 12.7% of the variance went through the mediator which implied that considerable variance in depression could be due to change in sleep status. These findings imply that, to reduce depressive symptoms among college students, interventions can target alleviating their sleep problems rather than promoting their optimism level, a dispositional construct, which was believed to be difficult to change.

The present investigation warrants caution for causal relationship due to its cross-sectional design. Since participants retrospectively reported their bed time, wake up time and total hours of sleep of the prior month, recall bias might have confounded the results of this study. Future studies may use other methods such as daily or weekly sleep log to assess sleep patterns so as to verify the current findings. Although the current study significantly demonstrated that, after controlling for social support, optimism influences depression through insomnia, other covariates such as social, behavioural, and cognitive factors may interact with each other in influencing the relationship between optimism and depression. This should be addressed in future studies.

In summary, the current study has contributed to our understanding of the relationship between optimism, insomnia. and depression. Insomnia was evidenced carrying a mediating role

in the relationship between optimism and depression. School-based intervention can target promoting sleep hygiene to improve students' sleep qualities thereby reducing depressive symptoms.

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