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Dispositional optimism and sleep quality: a test of mediating pathways

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Abstract

Dispositional optimism has been related to beneficial influences on physical health outcomes. However, its links to global sleep quality and the psychological mediators responsible for such associations are less studied. This study thus examined if trait optimism predicted global sleep quality, and if measures of subjective well-being were statistical mediators of such links. A community sample of 175 participants (93 men, 82 women) completed measures of trait optimism, depression, and life satisfaction. Global sleep quality was assessed using the Pittsburgh Sleep Quality Index. Results indicated that trait optimism was a strong predictor of better PSQI global sleep quality. Moreover, this association was mediated by depression and life satisfaction in both single and multiple mediator models. These results highlight the importance of optimism for the restorative process of sleep, as well as the utility of multiple mediator models in testing distinct psychological pathways.

Keywords

Depression; Health; Life satisfaction; Optimism; Sleep

Introduction

Trait optimism represents the general expectation that good things will happen in the future (Carver & Scheier, 2014) and meta-analytic reviews have found it to predict better health across a number of outcomes (e.g., cardiovascular disease, DuBois et al., 2015; Rasmussen et al., 2009). Given existing epidemiological data, one might expect dispositional optimism to predict better sleep. Sleep plays an important role in biological restoration and repair (Hawkley & Cacioppo, 2004; Robles & Carroll, 2011) and emerging research has linked

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Conflict of interest Bert N. Uchino, Matthew Cribbet, Robert G. Kent de Grey, Sierra Cronan, Ryan Trettevik, and Timothy W. Smith declares that they have no conflict of interest.

Compliance with ethical standards

Human and animal rights and Informed consent All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

indicators of sleep to negative health outcomes (Cohen et al., 2009; Irwin, 2014; King et al., 2008). However, the optimism-global sleep quality link has been less studied so more research is needed in order to better characterize the scope of outcomes related to optimism.

At a broader theoretical level, there are good reasons to suspect that trait optimism would be related to better global sleep quality. Optimists engage in greater proactive coping which is an adaptive orientation for dealing with stressful upcoming events (Aspinwall & Taylor, 1997). Optimists also engage in positive self-regulatory behaviors when directly dealing with stress which has downstream benefits such as higher future work salaries (Nes Solberg et al., 2009; Segerstrom & Solberg Nes, 2006). More generally, optimists engage in approach coping strategies in comparison to avoidant coping strategies (Nes & Segerstrom, 2006). These beneficial proactive and self-regulatory coping strategies should result in better global sleep quality via higher subjective well-being. Consistent with this reasoning, preliminary evidence links optimism to key aspects of sleep, including both self-reported global sleep quality/insomnia symptoms (Sing & Wong, 2011; Lemola et al., 2013) and actigraphy-derived measures of sleep duration and sleep efficiency (Lemola et al., 2011). Moreover, experimental evidence suggests that self-reported optimism declines during sleep restriction and returns to baseline levels with recovery sleep (Haack & Mullington, 2005).

Although dispositional optimism is generally linked to better health outcomes, much less is known on potential psychological pathways responsible for such links (Rasmussen et al., 2009). Psychological processes related to subjective well-being are likely mediators and include both positive and negative affect/evaluative processes (Pavot & Diener, 2008). Of these, depression and life satisfaction are important indicators and have been strongly linked to trait optimism in a prior meta-analytic review (Alarcon et al. 2013). Although poor sleep is strongly associated with higher levels of depression (Irwin, 2014), no study to date appears to have examined both positive and negative indicators of subjective well-being as potential mediators.

The major aims of the present study were thus to examine the link between trait optimism and PSQI global sleep quality and model psychological pathways. Based on prior work, it was predicted that optimism would be related to better global sleep quality and that depression and life satisfaction will be statistical mediators. This study also examined the utility of modeling multiple mediators given most prior work has focused on single mediation models. It was hypothesized that a multiple mediator model would show a stronger mediator link given depression and life satisfaction are distinct measures of subjective well-being.

Methods

Participants and procedure

One hundred seventy-five relatively healthy community participants (93 men and 82 women) participated in this IRB approved study. The sample was middle-aged to older adults between 48 and 77 ($M_{\text{age}} = 60.1$, $SD = 6.5$). The median education level was college graduation and the median income was \$40,000 or more per year. As part of the larger study focusing on psychosocial predictors of health, individuals with serious medical problems

were excluded (e.g., cancer, see Uchino et al., 2012a). Eligible participants were scheduled for an appointment and provided informed consent. Participants completed a demographic questionnaire, the Life Orientation Test-Revised, Pittsburgh Sleep Quality Index, as well as The Center for Epidemiologic Studies Depression Scale and the Life Satisfaction Scale (see below). Participants were then debriefed and compensated. The authors have no conflicts of interest.

Measures

Life orientation test-revised (LOT-R)—The LOT-R is a 10-item scale which includes filler items and assesses dispositional optimism (Scheier et al., 1994). It has good psychometric properties and is distinguishable from other personality constructs (Scheier et al., 1994). The internal consistency of the scale in the present study was high (.83).

PSQI—The Pittsburgh Sleep Quality Index (PSQI) assesses sleep quality disturbances during the previous month (Buysse et al., 1989). The scale is comprised of 19 items which are used to derive a global PSQI score with higher scores indicating poorer sleep quality. This instrument has demonstrated good reliability and validity (Morin & Espie, 2003). The internal consistency of the global PSQI in the current study was .73.

CES-D—The Center for Epidemiologic Studies Depression Scale (CES-D) is a 20-item scale that assesses depressive symptoms. The Cronbach's alpha was high in both patient and control samples (.90), with a 4 weeks test–retest correlation of .67 (Radloff, 1977). Importantly, the CES-D also has good sensitivity for detecting depressive symptoms (Lyness et al., 1997). The internal consistency of the CES-D in the current study was similarly high (.91). In all analyses, the item dealing with sleep problems was deleted to avoid overlap with the PSQI.

Satisfaction With Life Scale (SWLS)—The SWLS is a 5 item scale that measures general life satisfaction (Diener et al., 1985). The SWLS is characterized by high internal consistency (e.g., .89) and good test–retest reliability (e.g., 4 years test–retest reliability of .54, Pavot & Diener, 1993). The internal consistency of the scale in this study was high (.92).

Statistical analysis plan

A simultaneous regression analysis was used to test the hypothesized link between trait optimism and PSQI global sleep quality. Consistent with prior work, basic demographic factors were statistically controlled and included age, sex, income, and education as they have been linked to sleep patterns (Hall et al., 2008; Mezick et al., 2008). The proposed psychological mediators of depression and life satisfaction were first tested individually using bootstrapping (2000 resamples, Preacher & Hayes, 2004) given they are distinct constructs. The proposed mediators were then tested together to examine the utility of a multiple mediator model.

Results

Preliminary analyses

Replicating prior work, zero-order correlations showed that higher trait optimism was related to lower depression ($r = -.57, p < .001$) and higher life satisfaction ($r = .61, p < .001$). The zero-order correlation between trait optimism and sleep was also significant ($r = -.45, p < .001$). The mean global PSQI score for this sample was 6.15 (SD = 3.6, range 0–17) which is indicative of poor sleep quality (Buysse et al., 2008; Grandner et al., 2006).

Main analyses

As shown in Table 1, dispositional optimism was a significant predictor of sleep quality while statistically controlling for basic demographic factors. Consistent with the few studies in the area, higher trait optimism was associated with better PSQI global sleep quality [$b = -1.88, 95\% \text{ CI } (-2.52, -1.24), \beta = -.41, p < .0001$]. In fact, trait optimism was a significant predictor of each component of global sleep quality (p 's $< .05$) except for sleep efficiency ($p < .10$). Subgroup analyses examining normal (PSQI $< 5, n = 63$) and poor sleepers (PSQI $\geq 5, n = 112$) found that trait optimism significantly predicted better global sleep quality only in the poor sleep group ($p < .001$) although analyses of normal sleepers was characterized by less statistical power and a more restricted range.

Bootstrap mediational models were next tested with depression and life satisfaction in single and multiple mediator models. The bias corrected bootstrap analysis indicated that the indirect effect of trait optimism on better sleep quality via depression was significant [$a \times b = -.73, 95\% \text{ CI } (-1.25, -.31)$]. The bias corrected bootstrap analyses examining life satisfaction also showed a significant mediating influence on the optimism—sleep quality link [$a \times b = -.84, 95\% \text{ CI } (-1.47, -.41)$]. However, as shown in Fig. 1, examination of depression and life satisfaction in a multiple mediator model produced the strongest indirect effect [$a \times b = -1.06, 95\% \text{ CI } (-1.75, -.54)$] suggesting that they are both important mediators of such links.

Discussion

The present study sought to provide evidence for a link between dispositional optimism and PSQI global sleep quality as well as the psychological mediators potentially responsible for such links. Consistent with a small body of research, dispositional optimism was related to better global sleep quality. In addition, this link was statistically mediated by depression and life satisfaction. These results are consistent with broader epidemiological research showing that trait optimism is related to better health outcomes across a number of biological systems and disease conditions (DuBois et al., 2015; Rasmussen et al., 2009). In addition, these data highlight the importance of subjective well-being measures as psychological mediators.

The first main goal of the study was to provide additional data on the link between trait optimism and PSQI global sleep quality. Consistent with predictions, optimism was related to better global sleep quality. These data are important as sleep has emerged as an important restorative process that is related to health outcomes (Hawkley & Cacioppo, 2004; Irwin, 2014; Robles & Carroll, 2011). For instance, the CARDIA study found that longer sleep was

related to less coronary artery calcification (King et al., 2008). This study, among others (Lau et al., 2015; Lemola et al., 2013), adds to the growing list of health-relevant outcomes associated with dispositional optimism which can potentially explain epidemiological links to more downstream health conditions.

A second major aim of this study was to test measures of subjective well-being as statistical mediators. The link between trait optimism and PSQI global sleep quality was mediated by depression and life satisfaction, with stronger influences in a multiple mediator model which included both. These data highlight the importance of subjective well-being as pathways linking trait optimism to health outcomes. More research will be needed to test whether subjective well-being is an important mediator for other health outcomes associated with dispositional optimism such as immune-mediated inflammation. Future epidemiological work might also benefit from examining more complex models of mediation informed by this work. For instance, both subjective well-being and global sleep quality could be included in a process mediational model predicting distal health outcomes (Judd & Kenny, 1981).

These data are also important because much of the prior work on psychosocial risk factors and health examines single mediator models. It has been argued that such models are unlikely to reveal strong evidence for mediators given the likely small effect size associated with any one pathway (Uchino et al. 2012b). Testing multiple mediators can thus better inform theoretical frameworks by highlighting more complex pathways.

There are several important limitations of this work. These data are cross-sectional so longitudinal designs will be needed in future studies to strengthen inferences. To this point, it is important to note that some research indicates that sleep problems might influence mood states and perceptions of optimism. For instance, participants who were randomized to 4 h of sleep (compared to 8 h) for 12 consecutive days showed progressive declines in state levels of optimism/sociability (Haack & Mullington, 2005). Similarly, a longitudinal study found evidence for both associations as trait optimism was related to poorer sleep over time, and poor sleep was related to lower dispositional optimism over time (Lau et al., 2015). Finally, although subjective sleep quality has been linked to objective sleep indicators, this study did not collect such measures (e.g., polysomnography) which might provide converging evidence for such links.

These limitations notwithstanding, these data are among the first showing mediation of the link between trait optimism and global sleep quality using a multiple mediator model. It is important to highlight that facets of sleep are linked to negative health outcomes (Irwin, 2014) and thus underscores the potential importance of developing interventions that could augment perceptions of optimism. Preliminary attempts to foster greater optimism include imagery and writing manipulations (Peters et al., 2013; Sergeant & Mongrain, 2014). However, future work will be needed to demonstrate that such interventions also alter health related outcomes of relevance to the present study and larger literature. Such work could play a critical role in helping researchers better understand the links between optimism and health.

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Fig. 1.
Multiple mediator model linking trait optimism to global sleep quality

Table 1

Results of simultaneous regression analyses predicting sleep quality (n = 175)

Variable	b	95 % CI	β	t	p
Age	-.05	(-.13, .03)	-.09	1.22	.22
Sex female	.69	(-.27, 1.66)	.10	1.42	.16
Income	-.16	(-.39, .07)	-.10	1.40	.16
Education	-.13	(-.49, .23)	-.05	.70	.48
Optimism	-1.88	(-2.52, -1.25)	-.41	5.82	.0001

Overall model $R^2 = .23$, adjusted $R^2 = .20$