Insomnia and Well-Being

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Most Americans have occasional problems with insomnia. The relationship of insomnia to illness is well known. However, insomnia may also relate to lower levels of well-being. Although there are various definitions of well-being, one of the most clearly articulated and comprehensive models identifies 2 overarching constructs, psychological well-being and subjective well-being. The purpose in the present study was to assess the relationship between insomnia symptoms and the dimensions of psychological and subjective well-being, adjusting for the potential confound of comorbid physical and psychological illness. The data for the present study came from the National Survey of Midlife Development in the United States, a survey of community-dwelling adults. After adjustment for demographic characteristics and a wide range of chronic mental and physical health conditions, insomnia symptoms were found to have a significant relationship with both psychological and subjective well-being but a stronger relationship to subjective well-being. These data suggest that insomnia symptoms have a stronger relationship to enjoying life than to the perception that one has a meaningful life.

Keywords: insomnia, sleep, subjective well-being, psychological well-being

Most Americans have occasional problems getting to sleep and remaining asleep. In fact, large-sample surveys have suggested that between 13% and 52% of those surveyed report at least occasional problems with insomnia (e.g., Bixler, Vgontzas, Lin, Vela-Bueno, & Kales, 2002; Karacan et al., 1976; Mellinger, Balter, & Uhlenhth, 1985; Shapirio & Dement, 1993). Although occasional bouts of insomnia are probably of little long-term consequence, clinically significant insomnia has been found to correlate with physical discomfort, physical disability, and symptoms of social and emotional distress (Leger, Scheuermaier, Philip, Paillard, & Guilleminault, 2001; Philip et al., 2006; Zammit, Weiner, Damato, Sillup, & McMillan, 1999). Data such as these suggest that there are important links between insomnia and illness. However, the relationship between insomnia and well-being may be of equal importance and may in fact indicate vulnerability to pathology.

A review of the literature on insomnia suggests that the cause and course of insomnia are highly variable (Rothenberg, 1997). Although many people experience primary sleep disorders, sleep disturbances are a common side effect of many medications (e.g., SSRI antidepressants, decongestants); are related to use of many psychoactive substances (e.g., alcohol, tobacco, caffeine); and are included in the symptom profiles of many anxiety and mood disorders (American Psychiatric Association, 2000). Occasional or acute episodes of insomnia are often related to environmental stressors (such as noisy neighbors), job stress, or personal stressors, such as divorce or bereavement (e.g., Ancoli-Isreal & Roth, 1999). In contrast, clinically significant insomnia lasts for at least 1 month and causes significant distress and impairment (American Psychiatric Association, 2000). Thus, insomnia may occur independently of or concurrently with physical and psychological illnesses.

The relationship between insomnia and pathology has been well characterized; however, less is known about the relationship between insomnia and well-being. Empirical work has suggested that well-being can be characterized at the social, behavioral, emotional, and psychological levels of analysis (e.g., Keyes, 2005; Keyes, Shmotkin, & Ryff, 2002). Furthermore, these researchers emphasize that mental illness is correlated with but distinct from psychological well-being. Well-being, therefore, indicates a state of both positive physical and mental functioning rather than the mere absence of pathology.

At a behavioral level, the impact of insomnia on well-being can be seen in the studies that have shown insomnia to be associated with reduced quality of life. Insomnia has been found to correlate with diminished work productivity, work absenteeism, increased health care utilization, and reduction in time devoted to recreational activity (e.g., Foley, Ancoli-Isreal, Britz, & Walsh, 2004; Kapur et al., 2002; Leger, Guilleminault, Bader, Levy, & Paillard, 2002; Ozmininkowski, Wang, & Walsh, 2007). It should be noted, however, that at least one study has shown that the rate of absenteeism in people with insomnia is similar to that in healthy sleepers, after controlling for physical and psychiatric comorbidities (Philip et al., 2006). Thus, at a behavioral level, insomnia appears correlated with a reduced participation in role-related activities.

A number of studies link insomnia to behavioral indices of reduced well-being, but fewer studies have examined the relationship of insomnia to mental representations of well-being. Although

there are various definitions of well-being, one of the most clearly articulated and comprehensive models identifies two overarching latent constructs, psychological well-being (PWB) and subjective well-being (SWB; Keyes et al., 2002). In this model, PWB is conceptualized as an agentic approach to life that reflects values of lifelong personal development, growth, "challenged thriving," and a sense of meaningful existence (Keyes et al., 2002; Ryff, 1989). Indicators of PWB include self-acceptance, the maintenance of positive attitudes about oneself despite one's limitations; positive relations with others, the sustaining of healthy social relationships; autonomy, self-determination or psychological independence; environmental mastery, the ability to adjust or maintain an adaptive environment; purpose in life, the maintenance of a sense of direction and meaning; and personal growth, a desire for ongoing personal development. Maintaining a sense of PWB requires active engagement in one's daily life, a process that is likely to be easier if one feels well rested.

SWB is related to but distinct from PWB. Whereas PWB reflects an agentic approach to living, SWB reflects a subjective sense of satisfaction and enjoyment of life (Keyes et al., 2002). Thus, SWB has been defined as a global appraisal of more positive than negative emotions and as a general sense of life satisfaction (Keyes et al., 2002). Factor analytic studies strongly support a model in which SWB and PWB are correlated but distinct facets of well-being (Keyes et al., 2002). Thus, the data show that having a happy life is related to, but distinct from, having a meaningful life.

Assuming that well-being is a positive state and not simply the absence of illness, it must also be assumed that achieving and maintaining well-being require additional effort, above and beyond the effort required to avoid illness or dysfunction. Along these lines, it has long been theorized that the main purpose of sleep is to restore health and vigor (Adam & Oswald, 1977). Consistent with this theory, daily diary studies show a link between sleep and indicators of SWB. For instance, data have shown that among fibromyalgia patients, daily fluctuations in sleep duration and quality predicted more dysphoric affect, a stronger emotional response to stress and pain, and incomplete emotional recovery from stressful days (Hamilton et al., in press; Hamilton, Catley, & Karlson, 2007). Although these studies focused on sleep disruption in a population known to have a high prevalence of insomnia, insomnia symptoms were not measured directly. More specifically, a study of insomnia patients showed a dose-response relationship between insomnia and physical symptoms and between insomnia and psychological symptoms (including symptoms of depression and anxiety); patients with severe insomnia reported more symptoms than did patients with mild insomnia, and both groups reported more symptoms than did healthy sleepers (Leger et al., 2001). A more recent study showed that insomnia patients differed from good-sleeper control patients on both the magnitude of positive and negative affect and the diurnal time course of affect (Buysse et al., 2007). Thus, there is good reason to believe that insomnia may have a direct relationship to a diminished sense of SWB.

Although a number of studies have evaluated the relationship between insomnia and the affective component of SWB, to our knowledge, no studies have examined the relationship between insomnia and PWB. However, there are indications that sleep has a relationship to PWB. One study that employed polysomnography found that indices of sleep quality were related to select PWB subscales (Ryff, Singer, & Love, 2005. Specifically, environmental mastery was correlated with sleep duration, REM onset, and REM duration. Positive relations with others was related to REM onset, REM duration, and sleep quality, and purpose in life was related to overall sleep quality. More recently, data from a sample of community-dwelling adult men and women showed that sleep duration correlated with dimensions of PWB, as well as with symptoms of anxiety and depression (Hamilton, Nelson, Stevens, & Kitzman, 2007). Specifically, people who slept either too much (>8 hours per night) or too little (<6 hours per night) also reported lower levels of positive relations with others, purpose in life, and self-acceptance. Moreover, the relationship between sleep and these dimensions of PWB remained significant after the exclusion of those with high depression scores. Although these studies measured characteristics of sleep, rather than the presence of a sleep disorder or of insomnia symptoms, the results suggest that sleep may be relevant to PWB.

The relationship between insomnia and well-being is an important one. However, to effectively isolate the relationship between insomnia and well-being, extant research indicates, it would be necessary to account for conditions that are often comorbid with insomnia, such as psychiatric problems and physical illness. Insomnia is a common complaint among those with chronic illnesses. In large-scale, community-based surveys, insomnia has been found to be highly comorbid with chronic pain (Ohayon, 2005; Skevington, 1998) and with other medical conditions that include heart disease, high blood pressure, neurological disease, breathing problems, urinary problems, and gastrointestinal problems (Taylor et al., 2007). Furthermore, it would be important to account for the confounding influence of sleeping pills, which are a known risk factor for early mortality (Kripke, Simmons, Garfinkel, & Hammond, 1979). Assuming that physical and psychiatric illness diminishes well-being, it would be important to adjust for the potentially confounding effect of physical illness when examining the relationship between sleep and dimensions of well-being.

Our purpose in the present study was to assess the relationship between insomnia and dimensions of well-being. Our primary hypothesis was that insomnia symptoms would be significantly related to PWB and to SWB, after we had adjusted for comorbid physical and psychological illness and the use of sleeping pills. To obtain a relatively unbiased sample of adult community residents, we relied on data collected as part of the National Survey of Midlife Development in the United States (MIDUS). Consistent with prior research and the theory that adequate sleep is related to good health (and agentic activity) and to vigor, which is related to mood (Adam & Oswald, 1977), we predicted that insomnia would be associated with diminished well-being after we covaried for the influence of demographic characteristics and comorbid illness. Going beyond prior research that showed a relationship between sleep problems and behavioral indicators of well-being, we took a more theoretical approach and examined the relationship between insomnia and two dimensions of well-being, PWB and SWB (Keyes et al., 2002; Ryff, 1989). This approach allowed us to ask a clinically relevant conceptual question about the relative strength of the relationship between sleep and the facets of well-being.

Method

Procedure

The data for the present study came from MIDUS, a survey conducted by the John D. and Catherine T. MacArthur Founda-

tions's Research Network on Successful Midlife Development. The MIDUS project was a multidisciplinary investigation of the factors related to physical and psychological adjustment in American adults. Data for the project were collected from a nationally representative sample of adults, from 25 to 74 years of age, using a random digit dialing procedure. For the purposes of this project, we examined the questionnaires used in the MIDUS survey for variables related to sleep, psychological and subjective well-being, and health concerns. A detailed description of data collection procedures can be found online at the MIDUS website, http://midmac.med.harvard.edu/research.html. The procedures have been described by Keyes et al. (2002).

Participants

Only individuals who responded to the questions that assessed the frequency of insomnia were included in the final analyses, which left 3,643 of the original 4,242 individuals in the MIDUS sample. Of these 3,643 participants, 50% were female. The age of participants ranged from 25 to 74 years, with a mean age of 47.02 years ($SD = 13.25$). Of the respondents, 85.6% identified themselves as White, 6.1% as Black, 0.7% as Native American, 1.5% as Asian, 0.8% as multiracial, and 2.6% as other (2.7% did not provide data regarding racial identity). The majority of participants (63.3%) were married, 18% were divorced or separated, 6% were widowed, and 12.8% had never married. The sample included individuals across the socioeconomic spectrum. Although the average reported income was $27,938 ($SD = \$38,144$), the median income was $22,000 and yearly income ranged from nothing to $1 million per year. In terms of educational attainment, 8.8% had failed to complete high school. Approximately one third of the sample (28.4%) had graduated from high school, one third (30%) had attended but not graduated from college, and another third (32.8%) had completed college or obtained a professional degree. Thus, the data provide representation for a wide range of U.S. adults from a wide range of socioeconomic backgrounds.

Measures

Difficulty sleeping. Sleep problems were assessed with two items that asked about the frequency of sleep problems. Participants were asked, "During the past 30 days, how often have you experienced trouble getting to sleep or staying asleep?" The data were originally coded so that higher scores reflected lower levels of insomnia symptoms. To make the data more interpretable, we recoded the data, so that higher numbers reflected a greater frequency of insomnia symptoms: 1 (*Not at all*), 2 (*Once a month*), 3 (*Several times a month*), 4 (*Once a week*), 5 (*Several times a week*), and 6 (*Almost every day*). Although it would have been desirable to have additional information about the nature of the insomnia symptoms, other epidemiological studies, such as those linking sleep duration to mortality, have relied on similar single-item questions (Kripke, Garfinkel, Wingard, Klauber, & Marler, 2002; Kripke et al., 1979). In addition to reporting on insomnia, participants were asked to report (yes or no) whether they had ever used sedatives, barbiturates, or sleeping pills.

Psychological well-being. The psychological well-being scales assessed six components of Ryff's (1989) model of well-being: autonomy, environmental mastery, personal growth, posi-

tive relations with others, purpose in life, and self-acceptance. Each of the six subscales was initially developed to contain 20 items, and alphas for the scales ranged from .86 to .93 (Ryff, 1989). Short forms of each of the six scales were developed for the MIDUS survey. Three items were used to assess each of the six components of Ryff's model. Participants responded using a 7-point Likert scale ranging from *strongly disagree* to *strongly agree.* The alphas for these scales ranged from .37 to .55.

Subjective well-being. The three components of subjective well-being are positive affect (PA), negative affect (NA), and life satisfaction. PA and NA were assessed by asking each participant to describe his or her emotional state over the past 30 days by rating 12 adjectives (6 positive and 6 negative) on a 5-point Likert scale. Scale means were computed for positive and negative affect, after negative affect items had been reverse coded. Thus, higher scores on PA and NA, respectively, reflect greater positive affect and lower levels of negative affect. The measures of PA and NA were internally consistent (αs = .91 and .87, respectively). Life satisfaction was assessed with a single-item measure in which participants used a 4-point scale (response options ranged from *not at all* to *a lot*) to indicate how satisfied they were with their life.

Health indicators. Health variables were selected from the MIDUS data set on the basis of their potential effects on sleep or well-being. Participants were asked, "In the past 12 months, have you experienced or been treated for any of the following?" The variables included asthma; tuberculosis; other lung problems; arthritis, rheumatism, or other bone or joint diseases; sciatica, lumbago, or recurring backache; persistent skin trouble; thyroid disease; hay fever; recurring stomach trouble, indigestion, or diarrhea; urinary or bladder problems; being constipated most or all of the time; gallbladder trouble; persistent foot trouble; trouble with varicose veins that required medical treatment; AIDS or HIV infection; lupus or other autoimmune disorders; persistent trouble with gums or mouth; persistent trouble with teeth; high blood pressure or hypertension; anxiety, depression, or some other emotional disorder; alcohol or drug problems; migraine headaches; diabetes or high blood sugar; multiple sclerosis, epilepsy, or other neurological disorders; stroke; ulcer; and hernia or rupture.

Data Analytic Plan

Structural equation modeling (SEM) was used because of its ability to separate common and unique components of variance, a process that minimizes the effects of any unreliability due to measurement error.[1] SEM analyses were conducted according to the following data analytic strategy. We specified PWB and SWB as latent variables, each with three indicators, or parcels (see Figure 1). The three indicators of PWB were created by averaging random pairs of the 6 subscale scores of Ryff's (1989) measure,

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[1] Ordinarily, it would be worrisome that interitem consistencies for the PWB subscales were much lower than were those for SWB subscales. However, three factors have mitigated the effects of differential reliability. First, because we used a latent variable framework, only common variance was analyzed. In essence, both PWB and SWB have been "purged" of measurement error to the greatest extent possible. Second, because we used standardized path coefficients rather than unstandardized coefficients, the paths from insomnia to SWB and PWB are directly comparable. Third, we used parcels as indicators of PWB, and parcels yield higher reliability than do individual items.
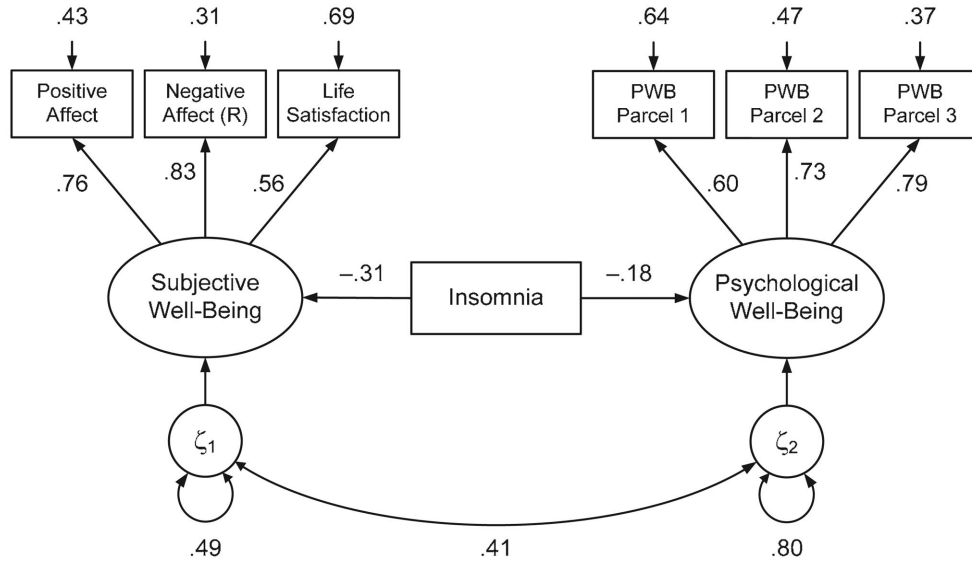
Figure 1. Correlates of subjective and psychological well-being. This figure illustrates a model in which the effects of insomnia on physical well-being (PWB) and on subjective well-being (SWB) are estimated after adjusting for age, gender, race, stomach trouble, trouble with teeth, emotional disorder, and alcohol or drug problems. SWB and PWB are latent dependent variables, treating positive affect, negative affect, and life satisfaction as observed indicators of SWB and treating parcels derived from Ryff's (1989) measure as indicators of PWB. Single-headed arrows are path coefficients or factor loadings, and double-headed arrows are residual variances or covariances. All path coefficients represent standardized values, and indicator-unique variances (at the top) represent proportions of variance in the observed indicators not explained by the SWB and PWB latent variables. ζ_1 and ζ_2 are residual terms. R = reverse scored.

resulting in three parcels. Creation of parcels to serve as indicators is consistent with recommended practice in SEM (see Kishton & Widaman, 1994; Landis, Beal, & Tesluk, 2001; Little, Cunningham, Shahar, & Widaman, 2002). Parcels are advantageous because they are more normally distributed than the items they comprise (thus they conform more closely to the assumptions of maximum likelihood) and are more reliable than individual items. Furthermore, use of a smaller number of parcels than of the original item indicators results in a more parsimonious model that remains consistent with classical test theory. Thus, relative to use of composite scale scores, parceling reduces bias and improves power (Coffman & MacCallum, 2005).

We specified insomnia as a predictor of both of these latent variables and covaried for a history of 25 comorbid physical and psychological illnesses and sedative use, as well as for demographic characteristics, gender, and ethnicity. To avoid estimation problems and to be consistent with SEM practice, we divided age by 10 to render its scale more comparable to that of other variables in the model. Regression residuals were permitted to covary, which resulted in a structurally saturated model. The negligible amount of missing data (covariance coverage was excellent, ranging from 96.4% to 100%) was addressed by employing the full-information maximum likelihood estimation algorithm in Mplus Version 4.2 (Muthén & Muthén, 1998–2006). Model fit was evaluated with two of the most commonly accepted indices of fit. Root-mean-square estimate of approximation (RMSEA) is an index of model "misfit" per degree of freedom. RMSEA values ranging from .05 to .08 are considered "acceptable"; values of .01 to .05 are considered indicative of close fit, and .00 indicates

perfect or exact fit. The Tucker–Lewis Index (TLI), a relative fit index, reflects the percentage improvement from the null model relative to a perfect fitting model. Values of .90 to .95 reflect acceptable fit; values of .95 to .99 indicate close fit, and 1.0 indicates perfect fit.

Results

A large proportion (47.5%) of this sample of middle-aged adults reported never experiencing insomnia symptoms. Of those sampled, 14.3% experienced insomnia once a month, 14.7% reported multiple bouts of insomnia in a month, 5.5% experienced insomnia once per week, 11.1% reported insomnia symptoms several times per week, and 7% reported insomnia symptoms almost every night. Consistent with other research, there was a negligible but statistically significant relationship between age and insomnia ($B = 0.005$, $SE = .002$, $p < .02$) and between gender and insomnia symptoms, $t(3,642) = 37.72$, $p < .0001$, such that older adults and women reported more frequent insomnia symptoms. On average, both women and men reported insomnia approximately once a month to several times a month (men: $M = 2.25$, $SD = 1.59$; women: $M = 2.53$, $SD = 1.74$).

Table 1 details the most commonly endorsed physical and mental health complaints represented in this sample of adults. Disorders endorsed by less than 1% of participants in this sample have been excluded from this table. The majority of participants (76%) in this sample reported suffering from at least one chronic condition, and approximately 56% reported having two or more chronic illnesses. Table 2 shows the correlation between insomnia

Table 1
Frequencies of Health Conditions and Loadings on Dimensions of Well-Being

Health condition	No. reporting condition	% sample reporting condition	Standardized effect on SWB	Standardized effect on PWB
Sciatica, lumbago	733	20.2	−0.025	−0.003
Bone or joint diseases	730	20.2	−0.016	−0.045[*]
Emotional disorder	717	19.7	−0.432[***]	−0.226[***]
Recurring stomach trouble	703	19.3	−0.042[**]	−0.063[**]
High blood pressure	666	18.3	−0.010	−0.017
Hay fever	593	16.4	0.007	0.031
Urinary or bladder problems	475	13.0	−0.039[**]	−0.020
Asthma, bronchitis, or emphysema	470	12.9	0.027	0.035
Persistent foot trouble	424	11.6	−0.036[*]	−0.024
Persistent skin trouble	411	11.3	−0.037[*]	−0.017
Piles or hemorrhoids	397	10.9	0.019	0.018
Migraine headaches	378	10.4	−0.039[**]	−0.037
Persistent trouble with teeth	350	9.6	−0.096[***]	−0.107[***]
Persistent trouble with gums or mouth	279	7.7	−0.012	−0.021
Constipation	217	6.0	−0.007	−0.018
Diabetes or high blood sugar	189	5.2	−0.029	−0.030
Thyroid disease	158	4.4	−0.009	0.012
Ulcer	147	4.0	−0.036[*]	−0.016
Other lung problems	135	3.7	−0.006	−0.016
Alcohol or drug problems	108	3.0	−0.047[**]	−0.073[**]
Hernia or rupture	107	2.9	−0.019	−0.008
Gallbladder trouble	81	2.2	0.004	−0.009
Neurological disorders	70	1.9	0.000	−0.014
Varicose veins	45	1.2	0.022	−0.022
Autoimmune disorders	44	1.2	0.004	0.030

Note. Conditions reported by less than 1% of the sample are not listed. SWB = subjective well-being; PWB = physical well-being.
[*] $p < .05$. [**] $p < .01$. [***] $p < .001$.

symptoms and observed indicators of PWB and SWB, after adjustment for demographic characteristics and the presence of physical health and mental health history and the use of sleeping pills or barbiturates.

Structural Equation Model

Our primary hypothesis was that insomnia symptoms would be significantly related to well-being, after adjustment for comorbid physical and psychological illness. Adopting the model of well-being proposed by Keyes et al. (2002), we specified PWB and SWB as latent variables. We specified insomnia symptoms as a predictor of both of these latent variables and included (histories of) 25 comorbid physical and psychological illnesses, demographic characteristics, and self-reported use of sleeping pills as covariates. The standardized effects of these variables on PWB and on SWB can be seen in Table 1. Examination of path coefficients

Table 2
Correlations Between Observed Variables

Variable	1	SWB			PWB					
		2	3	4	5	6	7	8	9	10
1. Insomnia	—	−.250	.305	−.110	−.161	−.075	−.042	−.158	−.084	−.065
2. Positive affect		—	−.512	−.340	.420	.307	.138	.410	.140	.269
3. Negative affect			—	.269	−.384	−.298	−.151	−.394	−.228	−.251
4. Life satisfaction				—	−.325	−.203	−.085	−.256	−.160	−.168
5. Self-acceptance					—	.438	.245	.524	.319	.377
6. Positive relations with others						—	.181	.315	.347	.353
7. Autonomy							—	.286	.123	.226
8. Environmental mastery								—	.218	.348
9. Purpose in life									—	.363
10. Personal growth										—

Note. All correlations are significant ($p < .05$) and all correlations $<.05$ are significant at the $p < .001$ level. SWB = social well-being; PWB = psychological well-being.

for the covariates indicated that age, race, and several physical and psychological conditions had a significant relationship with the dimensions of well-being. Standardized parameter estimates of the relationship between insomnia symptoms and the two dimensions of well-being are presented in Figure 1. Overall model fit was close, $\chi^2(128, N = 3,643) = 670.42$, TLI = .912, RMSEA = .034, 90% confidence interval (CI) = .032–.037, standardized root-mean-square residual (SRMR) = .013, and no post hoc model modification was undertaken. It should be noted that the entire 90% CI fell under this value, which indicates a high degree of confidence that the model fit the data closely.

The standardized effect of insomnia symptoms on SWB was significantly negative ($\beta = -.31$, $t = 19.51$). The standardized effect of insomnia symptoms on PWB was also significantly negative ($\beta = -.18$, $t = 9.03$), which indicated that insomnia symptoms had a relationship to well-being that was independent of a wide variety of medical and psychiatric conditions and of the use of sleeping pills (this itself was not significantly associated with SWB or with PWB). In addition to establishing these effects, we were interested in examining their relative strength. Constraining the standardized coefficients to equality resulted in a significant increase in lack of fit, $\Delta\chi^2(1) = 63.67$, $p < .0001$, which indicates that the effect of insomnia on SWB was significantly greater than was its effect on PWB.

The primary analysis reported above tested the linear relationship between insomnia symptoms in dimensions of well-being. However, we recognize that it might be important to document the relationship between insomnia and well-being, with a focus on those people with at least a moderately frequent sleep problem. Thus, we reestimated our model using the 857 people who reported symptoms once per week, several times a week, or almost every day. The results showed that even at the high end of our scale, insomnia symptoms were inversely related to SWB ($\beta = -.164$) and to PWB ($\beta = -.167$). The difference in effect size remained significant because of the large sample size, $\chi^2(1, N = 857) = 5.994$, $p = .014$. Like the original model, the restricted-range model retains a close fit, RMSEA = .034, 90% CI = .028–.040, TLI = .913, SRMR = .016. Although we had restricted the range of the data to those individuals at the high end of the insomnia symptoms scale, insomnia symptoms continued to show a significant relationship to both indices of well-being.

Discussion

The present study suggests that insomnia symptoms are related to lower levels of well-being. Furthermore, this relationship is above and beyond the influence of self-reported clinically significant physical illness and psychiatric difficulties. Although the relationship between insomnia and dimensions of well-being was not large, it was the second strongest predictor of well-being in the model, second only to the relationship of an emotional disorder to well-being. Moreover, insomnia was significantly related to both dimensions of well-being, and the relationship between insomnia and SWB was nearly twice as large as the relationship between insomnia and PWB. Conceptually, this finding indicates that difficulty sleeping has a stronger association with diminished enjoyment and satisfaction with life than it does with more agentic domains of well-being. Thus, insomnia symptoms appear less likely to promote withdrawal from important role-related obliga-

tions and social relationships than to reduce enjoyment of these activities.

Although the present study indicates that those with high levels of insomnia symptoms also report lower levels of well-being, it does not provide insight into the temporal precedence of this relationship. We framed our hypothesis to reflect a causal pathway beginning with the onset of insomnia symptoms and leading to a diminished sense of well-being. The current data are consistent with this idea and also with several diary studies that have shown poor sleep quality and periods of inadequate sleep to be prospectively related to a more negative hedonic tone (Hamilton et al., in press; Totterdell, Reynolds, Parkinson, & Briner, 1994). Significantly, these studies have shown that minor daily fluctuations in sleep predict more dysphoric mood the next day. To date, there have been no corresponding studies that have attempted to evaluate the temporal precedence of sleep and PWB.

If insomnia symptoms are causally antecedent to diminished SWB and PWB, this may help explain the prospective relationship between insomnia and onset of other psychiatric disorders, such as depression and alcoholic relapse (Drummond, Gillin, Smith, & DeModena, 1998; Ford & Kamrerow, 1989; Perlis et al., 2006). Following this possible causal scenario, insomnia would lead to more dysphoric affect and, to a lesser extent, a sense of alienation and withdrawal from the rest of the world. For those vulnerable to mood and anxiety disorders, the loss of well-being might be an important intermediate step on the pathway to clinically significant impairment.

An equally plausible causal scenario would begin with low levels of PWB and SWB leading to disturbed sleep. One could easily imagine a circumstance in which increased social isolation, a sense of purposelessness, and not feeling in control of one's life and destiny (which correspond roughly to social connectedness, purpose in life, autonomy, and environmental mastery, all dimensions of PWB), coupled with high levels of negative affect, might lead to difficulty falling asleep or staying asleep. This model is supported by research showing that life stressors and appraisals that life is more stressful predict diminished sleep quality (e.g., Ancoli-Isreal & Roth, 1999; Morin, Rodrigue, & Ivers, 2003).

Yet another causal scenario suggests that individual differences in arousal level might be the cause of poor sleep and diminished quality of life. Current theories of insomnia emphasize individual differences in arousal as a primary cause of insomnia (Bonnet & Arand, 1996) or as a diathesis activated by life stress (Morin, 1993; Spielman & Glovinsky, 1991). According to the latter formulation, precipitating factors, such as the loss of a job or the death of a loved one, may both decrease the individual's sense of well-being and activate the individual's tendency to ruminate or worry (Morin, 1993) and thus trigger the onset of insomnia. In this case, both insomnia and well-being would be caused by a third variable rather than by the cause or outcome of changes in well-being.

Longitudinal data should help to resolve the issue of temporal precedence. Instead of supporting a single linear causal pathway, the relationship between well-being and insomnia will most likely be bidirectional or cyclical in nature and will vary in response to life's challenges. Changes in the ability to initiate and maintain sleep are likely to diminish one's sense of well-being, which would in turn increase subsequent insomnia symptoms.

In an effort to isolate the effect of insomnia from potential confounding medical and psychiatric conditions, we covaried for

the presence of 25 conditions. However, less than 1% of our participants reported ever using sleeping pills or barbiturates. Furthermore, only 10 of a possible 25 physical and psychological illnesses bore unique predictive relationships with well-being (see Table 1). For instance, it seems counterintuitive that living with HIV would not diminish well-being. However, there was a very low frequency of many of the most severe medical conditions. Illnesses such as HIV, stroke, and tuberculosis were endorsed by less than 1% of the sample. Furthermore, there were two notable omissions within this list of illnesses: cancer and myocardial infarction. There was not enough variability in many of illness variables to make a significant contribution to this model, and we therefore cannot exclude the possibility that cancer or a recent heart attack could confound this relationship for some individuals.

It should be noted that we adjusted for the confounding influence of sleep medications. Epidemiological data have shown that the mortality risk of insomnia may be mainly due to the use of sleeping pills (Kripke et al., 1979). The MIDUS data set includes a single dichotomous question about lifetime use of sedatives, barbiturates, or sleeping pills. After adjustment for the use of prescription sleep medications, insomnia symptoms remained a significant predictor of well-being. However, less than 1% of participants reported ever using this type of medication. Thus, there was insufficient variability in the response to this question, so these data probably do not provide a meaningful test of the effect of sleep medication on dimensions of well-being.

In addition to the limitations we have noted, it should be acknowledged that we measured insomnia using a single question about the frequency of insomnia symptoms. The clinical definition of an insomnia disorder includes additional criteria, such as clinically significant distress or impairment in daytime functioning, and exclusionary criteria, such as the presence of another sleep disorder (e.g., sleep-disordered breathing), another mental disorder, or the presence of symptoms related to the use of a substance or other medical condition (American Psychiatric Association, 2000; Edinger et al., 2004). Although we were able to adjust for the presence of other psychiatric conditions and most major medical conditions, we cannot be sure that difficulty in initiating and maintaining sleep was not the result of another sleep disorder. Thus, our findings should be interpreted as the result of the relationship between the frequency of nighttime insomnia symptoms and well-being rather than of the relationship between a clinically distinct insomnia disorder and well-being.

Summary and Clinical Implications

The high population prevalence of insomnia symptoms suggests that a large number of people experience a reduced feeling of well-being. In fact, epidemiological data show that up to half of adults report at least occasional problems with insomnia (Bixler et al., 2002; Karacan et al., 1976; Mellinger et al., 1985; Shapirio & Dement, 1993). Although the causal direction of the relationship between insomnia and well-being is not known, the presence of insomnia symptoms coincides with a more dysphoric affective tone and, to a lesser extent, with a reduced sense of agency and engagement with life. Thus, insomnia has clear implications for mental health and well-being.

The results of this study, integrated with extant research on insomnia and quality of life, highlight the importance of routine evaluation of sleep complaints by health care providers and of referral for effective behavioral or pharmacological treatment. Evidence-based practice suggests that cognitive–behavioral therapy for insomnia (CBT-I; Morin, 1993) is an effective treatment for both primary insomnia and insomnia secondary to a variety of medical conditions, including chronic pain (Currie, Wilson, Pontefrack, & deLaplante, 2000; Edinger, Wohlgemuth, Krystal, & Rick, 2005). Moreover, CBT-I has been successfully implemented in individual (Edinger, Wohlgemuth, Radtke, Marsh, & Quillian, 2001; Jacobs, Pace-Schott, Stickgold, & Otto, 2004) and group formats (Bastien, Morin, Ouellet, Blais, & Bouchard, 2004; Currie et al., 2000). It is likely, then, that CBT-I can be incorporated as part of many therapists' practices. CBT-I may thus target a phenomenon that not only plays an important role in acute psychological disorders but is related to reduced psychological and subjective well-being.

Conversely, it would be important to investigate the possiblity that interventions designed to increase levels of psychological or subjective well-being, such as daily gratitude exercises or benefit finding (Sheldon & Lyubomirsky, 2006), might have the added benefit of reducing the experience of insomnia. Explicit targeting and evaluation of the reciprocal relationship between well-being and insomnia may provide useful information about the role of sleep and mental health.

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