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Original Article

Are Mindfulness and Self-Compassion Associated with Sleep and Resilience in Health Professionals?

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Abstract

Objectives: To describe the relationship between trainable qualities (mindfulness and self-compassion), with factors conceptually related to burnout and quality of care (sleep and resilience) in young health professionals and trainees.
Design: Cross-sectional survey.
Setting: Large Midwestern academic health center.
***Participants*:** 213 clinicians and trainees.
Outcome measures: Sleep and resilience were assessed by using the 8-item PROMIS Sleep scale and the 6-item Brief Resilience Scale. Mindfulness and self-compassion were assessed using the 10-item Cognitive and Affective Mindfulness Scale, Revised and the 12-item Self-Compassion Scale. Health was assessed with Patient-Reported Outcomes Measurement Information System (PROMIS) Global Health measures, and stress was assessed with the 10-item Perceived Stress Scale. After examination of descriptive statistics and Pearson correlations, multiple regression analyses were done to determine whether mindfulness and self-compassion were associated with better sleep and resilience.
Results: Respondents had an average age of 28 years; 73% were female. Professions included dieticians (11%), nurses (14%), physicians (38%), social workers (24%), and other (12%). Univariate analyses showed normative values for all variables. Sleep disturbances were significantly and most strongly correlated with perceived stress and poorer health, but also with less mindfulness and self-compassion. Resilience was strongly and significantly correlated with less stress and better mental health, more mindfulness, and more self-compassion.
Conclusions: In these young health professionals and trainees, sleep and resilience are correlated with both mindfulness and self-compassion. Prospective studies are needed to determine whether training to increase mindfulness and self-compassion can improve clinicians' sleep and resilience or whether decreasing sleep disturbances and building resilience improves mindfulness and compassion.

Introduction

THE PRIMARY GOAL OF TRAINING HEALTH professionals is to improve health outcomes by providing high-quality care. Recently, resilience has gained increasing attention as a possible protective factor against clinician burnout, a major risk factor for poor health and poor quality of care.[1–3] Sadly, burnout tends to increase as learners progress through training;[4–6] it has not improved in response to restrictions on duty hours, which were instituted to decrease stress and improve opportunities to sleep.[7] (See Fig. 1 for conceptual model of relationship between variables affecting quality of care and health outcomes.)

While resilience may protect against burnout, impaired sleep may exacerbate it. The Institute of Medicine has identified sleep as an important issue to address for health professionals because poor or inadequate sleep can contribute to poor personal health and burnout and adversely affect the quality of care.[8–11] Sleep is affected not only by stress, and physical and mental health problems but also by the load and structure of professional work, particularly when that work calls for extended hours and changing

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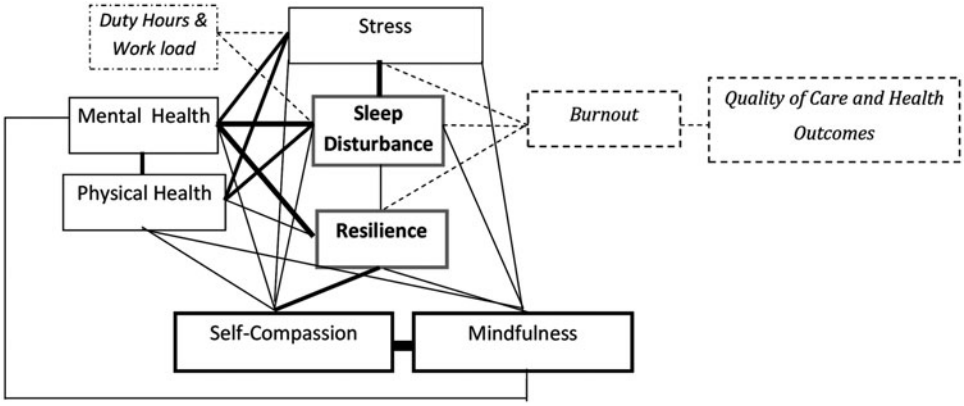

FIG. 1. Model of the posulated and measured relationships between stress, health, sleep, resilience, self-compassion, and mindfulness and the goals of high-quality care and health outcomes. Training variables are self-compassion and mindfulness. The variables sleep disturbance and resilience are the key intermediary variables tested in this conceptual model. Variables in *dashed* boxes and *italicized* text (duty hours and workload; burnout; quality of care and health outcomes) were not tested in the present study but are included as part of a larger conceptual model. Mental health refers to scores on the Patient-Reported Outcomes Measurement Information System (PROMIS) Global Mental Health instrument. Physical health refers to scores on the PROMIS Global Physical Health Instrument. Sleep disturbance refers to scores on the PROMIS Sleep Disturbance instrument. *Heavy lines* indicate correlations are significant at $p < 0.01$; *solid lines* indicate correlations are significant at $p < 0.05$. *Dashed lines* indicate that relationships are postulated but not measured in this study. There are no arrows in this figure because all measured relationships are correlational rather than causational.

shifts.[12,13] Policies aimed at reducing duty hours during graduate medical education have not been completely successful in improving sleep among trainees.[14–17] Furthermore, there are concerns that decreasing duty hours might impair rather than improve quality of care.[15,16] To the extent that reducing duty hours leads to poorer communication, less time for education, and trying to fit the same number of tasks into a shorter timeframe, this approach may actually increase stress.[18]

Clearly, a more comprehensive, holistic, and integrative approach is needed to improve sleep and resilience in health professionals. One new strategy to include in this approach may be to provide additional training to enhance protective factors. However, there are gaps in understanding the complex relationships between factors affecting burnout (sleep, resilience, mental health, and stress) and trainable qualities (such as mindfulness and self-compassion).

Mind-body training has become a popular strategy to improve health professionals' mindfulness and resilience, decrease burnout, and improve patient care.[19–24] For example, Krasner and colleagues reported that mind-body training was associated with significant improvements not only in mindfulness and burnout but also in empathy, emotional stability, and conscientiousness.[21] Fortney and colleagues found that even brief mindfulness training was associated with prolonged improvements in burnout, depression, anxiety, and stress in physicians.[24] Mindfulness training has also been endorsed as one approach to relieving insomnia in patients,[25–30] but little is known about the relationship between mindfulness and sleep in health professionals. Mindfulness has been defined by Dr. Jon Kabat-Zinn as ''paying attention in a particular way—on purpose, to the present moment, nonjudgmentally.''[22,31] The authors' small pilot study of clinicians found that mindfulness was correlated with resilience, but this relationship needs to be evaluated in more diverse groups of professionals and expanded to explore the relationship with other risk and protective factors for burnout.[32] Other studies have confirmed that mindfulness training enhances resilience over time,[33,34] but no published research appears to have evaluated the relationship between mindfulness and sleep or resilience among a multidisciplinary group of health professionals.

Another attractive target for reducing compassion fatigue or burnout in health professionals is by enhancing self-compassion.[35] Self-compassion has been defined as being composed of mindfulness, kindness toward self, and recognition of one's common humanity with others;[36] it is not the same as self-pity, self-esteem, or self-indulgence. It also differs from mindfulness, which fosters a neutral, curious attitude toward present moment experiences, although some mindfulness training programs also include training in compassion meditation practices. Self-compassion is strongly associated with emotional intelligence in nurses and nursing students, and some consider it a necessary foundation for effective empathy and compassion for others.[37,38] The authors' small pilot study of medical trainees found that self-compassion was strongly positively associated with clinician resilience.[32] However, gaps remain in understanding the relationship between mindfulness, self-compassion, sleep, and resilience in more diverse groups of health professionals.

While planning a comparison of in-person with on-line mindfulness and compassion training, the authors wished to conduct a preliminary study to assess cross-sectional relationships between trainable factors (mindfulness and self-compassion) and relevant intermediary factors for burnout (resilience and sleep) in a diverse sample of health professionals. As future interventions are planned, what other factors should be included as potentially powerful predictors of resilience and sleep (such as perceived stress and global health), and ultimately which of these factors are related to burnout and quality of care? This preliminary investigation began with the more focused question of how dispositional

mindfulness and self-compassion were related to resilience and sleep disturbances among a large, diverse group of health professionals.

Materials and Methods

This study tested these conceptual relationships in a cross-sectional survey between May 1 and July 31, 2014, in a large Midwestern academic health center. This study was approved by the Ohio State University Office of Research Institutional Review Board (2013B0611).

Participants

Participants were eligible if they were older than age 18 years, spoke and read English, had access to the Internet, and agreed to participate in a survey as part of a larger study evaluating an online curriculum in integrative medicine.

Recruitment occurred by email and focused on trainees in the health professions. The administrative offices of the Deans of the Colleges of Medicine, Social Work, and Nursing and the Program Directors for Pediatrics and Family Medicine sent emails to incoming graduate students and trainees in May and June 2014 inviting them to participate in the project with a link to the survey. In June, a faculty leader from the university's dietetics program asked if her students might be included, and the same email was forwarded to them. Approximately 450 individuals received a direct email inviting them to participate in the survey. Email ''bounces'' or returns were not included, although many trainees were moving from other institutions and had not yet arrived at the university; thus, the email invitations may not have reached them. Some University faculty and staff who heard about the project also asked to participate so they could better advise trainees. Participants who completed the questionnaires were eligible to receive $10 in recognition of their time completing the surveys.

Measures

Demographic measures included age, sex, profession, and trainee status (trainee or non-trainee).

Sleep and resilience

Sleep disturbance was assessed by using the National Institutes of Health–funded, 8-item Patient-Reported Outcome Measurement Information System (PROMIS), Sleep Disturbance Short Form,[39] which assesses sleep over the previous 7 days on a 5-point scale; it focuses on perceptions of sleep quality, sleep depth, and restoration associated with sleep; perceived difficulties with getting to sleep or staying asleep; and perceptions of the adequacy of and satisfaction with sleep.[40] As with the other PROMIS scales, raw scores (typical means are 16–18) are converted to a T-score in which 50 represents the population mean; the scale has a reliability of 0.90, with greater precision than the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale despite having fewer total test items.[39]

Resilience was assessed by using Smith's 6-item Brief Resilience Scale, which uses a 5-level summative rating response (1 = strongly disagree and 5 = strongly agree) and 3 reverse-coded items; the item-mean for this scale is typically 3.5 of a possible 5 or a scale average of 21. It is reliable, measures a unitary construct, and is negatively related to anxiety, depression, negative affect, and physical symptoms, with a Cronbach α ranging from 0.80 to 0.91 in different samples.[41]

Mindfulness and self-compassion

Dispositional mindfulness was assessed by using the 10-item Cognitive and Affective Mindfulness Scale, Revised, CAMS-R,[42] which has a 4-point summative rating scale (1 = rarely or never at all, 5 = almost always) and 1 reverse-coded item; the normative mean value for this scale is 31. This scale was developed and tested in college samples to measure dispositional mindfulness. It measures a unitary construct composed of 4 factors (attention, present focus, awareness, and acceptance) and has an overall α reliability of 0.7 to 0.74. It has strong and significant correlations with another measure of dispositional mindfulness, the Mindful Attention Awareness Scale and the Freiburg Mindfulness Inventory.[42]

Self-compassion was assessed by using Neff's 12-item self-compassion scale, which has 6 reverse-scored items (rated on a 0 = never to 5 = always scale); the normative values for this scale are a mean of 36 with standard deviation of 7. The 12-item version of the scale has nearly perfect correlation with the long form, 26-item, scale ($r > 0.97$) and has good internal reliability, with a Cronbach α of 0.86.[36]

Other predictive factors: physical and mental health, perceived stress

Global mental and physical health were assessed by using the PROMIS global health scales, which were developed and tested in multiple waves of more than 20,000 U.S. adults;[43] raw scores (typically ranging from 14 to 17) for these scales are converted to T-scores. For the general population, a T-score of 50 represents the population mean. Higher scores reflect better health; α reliability scores exceed 0.90 and the short-form scales have correlations of $r > 0.9$ for PROMIS long-form and greater than 0.8 for longer legacy measures of global health.[44]

Perceived stress was assessed by using Cohen's 10-item Perceived Stress Scale, in which each item has a response range of 0 = never to 4 = very often over the past month.[45] Total scores can range from 0 to 40, and typical scores on the PSS for health professionals range from 12 to 17; scores among adults in the general public are generally 12 to 14, and the Cronbach α for internal reliability for the 10-item version is 0.78.[46–48]

Other measures that were included in the survey but not part of the present study included 2 instruments under development (the Calm, Compassionate Care Scale and a scale to measure Self-Efficacy in providing Non-Drug Therapies),[49] and other measures used to address separate study questions, such as whether subsequent interventions were targeting those who might benefit more from training mindfulness, empathy, or compassion or whether those interventions were simply ''preaching to the choir''.[50] Similarly, measures were included to evaluate the acute effect of different kinds of mind-body skills training on empathy as well as mindfulness, resilience, and compassion.[51] Because these additional measures were not directly related to the study questions about relationships between mindfulness, compassion, resilience, and sleep, they are not described in this paper.

Statistical analysis

Surveys were completed on-line by using Survey Monkey. Data were de-identified and cleaned by a research assistant blind to the study question, exported into a spreadsheet, reformatted, and imported into SPSS software, version 22 (IBM, Armonk, NY) for scoring and analysis by a biostatistician. Univariate analysis was used to evaluate the distribution of each variable, including demographic variables and questionnaire scores. Correlations were assessed by using Pearson correlation coefficients. Although tables for all correlations are available, this report focuses on correlations between the primary factors thought to be related to burnout (sleep disturbance and resilience) and the other factors, such as mindfulness, self-compassion, global physical and mental health, and perceived stress, rather than the correlations among all possible combinations of factors.

Multiple regression analyses were performed to determine whether mindfulness or self-compassion independently predict sleep disturbances or resilience after controlling for other factors. The analysis was conducted by using SAS software, version 9.4 (SAS, Inc.; Cary, NC).

Results

Participants

As expected on the basis of the recruitment strategy, the 213 survey participants represented diverse health professionals (Table 1). They had a mean age of 28 years; most (73%) were female; and 76% were trainees.

Table 1. Participant Description

Characteristic	*Value (n = 213)*
Age (yr)	28.3 ± 8.9
Women (%)	155 (73%)
Profession	
Dietician/Nutrition professional	24 (11%)
Nurse	30 (14%)
Physician	81 (38%)
Social work	52 (24%)
Other (psychologist, public health professional, etc.)	26 (12%)
Outcomes of interest: sleep, resilience	
PROMIS Sleep Disturbance Scale (higher scores worse)	17.2 ± 6.4
Resilience (higher scores better)	21.6 ± 4.6
Mediators of interest: mindfulness, self-compassion	
Mindfulness (higher scores better)	27.7 ± 5.4
Self-compassion (higher scores better)	37.7 ± 7.5
Other factors that may affect sleep and resilience	
PROMIS Global Physical Health (higher scores better)	15.7 ± 2.1
PROMIS Global Mental Health (higher scores better)	14.1 ± 2.9
Perceived Stress Scale (higher scores worse)	17.4 ± 5.3

Values are expressed as the mean ± standard deviation or number (%) of participants.

PROMIS, Patient-Reported Outcomes Measurement Information System.

Scores for sleep and resilience

Sleep scores on the PROMIS Sleep Disturbance Scale averaged 17.2, with a T-score of 49.1 indicating that the study sample had a similar level of sleep disturbances as the general population.[52] Resilience scores on the Brief Resilience Scale averaged a total of 21.6 with an item average of 3.6, again similar to normative samples.[41]

Scores for mindfulness and resilience

Mindfulness scores were an average of 27.7, and self-compassion scale scores averaged 37.7; the mindfulness score was similar to the score in the population in which this instrument was developed,[53] and the self-compassion score was nearly identical to the population in which this instrument was tested.[54] Scores for both were normally distributed.

Scores for global physical and mental health and perceived stress

Scores for global physical and mental health were similar to population mean levels.[43] The most commonly reported health problems were headaches, allergies, premenstrual syndrome, and back pain. Perceived stress, with an average score of 17, was at the high end of perceived stress scores among health professionals.[24,55–58]

Correlations

Scores on the PROMIS Sleep Disturbance scale were significantly negatively correlated with mindfulness ($r = -0.32$; $p < 0.01$) and self-compassion ($r = -0.27$; $p < 0.01$) as well as worse physical ($r = -0.33$; $p < 0.01$) and mental health ($r = -0.37$; $p < 0.01$). Sleep disturbances were most strongly correlated with perceived stress ($r = 0.43$; $p < 0.01$) (Table 2).

Resilience scores were strongly and significantly correlated with both mindfulness ($r = 0.5$; $p < 0.01$) and self-compassion ($r = 0.54$; $p < 0.01$) and negatively correlated with perceived stress ($r = -0.53$; $p < 0.01$). Resilience was also significantly correlated with better physical ($r = 0.26$; $p < 0.01$) and particularly mental ($r = 0.44$; $p < 0.01$) health.

Mindfulness and self-compassion were strongly correlated with each other ($r = 0.63$; $p < 0.001$), and both were correlated with physical health ($r = 0.37$ and 0.29, respectively; $p < 0.01$ for both), global mental health ($r = 0.56$ and 0.53, respectively; $p < 0.001$), and perceived stress ($r = -0.58$ and -0.55; $p < 0.001$).

In addition, perceived stress was strongly negatively correlated with better mental health ($r = -0.65$; $p < 0.001$) and moderately negatively correlated with better physical health ($r = -0.4$; $p < 0.01$).

Regression analyses for sleep and resilience

Simple regression analysis for sleep indicated that both mindfulness (slope, −0.37; 95% confidence interval [CI], 0.53 to −0.22; $p < 0.0001$) and self-compassion alone (slope, −0.23; 95% CI, −0.34 to −0.12; $p < 0.0001$) were significant independent predictors of better sleep (Table 3). However, after adjustment for scores on the perceived stress scale and global mental health in the multivariate analysis, neither was a statistically significant predictor of sleep (mindfulness:

Table 2. Pearson Correlation Coefficients Between Sleep, Resilience, and Other Factors

Characteristic	*Sleep disturbance*	*Resilience*	*Mindfulness*	*Self-compassion*	*Physical health*	*Mental health*	*Perceived stress*
Sleep disturbance	1	−0.24[a]	−0.32[a]	−0.27[a]	−0.33[a]	−0.37[a]	0.43[a]
Resilience	−0.24[a]	1	0.5[a]	0.54[a]	0.26[a]	0.44[a]	−0.53[a]

[a] $p < 0.001$.

slope, −0.09 [95% CI, −0.3 to 0.11], $p = 0.38$; self-compassion: slope, 0.02 [95% CI, −0.12 to 0.17], $p = 0.76$).

Simple regression analysis also showed that both mindfulness (slope, 0.42; 95% CI, 0.32–0.52; $p < 0.0001$) and self-compassion alone (slope, 0.33; 95% CI, −0.26 to 0.41; $p < 0.0001$) were significant predictors of better resilience scores. However, after adjustment for the perceived stress and global mental health scores in the multiple regression analysis, mindfulness lost its predictive ability (slope, 0.12; 95% CI, −0.01 to 0.2; $p = 0.081$). On the other hand, self-compassion remained a significant predictor of better resilience even after controlling for other factors (slope, 0.18; 95% CI, 0.08–0.27; $p = 0.0002$).

Discussion

This is the first cross-sectional survey to examine multiple factors affecting both sleep and resilience in a diverse group of health professionals. These young health professionals reported overall levels of sleep disturbances, resilience, dispositional mindfulness, self-compassion, and health that were similar to others, despite higher stress levels. As expected, stress, mental and physical health, mindfulness, and self-compassion were significantly correlated with both sleep and resilience in simple correlations and simple regression analyses. All of these factors should be included in intervention studies designed to improve sleep, resilience, burnout, and quality of care. Even after controlling for perceived stress and mental health in a multiple regression analysis controlling for mental health and stress, self-compassion remained a significant predictor of resilience and offers an innovative target for future mind-body skills training programs for health professionals.

In this larger, more diverse group of health professionals and trainees, this study confirmed the authors' pilot project findings that dispositional mindfulness was correlated with resilience[32] and expanded understanding of the relationships to include additional variables. Most other studies evaluating the effect of mindfulness training have not controlled for perceived stress levels, sleep, or mental health, but the current study found that after controlling for stress and mental health, mindfulness alone was no longer significantly related to resilience or sleep. This may be because this population did not report high levels of sleep disturbance or lower than normal resilience or because the ability to detect significant relationships may have been limited by ceiling effects. It could also be that mindfulness does not affect resilience or sleep directly but does so primarily through changes in mental health or perceived stress. It is also possible that the measurement tools were not refined enough to detect the effects of subtle differences. These findings emphasize the importance of measuring multiple relevant variables and minimizing ceiling effects in future intervention studies.

In addition to the variables measured in this study, future intervention trials aimed at training health professionals in mind-body skills will need to measure and control for other modifiable factors, such as duty hours and work load, as well as perceived stress, global physical, and mental health. Each of these variables can have a significant effect on sleep and resilience, and ultimately on burnout and quality of care.

This study had some limitations. It was done at one academic health center and focused primarily on trainees. Results should be replicated in other settings with more established clinicians as well as those in training. The participants in this study had generally normal levels of sleep disturbance, and

Table 3. Simple and Multiple Regression Analyses Predicting Better Sleep and Resilience

Outcome Variables	*Predictor variable(s)*	*Estimated slopes (95% confidence interval)*	p-*Value*
Better sleep (simple regression analysis)	Mindfulness alone	−0.37 (−0.53 to −0.22)	<0.0001
	Self-compassion alone	−0.23 (−0.34 to −0.12)	<0.0001
Better sleep (multiple regression)	Perceived stress	0.35 (0.14–0.56)	0.0012
	Mental health	−0.36 (−0.75 to 0.03)	0.071
	Mindfulness	−0.09 (−0.3 to 0.11)	0.38
	Self-compassion	0.02 (−0.12 to 0.17)	0.76
Better resilience (simple regression)	Mindfulness alone	0.42 (0.32–0.52)	<0.0001
	Self-compassion alone	0.33 (0.26–0.41)	<0.0001
Better resilience (multiple regression)	Perceived stress	−0.23 (−0.37 to −0.1)	0.0007
	Mental health	0.05 (−0.2 to 0.3)	0.71
	Mindfulness	0.12 (−0.01 to 0.25)	0.08
	Self-compassion	0.18 (0.08– 0.27)	0.0002

results might differ in those reporting more sleep problems. This study was done as part of a larger prospective study, and participants may have self-selected on the basis of higher stress levels or interest in integrative medicine. A cross-sectional design lacking a control group cannot establish causality, and inferences about whether training in mindfulness or self-compassion can positively affect sleep or resilience need to be addressed in prospective trials. Indeed, it is possible that interventions that focus on improving sleep could improve resilience and mindfulness. Likewise, a cross-sectional study can explore relationships but cannot address the underlying mechanisms for observed associations; these mechanisms could be explored in future studies by using psychophysiologic measures and imaging techniques. Furthermore, this study measured dispositional mindfulness by using a standard measure, but other measures that focus on trained mindfulness may be worthwhile exploring in prospective trials of the effects of training in mindfulness on patient care.

Despite these limitations, this study has important implications for training health professionals. Specifically, it appears that training in mind-body skills, particularly in self-compassion, may be a worthwhile, innovative strategy to help build resilience in diverse young health professionals and trainees. Self-compassion may buffer the negative effects of stress and poorer mental health. This promising approach should be tested in a prospective, controlled trial comparing the effectiveness of self-compassion alone to mindfulness training alone and comparing both individual kinds of training to combined training. It would also be useful to test both types of training against interventions that directly target sleep, mental health, and stress.

In conclusion, mindfulness and self-compassion are positively related to sleep and resilience, and their effects may be moderated by mental health and stress levels. They offer innovative additions to comprehensive strategies to reduce clinician burnout and improve the quality of health care. Additional studies are needed to determine the best ways of decreasing stress and improving overall health, mindfulness, and self-compassion among health professionals and trainees to improve their lives and the quality of care they provide.

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Author Disclosure Statement

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