Efficacy of the Well-Being Index to identify distress and stratify well-being in Nurse Practitioners and Physician Assistants

Liselotte N. Dyrbye, MD, MHPE[1], Pamela O. Johnson, MS, RN, NEA-BC[2], LeAnn M. Johnson, MS, RN, NEA-BC[3], Michael P. Halasy, PA-C, MS[4], Andrea A. Gossard, APRN, CNP[5], Daniel Satele, BA[6], & Tait Shanafelt, MD[7]

ABSTRACT

Background and purpose: To evaluate the ability of the Well-Being Index (WBI) to stratify distress and well-being (high quality of life [QOL]) in nurse practitioners and physician assistants (NPs and PAs) and identify those whose degree of distress place them at an increased risk for medical error or turnover.

Methods: A national sample of NPs and PAs completed a survey that included the WBI and instruments to measure QOL, fatigue, burnout, recent suicidal ideation, medical error, and intent to leave the current job.

Conclusions: Overall, 1,576 of 4,106 (38.4%) NPs and PAs completed the survey. Those NPs and PAs with low mental QOL, extreme fatigue, recent suicidal ideation, or burnout had less favorable WBI scores (all $p < .0001$). Using a prevalence of low overall QOL among APPs of 14.4% as the pretest probability, the WBI score can reduce the posttest probability of low QOL to 2% or increase it to 64.7%. As the WBI score worsened, the posttest probability of high overall QOL decreased from 73% to 8.2%. Also, WBI score stratified the NPs and PAs likelihood of reporting recent medical errors and intent to leave his or her current job.

Implications for practice: The WBI is a useful screening tool to stratify distress and well-being in APPs across a variety of domains and identify those NPs and PAs whose degree of distress may increase the risk of medical error or turnover.

Key words: Advance practice; burnout; fatigue; job turnover; medical error; nurse practitioners; physician assistants; quality of life; self-assessment; suicidal ideation.

Introduction

Nurse practitioners and physician assistants (NPs and PAs) provide high-quality care to patients and expand access to care (Mundinger et al., 2000; Newhouse et al., 2011; Pavlik, Sacchetti, Seymour, & Blass, 2017; Roy et al., 2008). Generally, NPs and PAs report high job satisfaction (Bae, 2016; Hooker, Kuilman, & Everett, 2015), which is not surprising given the altruistic and meaningful nature of their work.

However, like other health care professionals, NPs and PAs also experience substantial work-related stress (Almost & Laschinger, 2002; Brom, Melnyk, Szalacha, & Graham, 2016; Trautmann, Epstein, Rovnyak, & Snyder, 2015) and are at the risk of professional burnout, depression, fatigue, and other forms of psychological distress. The prevalence of burnout and depression among physicians and nurses is alarmingly high (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Dyrbye et al., 2017; Letvak, Ruhm, & Gupta, 2012; McHugh, Kutney-Lee, Cimiotti, Sloane, & Aiken, 2011; Shanafelt et al., 2015), and this negatively affects patient outcomes, patient experience, and the cost of care. For example, burnout has been found to increase the risk of medical errors, health care–associated infections, patient dissatisfaction with their medical care, and patient mortality. Among health care workers, burnout is linked to career dissatisfaction, productivity, and turnover (Cimiotti, Aiken, Sloane, & Wu, 2012; Hayes et al., 2012; Leiter, Harvie, & Frizzell, 1998; Leiter & Maslach, 2009; McHugh et al., 2011; Shanafelt et al., 2009; Spence Laschinger, Leiter, Day, & Gilin, 2009; Vahey, Aiken, Sloane, Clarke, & Vargas, 2004; Welp, Meier, & Manser,

[1]*Professor of Medicine and Medical Education, Co-Director of Mayo Clinic Program on Physician Well-Being, Mayo Clinic, Rochester, Minnesota* [2]*Chief Nursing Officer, Mayo Clinic, Rochester, Minnesota* [3]*Department of Nursing, Mayo Clinic, Rochester, Minnesota* [4]*Department of Emergency Medicine, Mayo Clinic, Rochester, Minnesota* [5]*Department of Medicine, Mayo Clinic, Rochester, Minnesota* [6]*Department of Health Sciences Research, Mayo Clinic, Rochester, Minnesota* [7]*Jeanie & Stewart Ritchie Professor of Medicine, Chief Wellness Officer Stanford Medicine, Associate Dean, Stanford School of Medicine, Stanford, California*

Correspondence: *Liselotte N. Dyrbye, MD, MHPE, 200 First Street SW, Rochester, MN 55905. Tel: 507.284.2511; Fax: 507.266.2297; E-mail: dyrbye.liselotte@mayo.edu*

Received: *28 June 2018; accepted 22 October 2018*

2015). In addition to these professional consequences, mental health problems can lead to negative personal ramifications, including broken relationships, substance abuse, and suicide (Dyrbye et al., 2008; Oreskovich et al., 2011; Shanafelt, Sloan, Satele, & Balch, 2011). Despite the extensive data for physicians and nurses, little is known about the prevalence of distress among NPs and PAs or its professional and personal implications (Benson et al., 2016; Browning, Ryan, Thomas, Greenberg, & Rolniak, 2007).

A multifaceted approach is needed to improve the well-being of health care professionals. Individuals with high well-being should be encouraged to actively continue their current strategies. Others may benefit from help in detecting and seeking treatment for mental health problems, preferably early on when symptoms are less severe, more readily treatable, and have not yet led to personal and professional consequences. Even experienced diagnosticians struggle to accurately calibrate their own well-being (Shanafelt et al., 2014), and this contributes to the lack of timely help-seeking behaviors. Tools to assist with such self-assessment should ideally stratify well-being across the continuum from high to low well-being, screen for multiple dimensions of distress, and be practical.

Until recently, barriers to such self-assessment included existing instruments evaluating only one dimension of distress (e.g., depression, anxiety, fatigue, stress, quality of life [QOL]), being difficult to score, and not predicting professional outcomes (e.g., medical error, turnover).

In 2011, the researchers (LND, TS) developed a Well-Being Index (WBI) for health care professionals that assesses multiple dimensions of distress (Dyrbye et al., 2011) and satisfaction with work–life integration and meaning in work. The WBI score also predicts the increased risk of turnover and self-reported medical errors among health care professionals. Although validated in physicians and other US workers (Dyrbye, Satele, & Shanafelt, 2016; Dyrbye, Satele, Sloan, & Shanafelt, 2014), the ability of the WBI to stratify well-being and identify distress in APPs has not been studied.

To address this gap, the researchers conducted a national study of NPs and PAs to evaluate the ability of the WBI to stratify distress (low QOL, extreme fatigue, burnout, and recent suicidal ideation), identify those with well-being (high QOL), and ascertain individuals whose degree of distress place them at an increased risk for adverse personal and professional (medical error or turnover) consequences.

Methods
Participants
The researchers obtained e-mail and mailing addresses for a random sample of 2,100 nurse practitioners' and 2,100 physician assistants' from Redi-Data, a company that maintains more than 167,000 postal addresses and 106,000 e-mail addresses of US nurse practitioners and more than 89,000 postal addresses and 58,000 e-mail addresses for US physician assistants. Redi-Data obtains this information on NPs and PAs from state licensing records (more information available: http://www.redi-data.com/healthcare-lists/mailing-email-lists/state-licensed-nurses-rns-mailing-email-lists). In November of 2016, these were sent e-mails stating the purpose of the study (e.g., to better understand the factors that contribute to satisfaction with an invitation) with an invitation to participate and a link to the survey. Individuals who did not respond to the Web survey after three reminders were mailed a paper survey.

From the sample of 2,100 nurse practitioners and 2,100 physician assistants, the researchers were unable to reach 25 nurse practitioners and 69 physician assistants (no functional e-mail or address), resulting in a final sample of 2,075 nurses practitioners and 2,031 physician assistants.

Participation was voluntary, and all responses were anonymous. The study was deemed exempt by the Mayo Clinic Institutional Review Board.

Study measures
The survey included the nine-item WBI (Dyrbye et al., 2016) and standardized instruments to measure QOL (Gudex, Dolan, Kind, & Williams, 1996; Norman, Sloan, & Wyrwich, 2004; Rummans et al., 2006), suicidal ideation (National Comorbidity Survey 2001–2003; U.S. Department of Health and Human Services 2009), and burnout (Maslach, Jackson, & Leiter, 2016). Additional items asked were demographic and practice characteristics, intent to leave the current job, and perceived recent medical error, used in previous studies of physicians and nurses (Shanafelt, Sloan, Satele, & Balch, 2011; Shanafelt et al., 2010; West et al., 2006; West, Tan, Habermann, Sloan, & Shanafelt, 2009).

Well-Being Index
The process to develop and validate the WBI has been reported and included literature review, expert input, pilot assessment, correlation analysis from previously administered assessments, and validation studies in independent samples to examine correlations between WBI score and various outcome measures (Dyrbye et al., 2016; Dyrbye, Satele, Sloan, & Shanafelt, 2013; Dyrbye et al., 2014; Dyrbye et al., 2011). The WBI was intentionally designed to screen for multiple dimensions of distress, including depression, anxiety, stress, fatigue, burnout, and QOL (Dyrbye et al., 2011). The original seven-item index was later expanded to a nine-item index by adding two items evaluating work–life integration and meaning in work (Dyrbye et al., 2016).

Multiple validation studies in independent samples involving more than 25,800 health care professionals and

US workers in other fields have subsequently been conducted and published (Dyrbye et al., 2016; Dyrbye et al., 2013; Dyrbye et al., 2014; Dyrbye et al., 2011). However, WBI scores have been found to identify health care professionals and US workers in other fields with low QOL, extreme fatigue, burnout, and recent suicidal ideation and distinguish those with positive well-being (high QOL) (Dyrbye et al., 2016). Among health care workers, the WBI score also stratifies career satisfaction, intent to leave current job, and self-reported medical errors (Dyrbye et al., 2016; Dyrbye et al., 2013; Dyrbye et al., 2014; Dyrbye et al., 2011).

Scoring of the nine-item WBI (Dyrbye et al., 2016) involves assigning one point for each "yes" response to the original seven WBI items. Responses to the remaining two items— meaning in work ("The work I do is meaningful to me") and work–life balance ("My work schedule leaves enough time for my personal/family life)— result in subtracting one point, adding one point, or no change in score (Dyrbye et al., 2016). For the meaning in work item, from the Empowerment at Work scale; one point is added to the response indicates a low level of meaning in work (response option of one or two on the seven-item scale), whereas one point is subtracted from the total score if a favorable response (response option of six or seven) is provided. For work–life satisfaction, one point is added to the total score if lower satisfaction with work–life integration is indicated (disagree, strongly disagree), whereas those who indicated higher satisfaction (agree, strongly agree) have one point subtracted from the total score. As a result, the total WBI total score ranges from −2 to 9, with higher scores indicating greater degree of distress, lower meaning in work, and less satisfaction with work–life integration.

Other study measures

Overall QOL was measured using a standardized linear analog scale (0 = "As bad as it can be"; 10 = "As good as it can be"). Previous studies have demonstrated the validity of this scale for stratifying QOL in a variety of populations (Gudex et al., 1996; Norman et al., 2004; Rummans et al., 2006). The researchers measured fatigue using a similar linear analog scale (West et al., 2009). Suicidal ideation within the past 12 months was assessed using an item similar to items used in large US epidemiologic studies and previous studies of physicians (National Comorbidity Survey 2001–2003; U.S. Department of Health and Human Services 2009). The researchers used the Maslach Burnout Inventory Human Services Survey, widely considered the gold standard, to measure burnout (Maslach et al., 2016). Consistent with other studies, NPs and PAs were considered to have at least one symptom of burnout if they scored high on the emotional exhaustion (score ≥27) and/or depersonalization (score ≥10) subscales (Shanafelt et al., 2012; Shanafelt et al., 2015). Additional items from the previous studies of health care professionals asked about intent to leave the current job

within the next 2 years and self-perceived medical errors in the past 3 months (Shanafelt et al., 2011; Shanafelt et al., 2010; West et al., 2006; West et al., 2009).

Relationship to other variables

Because distress can manifest in a variety of ways (e.g., low QOL, burnout, fatigue) and there is no single definition for "severe distress," the researchers assessed the ability of the WBI to

1. identify NPs and PAs with low or high overall QOL as defined by a score of ≥0.5 standard deviation (SD) above or below the sex-matched mean for the group (a clinically meaningful effect size) (Norman et al., 2004);
2. identify NPs and PAs with extreme fatigue, defined by having a fatigue score of ≥0.5 SD *worse* than the sex-matched mean for the group;
3. identify APPs who had high levels of burnout in either the emotional exhaustion and/or depersonalization domains of the Maslach Burnout Inventory as defined by scores of ≥27 for emotional exhaustion or ≥10 for depersonalization;
4. identify NPs and PAs who reported suicidal ideation within the past 12 months;
5. stratify the likelihood of reporting a major medical error within the past 3 months; and
6. stratify the intent to leave their current job within the next 24 months for reasons other than retirement.

Statistical analysis

Basic descriptive statistics were calculated. The researchers used the Fisher exact tests or chi-square test, as appropriate, to determine univariate odds ratio (OR), posttest probabilities, and likelihood ratios (LRs) associated with the WBI scores for outcomes of interest. Mean WBI scores were compared between risk groups using Wilcoxon, Kruskal–Wallis, or 2-sample t tests, as appropriate. The researchers used a 5% type I error rate and a 2-sided alternative. The researchers constructed receiver operating characteristic (ROC) curves for the outcomes of interest. All analysis was conducted using SAS version 9 (SAS Institute, Cary, NC).

Results

Of the 2,075 nurses practitioners who received the survey, 976 (47%) responded. Among the 2,031 physician assistants, 600 (29.5%) responded. The demographics and practice characteristics of the 1,576 of 4,106 (38.4%) APPs who responded to the survey are shown in Table 1. The mean age of responders was 49.3, 82.8% were women, 74.9% were married, and 80.9% had children. Most (55.1%) responders worked in an outpatient clinic setting. On average, responders worked 42 hours per week.

Mean overall QOL score was 7.9 with 14.4% having low overall QOL (0.5 SD below the sex-matched mean) and

Table 1. Demographics and practice characteristics of NPs and PAs

	Combined, No. (%), n = 1,576	Nurse Practitioners, No. (%), n = 976	Physician Assistants, No. (%), n = 600
Age, mean (SD), year	49.3 (11.5)	51.6 (11.1)	45.6 (11.1)
Relationship status, no. (%)			
Single	281 (17.9)	181 (18.6)	100 (16.8)
Married	1,177 (74.9)	712 (73.1)	465 (77.9)
Partnered	83 (5.3)	55 (5.6)	28 (4.7)
Widowed	30 (1.9)	26 (2.7)	4 (0.7)
Female sex, no. (%)	1,301 (82.8)	892 (91.6)	409 (68.5)
Have children, no. (%)	1,272 (80.9)	802 (82.4)	470 (78.5)
Hours work/week, mean (SD)	42.0 (14.9)	41.7 (15.4)	42.5 (14.2)
Current practice setting, n (%)			
Hospital based	290 (20.1)	164 (18.1)	126 (23.3)
Ambulatory clinic	795 (55.1)	477 (52.7)	318 (58.9)
Nursing home, home health, or hospice	22 (1.6)	20 (2.2)	2 (0.4)
Nonclinical, such as management	14 (1.0)	10 (1.1)	4 (0.7)
Public health	21 (1.5)	15 (1.7)	6 (1.1)
Other	303 (21.0)	219 (24.2)	84 (15.6)

Note: APPs = advanced practice providers; SD = standard deviation.

42.1% having high overall QOL (0.5 SD above the sex-matched mean). Collectively, 38.5% of APPs had at least one symptom of burnout. The mean fatigue score was 6.0, and 26.3% had extreme fatigue. A few (2.5%) NPs and PAs endorsed suicidal ideation within the past year. Nearly one-third (31.5%) indicated a moderate or greater likelihood of leaving their current job within the next 2 years for reasons other than retirement, and 4.4% reported that they had made a major medical error in the past 3 months.

The proportion of NPs and PAs endorsing each WBI score is shown in **Figure 1**. The mean WBI score was 0.7 (SD, 2.4) with women NPs and PAs having a mean score of 0.77 (SD, 2.47) and male NPs and PAs having a mean score of 0.49 (SD, 2.30). Mean WBI score varied by age with those aged 25–34 years having a mean score of 1.20 (SD, 2.56), aged 35–44 years with a mean score of 0.81 (SD, 2.40), aged 45–54 years with a mean score of 0.59 (SD, 2.39), and aged ≥65 years with a mean score of 0.09 (SD, 2.50).

Ability to detect distress

Generally, NPs and PAs with low overall QOL were more likely to endorse each WBI item (Table 2) and have a less favorable index score (mean, 3.2 vs. 0.3; $p < .0001$). Using summative WBI scores, the OR of low overall QOL ranged from 0.09 for those with a score of −2 (lower score is more favorable) to 13.61 for those with a score of 6 or higher (Table 2). Using an overall prevalence of low overall QOL among NPs and PAs of 14.4% as the pretest probability, the WBI score lowered the posttest probability of low QOL to 2.0% or raised it to 64.7% (Table 3). The area under the receiver operating characteristic curve of the WBI for low QOL was 0.810.

Those NPs and PAs with extreme levels of fatigue (mean WBI score 2.2 vs. 0.2; $p < .0001$), recent suicidal ideation (mean WBI score 4.1 vs. 0.6; $p < .0001$), or symptoms of burnout (mean WBI score 2.5 vs. −0.4; $p < .0001$) also had less favorable index scores. As WBI score
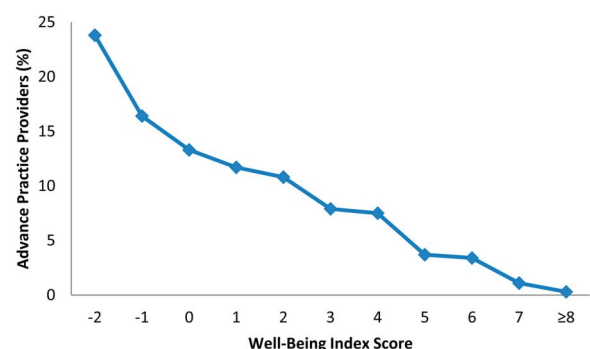

Figure 1. Well-Being Index score among advanced practice providers.

Table 2. Well-Being Index items endorsed by 1,506 NPs and PAs with or without low (unfavorable) QOL[a]

During the Past Month:	No. (%) Endorsing Item[b]		
	Individuals With Low Overall QOL (n = 215)	Individuals Without Low Overall QOL (n = 1,291)	*p*-Value
Have you felt burned out from your work?	169 (78.6%)	592 (45.9%)	<0.0001
Have you worried your work is hardening you emotionally?	104 (48.4%)	293 (22.7%)	<0.0001
Have you often been bothered by feeling down, depressed, or hopeless?	115 (53.5%)	179 (13.9%)	<0.0001
Have you fallen asleep while sitting inactive in a public place?	35 (16.3%)	118 (9.1%)	0.001
Have you felt all things you had to do were piling up so high you could not overcome them?	124 (57.7%)	326 (25.3%)	<0.0001
Have you been bothered by emotional problems (such as feeling anxious, depressed, or irritable)?	164 (76.3%)	454 (35.2%)	<0.0001
Has your physical health interfered with your ability to do your daily work at home and/or away from home?	61 (28.4%)	163 (12.6%)	<0.0001
Meaning in work			<0.0001
Response of 1 or 2	8 (3.7%)	34 (2.6%)	
Response of 3–5	75 (34.9%)	148 (11.5%)	
Response of 6 or 7	132 (61.4%)	1,109 (85.9%)	
Satisfaction with work–life integration			<0.0001
Disagree, strongly disagree	113 (52.6%)	219 (17.0%)	
Neutral	35 (16.3%)	197 (15.3%)	
Agree, strongly agree	67 (31.2%)	875 (67.8%)	
Mean WBI score[c]	3.2 (2.4)	0.3 (2.2)	<0.0001
WBI score[c]			OR (95% CI)[d]
−2 (most favorable)	7 (2.0%)	351 (98.0%)	0.09 (0.04–0.19)
−1	10 (4.0%)	238 (96.0%)	0.22 (0.11–0.41)
0	19 (9.5%)	181 (90.5%)	0.59 (0.36–0.98)
1	12 (6.8%)	165 (93.2%)	0.40 (0.22–0.74)
2	27 (16.6%)	136 (83.4%)	1.22 (0.78–1.90)
3	41 (34.7%)	77 (65.3%)	3.72 (2.46–5.60)
4	29 (25.7%)	84 (74.3%)	2.24 (1.43–3.51)
5	23 (41.1%)	33 (58.9%)	4.57 (2.63–7.94)
≥6 (least favorable)[e]	47 (64.4%)	26 (35.6%)	13.61 (8.21–22.56)

Note: CI = confidence interval; OR = odds ratio; QOL = quality of life; SD = standard deviation; WBI = Well-Being Index.
[a]The WBI is copyrighted, and permission for use must be obtained from the author.
[b]For the purpose of this study, low overall QOL was defined as having an overall standardized linear analog QOL score of ≥0.5 SD below that of the sex-matched mean for the group.
[c]See Methods for scoring.
[d]Odds ratio represents risk of low overall QOL in group of individuals that endorsed the item or the number of items relative to the referent group.
[e]These categories were pooled because a few individuals scored higher than 6 (n = 21).

Table 3. Efficacy of the WBI for identifying low overall QOL, unfavorable fatigue, recent suicidal ideation, burnout, medical error, intent to leave current job within the next 24 months for reasons other than retirement, and high QOL among NPs and PAs[a]

WBI Score	Low Overall QOL (n = 1,506)		Extreme Fatigue (n = 1,507)		Suicidal Ideation (n = 1,509)	
	LR[b]	Posttest Prob. %[c]	LR (95% Confidence Interval)	Posttest Prob. %	LR	Posttest Prob. %
−2	0.12 (0.04, 0.27)	2.0	0.39 (0.26, 0.56)	12.1	0.11 (0, 0.64)	0.3
−1	0.25 (0.11, 0.51)	4.1	0.37 (0.22, 0.6)	11.7	0.16 (0, 0.95)	0.4
0	0.63 (0.34, 1.11)	9.6	0.64 (0.39, 1)	18.4	0.2 (0, 1.2)	0.5
1	0.44 (0.2, 0.87)	6.9	0.9 (0.57, 1.41)	24.3	0.45 (0.05, 1.77)	1.1
2	1.19 (0.68, 1.99)	16.7	1.6 (1.03, 2.45)	36.2	1.26 (0.37, 3.13)	3.1
3	3.2 (1.9, 5.27)	35.0	2.11 (1.27, 3.48)	42.9	1.03 (0.18, 3.34)	2.5
4	2.07 (1.15, 3.6)	25.9	3.3 (1.98, 5.52)	54.0	1.46 (0.34, 4.15)	3.6
5	4.19 (1.93, 8.84)	41.4	1.69 (0.76, 3.64)	37.5	5.68 (1.82, 14.22)	12.5
≥6	10.85 (5.63, 21.21)	64.7	6.53 (3.28, 13.36)	69.9	8.62 (3.87, 16.81)	17.9

WBI Score	Burnout (n = 1,493)		Medical Error (n = 1,464)		Intent to Leave Current Position Next 24 Months (n = 1,290)		High Overall QOL (n = 1,506)	
	LR	Posttest Prob. %	LR	Posttest Prob. %	LR	Posttest Prob. %	LR	Posttest Prob. %
−2	0.1 (0.05, 0.16)	5.6	0.32 (0.1, 0.77)	1.4	0.26 (0.16, 0.41)	10.8	3.72 (2.8, 4.98)	73.0
−1	0.33 (0.21, 0.5)	17.0	0.64 (0.24, 1.41)	2.9	0.49 (0.31, 0.75)	18.4	1.95 (1.4, 2.73)	58.7
0	0.61 (0.4, 0.92)	27.6	0.91 (0.35, 1.93)	4.0	0.75 (0.47, 1.18)	25.8	1.03 (0.7, 1.5)	42.8
1	1.08 (0.72, 1.63)	40.4	1.18 (0.48, 2.45)	5.2	1.02 (0.64, 1.61)	32.0	0.7 (0.46, 1.06)	33.7
2	2.39 (1.56, 3.66)	59.9	1.3 (0.53, 2.72)	5.6	1.7 (1.08, 2.66)	43.9	0.5 (0.31, 0.8)	26.9
3	4.56 (2.63, 8.08)	74.0	2.05 (0.85, 4.28)	8.6	2.32 (1.37, 3.93)	51.7	0.3 (0.15, 0.55)	17.7
4	5.89 (3.24, 11.08)	78.6	1.49 (0.51, 3.54)	6.4	2.48 (1.42, 4.32)	53.3	0.12 (0.05, 0.27)	7.9
5	9.54 (3.61, 28.93)	85.6	1.72 (0.36, 5.64)	7.3	2.02 (0.88, 4.59)	48.2	0.08 (0.01, 0.3)	5.3
≥6	35.73 (9.61, 216.69)	95.7	1.99 (0.59, 5.28)	8.4	6.45 (3.05, 14.26)	74.8	0.12 (0.04, 0.34)	8.2

Note: LR = likelihood ratio; prob = probability; QOL = quality of life; SD = standard deviation; WBI = Well-Being Index.

[a]We defined (1) low overall QOL as having as mental standardized linear analog QOL score of ≥0.5 SD below that of the sex-matched mean for the group, (2) high fatigue as having a fatigue standardized linear analog score of ≥0.5 SD below that of the sex-matched mean for the group (high score is favorable), (3) recent suicidal ideation as endorsing experiencing suicidal ideation within the previous 12 months, (4) burnout as having high emotional exhaustion or high depersonalization on the Maslach Burnout Inventory, (5) medical error as endorsing the item "are you concerned you have made a major medical error in the past 3 months," (6) intent to leave as having a moderate or higher likelihood of leaving current job within the next 24 months, and (7) high overall QOL as having as mental standardized linear analog QOL score of ≥0.5 SD above that of the sex-matched mean for the group.

[b]LR indicates the likelihood ratio associated with the exact score.

[c]Posttest probability was calculated using an estimated prevalence of 14.4% for low overall QOL, 26.3% for extreme fatigue, 2.5% for suicidal ideation, 38.5% for burnout, 4.4% for medical error, 31.5% moderate or higher intent to leave current practice for reason other than retirement, and 42.1% for high overall QOL as the pretest probability.

worsened, so did the odds of extreme fatigue (OR most favorable score 0.31; OR least favorable score 7.34), recent suicidal ideation (OR most favorable score 0.09; OR least favorable score 12.75), and burnout (OR most favorable score 0.06; OR least favorable score 40.21). Assuming a prevalence of 26.3% for extreme fatigue as the pretest probability, the WBI lowered the posttest probability to 12.1% or raised it to 69.9% (Table 3). Using a prevalence of 2.46% as the pretest probability for suicidal ideation, the WBI score lowered the posttest probability to 0.3% or raised it to 17.9%. Similarly, using a prevalence of 38.5% as the pretest probability for symptoms of burnout, the WBI score lowered the posttest probability to 5.6% or raised it to 95.7%. The area under the ROC curve of the WBI for extreme fatigue, recent suicidal ideation, and burnout was 0.723, 0.840, and 0.846, respectively.

Ability to detect intent to leave and medical error
Advanced practice providers who reported they intended to leave their current job within the next 24 months had less favorable scores on the index (mean 1.7 vs. 0.1, $p < .001$); however, the mean difference in score between those who did and did not report a medical error within the previous 3 months did not reach statistical significance (mean 1.9 vs. 0.7, $p = .09$). Assuming an estimated prevalence of 4.4% for recent major medical error as the pretest probability, the WBI score lowered the posttest probability to 1.4% or raised it to 8.4% (Table 3). Lastly, using an estimated prevalence of 31.5% for intent to leave the current job within the next 24 months for reasons other than retirement, the WBI score lowered the posttest probability to 10.8% or raised it to 74.8%. The area under the ROC curve of the WBI for intent to leave and medical error was 0.682 and 0.654, respectively.

Ability to detect high quality of life
In addition to detecting distress, the researchers also evaluated the ability of the WBI to identify those with high well-being (Table 4); NPs and PAs with high overall QOL had more favorable scores on the index (mean WBI score −0.6 [lower score favorable] vs. 1.7; $p < .0001$). The OR of high QOL decreased in a stepwise fashion as the WBI score increased (from OR of 5.63 to less than 0.11). Using an estimated prevalence of high overall QOL of 42.1% as the pretest probability, the WBI score lowered the posttest probability to 8.2% or raised it to 73% (Table 3). The area under the ROC curve of the WBI for high QOL was 0.773.

Threshold score
With respect to threshold scores to identify groups of APPs who may benefit from additional support, NPs and PAs with a WBI score of two or greater were at an increased risk (LR > 1) of low QOL, extreme fatigue, suicidal ideation, burnout, recent medical error, and intent to leave the current job and were half as likely to have high QOL. These findings suggest that a score of two or higher may be a useful threshold for identifying NPs and PAs at the risk of severe distress. For example, applying a threshold score of ≥2 as a marker of risk would identify APPs with a 4-fold higher likelihood of burnout (LR, 4.72; 95% confidence interval [CI], 3.80–5.90) and a 2-fold higher likelihood of extreme fatigue (LR, 2.43; 95% CI, 2.02–2.92), low QOL (LR, 2.82; 95% CI, 2.38–3.3) and moderate or greater intent to leave their current position for reasons other than retirement in the next 24 months (LR, 2.41; 95% CI, 1.98–2.94). A threshold score of ≥2 would also identify individuals with a 65% increased likelihood of perceiving having committed a recent medical error (LR, 1.65; 95% CI, 1.18–2.18). In this cohort, 34.7% had a score of ≥2 with difference by age (age 25–34 years: 39.9%; age 35–44 years: 35.5%; age 45–54 years: 37.1%; age 55–64 years: 33.2%; age ≥65 years: 23.4%).

Discussion
In this large national study of NPs and PAs, the WBI identified those with distress (i.e., low QOL, burnout, extreme fatigue, and recent suicidal ideation) and also ascertained those at the positive end of the well-being spectrum (i.e., high QOL, high meaning in work, satisfied with work–life balance). Furthermore, the WBI stratified NPs' and PAs' intent to leave their current job for reason other than retirement and perception of having recently committed a major medical error—both professional implications of distress. These findings support that the brief WBI evaluates distress across multiple relevant dimensions (e.g. burnout, depression, QOL, stress, fatigue), predicts relevant outcomes (e.g., medical error, intent to leave), and identifies those with high and low well-being.

Among the NPs and PAs in this study, 38.5% had substantial symptoms of burnout and nearly one-third were considering a job change, similar to previous studies of APPs (Benson et al., 2016; Browning et al., 2007; De Milt, Fitzpatrick, & Sister Rita, 2011; Dyrbye et al., 2017; Hoff, Carabetta, & Collinson, 2017). The WBI takes less than 1 minute to complete, evaluates multiple dimensions of distress, is easy to score, and is associated with important personal and professional outcomes. These factors support the notion that the WBI could be a useful tool for self-assessment and work-unit evaluation. One way the WBI could be used is as a self-assessment tool to improve self-awareness and identify those who may benefit from additional support. For example, an NP or PA could complete the WBI, receive their score, and then learn how their score compares with to similar professionals nationally and whether their current level of distress places them at an increased risk of personal or professional consequences. Previous studies suggest that health care professionals frequently do not accurately calibrate their well-being (Shanafelt et al., 2014). Furthermore, providing

Table 4. Well-Being Index Items endorsed by 1,506 NPs and PAs with and without high (favorable) overall QOL, 2016[a]

During the Past Month:	No. (%) Endorsing Item		*p*-Value
	Individuals With High QOL[b] (n = 637)	Individuals Without High QOL (n = 869)	
Have you felt burned out from your work?	204 (32.0%)	557 (64.1%)	<0.0001
Have you worried your work is hardening you emotionally?	92 (14.4%)	305 (35.1%)	<0.0001
Have you often been bothered by feeling down, depressed, or hopeless?	38 (6.0%)	256 (29.5%)	<0.0001
Have you fallen asleep while sitting inactive in a public place?	52 (8.2%)	101 (11.6%)	0.0281
Have you felt all things you had to do were piling up so high you could not overcome them?	98 (15.4%)	352 (40.5%)	<0.0001
Have you been bothered by emotional problems (such as feeling anxious, depressed, or irritable)?	127 (19.9%)	491 (56.5%)	<0.0001
Has your physical health interfered with your ability to do your daily work at home and/or away from home?	42 (6.6%)	182 (20.9%)	<0.0001
Meaning in work			<0.0001
Response of 1 or 2	12 (1.9%)	30 (3.5%)	
Response of 3–5	32 (5.0%)	191 (22.0%)	
Response of 6 or 7	593 (93.1%)	648 (74.6%)	
Satisfaction with work–life integration			<0.0001
Disagree, strongly disagree	59 (9.3%)	273 (31.4%)	
Neutral	77 (12.1%)	155 (17.8%)	
Agree, strongly agree	501 (78.6%)	441 (50.7%)	
Mean WBI score[c]	−0.6 (1.7)	1.7 (2.5)	<0.0001
WBI score[c]			OR (95% CI)[c]
−2 (most favorable)	262 (73.2%)	96 (26.8%)	5.63 (4.32, 7.33)
−1	146 (58.9%)	102 (41.1%)	2.24 (1.69, 2.95)
0	86 (43.0%)	114 (57.0%)	1.03 (0.77, 1.40)
1	60 (33.9%)	117 (66.1%)	0.67 (0.48, 0.93)
2	44 (27.0%)	119 (73.0%)	0.47 (0.33, 0.67)
3	21 (17.8%)	97 (82.2%)	0.27 (0.17, 0.44)
4	9 (8.0%)	104 (92.0%)	0.11 (0.05, 0.21)
5	3 (5.4%)	53 (94.6%)	0.07 (0.02, 0.23)
≥6 (least favorable)[d]	6 (8.2%)	67 (91.8%)	0.11 (0.05, 0.26)

Note: CI = confidence interval; OR = odds ratio; QOL = quality of life; SD = standard deviation; WBI = Well-Being Index.
[a]*The WBI is copyrighted, and permission for use must be obtained from the author.*
[b]*For the purpose of this study, high overall QOL was defined as having an overall standardized linear analog QOL score of ≥0.5 SD above that of the sex-matched mean for the group.*
[c]*Odds ratio represents risk of high overall QOL in group of individuals that endorsed the item or the number of items relative to the referent group.*
[d]*These categories were pooled because few individuals scored higher than 6 (n = 21).*

feedback on the WBI score and how it compares with national samples of like professionals promotes behavioral change for those in distress (Shanafelt et al., 2014).

Aggregate, de-identified WBI scores by work-unit or by demographic group (e.g., sex, years in nursing, years of employment) could help guide organizations trying to improve APP well-being by identifying areas or groups of individuals with the greatest needs. Data from these data suggest that female and younger aged NPs and PAs may be at the highest risk for distress, suggesting limited resources, and interventions should include or target these individuals. This could help optimize resource allocation and lead to tailored work-unit or group interventions that may improve quality of care and reduce turnover (Goldberg & Steury, 2001; Pomaki, Franche, Murray, Khushrushahi, & Lampinen, 2012; Shanafelt et al., 2016). Furthermore, organizations could also use the WBI to track the well-being of APPs at their center over time to provide insights into how organizational changes are affecting NP and PA well-being.

In addition to the ethical case to monitor and improve the well-being of NPs and PAs, there is a business case. Although the rate of perceived medical errors in this cohort of NPs and PAs was lower than in previous studies of physicians (Shanafelt et al., 2010), 31.5% of NPs and PAs intened to leave their current position for a reason other than retirement in the next 24 months. Other US studies have reported a similar prevalence (27%) of NPs and PAs considering leaving their current job (De Milt et al., 2011) and strong relationships between reported intent to leave and actual turnover (Irvine & Evans, 1995). Given the cost associated with recruitment and training of NPs and PAs, taking action to promote well-being, offering support to those in distress, and addressing system issues contributing to distress are likely to have a positive return on investment (Shanafelt, Goh, & Sinsky, 2017).

Our study has several limitations. Distress is a multidimensional construct, and there is no gold standard to assess it. The researchers chose to evaluate the ability of the WBI to stratify QOL and identify those with extreme fatigue, symptoms of burnout, and recent suicidal ideation as clinically relevant dimensions of distress with potentially serious personal and professional ramifications. The researchers do not know how well the WBI stratifies other dimensions of distress. It should be noted that the WBI is not designed to evaluate or diagnosis any specific mental health conditions. Individuals who score unfavorably are likely to benefit from a professional evaluation. In addition, the present study is cross sectional and cannot determine causation and or the direction of the effect between the parameters assessed. Nonetheless, the researchers did use validated metrics to measure QOL, fatigue, and burnout and studied the relationship between WBI scores and relevant personal and professional outcomes, providing evidence of construct and criterion validity for the use of the WBI in APPs.

In summary, the present study provides data on validity and utility of the WBI in NPs and PAs. Our findings suggest that the WBI may be a useful screening tool to identify both distress and well-being across a variety of dimensions for these two professional groups. The WBI stratifies NPs and PAs well-being and identifies those at an increased risk for severe fatigue, burnout, and recent suicidal ideation and those whose degree of distress may place them at an increased risk for making a medical error or leaving their current job. Next steps include additional research to examine the relationship between anonymous self-assessment and feedback using the WBI, individual help-seeking, organizational response and system-level change, and improved well-being among NPs and PAs.

References

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association*, 288, 1987–1993.

Almost, J., & Laschinger, H. K. (2002). Workplace empowerment, collaborative work relationships, and job strain in nurse practitioners. *Journal of the American Academy of Nurse Practitioners*, 14, 408–420.

Bae, S. H. (2016). Nurse practitioners' job satisfaction in rural versus nonrural areas. *Journal of the American Association of Nurse Practitioners*, 28, 471–478.

Benson, M. A., Peterson, T., Salazar, L., Morris, W., Hall, R., Howlett, B., & Phelps, P. (2016). Burnout in rural physician assistants: An initial study. *The Journal of Physician Assistant Education*, 27, 81–83.

Brom, H. M., Melnyk, B. M., Szalacha, L. A., & Graham, M. (2016). Nurse practitioners' role perception, stress, satisfaction, and intent to stay at a Midwestern academic medical center. *Journal of the American Association of Nurse Practitioners*, 28, 269–276.

Browning, L., Ryan, C. S., Thomas, S., Greenberg, M., & Rolniak, S. (2007). Nursing specialty and burnout. *Psychology Health & Medicine*, 12, 248–254.

Cimiotti, J. P., Aiken, L. H., Sloane, D. M., & Wu, E. S. (2012). Nurse staffing, burnout, and health care-associated infection. [Erratum appears in Am J Infect Control. 2012 Sep;40(7):680]. *American Journal of Infection Control*, 40, 486–490.

De Milt, D. G., Fitzpatrick, J. J., & Sister Rita, M. (2011). Nurse practitioners' job satisfaction and intent to leave current positions, the nursing profession, and the nurse practitioner role as a direct care provider. *Journal of the American Academy of Nurse Practitioners*, 23, 42–50.

Dyrbye, L. N., Satele, D., & Shanafelt, T. (2016). Ability of a 9-item well-being index to identify distress and stratify quality of life in US workers. *Journal of Occupational and Environmental Medicine/American College of Occupational and Environmental Medicine*, 58, 810–817.

Dyrbye, L. N., Satele, D., Sloan, J., & Shanafelt, T. D. (2013). Utility of a brief screening tool to identify physicians in distress. *Journal of General Internal Medicine*, 28, 421–427.

Dyrbye, L. N., Satele, D., Sloan, J., & Shanafelt, T. D. (2014). Ability of the physician well-being index to identify residents in distress. *Journal of graduate medical education*, 6, 78–84.

Dyrbye, L. N., Schwartz, A., Downing, S. M., Szydlo, D. W., Sloan, J. A., & Shanafelt, T. D. (2011). Efficacy of a brief screening tool to identify medical students in distress. *Academic Medicine: Journal of the Association of American Medical Colleges*, 86, 907–914.

Dyrbye, L. N., Shanafelt, T. D., Sinsky, C. A., Cipriano, P. F., Bhatt, J., Ommaya, A., West, C. P., & Meyers, D. (2017). *Burnout among health care professionals: A call to explore and address this under-recognized threat to safe, high-quality care. NAM Perspectives. Discussion Paper*. National Academy of Medicine, Washington DC. Retrieved from https://nam.edu/burnout-among-health-care-professionals-a-call-to-explore-and-address-this-underrecognized-threat-to-safe-high-quality-care.

Dyrbye, L. N., Thomas, M. R., Massie, F. S., Power, D. V., Eacker, A., Harper, W., … Shanafelt, T. (2008). Burnout and suicidal ideation among US medical students. *Annals of Internal Medicine*, 149, 334.

Goldberg, R. J., & Steury, S. (2001). Depression in the workplace: Costs and barriers to treatment. *Psychiatric Services*, 52, 1639–1643.

Gudex, C., Dolan, P., Kind, P., & Williams, A. (1996). Health state valuations from the general public using the visual analogue scale. *Quality of Life Research*, 5, 521–531.

Hayes, L. J., O'Brien-Pallas, L., Duffield, C., Shamian, J., Buchan, J., Hughes, F., … North, N. (2012). Nurse turnover: A literature review-an update. *International Journal of Nursing Studies*, 49, 887–905.

Hoff, T., Carabetta, S., & Collinson, G. E. (2017) Satisfaction, burnout, and turnover among nurse practitioners and physician assistants: A review of the empirical literature. *Medical Care Research and Review*, 1077558717730157. doi: 10.1177/1077558717730157.

Hooker, R. S., Kuilman, L., & Everett, C. M. (2015). Physician assistant job satisfaction: A narrative review of empirical research. *The Journal of Physician Assistant Education*, 26, 176–186.

Irvine, D. M., & Evans, M. G. (1995). Job satisfaction and turnover among nurses: Integrating research findings across studies. *Nursing Research*, 44, 246–253.

Leiter, M. P., Harvie, P., & Frizzell, C. (1998). The correspondence of patient satisfaction and nurse burnout. *Social Science & Medicine*, 47, 1611–1617.

Leiter, M. P., & Maslach, C. (2009). Nurse turnover: The mediating role of burnout. *Journal of Nursing Management*, 17, 331–339.

Letvak, S. A., Ruhm, C. J., & Gupta, S. N. (2012). Nurses' presenteeism and its effects on self-reported quality of care and costs. *American Journal of Nursing*, 112, 30–38; quiz 48, 39.

Maslach, C., Jackson, S. E., & Leiter, M. P. (2016). *Maslach Burnout Inventory (4th ed.)*. Mind Garden, Inc. Retrieved from www.mindgarden.com.

McHugh, M. D., Kutney-Lee, A., Cimiotti, J. P., Sloane, D. M., & Aiken, L. H. (2011). Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. *Health Affairs*, 30, 202–210.

Mundinger, M. O., Kane, R. L., Lenz, E. R., Totten, A. M., Tsai, W. Y., Cleary, P. D., … Shelanski, M. L. (2000). Primary care outcomes in patients treated by nurse practitioners or physicians: A randomized trial. *Journal of the American Medical Association*, 283, 59–68.

National Comorbidity Survey (2001–2003). Collaborative psychiatric epidemiology surveys. Suicidality. Retrieved from http://www.icpsr.umich.edu/cocoon/cpes/cpes/BLSUICIDALITY/all/section.xml. May 15, 2008.

Newhouse, R. P., Stanik-Hutt, J., White, K. M., Johantgen, M., Bass, E. B., Zangaro, G., … Weiner, J. P. (2011). Advanced practice nurse outcomes 1990-2008: A systematic review. *Nursing Economics*, 29, 230–250; quiz 251.

Norman, G. R., Sloan, J. A., & Wyrwich, K. W. (2004). The truly remarkable universality of half a standard deviation: Confirmation through another look. *Expert Review of Pharmacoeconomics & Outcomes Research*, 4, 515–519.

Oreskovich, M., Kaups, K., Balch, C., Hanks, J., Satele, D., Sloan, J., … Shanafelt, T. D. (2011). The prevalence of alcohol use disorders among american surgeons. *Archives of Surgery*, 147, 168–174.

Pavlik, D., Sacchetti, A., Seymour, A., & Blass, B. (2017). Physician assistant management of pediatric patients in a general community emergency department: A real-world analysis. *Pediatric Emergency Care*, 33, 26–30.

Pomaki, G., Franche, R. L., Murray, E., Khushrushahi, N., & Lampinen, T. M. (2012). Workplace-based work disability prevention interventions for workers with common mental health conditions: A review of the literature. *Journal of Occupational Rehabilitation*, 22, 182–195.

Roy, C. L., Liang, C. L., Lund, M., Boyd, C., Katz, J. T., McKean, S., & Schnipper, J. L. (2008). Implementation of a physician assistant/hospitalist service in an academic medical center: Impact on efficiency and patient outcomes. *Journal of Hospital Medicine (Online)*, 3, 361–368.

Rummans, T., Clark, M. M., Sloan, J. A., Frost, MH, Bostwick, JM, Atherton, PJ, … Hanson, J (2006). Impacting quality of life for patients with advanced cancer with a structured multidisciplinary intervention: A randomized controlled trial. *Journal of Clinical Oncology*, 24, 635–642.

Shanafelt, T. D., Balch, C. M., Bechamps, G. J., Russell, T., Dyrbye, L., Satele, D., … Freischlag, J. A. (2009). Burnout and career satisfaction among American surgeons. *Annals of Surgery*, 250, 463–471.

Shanafelt, T. D., Balch, C. M., Bechamps, G., Russell, T., Dyrbye, L., Satele, D., … Freischlag, J. (2010). Burnout and medical errors among American surgeons. *Annals of Surgery*, 251, 995–1000.

Shanafelt, T. D., Balch, C. M., Dyrbye, L. N., Bechamps, G., Russell, T., Satele, D., … Oreskovich, M. R. (2011). Suicidal ideation among American surgeons. *Archives of Surgery*, 146, 54–62.

Shanafelt, T. D., Boone, S., Tan, L., Dyrbye, L. N., Sotile, W., Satele, D., … Oreskovich, M. R. (2012). Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Archives of Internal Medicine*, 172, 1377–1385.

Shanafelt, T., Goh, J., & Sinsky, C. (2017). The business case for investing in physician well-being. *JAMA Internal Medicine*, 177, 1826–1832.

Shanafelt, T. D., Hasan, O., Dyrbye, L. N., Sinsky, C., Satele, D., Sloan, J., & West, C. P. (2015). Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. [Erratum appears in Mayo clin proc. 2016 Feb;91(2):276]. *Mayo Clinic Proceedings*, 90, 1600–1613.

Shanafelt, T. D., Kaups, K. L., Nelson, H., Satele, D. V., Sloan, J. A., Oreskovich, M. R., & Dyrbye, L. N. (2014). An interactive individualized intervention to promote behavioral change to increase personal well-being in US surgeons. *Annals of Surgery*, 259, 82–88.

Shanafelt, T. D., Mungo, M., Schmitgen, J., Storz, K. A., Reeves, D., Hayes, S. N., … Buskirk, S. J. (2016). Longitudinal study evaluating the association between physician burnout and changes in professional work effort. *Mayo Clinic Proceedings*, 91, 422–431.

Shanafelt, T., Sloan, J., Satele, D., & Balch, C. (2011). Why do surgeons consider leaving practice? *Journal of the American College of Surgeons*, 212, 421–422.

Spence Laschinger, H. K., Leiter, M., Day, A., & Gilin, D. (2009). Workplace empowerment, incivility, and burnout: Impact on staff nurse recruitment and retention outcomes. *Journal of Nursing Management*, 17, 302–311.

Trautmann, J., Epstein, E., Rovnyak, V., & Snyder, A. (2015). Relationships among moral distress, level of practice independence, and intent to leave of nurse practitioners in emergency departments: Results from a national survey. *Advanced Emergency Nursing Journal*, 37, 134–145.

U.S. Department of Health and Human Services (2009). *Youth Risk Behavior Survey. Centers for Disease Control and Prevention*. National Center for Health Statistics. Hyattsville, MD. Retrieved from http://www.cdc.gov/HealthyYouth/yrbs/trends.htm. Accessed March 24, 2010.

Vahey, D. C., Aiken, L. H., Sloane, D. M., Clarke, S. P., & Vargas, D. (2004). Nurse burnout and patient satisfaction. *Medical Care*, 42, II57-66.

Welp, A., Meier, L. L., & Manser, T. (2015). Emotional exhaustion and workload predict clinician-rated and objective patient safety. *Frontiers in Psychology*, 5, 1–13.

West, C. P., Huschka, M. M., Novotny, P. J., Sloan, J. A., Kolars, J. C., Habermann, T. M., & Shanafelt, T. D. (2006). Association of perceived medical errors with resident distress and empathy: A prospective longitudinal study. *Journal of the American Medical Association*, 296, 1071–1078.

West, C. P., Tan, A. D., Habermann, T. M., Sloan, J. A., & Shanafelt, T. D. (2009). Association of resident fatigue and distress with perceived medical errors. *Journal of the American Medical Association*, 302, 1294–1300.