

# Well-Being in Residency: A Systematic Review

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## ABSTRACT

**Background** Rates of physician burnout have increased in recent years, and high burnout levels are reported by physicians in training.

**Objective** This review of the research on resident well-being seeks to identify factors associated with well-being, summarize well-being promotion interventions, and provide a framework for future research efforts.

**Methods** Keywords were used to search PubMed, PsycINFO, and MEDLINE. Studies included were conducted between 1989 and 2014. The search yielded 82 articles, 26 which met inclusion criteria, and were assessed using the Medical Education Research Study Quality Instrument.

**Results** Articles measured resident well-being and associated factors, predictors, effects, barriers, as well as interventions to improve well-being. Factors identified in psychological well-being research—autonomy, building of competence, and strong social relatedness—are associated with resident well-being. Sleep and time away from work are associated with greater resident well-being. Perseverance is predictive of well-being, and greater well-being is associated with increased empathy. Interventions focused on health and coping skills appear to improve well-being, although the 3 studies that examined interventions were limited by small samples and single site administration.

**Conclusions** An important step in evolving research in this area entails the development of a clear definition of resident well-being and a scale for measuring the construct. The majority ( $n = 17$ , 65%) of existing studies are cross-sectional analyses of factors associated with well-being. The literature summarized in this review suggests future research should focus on factors identified in cross-sectional studies, including sleep, coping mechanisms, resident autonomy, building competence, and enhanced social relatedness.

## Introduction

Physicians spend 3 to 7 years of their young adulthood in residency. Levinson,<sup>1</sup> an adult development researcher, described ages 28 to 33 specifically as the “Age 30 Transition,” a time to complete early adulthood with pursuit of aspirations, establishment of a niche in society, and raising a family. Yet, in residency training, inherent structural constraints present barriers to satisfactory progression through this developmental stage. The intensity of training also is associated with significant reduction in well-being markers in residents, including sleep, exercise, family interactions, religious activity, and an increase in missing significant events.<sup>2</sup> Well-being deficits that develop during residency also are present in practicing physicians. Satisfaction with work-life balance declined (48.5% versus 40.9%,  $P < .001$ ) and burnout increased in physicians between 2011 and 2014. In contrast to physicians, minimal changes in satisfaction with work-life balance or in burnout were observed between 2011 and 2014 in other working US adults, demonstrating an increasing disparity in well-being among physicians relative to the general US working population.<sup>3</sup> Furthermore, rates of burnout are increasing and more prevalent among younger physicians.<sup>4</sup>

The purpose of this study was to review the research on resident well-being, assess its quality, identify potential factors associated with resident well-being, summarize interventions that may have benefit in promoting resident well-being, and provide a framework for future research efforts in this area.

## Methods

The following electronic databases were searched: MEDLINE, PubMed, and PsycINFO. Search words included “wellness,” “well-being,” and “residency,” as well as their synonyms.

Inclusion criteria of articles for review were as follows: (1) published in an English-language peer-reviewed journal from January 1989 to January 2014; (2) study was conducted no earlier than 1989; and (3) search words appear in the title and/or abstract. Studies were excluded if they did not focus primarily on well-being of residents, and if they focused specifically on duty hours. Many residency programs implemented significant changes after New York State adopted duty hour limits in 1989<sup>5</sup>; therefore, 1989 was selected as the publication cutoff date.

The entire systematic review process was conducted by the author. The initial search identified 82 articles. Articles were further screened using the above inclusion criteria, and 53 were selected. Twenty-seven of these were excluded due to lack of focus on

DOI: <http://dx.doi.org/10.4300/JGME-D-15-00764.1>

resident well-being or specific focus on duty hours. This resulted in a total of 26 articles for analysis in this review (FIGURE 1). The Medical Education Research Study Quality Instrument (MERSQI) for quantitative studies was used to measure study quality.<sup>6</sup>

## Results

The majority ( $n = 17$ , 65%) of studies were cross-sectional, designed to determine associations between a number of personal or work characteristics and resident well-being. Twenty-one articles were quantitative research, and their average MERSQI for quantitative studies score was 10.8, with a range of 7 to 13.5 (possible MERSQI scores range from 5 to a maximum of 18). Often only specific specialties were studied, such as internal medicine, and most often studies were conducted in a single program. TABLES 1 and 2 list the studies, study characteristics, measures of well-being, and significant findings of interest.

The studies used various scales to measure well-being, including the Satisfaction with Life Scale, accepted within psychology well-being research, which measures life satisfaction, positive mood, and absence of negative mood<sup>7,8</sup>; the World Health Organization–5, a well-being scale with less ceiling effect than the Short Form (SF) mental health subscale<sup>9</sup>; and the Postgraduate Hospital Education Environment Measure (PHEEM), which evaluates autonomy, teaching, and social support.<sup>10,11</sup>

Studies had several areas of focus—measurement of well-being, predictors and factors associated with well-being, effects of well-being, interventions to enhance well-being, and barriers to well-being interventions (FIGURE 2).

### Measurement of Resident Well-Being

Resident well-being overall was lower than population well-being norms in 7 of 8 studies.<sup>12–18</sup> Comparing data that Beckman et al<sup>19</sup> collected from 202 (63%) internal medicine residents, post hoc analysis of the SF-8 mental health subscore for residents shows lower well-being scores (mean scores 46.57 versus 50.5, respectively,  $P < .0001$ ) than a similarly aged population norm.<sup>19,20</sup> A large sample of Canadian residents self-rated their mental health lower than the Canadian population norm,<sup>16</sup> and the mean perceived stress level in a large survey of family medicine interns was above population norms.<sup>17</sup> Effect sizes are small and given the variety of well-being measures used across studies, no quantitative aggregate conclusions can be drawn.

Four studies drew comparisons of well-being between various groups (FIGURE 2, group A). In a

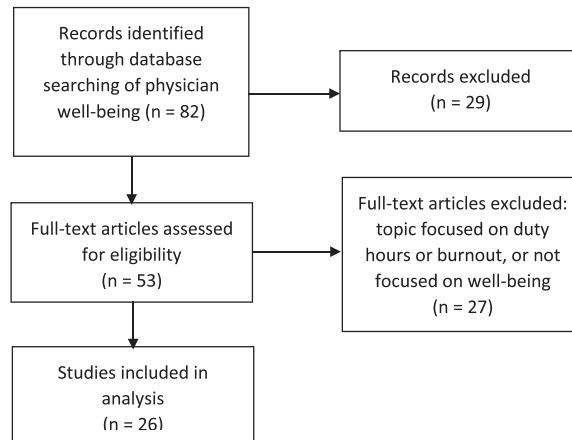
cross-sectional study comparing residents across postgraduate year (PGY), PGY-1 residents reported significantly less satisfaction with lifestyle than PGY-2 and PGY-3 residents (mean rating 1.29, 1.66, and 1.70, respectively, on a 0–4 scale, where 0 was completely dissatisfied;  $P < .001$ ). There were no significant differences in their mean ratings of work relationships, work environment, or response to patients.<sup>12</sup> Residents and their spouses did not differ in well-being or perceived stress, though response rate to this study was low at 26%.<sup>14</sup>

Two studies compared resident and faculty well-being. Residents, female residents in particular, had the lowest probability of scoring above the study population mean for well-being. They were also most likely to report frequent feelings of sadness or depression. Residents were 6 times less likely than medical students to report finding fulfillment in school or work, and residents were 13 times less likely than students to exhibit high overall career satisfaction, with attending physicians ranking between residents and students in these 2 areas.<sup>13</sup> Similarly, in a survey of 384 orthopedic residents and 264 faculty across 64 programs, orthopedic residents reported significantly higher rates of emotional exhaustion (32% versus 28.4%, respectively;  $P < .04$ ) and depersonalization (56% versus 24.8%, respectively;  $P < .0001$ ) compared to faculty, and 18% of residents versus 10% of faculty scored in the low range of personal accomplishment ( $P < .009$ ).

More residents reported a worse work-life balance than faculty (30% versus 17% were somewhat to extremely dissatisfied,  $P < .0001$ ), indicated more work-life conflicts, and reported they felt too tired or irritable after work to participate in home life. Residents exercised less frequently (41% of residents versus 54% of faculty exercised 3 to 5 times per week,  $P < .002$ ); exercise and hobbies were correlated with lower psychological symptomatology. Interestingly, faculty reported higher levels of stress and more difficulty leaving personal concerns behind when at work.<sup>21</sup> Generalizability of these studies is limited due to low response rates (17%–30%) to the cross-sectional surveys. Thus, these are useful pilot data and require replication with a greater response rate for conclusions to be drawn.

### Factors Correlated With Resident Well-Being

Several studies examined factors that correlate with well-being measures (FIGURE 2, group B). Overall, autonomy, competence, and social relatedness were the areas found to be widely associated with greater resident well-being. Specifically, a sense of control and



**FIGURE 1**  
Review Selection Process and Results

Note: Twenty-nine of 82 articles were excluded after review of articles retrieved through database keyword search based on the following inclusion criteria: (1) published in an English-language peer-reviewed journal from January 1989 to January 2014 with study having been conducted since 1989; (2) search words appear in the title and/or abstract; and (3) primary well-being research with residents. Fifty-three full-text articles were assessed and were excluded if focused specifically on the issue of duty hours or burnout due to existing literature reviews that address this. This resulted in a total of 26 articles identified for inclusion.

autonomy, pursuit and achievement of goals, opportunities for learning, increased confidence and sense of increasing mastery, positive feedback, and positive colleague relationships were all associated with greater well-being across 4 studies.<sup>21–24</sup>

A few additional factors were associated with well-being. Sleep was found to be important in several studies. A greater amount of sleep, physical activity, and time in nature were associated with measures of greater well-being or less burnout.<sup>17</sup> Sleep deprivation was associated with increases in all measures of distress in a survey of orthopedic residents in 2009.<sup>21</sup> In interviews conducted in 2005, residents described sleep deprivation as an important stressor that led to poorer well-being.<sup>25</sup> Papp et al<sup>26</sup> studied residents across 6 different specialties in 5 institutions in 2001–2002, and residents noted that sleep loss affected their personal well-being, ability to learn, professionalism, task performance, and personal relationships. In the same study, 84% of residents fell in range of the Epworth Sleepiness Scale where “clinical intervention is recommended,” and mean scores fell between the average score for patients with obstructive sleep apnea and narcolepsy.<sup>26</sup>

Time away from work was another important associated factor. In a cross-sectional survey, a score for personal time availability (PTA) was computed by averaging residents’ reported ability to find time to exercise, socialize, and tend to errands. Residents scoring above the median PTA reported more positive experiences and emotions, fewer negative experiences and emotions, higher career choice satisfaction, and less perceived stress. Scoring above median PTA was also associated with working fewer hours ( $P < .001$ )

and more sleep hours ( $P = .006$ ), after adjustment for age, gender, and years in training.<sup>27</sup> Due to the study design, it cannot be determined whether PTA is the factor most associated with greater well-being, or if it is a proxy measure of fewer hours of work. Interns identified that lighter rotations and vacations were associated with upswings in their well-being, and long work hours and on call were associated with downswings.<sup>24</sup> Obstetrics-gynecology residents in 1 program rated their lifestyle low, which correlated with lower residency satisfaction.<sup>22</sup>

Being in a relationship was studied and found associated with greater well-being.<sup>16,17</sup> In a survey of residents across 11 specialties, sexual functioning was associated with overall quality of life, and sexual dysfunction (a score less than 23 on the male and female sexual function inventories) was found to affect 49% of women and 11% of men. High stress was associated with sexual dissatisfaction (a subset measure on the male and female sexual function inventories), and male residents working over 70 hours per week were 4 times as likely to have sexual dissatisfaction ( $P < .001$ ; adjusted OR = 4.35; 95% CI 1.83–11.6). Residents reported that their sexual activity frequency and partner relationship quality had decreased during residency, with also a decrease in sexual encounters per month from a mean of 10.5 prior to residency for women down to 4.4 per month during residency, and from 8.3 down to 4.2 for men ( $P < .001$ ).<sup>28</sup>

Religion and spirituality were examined in 2 studies. Higher mental well-being was associated with “incorporating a life philosophy stressing balance in personal and professional life” and “nurturing

**TABLE 1**  
Demographics and Characteristics of Studies Examining Resident Well-Being

Source, <i>y</i> (Category per FIGURE 2)	Sample Size (Response Rate %)	Study Period	Population	Study Design	MERSQI Quality Score <sup>a</sup>
Hoonpongimanont et al, <sup>12</sup> 2013 (A)	360 (30)	NR	Nonrandom sample of US ER residents	Cross-sectional survey	7.5
Hull et al, <sup>13</sup> 2008 (A)	2341 (17 of residents)	2001–2004	Midwest school alumni, faculty, medical students, and residents	Cross-sectional survey	7
Powers et al, <sup>14</sup> 2004 (A)	324 (26)	NR	Southeast hospital married residents in internal medicine, radiology, ob-gyn, and family medicine and spouses	Cross-sectional survey	12
Sargent et al, <sup>15</sup> 2004 (A)	1416 (27)	NR	Orthopedic residents and faculty	Cross-sectional survey	9.5
Cedfeldt et al, <sup>27</sup> 2010 (B)	675 (66)	Jan 2008	Oregon Health & Science University residents	Cross-sectional survey	9.5
Cohen et al, <sup>16</sup> 2008 (B)	5784 (35)	2004–2005	Canadian residents	Cross-sectional survey	12
Eckleberry-Hunt et al, <sup>29</sup> 2009 (B)	395 (38)	Oct–Nov 2006	Michigan residents from 2 hospitals	Cross-sectional survey	10.5
Lebensohn et al, <sup>17</sup> 2013 (B)	219 (77)	Fall 2012	Interns from 12 family medicine programs	Cross-sectional survey	10
Lund et al, <sup>22</sup> 2004 (B)	35 (94)	June 2003	University of Colorado ob-gyn residents	Cross-sectional survey	11
Sangi-Haghpheykar et al, <sup>28</sup> 2009 (B)	480 (71)	NR	Baylor University residents from 11 specialties	Cross-sectional survey	10.5
Yi et al, <sup>30</sup> 2007 (B)	227 (92)	July–Nov 2003	University of Cincinnati residents from internal medicine, pediatrics, medicine-pediatrics, and family medicine	Cross-sectional survey	12
Manusov et al, <sup>23</sup> 1995 (B)	86 (67)	Mar–May 1994	Residents from 4 programs in family medicine	Interviews with participant observation	N/A
Papp et al, <sup>26</sup> 2004 (B)	149 (NR)	2001–2002	Residents at 5 US programs in ob-gyn, ER, family medicine, internal medicine, pediatrics, and surgery	Interviews, cross-sectional survey	10.5
Hurst et al, <sup>24</sup> 2013 (B)	17 (NR)	NR	University of Toronto interns	Interviews, qualitative thematic analysis	N/A
Salles et al, <sup>31</sup> 2013 (C)	141 (84)	NR	Stanford Hospital surgical residents	Cross-sectional survey	11.5
Zahrai et al, <sup>32</sup> 2008 (C)	15 (NR)	NR	University of Toronto orthopedic residents	Prospective observational	N/A
Shanafelt et al, <sup>18</sup> 2005 (D)	165 (50)	Summer 2003	Mayo Clinic internal medicine residents	Cross-sectional survey	11.5
West et al, <sup>33</sup> 2010 (D)	21 208 (77)	2008–2009	US internal medicine residents taking in-training examination	Cross-sectional survey	12
West et al, <sup>34</sup> 2011 (D)	182 (74)	July 2004–June 2007	Mayo Clinic internal medicine residents	Cross-sectional survey	11.5
Beckman et al, <sup>19</sup> 2012 (D)	312 (65)	Jan 2009–Aug 2010	Mayo Clinic internal medicine residents	Cross-sectional survey	11.5

**TABLE 1**  
Demographics and Characteristics of Studies Examining Resident Well-Being (continued)

Source, y (Category per FIGURE 2)	Sample Size (Response Rate %)	Study Period	Population	Study Design	MERSQI Quality Score <sup>a</sup>
Ratanawongsa et al, <sup>25</sup> 2008 (D)	49 (53)	Feb–June 2005	Residents from 2 hospitals in internal medicine, psychiatry, surgery, ER, anesthesia, ob-gyn, and pediatrics	Interviews	N/A
de Oliveira Filho and Vieira, <sup>35</sup> 2007 (D)	63 (89)	July 2003–Jan 2005	Residents from 3 Brazilian programs in anesthesia	Prospective observational	N/A
Ey et al, <sup>36</sup> 2013 (E)	629 (71)	2011	Oregon Health & Science University residents	Cross-sectional survey	8.5
Watson et al, <sup>37</sup> 2009 (F)	33 (79)	2003	US hospital surgical residents	Prospective interventional	13.5
Foster et al, <sup>38</sup> 2012 (F)	23 (NR)	2007–2010	Lehigh Valley Health Network family medicine residents	Prospective interventional	12.5
Saadat et al, <sup>39</sup> 2012 (F)	60 (N/A)	2 years, 16-week intervention	Urban hospital anesthesia residents	Randomized control trial: wellness intervention group, control with release time, control with routine duties	13

Abbreviations: MERSQI, Medical Education Research Study Quality Instrument; NR, not reported; ER, emergency room; ob-gyn, obstetrics-gynecology; N/A, not applicable.  
<sup>a</sup> The MERSQI for Quantitative Studies was used to measure study quality (score range 5–18).

religious/spiritual aspects of [oneself].”<sup>18</sup> In a multivariate analysis, a lower health rating on a self-rated health scale was associated with poor spiritual well-being.<sup>30</sup>

One study chose to measure well-being as the opposite of burnout. They used the inverse of the submeasures of the well-validated Maslach Burnout Inventory, thus defining well-being as lower emotional exhaustion, lower depersonalization (feeling detached or cynical about patients), and higher personal accomplishment. An increase in perceived social support via family, friends, or support groups for physicians was associated with decreased emotional exhaustion and depersonalization and increased personal accomplishment. Adjustment for multiple comparisons and raw or mean scores were not reported.<sup>29</sup> The questionnaire design asked residents to self-identify which factors protect them from burnout; this carries the implicit assumption that protection from burnout is well-being, and that residents know what protects them from burnout. Alcohol use was negatively associated with well-being in 2 other studies, and prescription drug use associated with higher depersonalization scores.<sup>16,17,21</sup>

### Predictors of Resident Well-Being

Two studies, which were stronger in having a longitudinal design (FIGURE 2, group C), examined potential predictors of well-being. In a prospective longitudinal study of surgical residents at 1 institution, “grit,” or perseverance, was found predictive of higher psychological well-being 6 months later, controlling for gender and baseline well-being ( $B = 0.27, P < .01$ ).<sup>31</sup> In a longitudinal study of orthopedic surgery residents on a trauma rotation, general health scores decreased 2 months into the rotation (mean SF-36 subscale scores 58.13–53.68,  $P = .015$ ). Residents became less concerned about not having enough time to spend with friends and family, and more social time became time spent exclusively with medical colleagues.<sup>32</sup>

### Potential Effects of Resident Well-Being

The next set of studies examined the correlation of well-being to hypothesized downstream effects of well-being (FIGURE 2, group D). Shanafelt et al<sup>18</sup> found greater mental well-being to be associated with greater empathy in internal medicine residents. Four studies examined well-being and the potential association with academic performance. When adjusted for year of training, internal medicine in-training examination scores were not correlated with well-being.<sup>33,34</sup> Similarly, well-being and academic success were not correlated in 2 additional studies.<sup>19,35</sup>

**TABLE 2**  
Measures and Findings of Studies Examining Resident Well-Being

Source, y (FIGURE 2 Category)	Well-Being Measures	Significant Well-Being Findings
Hoonpongsimanont et al, <sup>12</sup> 2013 (A)	Study-designed survey	Lifestyle: significantly dissatisfied; PGY-2 and PGY-3 more satisfied than PGY-1
Hull et al, <sup>13</sup> 2008 (A)	Empathy, spirituality, and wellness in medicine scale	Residents: had lower wellness than faculty and medical students; residents least likely to find fulfillment in work or have high career satisfaction
Powers et al, <sup>14</sup> 2004 (A)	Wellness Evaluation of Lifestyle, PSS, General Mattering Scale	Residents: demonstrated greater work satisfaction than their spouses and counseling students
Sargent et al, <sup>15</sup> 2004 (A)	MBI, General Health Questionnaire–12, Revised Dyadic Adjustment Scale	Residents: worse work-life conflicts than faculty and lower sense of personal accomplishment
Cedfeldt et al, <sup>27</sup> 2010 (B)	Personal time availability	Greater personal time associated with greater positive experiences and emotions, higher career satisfaction, and less stress
Cohen et al, <sup>16</sup> 2008 (B)	Masse well-being, self-rated mental and physical health	Greater mental health associated with being in a relationship, less financial stress, and being less likely to want to change residencies or careers
Eckleberry-Hunt et al, <sup>29</sup> 2009 (B)	MBI	Personal accomplishment associated with increased perceived social support
Lebensohn et al, <sup>17</sup> 2013 (B)	PSS, CES-D, MBI, Satisfaction with Life Scale, Wellness Behavior Survey	Life satisfaction greater in residents in a relationship, and associated with greater sleep and physical activity
Lund et al, <sup>22</sup> 2004 (B)	Overall residency satisfaction	Residency satisfaction associated with perception of quality of faculty; professional relationships and lifestyle are predictors of satisfaction
Sangi-Haghpeykar et al, <sup>28</sup> 2009 (B)	QOL Inventory, Female/Male Sexual Function Inventory	Lower QOL associated with sexual dysfunction/dissatisfaction and higher stress levels
Yi et al, <sup>30</sup> 2007 (B)	Self-rated health, 0–100	Lower health rating associated with internal medicine residents, depressive symptoms, poorer spiritual well-being
Manusov et al, <sup>23</sup> 1995 (B)	Factors residents associate with well-being	Not applicable
Papp et al, <sup>26</sup> 2004 (B)	Perceived effects of sleep loss; fatigue level, Epworth Sleepiness Scale	Residents report sleep loss affects ability to learn, professionalism, performance, well-being, relationships
Hurst et al, <sup>24</sup> 2013 (B)	Study-designed probing questions	Not applicable
Salles et al, <sup>31</sup> 2013 (C)	Dupuy Psychological General Well-being Scale, MBI, Short Grit Scale	Grit predictive of well-being 6 months later
Zahrai et al, <sup>32</sup> 2008 (C)	36-item Short-Form Health Survey, perceived level of stress	Throughout surgical rotation, physical health and social function decreased; lack of social time decreased as perceived problem
Shanafelt et al, <sup>18</sup> 2005 (D)	SF-8; IRI	Greater well-being associated with greater empathy; men had greater mental well-being
West et al, <sup>34</sup> 2011 (D)	QOL via single-item LASA, MBI	Higher QOL and work-life balance satisfaction associated with PGY-3
West et al, <sup>33</sup> 2010 (D)	QOL LASA, MBI, SF-8, PRIME-MD depression screen	Well-being not associated with in-service test scores when adjusted year of training
Beckman et al, <sup>19</sup> 2012 (D)	QOL LASA, MBI, SF-8, depression screen, IRI	Well-being not associated with test scores
Ratanawongsa et al, <sup>25</sup> 2008 (D)	Well-being rating	Not applicable
de Oliveira Filho and Vieira, <sup>35</sup> 2007 (D)	World Health Organization Quality of Life Inventory	Subjective QOL not associated with academic performance

**TABLE 2**  
Measures and Findings of Studies Examining Resident Well-Being (continued)

Source, y (FIGURE 2 Category)	Well-Being Measures	Significant Well-Being Findings
Ey et al, <sup>36</sup> 2013 (E)	Survey about resident wellness program	Reasons for not accessing wellness program associated with variable demographics
Watson et al, <sup>37</sup> 2009 (F)	Stanford Presenteeism Scale	Baseline presenteeism score below population norm; senior residents showed significant improvement in wellness with intervention compared to junior residents
Foster et al, <sup>38</sup> 2012 (F)	Arizona Integrative Outcome Scale	No significant difference between intervention and nonintervention group
Saadat et al, <sup>39</sup> 2012 (F)	48-item Role Quality Scale, coping strategy and social support indicators, CES-D, State-Trait Anxiety Inventory	Wellness intervention group with greater problem solving, more social support from work, decreased parental stress and anxiety, and trend of decreased stress showed decreased depressive symptoms

Abbreviations: PGY, postgraduate year; PSS, Perceived Stress Scale; MBI, Maslach Burnout Inventory; CES-D, Center for Epidemiologic Studies Depression Scale; QOL, 36-item Quality of Life; SF-8, 8-item Short Form; IRI, Interpersonal Reactivity Index; LASA, Linear Analogue Self-Assessment; PRIME-MD, Primary Care Evaluation of Mental Disorders.

Via semistructured interviews of residents in 2 programs, residents identified their well-being as affecting relatedness (specifically, the quality of discussions with patients and interactions with colleagues), competence (performance and decision making), and autonomy (motivation with both daily work and career).<sup>25</sup> Directionality of effects of well-being cannot be drawn here, as the identified effects may instead be generating well-being.

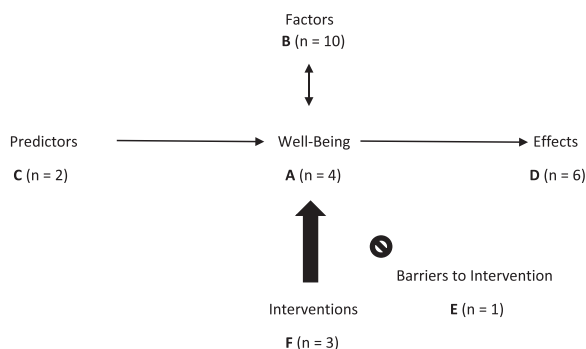
**Barriers to Interventions to Improve Resident Well-Being**

Demographics of being a woman, under age 32, and Caucasian were each associated with not using a resident mental well-being program because of feeling unable to take time for an appointment (FIGURE 2, group E). Men were more concerned about the potential utility of this well-being program (OR = 0.55, 95% CI 0.36–0.85), and minorities were significantly more concerned about confidentiality (OR = 0.56, 95% CI 0.28–0.92). Unwillingness to

use the program was associated with concerns about helpfulness and stigma.<sup>36</sup>

**Interventions to Improve Resident Well-Being**

Three studies tested and evaluated interventions aimed to improve resident well-being (FIGURE 2, group F). An intervention of providing faculty group consultation to family medicine residents on progress, goals, and well-being 2 to 3 times per year showed no difference to the prior-to-intervention group, although a true difference cannot be excluded due to the small sample size used in the study and lack of prior power calculation.<sup>38</sup> An assumed effect of well-being—presenteeism, an ability to concentrate and maximally produce quality work while at a job—was studied before and after the well-being intervention of hospital gym access. Baseline presenteeism scores of these surgical residents were significantly below the population norm (mean Stanford Presenteeism Scale scores 17.3 versus 24,  $P < .0001$ ), and senior residents demonstrated significant improvement in presenteeism with the intervention, compared to junior residents (mean 20.5 versus 16.6,  $P = .034$ ).<sup>37</sup> This study benefits from the interventional and longitudinal design but is limited by a small sample size. In a randomized controlled trial of anesthesia residents, an intervention developed around an evidence-based workplace program for strengthening coping mechanisms was delivered. One control group was given the equivalent amount of time to spend in a room together doing what they wished, and the other control group had duties as usual. There was a significant reduction in anxiety in the well-being group compared to the routine duties group (adjusted difference 7.6 on the State-Trait Anxiety Inventory [score range 20–80],  $P = .02$ ).<sup>39</sup> Limited by small



**FIGURE 2**  
Focus Areas of Studies Investigating Resident Well-Being

numbers, these studies suggest hypotheses for future testing, but they do not provide evidence that a particular intervention should be adopted by a residency program or institution.

## Discussion

The strength of the current literature is a demonstration of the factors that correlate with resident well-being. This body of literature has several methodological limitations. The vast majority of the studies are cross-sectional surveys, with associated problems of sampling, reporting, and recall bias. Only 3 studies reported the results of interventions to enhance well-being, all with small sample sizes. Due to the small sample sizes, it is difficult to determine whether failure to observe statistically significant outcomes was due to lack of intervention efficacy or lack of statistical power. The interventions studied surgical, anesthesia, and family medicine residents, limiting their generalizability to other specialties. No longitudinal studies have investigated how resident well-being evolves over the course of residency, nor have studies compared residents' current well-being to well-being preridency or postresidency. Well-being across specialties cannot be assessed with the current data, and several specialties are not represented.

The well-being measures used were varied, with limited discussion as to why they were chosen. A consensus on appropriate well-being scales in the field would allow greater comparisons to be drawn across future studies. The Satisfaction with Life Scale<sup>8</sup> could be considered in future studies. However, this scale may not fully capture well-being so much as happiness, and proposed additions to the scale include a subjective vitality scale, self-actualization scale, and mental health scales.<sup>40,41</sup> The PHEEM<sup>10</sup> is an important potential measure given the established importance of autonomy and social support in fostering well-being. Determination and validation of an appropriate well-being scale for this population is a key area for future work.

The 3 main factors associated with resident well-being in the current literature coincide with the psychological research on well-being. These factors are autonomy, competence building, and strong social connection. In the field of well-being research, Ryan and Deci<sup>40</sup> define well-being as a sense of life satisfaction, feeling one is living in accordance with deeply held values, and feeling fully engaged with life. Ryan and Deci<sup>42</sup> posit 3 psychological needs that lead to well-being when fulfilled: (1) autonomy, (2) competence, and (3) relatedness. This has been substantiated across observational and experimental studies; autonomy, competence, and relatedness

within person are each found to be associated with well-being.<sup>43</sup> Succeeding in an activity (high competence) while feeling pressured to do so (low autonomy) leads to happiness but not well-being, but when succeeding (high competence) at a task controlled by one's own motivation (high autonomy), greater well-being results.<sup>44</sup> Autonomy and competence are found predictive of well-being, both between-persons and within person.<sup>45</sup> Relatedness satisfaction is achieved by meaningful conversation and feeling understood and appreciated.<sup>43</sup>

This definition of well-being has established correlations in research on residents. Autonomy and burnout were significantly inversely correlated in a study of residents in Argentina.<sup>46</sup> Yet, as the measure used in this study highlights, the predominant focus of research on resident functioning has been stress and burnout. Evidence supports that positive mental states are more than the absence of symptoms.<sup>47</sup> Cowen<sup>48</sup> notes well-being anchors one end of a continuum, while the opposing end is anchored by pathology or sickness. This continuum is highlighted to describe well-being as more than the absence of illness, and thus disease or burnout prevention is a different strategy than well-being promotion. A shift in clinical medicine from management of pathogenesis to salutogenesis, well-being promotion, has been occurring over the past few decades.<sup>49</sup>

In addition, sleep and time away from work can augment well-being. Maslow's Hierarchy of Needs places sleep at the most basic level; residents sacrifice these needs during 30-hour calls and 80-hour weeks. Adequate sleep can thus be understood as a basic prerequisite for well-being; this theory could be examined in future work by comparing the well-being of residents who have variable ratings of sleep adequacy. The second additional factor, time away from work, may allow for the building of individual coping mechanisms. Cowen<sup>48</sup> added acquisition of effective stress coping skills as necessary on the pathway to well-being. Coping skills development for each resident may involve time to bolster physical, social, cognitive, or spiritual health, varying depending on the valence individuals place on each area.

Limitations of this review include that key articles may be missing; a single author reviewed the articles for inclusion/exclusion; bibliographies of key articles were not hand-searched; and searches using the names of authors of key articles were not done. Also, the selection of search terms may have been too restrictive to identify some important articles. The choice to omit articles focusing on duty hours may have missed some risk factors or interventions associated with well-being. The analysis did not consider different time periods, thus cohort effects across generations or potential



variations pre- and post- duty hour implementation in 2003 were not evaluated.

The current literature highlights the need for more rigorous research on medical education well-being. Next steps include finding or developing a well-being scale with validity evidence for research in this population, and longitudinal examination of well-being across multiple specialties. Literature summarized in this review directs future research toward evaluating interventions focused on factors associated with resident well-being in cross-sectional studies, including autonomy, building competence, enhanced social relatedness, sleep, and coping mechanisms. Adequate statistical power and generalizability will require large intervention trials involving residents from a broad range of training specialties.

## Conclusion

The major factors associated with resident well-being are autonomy, building of competence, strong social relatedness, sleep, and time away from work. Perseverance is predictive of well-being, and greater well-being is associated with increased resident empathy. Research evaluating efficacy of existing interventions is limited by small samples sizes and data from a single site or specialty. Due to these limitations, the current literature does not offer evidence for a specific intervention for programs to implement in order to enhance their residents' well-being.

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Funding: The author reports no external funding source for this study.

Conflict of interest: The author declares she has no competing interests.

The author would like to thank David Hong, MD, and Mickey Trockel, MD, PhD, both of whom provided valuable insight and editing assistance.

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Received December 6, 2015; revisions received March 28, 2016, and May 31, 2016; accepted June 20, 2016.