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# Determinants of Stress and Effects on Performance in Internal Medicine Residents

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# DETERMINANTS OF STRESS AND EFFECTS ON PERFORMANCE IN INTERNAL MEDICINE RESIDENTS

A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at Virginia Commonwealth University

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## Abstract

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The purpose of the present study was to assess: a) perceived stress, burnout, depression, and empathy at three time points in internal medicine residents, b) the role of gender and trait mindfulness in stress response during residency and c) to evaluate the impact these variables have on performance evaluations. Additionally, specific tasks of the residency that may contribute to the experience of stress and burnout were evaluated to test a model of job strain. Stress predicted subsequent burnout and depression. Burnout predicted subsequent depression, and stress mediated this relationship. Women reported higher mean levels of empathy and burnout than men. The exploratory measure of job strain was not significantly related to stress outcomes. The *acting with awareness* facet of mindfulness was negatively related to burnout and depression. Performance was both negatively and positively related to stress outcomes. The results are discussed within the context of the current literature.

Determinants of Stress and Effects on Performance in Internal Medicine Residents

Stress in the workplace is an important topic in psychological research (Lazarus, 2013). Across disciplines, occupational stress has been shown to negatively affect employee quality of life, satisfaction, and performance. When stress levels are high, maladaptive outcomes increase, and performance in the work place is negatively affected. Burnout has long been used as a measure of stress response in the workplace. "Burnout" has been operationalized as a combination of three dimensions: depersonalization, emotional exhaustion, and lack of personal accomplishment. The symptoms of work-related burnout may be clinically similar to depression (McKnight & Glass, 1995). There is substantial evidence that work-related burnout can lead to subsequent depression (Hakanene, Schaufeli, & Ahola, 2008; Toker & Biron, 2012). Other health issues linked to work-related burnout include cardiovascular disease, poor adrenal functioning, anxiety, and suicide (Melamed, Shirom, Toker, Berliner, & Shapira, 2006; Toker, Shirom, Shapira, Berliner, & Melamed, 2005).

A vocational group for which the adverse impact of stress has long been documented is health care professionals (IsHak et al., 2009; Lemkau et al., 1988; Martin et al., 1997; Purdy et al., 1987). Common pressures for health care professionals include a highly demanding work schedule, stressful clinical judgment, and the social influences of a hierarchical culture (Martin et al., 1997; Thomas, 2004). Physicians at the front line of care – family medicine, internal medicine, and emergency care – experience heightened levels of burnout when compared to other specialties and when compared to the national average (Shanafelt et al., 2012). Residents are particularly prone to experience negative effects of stress related to job demands (Durning et al., 2013; Dyrbye et al., 2014; Purdy, Lemkau, Rafferty, & Rudisill, 1987).

The present study assessed perceived stress, burnout, empathy, and depression in internal medicine residents at three time points during the beginning of a residency year. In line with the Job-Demand-Control (JDC) model (Karasek, 1979) of occupational stress, the perceived stressfulness of specific residency tasks on dimensions of demand and control were assessed. Levels of trait mindfulness were also assessed in residents to evaluate their potential moderating influences. Finally, performance evaluations were obtained to determine the effects of psychological health on residents' performance. In the following discussion the literature on the effects of stress and burnout on resident health, patient care, and resident performance is outlined. Then, the present study and hypotheses that were evaluated are presented in further detail.

**Burnout in Residency**

Prolonged exposure to stress can lead to burnout (Maslach, Jackson, & Leiter, 1996). Burnout has been the leading variable of interest in research on stress in health care professionals. As noted above, burnout has been operationalized as a three factor construct: 1) emotional exhaustion – feeling emotionally overextended; 2) depersonalization – a negative and detached response to others; and 3) reduced personal accomplishment – finding less achievement in ones work (Maslach & Jackson, 1981). The Maslach Burnout Inventory (MBI) is the gold standard in the assessment of burnout among health care professionals (Rafferty, Lemkau, Purdy, & Rudisill, 1986). The MBI is well validated and consists of three subscales and one composite score.

Residents may be more susceptible to stress and subsequent burnout than physicians and medical faculty members (Durning et al., 2013; Dyrbye et al., 2014; Purdy, Lemkau, Rafferty, & Rudisill, 1987). Purdy and colleagues (1987) had family practice residents and faculty rate

themselves on burnout using the MBI. Resident burnout scores were in the moderate to high range, whereas faculty burnout scores were in the low to moderate range on all subscales of the MBI. Durning and colleagues (2013) found higher levels of burnout in residents than in internal medicine physicians and faculty members on the composite score of the MBI. Another study compared burnout scores of medical students, medical residents, and early career physicians (5 or less years of practice) for all specialties (Dyrbye et al., 2014). Residents reported the highest levels of overall burnout, and depersonalization and emotional exhaustion were higher for residents than early career physicians. Residents showed the highest percentage of fatigue when compared to the other two stages, and scored lowest in quality of life. These findings (Durning et al., 2013; Dyrbye et al., 2014; Purdy et al., 1987) suggest a heightened stress response during training that may abate after residency.

Extensive literature shows moderate to high levels of burnout amongst residents across specialties (IsHak et al., 2009; Thomas, 2004). One study found that residents scored in the moderate range of burnout on the emotional exhaustion and lack of personal accomplishment subscales, and in the high range on the depersonalization subscale (Daly & Wilcock, 2002). Lemkau and colleagues (1988) found that family practice residents fell in the moderate range for emotional exhaustion, the high range for depersonalization, and the low to moderate range for lack of personal accomplishment on the MBI. Residencies in family practice may be less stressed than other resident specialties, including internal medicine. One study found that 27% of family practice residents met criteria for burnout, which was the lowest percentage across different specialties (Martini et al., 2004). These differences may be due to differences in populations cared for, and the variation in tasks assigned to residents in these specialties. Internal medicine residents may experience more difficult patients, more challenging clinical decisions, and more

demanding work loads because they are on the front line of access to care (Shanafelt et al., 2012).

Internal medicine residents are among the resident specialties scoring highest on measures of stress and burnout. Martini et al (2004) examined differences in burnout scores based on resident specialty. They found that internal medicine residents scored second highest on the composite score of the MBI, with 63% meeting criteria for burnout. In a literature review of resident burnout, IsHak and colleagues (2009) found that 29% to 64% of internal medicine residents met criteria for emotional exhaustion or depersonalization as measured by the MBI. In another study, 76% of the responding internal medicine residents met criteria for burnout (Shanafelt, Bradley, Wipf, & Back, 2002). In the present study, we explored levels of burnout to confirm these findings and clarify our understanding of how burnout is related to a general measure of stress and depressive symptoms.

**Effects of Stress on Resident Health**

Burnout in residents has been related to poor quality of life, psychiatric morbidity, depression, decreased immune responsiveness, and fatigue (Rosen, Gimotty, Shea, & Bellini, 2006; Willcock, Daly, Tennant, & Allard, 2004). Using a longitudinal design across 18 months of the first internship year psychiatric morbidity and burnout were assessed using the General Health Questionnaire (GHQ) and Maslach Burnout Inventory (MBI; Willcock et al., 2004). Of participants who completed the GHQ at each of the six time points over the course of the internship, (51%), 70% met criteria for psychiatric morbidity at, at least, one time point. Burnout steadily increased from baseline to time point five, and remained high for the final time point. Gender differences in depersonalization scores were present at time point one, but disappeared by time point six, with female depersonalization scores increasing to the level of

depersonalization for male interns. Those interns, who identified as single, reported higher scores on the emotional exhaustion subscale of burnout. Emotional exhaustion was significantly associated with psychiatric morbidity at each time point. These results suggest an increased risk of stress response throughout the internship year and a strong correlation between burnout and psychiatric morbidity. The present study continued this line of inquiry by evaluating the relationship between depression and burnout in internal medicine residents.

Personal distress has been used to measure the negative impact of residency (Bellini, Baime, & Shea, 2002). In a longitudinal design, mood-states and empathy were assessed in internal medicine residents (Bellini et al., 2002). At baseline, residents showed less tension, depression, anger, fatigue, and confusion and more vigor than the general adult population, as measured by the Profile of Mood States (POMS). At baseline, residents also showed better scores on perspective taking and empathy as measured by the Interpersonal Reactivity Index (IRI) than norms for the general adult population. At the second time point, five months into the internship, residents showed significant increases on measures of maladaptive mood states and personal distress, and significant decreases in empathic concern. These changes in scores from baseline to five months into the internship year persisted at two further time points. The IRI is a measure of empathy, which has been shown to positively correlate with personal well-being (Shanafelt et al., 2005). Depersonalization and emotional exhaustion may be related to low levels of empathy. The current research assessed resident empathy levels and investigated their relationship with burnout.

Another study assessing depression, sleep deprivation, burnout, and empathy in internal medicine residents found that chronic sleep deprivation, depression, and burnout increased significantly and empathy levels decreased over the first year from baseline to year-end (Rosen

et al., 2006). These results suggest that throughout the first year of residency work demands severely impact psychological well-being. The relationship among these variables remains unclear. The present study explored the relationships among empathy, burnout, and depression. Additionally, their relationships to the specific tasks of internal medicine residency were investigated to determine how the tasks contribute to the increase in stress levels and the development of psychological distress during residency.

**Effects of Stress on Resident Performance**

In addition to influencing resident health, stress and burnout may negatively impact the quality of care given to patients by residents. Burnout has been associated with poor patient care, an increase in perceived medical errors, and cognitive impairments related to clinical judgment (Durning et al., 2013; Fahrenkopf et al., 2008; Halbesleben, & Rathert, 2008; West et al., 2006; West, Tan, Habermann, Sloan, & Shanafelt, 2009b). In a study of practicing physicians and their patients, Halbesleben and Rathert (2008) found associations between higher scores on the depersonalization scale of the MBI and lower patient satisfaction as well as longer post-discharge recovery time. Results also revealed an association between physician depersonalization and patient perception of physician depersonalization, both of which were negatively associated with patient outcomes. Drybye and colleagues (2009) found that medical students who met criteria for burnout on the MBI were more likely to engage in unprofessional behaviors and less likely to engage in altruistic behaviors.

A three-year longitudinal design assessed perceived medical errors, burnout, quality of life, depression, and empathy throughout internal medicine residency (West et al., 2006). Thirty four percent of the residents reported making at least one major medical error throughout the course of the study, and 43% of those residents who completed at least one year of residency

during the study reported at least one major medical error. Perceived medical errors did not significantly correlate with demographic variables. Those residents reporting at least one perceived medical error reported significantly lower quality of life, and also had higher levels of burnout on all three subscales of the MBI. Perceived medical errors were non-significantly related to lower levels of empathy, as measured by the IRI. Over 60% of the residents who reported perceived medical errors screened positive for depression at least once during the study. Reporting a self-perceived medical error was associated with increased odds of subsequently screening positive for depression, and higher levels of burnout. Diminished empathy and higher levels of burnout were associated with increased odds of subsequently reporting a medical error.

In a separate publication using identical methods and similar variables, West, and colleagues (2009b), obtained similar results. Those residents with higher burnout, lower quality of life, or who screened positive for depression were more likely to self-report perceived errors at the subsequent survey time point. Sleepiness and fatigue were both associated with increased odds in reporting perceived medical errors at the following survey time point. When sleepiness or fatigue was modeled with burnout, sleepiness and fatigue dropped to non-significance, but showed minimal changes in point estimation. This suggests that burnout, sleepiness, and fatigue are clinically significant in the prediction of perceived medical errors, but that burnout may account for more of the variance. The results of these two studies (West et al., 2006; West et al., 2009b) suggest a strong relationship between the effects of stress, sleep, empathy, and perceived quality of care. Fatigue and decreased empathy may be significant contributors to the experience of burnout, and subsequent decline in resident performance. These studies did not include a measure of specific medical errors or a third party report of resident performance. Conclusions are preliminary until more detailed information is obtained. It is possible that residents with

higher levels of burnout and depression perceive their performance as poor due to their decrease in quality of life and feeling of personal accomplishment.

Fahrenkopf and colleagues (2008) assessed pediatric resident's medication errors using active surveillance by trained nurses and physicians who were blind to resident depression and burnout levels. Results revealed a strong association between depression and medication errors. Burnout was not associated with medication errors. However, burnout was significantly associated with higher self-report of errors made over the previous month. Coupled with the findings from West and colleagues (2006 & 2009b), these results suggest that the presence of burnout may lead to higher perceptions of medical errors than independently documented. Burnout may influence self-perception. Those meeting criteria for burnout may experience lower self-esteem and confidence. This is congruent with the operational definition of burnout; one of the MBI subscales is personal accomplishment, where lower scores indicate higher burnout. Whether burnout and the effects of stress impact performance from an objective rater remains unclear. In one study in which burnout and low QOL were prevalent, both were associated with lower scores on medical exams in internal medicine residents (West, Shanafelt, & Kolars, 2011). This is further support for the potential deleterious effects of work related stress on work performance. Using objective measures of resident performance, the present study explored the relationship between maladaptive stress outcomes and supervisor evaluations.

Brain imaging data has investigated the neurological effects of burnout in medical residents. The results of functional magnetic resonance imaging (fMRI) data revealed that, during a clinical judgment task, higher overall burnout in internal medicine residents was significantly correlated with decreased activation in a brain region implicated in managing and monitoring remembered information (Durning et al., 2013). These results suggest that burnout

may have cognitive and neurological impacts, which may result in poorer performance on resident tasks. In residents scoring high on the depersonalization dimension of burnout, results from fMRI data during a clinical reasoning task suggest a decrease in a brain region known for retrieval and management of information from memory (Durning et al., 2013). Further interpretations of these results revealed the importance of affect in the cognitive reasoning process. The decreases were found in the right side only of the brain region, suggesting negatively valenced stimuli were being processed, and clinical reasoning was impaired in dealing specifically with the negative valenced information. Additionally, decreases in the right side of the brain region known for perspective-taking and empathy suggest that burnout may lead to an impairment in reflection during clinical reasoning tasks. Lastly, the fMRI data revealed that emotional exhaustion was associated with an increase in activation of the middle frontal gyrus. These results provide support for the cognitive load theory, such that emotional exhaustion is ineffectively activating parts of the brain and therefore slowing down the ability to process cognitive tasks.

Taken together, these data implicate neuropsychological changes in the brain due to burnout in internal medicine residents (West et al., 2006; Fahrenkopf et al., 2008; Halbesleben & Rathert, 2008; West et al., 2009b). These changes in the brain may lead to diminished clinical judgment and may be responsible for the deleterious effects on resident performance seen in other studies, i.e., increases in medical errors, prolonged patient recovery, and overall decreased ability to perform under pressure. In the present study faculty supervisors' evaluations of resident performance were accessed to determine how and the extent to which resident emotional distress and burnout were associated with impaired performance.

**Potential Causes of Burnout**

**Qualities of work environment.** Higher susceptibility to stress during residency may be due to changes in pressures from medical school to residency training. These pressures include long work hours, chronic fatigue, difficult clinical judgment, dependency on supervisor evaluations, and more demanding workload. Due to concerns that long work hours were a cause of severe distress for residents, in 2003 the ACGME restricted work hours to no more than 80 hours per week and the amount of overnight call shifts to no more than one in three, prohibited shifts longer than 30 hours, and required at least 10 hours off between shifts. Several studies evaluated the impact work restrictions had on the stress response in medical residents (Barger et al., 2006; Fletcher, Underwood, Davis, Mangrulkar, McMahon, & Saint, 2005; Gelfand, Podnos, Carmichael, Saltzman, Wilson, & Williams, 2004; Gopal, Glasheen, Miyoshi, & Prochazka, 2005; Landrigan et al., 2004; Martini, Arfken, & Balon, 2006). Gelfand and colleagues (2004) explored the relationship between surgical resident work hours before and after the implementation of restriction with burnout scores on the MBI. Changes on the three dimensions of the MBI failed to show statistical significance. Another study looked at the relationship between pre-work hours restriction and post-work hour restriction on burnout, as measured by the MBI, in internal medicine residents (Gopal et al., 2005). The changes in two dimensions of burnout, depersonalization and emotional exhaustion, trended towards significance, and personal accomplishment did not change. Surprisingly, overall satisfaction significantly decreased. A review article explored the literature on work hour restrictions (Fletcher et al., 2005). Results suggest that work hour restrictions improve resident quality of life. However, several of the studies included in the review article had major limitations, which prevent solid conclusions from being drawn. Martini and colleagues (2006) found that burnout decreased after implementation of work hour restrictions. The decrease in burnout was primarily in the first-year

residents. Another study monitored medical errors made during extended work hour shift in the traditional schedule, which entails working shifts 24 hours or longer every other shift, compared to errors made during an intervention schedule with restrictions on work hours (Landrigan et al., 2004). Results revealed a significantly higher amount of serious diagnostic, medical, and medication errors during the traditional work shifts than during the intervention shifts. Physicians unaware of the resident's shift assignments monitored errors and inter-rater reliability between physicians was high. Similarly, Barger and colleagues (2006) showed that compared to months in which first-year residents worked no extended duration shifts, months when one to four and months when five or more extended duration shifts were worked, residents self-reported significantly higher amounts of fatigue-related medical errors. The findings regarding restriction of resident work hours suggest that work hours are positively related to medical errors, and perhaps in decreasing resident burnout. However, these findings are inconclusive, and burnout and the impact of stress remain a significant problem during residential training. One explanation for the inconclusive results regarding changes in work hours related stress outcomes could be due to the mediating relationship of sleep.

Several studies have addressed long work hours, sleep, and fatigue in the prediction of internal medicine resident burnout (Baldwin, Dodd, & Wrate, 1997; Bellini et al., 2002; Hillhouse, Adler, & Walters, 2000; Uchakin et al., 2011; West et al., 2009b). One longitudinal study followed internal medicine and surgical residents throughout one year of residency, assessing stressors, perceived stress, burnout, affective symptoms, supervisor evaluations, and general health (Hillhouse et al., 2000). The authors sought to test a model of stress such that stressors and perceived stress are temporally antecedent to the experience of burnout, which is antecedent to negative affect, poor health, and diminished clinical skills. The model had been

previously evaluated in a sample of nurses (Hillhouse & Adler, 1996). Results supported the model. Hours of sleep per week and perceived stress (i.e., stressors) from the first time point predicted perceived stress at the subsequent time point. Gender and perceived stress from the second time point predicted job and patient related burnout at the subsequent time point. Male residents showed higher levels of both job and patient burnout. The model was supported by the data, suggesting that stressors and perceived stress lead to burnout, which leads to subsequent negative outcomes in health and performance for residents. Importantly, hours worked per week decreased over the year, but depression increased, suggesting that work hours may not be directly related to increased stress and mental health problems in residents. Amount of hours of sleep per week, and not hours worked, hours on call, or demographic variables, was predictive of perceived stress, suggesting that amount of sleep is a salient stressor in predicting future perceived stress and burnout. Uchakin and colleagues (2011) found that fatigue during extended hour shifts accounted for a significant increase in cortisol levels, and a decrease in psychoneuroimmunology response, as measured by reactivation of the herpes virus in DNA samples; suggesting the impact of fatigue on the stress response in internal medicine residents has biological and immunological effects.

Work hours as a predictor of resident distress was unsupported by another study, which explored the relationship between mental health problems and work-related variables during the first year of residency across specialties (Tyssen, Vaglum, Gronvold, & Ekeberg, 2000). Amount of work hours were not associated with mental health problems self-reported by residents assessed at a subsequent time point. However, perceived job stress during the first year of residency significantly predicted subsequent mental health problems. The authors used a one-item measure, answered either yes or no, to assess self-report of mental health problems during

internship. Relying on perceived mental health problems as opposed to a validated measure of mental health is a major limitation to these findings. Previously outlined literature revealed the negative effects of fatigue on the presentation of burnout (Bellini et al., 2002; West et al., 2009b). Again, sleep and fatigue may be more salient measures of contributors to the stress experience than long work hours. However, there is some support for long work hours as a significant contributor.

Using a scale to measure work-related events on their effort-reward imbalance, a model of effort-reward imbalance as an explanation for job stress was tested in 2nd and 4th year residents (Buddeberg-Fischer, Klaghofer, Stamm, Siegrist, & Buddeberg, 2008). In addition to effort-reward imbalance, over-commitment, well-being, and satisfaction with life were assessed and all components were strongly associated with amount of working hours, with effort showing the strongest correlation. However, this study was conducted using measures not widely used in the assessment of stress in residents, or in American populations, as this study was conducted in Switzerland and it was the first exploration of the model in medical residents. Another study in residents in the U.K. used a measure of general health and found that longer work hours were significantly related to more somatic symptoms of distress (Baldwin et al., 1997). In this study a measure of burnout was not used, instead a measure of attitudes toward work assessed for the perception of feeling overwhelmed. Longer work hours did not contribute to this variable, however, number of emergency admissions, number of deaths, and number of menial tasks contributed to feeling overwhelmed. These results suggest that instead of long work hours, specific contexts of the residency may contribute significantly to perceived stress and burnout. This provides preliminary support for the JDC model, which is the investigation of stress accounted for by the demandingness of and control over tasks specific to the work environment.

While this study did not include an assessment of demand and control, the assessment of the relationship between work conditions and perceived stress pave the way for the present research's task-specific assessment. More research provides continued preliminary support for this model of job strain.

**Job Strain Model**

Stress in the workplace can be defined using the Job-Demand-Control (JDC) model, such that stress ("job strain") is a reaction to job situations posing high demand and low autonomy (limited latitude to make decisions) (Karasek, 1979). Others have extrapolated on the JDC model to include the impact of social support [JDC(S); Johnson, & Hall, 1988]. According to the JDC(S) model, low social support, high demands, and low autonomy produce the highest level of strain. Although little research has been done with the JDC model in health care professionals, much of the current literature supports portions of the model indirectly. Congruent with the JDC(S) model of occupational stress, which calls for assessment of specific areas within the job on dimensions of demand and control, as well as level of perceived social support, Tyssen and colleagues (2000) identified three factors that may contribute to the demand and social factors of the JDC(S) model in physicians. Emotional demands from patients, time pressures, and interference with social life comprised the job stress model for this study. Results revealed that the emotional demands from patients factor was the most relevant predictor of mental health problems. The use of a model assessing for specific aspects of work-related stress is unique and worth noting. The present research assessed a newly developed survey of specific areas of resident work on dimensions of demand and control to provide preliminary evaluation of the job strain model in internal medicine residents. .

Further preliminary support for the job strain model in medical residents is evident in several studies assessing the relationship between job-related factors and resident stress (Biaggi, Peter, & Ulich, 2003; Boerjan, Bluyssen, Bleichrodt, Weel-Baumgarten, Evelyn, & Van Goor, 2010; Eckleberry-Hunt et al., 2009; Firth-Cozens, 1987; Hurst, Kahan, Ruetalo, & Edwards, 2013; Nyssen, Hansez, Lamy, & De Keyser, 2003; Thomas, 2004; Toews, Locjyer, Dobson, & Brownell, 1993). In one study, residents were followed up from a previous survey during medical school, and asked to rate the stressfulness of a list of problematic events reported previously by doctors (Firth-Cozens, 1987). The stress-ratings of specific work events were used in conjunction with questions relating to number of hours worked, diet, sleep, and job characteristics. Of those job-related events, feeling overworked was rated highest in perceived stressfulness, however hours worked was not associated with stress levels, suggesting that perceived stress (demand) contributes to the experience of stress more so than long work hours, which calls for more inquiry into the specifics of residency training that contribute to demand, and thus strain. Other events rated as highly stressful by the sample were: talking to distressed relatives, effects on personal life, and serious medical failures. Stress and depression were highly related to effects on personal life, feeling overworked, and making decisions. Additionally, those residents who reported feeling more stressed, were more likely to report less favorable dimensions of specific job characteristics, including, discussing problems about work with senior colleagues, knowing less of what was expected of them, feeling more overwhelmed by responsibility, and being less likely to see themselves continuing to practice medicine. What remains unclear is the degree to which each job-related characteristic contributes to feelings of high demand or low autonomy.

Toews and colleagues (1993) developed a questionnaire of 15 job-related stressors that medical students and residents rated on the degree to which each was a source of stress. The stressors rated highest by both groups were self-expectation, examination and evaluation, time available, and volume of work. All of which could map onto the concept of high demand within the job strain model. Women reported higher levels of stress on all measures in all groups. An important study in providing preliminary evidence for this model surveyed residents regarding work-related stressors and resources, and the associated subjective strain (Biaggi et al., 2003). Results revealed that the stressors: overburdened by workload, subjective work intensity, inadequate leisure time, and lack of a right to say in important matters were strongly associated with meeting criteria for emotional exhaustion and aversion to patients. Again, we see indirect support for high levels of demand, as well as preliminary support for low autonomy during residency. Additionally, work-related deficits, operationalized as deficits between work-related expectations and satisfaction revealed that residents rated time off, future career prospects, clear management, adequate feedback, right to say in important matters, and culture of openness as the greatest work-related deficits. These findings suggest more potential evidence for low perceived autonomy during residency. This study also included third-party observation of resident work activities, which revealed constant interruptions, redundant tasks and frequent switches between activities. Nyssen and colleagues (2003) had similar findings with anesthesia residents who reported lack of control over time management and work planning, work organization, inherently difficult job situations, and interpersonal conflicts as commonly problematic work-related events. These findings provide continued yet indirect support for the job strain model.

Lack of perceived autonomy has gained more preliminary support for its associations with burnout. One study assessed resident-identified burnout factors and their correlations with

each dimension of the MBI (Eckleberry-Hunt et al., 2009). Control factors strongly associated with emotional exhaustion and depersonalization were being a perfectionist, lack of control over office processes, and lack of control over schedule. The survey of potential burnout factors was comprised of 32 items that residents rated on their level of pertinence to the experience of burnout. The factors suggest support for the job strain model. Further research should continue this line of inquiry using this model as a framework for identifying demand and control factors that correlate with stress related outcomes.

One study tested the JDC(S) model directly in Dutch surgical residents, by measuring job-related autonomy and social support, but not job related demands or perceived strain (Boerjan et al., 2010). Measures used in this study are not widely used in American medical samples, and therefore relationships are interpreted with caution. There was no measure of stress, but a measure of health outcomes was included. The relationship between perceived autonomy and health outcomes was not assessed, and since there was not an independent measure of stress, work-related autonomy may or may not be an important factor in resident stress. The mean level of autonomy reported by residents was significantly lower than the standard of reference for nurses, which provides support that residents may experience low perceived autonomy. Amount of hours worked correlated with autonomy, such that more hours predicted less reported autonomy. Social support interacted with gender and type of hospital. Female residents in university hospitals experienced less social support than male residents in teaching hospitals. Residents who worked less reported less social support from colleagues. Social support provided by supervisors, not colleagues, was strongly correlated with better health outcomes. Social support in this study did not include a measure of home life social support, suggesting a need to assess for home-related support and its relationship to job related stress. Another important study

in the preliminary support of the JDC(S) model was a qualitative study that followed residents in their first year of training and conducted interviews to assess fluctuating patterns of well-being (Hurst et al., 2013). Results revealed a pattern of changes in well-being in concert with changes in rotations with clear contributing factors. Well-being increased when residents experienced higher levels of team support, felt competent, and experienced valued learning opportunities. Well-being decreased in conjunction with low team support, high work demands, few learning opportunities, and poor orientations. These results suggest the impact of perceived work-related support and high demands in the prediction of job strain.

Overall, there is good preliminary support for the value of job strain model in accounting for stress in medical residents. High work demands including heavy workload, time constraints, difficult patients, and pressured tasks; coupled with low autonomy, including feeling a lack of control over scheduling, work organization, and internalized perfectionistic attitudes correlate with perceived stress and health outcomes. The current research used a specially constructed measure of seven residency-specific tasks on which residents rated each task's perceived demand and perceived autonomy. This measure was based on the Job Content Questionnaire (JDC; Karaseck et al., 1998). The list of tasks to be rated were based on prior studies of resident stress and discussions with chief residents from the program under assessment.

**Trait Mindfulness**

Trait mindfulness is correlated with higher levels of psychological well-being and distress tolerance in non-medical professional populations (Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006; Baer et al., 2008; Cash, & Whittingham, 2010). Trait mindfulness has been shown to correlate negatively with key factors in depression, suggesting that mindfulness may protect against depressive symptomology (Paul, Stanton, Greeson, Smoski, & Wang, 2013).

Trait mindfulness has also been shown to protect against the effects of burnout among educators (Abenavoli, Jennings, Greenberg, Harris, & Katz, 2013). Additionally, among educators, mindfulness-based interventions have been shown to decrease burnout, where increases in trait mindfulness significantly predicted decreases in burnout (Flook, Goldberg, Pinger, Bonus, & Davidson, 2013). Currently, there are few studies assessing trait mindfulness in residents. One study used a mindfulness based intervention program for primary care physicians and found significant increases in trait mindfulness and significant decreases in burnout from baseline to post intervention. Increases in trait mindfulness were significantly correlated with decreases in the emotional exhaustion subscale of the MBI (Krasner et al., 2009). The current research explored the relationship between resident trait mindfulness and burnout.

**Gender**

Findings regarding the relation of gender to residency stress are mixed. The majority of studies show women reporting higher levels of stress, depression, and empathy (Boerjan et al., 2010; Cohen & Patten, 2005; Gramstad et al., 2013; Levey, 2001; Toews, et al., 1993). Consistent with non-physician populations, depression is more likely to occur in women (Bertakis, Helms, Callahan, Azari, Leigh, & Robbins, 2001). An explanation for this may be that female residents are more likely to self-report symptoms of stress and psychological illness. Other studies found no significant effects of gender on stress-related outcomes (Lemkau et al., 1988; Shanafelt et al., 2002; Thomas, 2004). Some studies found that male residents reported higher levels of burnout than female residents (Hillhouse et al., 2000; Michels et al., 2003; Willcock et al., 2004). Whether female or male residents are more susceptible to the negative effects of stress remains unclear. The present study investigated gender effects on depression, burnout, and empathy to better understand this relationship.

**Statement of the Problem**

The current research used the job strain model to explore the relationship between job-related stress in internal medicine residents and measures of psychological stress distress and clinical competency. Using a longitudinal design, residents from all years of residency were assessed for perceived stress, burnout, empathy, and depression, at three time points throughout the first half of one residency year. Trait mindfulness was assessed at the first time point to evaluate the relationship between trait mindfulness and burnout and depression in this population. The latter two time points included assessment of demand and autonomy for specific job-related events. At the study's end, supervisor evaluations were aggregated for each resident.

The following major hypotheses were evaluated:

1. Based on findings by Hillhouse and colleagues (2000): a) Residents who experience higher levels of perceived stress will be more likely to have higher levels of burnout and/or depression at the subsequent time point, b) Burnout is predicted to lead to subsequent depression.

2. Based on the job strain model, it is predicted that job strain as measured by residency tasks rated as higher in demand and lower in autonomy will be significantly related to resident stress and burnout.

3. Based on findings that male residents report higher levels of burnout whereas female residents report higher levels of stress and psychiatric illness (Boerjan et al., 2010; Cohen & Patten, 2005; Hillhouse et al., 2000; Levey, 2001; Michels et al., 2003; Toews, et al., 1993; Willcock et al., 2004), female residents will report higher levels of stress and depression, while male residents will report higher levels of burnout across time points. It is also predicted that female residents will report higher levels of empathy.

4. Based on findings that trait mindfulness is positively associated with adaptive outcomes and negatively associated with maladaptive outcomes (Baer et al., 2006; Baer et al., 2008), it is expected that higher levels of trait mindfulness will be related to lower levels of burnout and depression.

5. It is expected that empathy levels will be consistently higher for female residents than male residents, and empathy levels will be negatively associated with burnout levels. Focus will be on the depersonalization subscale of the burnout measure because this subscale measures the degree to which health care providers depersonalize their patients and could be conceptualized as the opposite of empathy.

6. Based on findings by West and colleagues (2011) residents with higher levels of stress, burnout and/or depression, and lower levels of empathy will be more likely to receive lower performance evaluations.

## Method

### Participants

All internal medicine residents at a university hospital were approached during their orientation (internship year) or during transition meetings ($2^{nd}$ and $3^{rd}$ year residents) at the start of a residency year. No residents were excluded from participation in this study. All residents who agreed to participate provided informed consent. The total sample size consisted of 38 participants. The sample included 29 men (76.3%) and 9 women (23.7%). Ages ranged from 25-35 ($M = 28.59$, $SD = 2.69$). Participants were compensated with a five dollar gift card to a coffee shop after their participation at Time Points 2 and 3. At Time Point 1, a total of 32 residents participated; at Time Point 2, a total of 31 participated; and at Time Point 3 a total of 24 participated.

## Procedure

Data collection at Time Point 1 was completed in person. Following informed consent, residents were administered measures of perceived stress, burnout, depression, empathy, trait mindfulness, and a demographic questionnaire. Residents provided an identification number comprised of the first letter of their last name and the last four digits of their social security number in order to link questionnaires and performance evaluations. The identification number was kept in a password-protected computer and no residency faculty or supervisors had access. At the study's end, once performance evaluations were obtained all identifying information was removed from the documentation. Residents were also asked to provide their email address for future correspondence; these were kept separate from questionnaire data in a password-protected computer and not linkable to their survey responses. The email addresses were destroyed at the study's end. Time Points 2 and 3 were completed online via a REDcap survey. Two months after the baseline assessment an email was sent to all the residents who consented to participate. There was a link in the email to access the study online, where residents provided their participant identification number to link the different time points together. At the 2$^{nd}$ time point residents were administered measures of perceived stress, burnout, depression, empathy, and the job demand/control questionnaire. Once the survey was completed, participants were given access to a code to redeem a $5 gift card to a coffee shop. For the 3$^{rd}$ and final wave of data collection, approximately four months later, all participants received a similar email containing another link to participate in the study. Residents were administered the same battery of questionnaires as at the previous time point. Upon completion of the survey a code was given to claim another $5 gift card to the same coffee shop.

## Measures

**Burnout.** The Maslach Burnout Inventory (MBI) measures burnout in three domains: emotional exhaustion, depersonalization, and lack of personal accomplishment (Maslach, Jackson, & Leiter, 1996). The MBI is a 22-item measure asking respondents to rate the frequency of several feelings and experiences on a 7-point Likert scale ranging from "never" to "daily." This instrument is the gold standard for measuring burnout in medical professionals and is well validated in this population (Rafferty et al., 1986). Scores above 30 on the emotional exhaustion subscale or scores above 12 on the depersonalization subscale are considered criteria for meeting burnout. Consistent with previous literature, low scores on the personal accomplishment subscale are not considered burnout, because this may be measuring a distinct dimension (Maslach et al., 1996). Therefore, unless otherwise discussed, the subscales of emotional exhaustion and depersonalization were totaled to create an overall burnout score. The three subscales demonstrated adequate to good internal consistency: alpha coefficients for the emotional exhaustion subscale ranged from .85 to .91, and the depersonalization subscale ranged from .77-.84.

**Perceived stress and depression.** The Depression Anxiety Stress Scales short form (DASS 21) were used to measure perceived stress and depression (Antony, Bieling, Cox, Enns, & Swinson, 1998). Only the stress and depression subscales will be used. Each subscale consists of 7 items. Participants are asked to rate the degree to which statements applied to them over the last week on a 4-point Likert scale ranging from "did not apply to me at all" to "applied to me very much, or most of the time." The DASS 21 is well validated and well normed in non-clinical populations (Henry & Crawford, 2005). The depression and stress subscales demonstrated adequate to good internal consistency, alphas ranged from .78-.81 and .71-.86, respectively.

**Empathy.** The Interpersonal Reactivity Index (IRI) is a 28-item measure with 4 subscales comprised of 7 items each measuring different aspects of empathy (Davis, 1983). The cognitive and emotive scales of empathy were used. The cognitive scale of empathy measures the degree to which respondents adopt the viewpoint of others. The emotive scale of empathy measures "other-oriented" feelings of sympathy and concern. The IRI subscales have been shown to be a reliable measure of social functioning, emotionality, and sensitivity towards others (Bellini et al., 2002). The perspective taking and empathic concern subscales demonstrated questionable to good internal consistency, alphas ranged from .54-.85 and .63-.81, respectively. Because all analyses involving empathy were performed with a total empathy score, reliability analyses were performed for the total scale at each time point, demonstrating adequate to good internal consistency ($\alpha$ = .71 -.87).

**Trait mindfulness.** The Five Facet Mindfulness Questionnaire Short Form (FFMQ-sf) is a 24-item measure, derived from the 39-item FFMQ, which assesses trait mindfulness on a five level Likert scale (Bohlmeijer, Peter, Fledderus, Veehof, & Baer, 2011). The FFMQ-sf captures the tendency to be mindful in one's life using five distinct subscales, *observe, describe, acting with awareness, nonjudging of inner experience,* and *non-reactivity to inner experience*. The FFMQ-sf shows good psychometric properties in adult, student, and patient samples (Bohlmeijer et al., 2011). The five facets demonstrated good internal consistency; alpha coefficients ranged from .73 to .91.

**Job Content Questionnaire.** Based on the JDC model, the Job Content Questionnaire (JCQ) assesses job-related scenarios on dimensions of demand and autonomy (Karaseck et al., 1998). For this study, we developed a JCQ specific to internal medicine residents. The

questionnaire is comprised of seven items asking the respondent to rate, on a four-point Likert scale, the degree to which each activity or task is demanding, ranging from “not at all” to “very much,” and on a four-point Likert scale the degree to which they feel autonomy in regards to each task, ranging from “not at all” to “very much.” The measure was developed based on discussions with chief residents, program directors, and an overview of the relevant literature. The tasks to be rated were: inpatient admission, night float cross covering, interactions with patient family members, communication with other providers, communication with other health care professionals, unexpected death disclosure, morning report presentation, and restriction on inpatient duty hour work rules. Internal consistency is reported in the results section.

**Demographic variables.** In addition to age, gender, ethnicity, and residency year, we assessed relationship status, number of children, current rotation in residency training, average hours of sleep per week, and average hours of work per week.

**Performance evaluations.** The residency program under study uses an online system to evaluate residents throughout their training. Supervisors evaluate residents based on six core competencies: patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems based practice. For each resident an aggregate of evaluations from attending physicians and faculty are discussed during a three person committee meeting providing performance scores for each resident on 23 milestones developed by the ACGME, each of which falls under one of the 6 core competencies described above. The committee is made up of department chiefs. The committee bases the evaluations on the aggregate of supervisor evaluations and direct observation of the residents. Milestones include “develops and achieves comprehensive management plan for each patient,” “knowledge of diagnostic testing and procedure,” all of which are rated on a 5-point scale ranging from

"critical deficiencies" to "aspirational". Specifically, a 1 = "critical deficiencies," 2 = "describes behaviors of an early learner," 3 = "Describes behavior of a resident who is advancing and demonstrating improvement in performance related to milestones," 4 = "ready for unsupervised practice," 5 = "Aspirational." Further, a 5 is only expected to be reached by a few residents who exhibit expertise as a role model in their milestone performance. It is expected that first, second, and third year residents will vary in their milestone ratings. Therefore, performance on each milestone was compared with the residency class to which each participant belonged, to determine whether they fell below the class average or at or above the class average, making performance on each milestone a dichotomous variable relative to the average performance of the resident's class.

**Data Analytic Plan**

The data analytic plan for each hypothesis is outlined below:

1. To evaluate whether perceived stress at Time Point 1 would predict burnout and depression at subsequent time points, and depression at subsequent time points, first standard regression analyses were performed with stress at Time Point 1 as the predictor of Time Point 2 burnout and depression. If significant, hierarchical regression analyses were performed controlling for burnout or depression at Time Point 1. Separate standard regression analyses were performed to with burnout as a predictor of depression. Stress was entered into the model and evaluated as a mediator of the relationship between burnout and depression.

2. To test the prediction that those residents who rate tasks as higher in demand *and* lower in control will be more likely to report higher levels of burnout and depression, first reliability analyses were performed for each subscale of the JDC measure. If reliability was larger than or equal to 0.60, then scores were categorized as follows: those reporting tasks as higher in demand by at least three points when compared to ratings of control were categorized as high in demand and low in autonomy. All others were placed in a comparison category. Independent samples t-tests were performed with the JDC measure as a predictor of stress and burnout at the same point.

3. To test the prediction that female residents would report higher levels of depression and stress, while male residents would report higher levels of burnout, exploratory independent t-tests were performed, with stress, burnout, and depression at each time point as the dependent variables and gender as the comparison variable.

4. To evaluate whether trait mindfulness predicts burnout and depression across time points, bivariate correlations were performed for with each of the five trait mindfulness subscales and burnout and depression at each time point.

5. a) To evaluate the relationship between empathy and burnout across time points with gender as a between subjects factor, a repeated measures MANOVA was performed with empathy and burnout (using the depersonalization subscale of the Maslach Burnout Inventory) as the

dependent variables and gender as the between-subjects variable. b) To evaluate the relationship between empathy and performance evaluations separate logistical regressions were performed with evaluations as the dependent variable and empathy at Time Points 1, 2, and 3 as the independent variables.

6. To evaluate whether burnout criteria predicted performance on the 23 milestone evaluations, first, to reduce familywise error and the performance of many post hoc exploratory analyses, inspection of crosstabs was performed to determine where relationships in the data were located. Based on this inspection, logistical regressions were performed with evaluations as the dependent variable, categorized as a dichotomous variable 1) below or 2) at/above average, and level of burnout as the independent variable. The criteria for high burnout was established as scores above 27 on the emotional exhaustion subscale and/or scores above 12 on the depersonalization subscale. These criteria were applied at each of the three time points. To investigate whether performance was significantly related to stress outcomes, performance on the 23 milestones were aggregated and averaged on the six domains to which they belonged. Then, inspection of mean differences in below average and at/above average performance on stress outcomes (stress, burnout, depression, and empathy) guided further analysis. Based on inspection, independent samples t-tests were performed with

performance as the comparison (independent) variable and stress, burnout, empathy or depression as the continuous variable.

## Results

### Demographics and Participant Characteristics

The total sample consisted of 38 participants. It included 29 men (76.3%) and 9 women (23.7%). Age ranged from 25-35 (M = 28.59, SD = 2.69). Of the total sample, 50% identified as white (n = 19) and 26.3% identified as Asian (n = 10). At Time Point 1, 32 residents participated; at Time Point 2, 31 participated; and at Time Point 3, 24 participated.

### Stress and Burnout

To evaluate whether stress at Time Point 1 would predict burnout at Time Point 2 a standard regression analysis was performed. Perceived stress at Time Point 1 was entered into the model with residents' total burnout score (sum of emotional exhaustion and depersonalization subscales) at Time Point 2 as the dependent variable. The model was significant. The regression analyses are presented in Table 1. Stress predicted 16% of the variance in subsequent burnout. When burnout at Time Point 1 was entered into the model at step one to control for baseline levels and perceived stress at Time Point 1 was entered into the model at step two, the model with both predictors was significant. However, stress did not significantly predict subsequent burnout, $t$ (23) = .021, $\beta$ = .003, $p$ = 0.98 after variance due to burnout at Time Point 1 was accounted for, whereas burnout at Time Point 1 was a significant predictor, $t$ (22) = 4.75, $\beta$ = .763, $p < 0.001$. Burnout at Time Point 1 accounted for 43% of the variance in subsequent burnout. Finally, stress at Time Point 2 was evaluated as a predictor of burnout at Time Point 3. The model was not significant (see Table 2). Burnout at Time Point 2

was also entered as a predictor of subsequent burnout at Time Point 3. The model was significant (see Table 2). Burnout at Time Point 2 was a significant predictor of burnout at Time Point 3, $t$ (22) = 4.52, β = .829, $p < 0.001$, after accounting for variance due to stress at Time Point 2.

Table 1.

*Simple (SR) and hierarchical (HR) regression analyses of resident burnout at Time Point 2*

| | | Independent Variables | *F* | *df* | *p* | $R^2$ | $\Delta R^2$ | β |
|---|---|---|---|---|---|---|---|---|
| SR | Model 1 | Stress 1 | 4.40 | (1, 23) | .047* | .161 | -- | .401 |
| HR | Model 1 | Burnout 1 | 32.49 | (1, 23) | <.001* | .586 | -- | .765 |
| | Model 2 | Burnout 1 & Stress 1 | 15.54 | (2, 22) | <.001* | .586 | .00 | -- |

*Note:* N = 32 at Time Point 1, N = 31 at Time Point 2

Table 2.

*Simple (SR) and hierarchical (HR) regression analyses of resident burnout at Time Point 3*

| | | Independent Variables | *F* | *df* | *p* | $R^2$ | $\Delta R^2$ | β |
|---|---|---|---|---|---|---|---|---|
| SR | Model 1 | Stress 2 | 0.27 | (1, 21) | .606 | .013 | -- | .113 |
| HR | Model 2 | Burnout 2 | 16.27 | (1, 21) | .001* | .437 | -- | .661 |
| | | Burnout 2 & Stress 2 | 10.46 | (2, 20) | .001* | .511 | 0.75 | -- |

*Note:* N = 31 at Time Point 2, N = 24 at Time Point 3

**Stress and Depression**

To evaluate whether stress at Time Point 1 predicted depression at Time Point 2, a standard regression analysis was performed (see Table 3). The overall model was significant. Therefore a hierarchical regression was performed to control for baseline levels of depression. The model with both predictors was significant (see Table 3). Adding stress at Time Point 1 to the model significantly improved the prediction. Stress was a significant predictor of subsequent depression, $t$ (22) = 2.46, β = .473, $p$ = 0.022. Baseline depression was not a significant predictor of subsequent depression, $t$ (22) = 1.45, β = .281, $p$ = 0.157. Stress at Time Point 2 was also evaluated as a predictor of depression at Time Point 3. The model was significant (see Table 4).

Depression at Time Point 2 was the only significant predictor of depression at Time Point 3, $t$ (21) = 3.35, β = .650, $p$ = 0.003 when both depression and stress at Time Point 2 were entered into the model. Stress at Time Point 2 was not a significant predictor, $t$ (21) = .755, β = .147, $p$ = 0.460.

Table 3.

*Simple (SR) and hierarchical (HR) regression analyses of resident depression at Time Point 2*

| | Independent Variables | *F* | *df* | *p* | $R^2$ | $\Delta R^2$ | β |
|---|---|---|---|---|---|---|---|
| Model 1 | Stress 1 | 15.48 | (1, 23) | .001* | .402 | -- | .634 |
| Model 2 | Depression 1 | 10.10 | (1, 23) | .004* | .305 | -- | .552 |
| | Depression 1 & Stress 1 | 17.17 | (2, 22) | <.001* | .609 | .304 | -- |

*Note:* N = 32 at Time Point 1, N = 31 at Time Point 2

Table 4.

*Simple (SR) and hierarchical (HR) regression analyses of resident depression at Time Point 3*

| | Independent Variables | *F* | *df* | *p* | $R^2$ | $\Delta R^2$ | β |
|---|---|---|---|---|---|---|---|
| Model 1 | Stress 2 | 8.83 | (1, 20) | .008* | .306 | -- | .553 |
| Model 2 | Depression 2 | 24.49 | (1, 20) | <.001* | .550 | -- | .742 |
| | Depression 2 & Stress 2 | 12.26 | (2, 19) | <.001* | .564 | .013 | -- |

*Note:* N = 31 at Time Point 2, N = 24 at Time Point 3

**Stress as a Mediator of Burnout and Depression**

A mediation analysis determined that stress at Time Point 1 mediated the effect of burnout at Time Point 1 on depression at Time Point 2 (see Figure 1). Using the Baron and Kenny (1986) method, burnout at Time Point 1 significantly predicted depression at Time Point 2 (β = .53, $p$ = 0.007). Next, burnout at Time Point 1 significantly predicted stress at the same time point (β = .46, $p$ = 0.008). When both stress and burnout at Time Point 1 were entered into a third model, the relation of stress to depression at Time Point 2 remained significant, β = .49, $p$ =

0.01, and the relation of burnout to depression dropped to nonsignificance, β = .273, $p$ = 0.152. Using the Sobel test, the magnitude of the relation between burnout at Time Point 1 and depression at Time Point 2 was found to decrease when stress at Time Point 1 was included ($z$ = 1.96, $p$ = .051).

A similar mediation analysis determined that stress at Time Point 2 approached significance as a mediator of the relationship between burnout at Time Point 2 and depression at Time Point 3 (see Figure1). Burnout at Time Point 2 significantly predicted depression at Time Point 3 (β = .50, $p$ = 0.02). Next, burnout at Time Point 2 significantly predicted stress at Time Point 2 (β = .56, $p$ = 0.001). When both stress and burnout at Time Point 2 were entered into a third model, the relation of stress to depression at Time Point 3 remained marginally significant, β = .41, $p$ = 0.056, and the relation of burnout to depression dropped to nonsignificance, β = .31, $p$ = 0.14. Using the Sobel test, the magnitude of the relation between burnout at Time Point 2 and depression at Time Point 3 was found to decrease with approaching significance when stress at Time Point 2 was included ($z$ = 1.78, $p$ = .075).

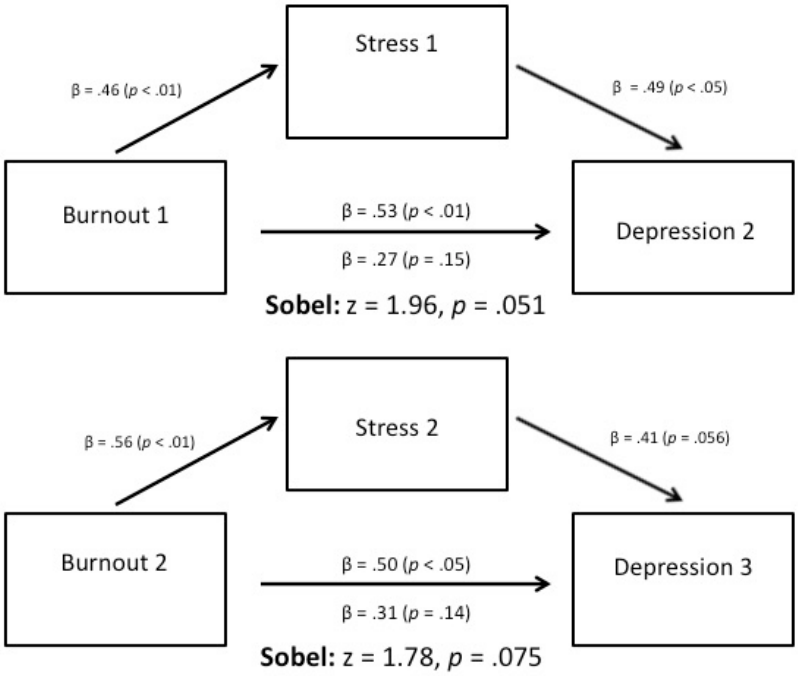


*Figure 1.* Stress as a mediator of the relationship between same time point burnout and subsequent depression.

**Job Strain as a Predictor of Burnout and Depression**

Job strain is based on evaluation of both perceived job demands and perceived job control. Because a specially constructed measure (JDC) was used to evaluate these dimensions the reliability (internal consistency) of each of the subscales of the JDC measure was evaluated first. At Time Point 2, both the control and demand subscales of the JDC demonstrated adequate reliability (control: $\alpha = .677$, demand: $\alpha = .683$.) However, at Time Point 3, the control subscale did not demonstrate adequate reliability ($\alpha = .181$)[1], while the Demand subscale demonstrated

[1] Examination of inter-item correlations revealed that the item, "Restriction on inpatient duty hour work rules" was poorly intercorrelated with the rest of the items. However, if deleted internal consistency continued to be unacceptable, $\alpha = .49$.

good reliability ($\alpha$ = .736). Therefore, analyses were not performed for the JDC measure at Time Point 3.

Descriptive data for the items on the JDC measure are presented in Table 5. It may be noted that Inpatient Admission was consistently rated as the most demanding task by both male and female residents. Restriction on Inpatient Duty Work Rules was consistently rated as lowest in Control (autonomy), except by females at Time point 3.

For the JDC measure at Time Point 2, categories were created based on an exploratory inspection of the data. Based on the theoretical model, when demands are higher than perceived controllability, job strain is said to be high. Inspection of the data revealed group sizes too small for analysis when separated into four categories based on median splits (i.e., high demand low control, high demand high control, low demand high control, and low demand low control). Therefore, those residents who rated tasks as higher in demandingness than controllability were placed in the job strain category (criteria was set for demandingness to be at least three points higher than controllability, indicating a moderately large difference between the two dimensions). All other residents were placed into a comparison category. An independent samples t-test was performed with JDC as a dichotomous independent variable (i.e., high vs. low job strain) and burnout at Time Point 2 as the dependent variable. The model was not significant, $t$ (28) = -.73, $p$ = .47. Another independent samples t-test was similarly performed with JDC as the predictor of stress at Time Point 2. The model was not significant, $t$ (28) = -1.36, $p$ = .18.

Table 5.

*Descriptive statistics for the Job Demand and Control Questionnaire at Time Points 2 and 3*

| | Time Point 2 | | | | Time Point 3 | | | |
|---|---|---|---|---|---|---|---|---|
| | Male | | Female | | Male | | Female | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| **Inpatient admission** | | | | | | | | |
| Demand | 3.13 | .74 | 3.49 | .49 | 3.00 | .67 | 3.25 | .50 |
| Control | 2.33 | .76 | 2.14 | .69 | 2.26 | .65 | 2.00 | 1.00 |
| **Morning report presentation** | | | | | | | | |
| Demand | 2.38 | .88 | 2.57 | .79 | 2.32 | .82 | 3.00 | 1.16 |
| Control | 2.50 | .93 | 2.57 | .54 | 2.79 | .79 | 2.75 | .50 |
| **Night float cross covering** | | | | | | | | |
| Demand | 3.00 | .83 | 3.00 | .82 | 2.89 | .74 | 3.00 | .00 |
| Control | 2.46 | .83 | 2.43 | .98 | 2.47 | .84 | 2.00 | .82 |
| **Interactions with patient family members** | | | | | | | | |
| Demand | 2.71 | .86 | 2.43 | .79 | 2.58 | .77 | 3.00 | .82 |
| Control | 2.79 | .83 | 2.57 | .79 | 2.53 | .70 | 2.25 | .96 |
| **Communication with other providers and other health care professionals** | | | | | | | | |
| Demand | 2.96 | .83 | 2.57 | .54 | 2.37 | .83 | 2.50 | .58 |
| Control | 2.96 | .69 | 2.71 | 1.11 | 2.79 | .71 | 2.50 | 1.00 |
| **Unexpected death disclosure** | | | | | | | | |
| Demand | 2.79 | .98 | 3.14 | .90 | 2.84 | 1.07 | 3.25 | .50 |
| Control | 2.29 | .81 | 2.29 | .76 | 2.58 | 1.02 | 2.75 | .50 |
| **Restriction on inpatient duty hour work rules** | | | | | | | | |
| Demand | 2.25 | .79 | 2.14 | .69 | 2.32 | .89 | 2.00 | .00 |
| Control | 1.83 | .87 | 2.00 | .82 | 2.12 | .74 | 3.00 | 1.41 |

*Note:* All items were measured on a four point Likert scale ranging from "not at all" to "very much of the time." $n$ = 24 male residents and $n$ = 7 female residents at Time Point 2; $n$ = 19 male residents and $n$ = 4 female residents at Time Point 3.

## Gender Differences

Using independent samples t-tests, post hoc comparisons of gender differences in stress, burnout, depression, and empathy were evaluated. There were no gender differences for depression or stress at any time point that even approached significance. However, there were

significant differences in empathy at Time Points 1 and 3 (see Table 6). Mean levels of empathy were higher for female residents than male residents at all three time points. Furthermore, there was a significant difference in burnout at Time Point 1, with female residents reporting significantly higher levels of burnout than male residents.

Table 6.

*Independent samples t-tests comparing gender differences in empathy at each time point*

| | ***t (df)*** | ***p*** | Gender | ***N*** | ***M*** | ***SD*** |
|---|---|---|---|---|---|---|
| **Empathy 1** | -2.35 | .03 | Male | 23 | 49.48 | 5.07 |
| | (30) | | Female | 9 | 53.67 | 2.50 |
| **Empathy 2** | -1.63 | .11 | Male | 23 | 51.83 | 6.81 |
| | (28) | | Female | 7 | 56.29 | 4.15 |
| **Empathy 3** | -2.12 | .049 | Male | 15 | 53.07 | 7.91 |
| | (17) | | Female | 4 | 61.75 | 7.95 |

Burnout at Time Points 2 and 3 resulted in non-significant gender differences (Table 7), however female residents reported higher mean levels of burnout at Time Point 1 and across time points. Based on previous literature (Rafferty et al., 1986), high levels of burnout are indicated by scores above 30 on the emotional exhaustion subscale and above 12 on the depersonalization subscale. Scores above 30 on the combined subscales would indicate either moderate ratings on both subscales, high ratings on at least one subscale, or high ratings on both. Inspection of the mean levels of burnout between men and women suggests that women consistently fall into the moderate to high burnout range, while men fall below the cutoff for moderate or high burnout. Based on these findings a frequency analysis was performed to determine the percentage of residents who met criteria for burnout at any time point and to determine the rates by gender. Based on previous literature (Rafferty et al., 1986; Thomas, 2004), residents scoring above 30 on the emotional exhaustion subscale and/or above 12 on the depersonalization subscale were

considered as having met criteria for burnout. Each time point was considered separately to determine whether criteria were met, then each time point was summed to determine if residents met criteria or not at any point during the first half the residency year. Overall, 66% (n = 25) of the residents met criteria for burnout. Broken down by gender, 89% (n = 8) of the female residents met criteria for burnout, and 59% (n =17) of the male residents met criteria for burnout. Considered separately, 47% (n =15), 45% (n = 14), and 42% (n = 10) of the residents met criteria at Time Point 1, 2, and 3 respectively. Female residents accounted for 47%, 29%, and 10% of the residents meeting criteria for burnout at Time Point 1, 2, and 3 respectively.

Table 7.

*Independent samples t-tests comparing gender differences in burnout at each time point*

| | ***t (df)*** | ***p*** | Gender | ***N*** | ***M*** | ***SD*** |
|---|---|---|---|---|---|---|
| **Burnout 1** | -2.79 | .01 | Male | 23 | 29.13 | 12.90 |
| | (30) | | Female | 9 | 41.78 | 6.30 |
| **Burnout 2** | -1.65 | .11 | Male | 24 | 29.25 | 13.10 |
| | (29) | | Female | 7 | 37.71 | 6.02 |
| **Burnout 3** | -.62 | .54 | Male | 20 | 26.00 | 11.96 |
| | (22) | | Female | 4 | 30.00 | 10.36 |

**Mindfulness, Burnout, and Depression**

To explore the relationship between trait mindfulness, burnout, and depression across time points, bivariate correlations were performed for each of the five subscales of trait mindfulness. The results are presented in Table 8 Results revealed the *acting with awareness* subscale to be negatively correlated with burnout and depression at Time Points 1 and 2, but not significantly related to burnout or depression at Time Point

Table 8.

*Intercorrelations, Means and Standard Deviations for Trait Mindfulness, Burnout, and Depression.*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | Mean | SD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. FFMQ OBS | — | | | | | | | | | | | 11.94 | 3.56 |
| 2. FFMQ DES | **.45**** | — | | | | | | | | | | 19.16 | 3.41 |
| 3. FFMQ AA | .10 | .32 | — | | | | | | | | | 17.69 | 3.66 |
| 4. FFMQ NJ | .25 | .22 | .34 | — | | | | | | | | 17.22 | 3.70 |
| 5. FFMQ NRCT | .01 | .18 | .25 | .33 | — | | | | | | | 16.06 | 3.41 |
| 6. Burnout 1 | -.12 | -.18 | **-.64**** | -.34 | -.34 | — | | | | | | 32.69 | 12.72 |
| 7. Burnout 2 | -.17 | -.17 | **-.44*** | **-.45*** | -.27 | **.77**** | — | | | | | 31.16 | 12.32 |
| 8. Burnout 3 | -.43 | -.30 | -.29 | -.22 | .15 | **.69**** | **.66*** | — | | | | 26.67 | 11.59 |
| 9. Depression 1 | -.24 | -.33 | **-.39*** | -.26 | -.33 | **.39*** | .40 | .14 | — | | | 1.94 | 2.14 |
| 10. Depression 2 | -.17 | -.34 | **-.48*** | -.37 | -.36 | **.53**** | **.60**** | .31 | **.55**** | — | | 3.13 | 2.92 |
| 11. Depression 3 | **-.48*** | -.45 | -.44 | -.07 | -.06 | .31 | **.50*** | **.51*** | **.48*** | **.74**** | — | 2.44 | 2.41 |

*$p < .05$, **$p < .01$

*Note*: FFMQ OBS = Five Facet Mindfulness Questionnaire Observe, FFMQ DES = Five Facet Mindfulness Questionnaire Describe, FFMQ AA = Five Facet Mindfulness Questionnaire Acting with Awareness, FFMQ NJ = Five Facet Mindfulness Questionnaire Nonjudging of inner experience, FFMQ NRCT = Five Facet Mindfulness Questionnaire Nonreactivity to inner experience. N = 32 at Time Point 1, N = 31 at Time Point 2, N = 24 at Time Point 3

**Gender, Burnout, and Empathy**

Based on the findings of significant gender differences in burnout and empathy in the current study, exploratory analyses were performed using a repeated measure MANOVA. Burnout (depersonalization subscale) and empathy were entered into the model as dependent variables. Conceptually, the depersonalization subscale represents the opposite of empathy. Therefore, empathy and depersonalization were included in the model together. The between-subjects factor was gender. The combined dependent variables differed by gender (between-subjects effect), Wilks' Lambda = .532, $F$ (2, 15) = 6.59, $p$ = .009, partial eta squared = .47. The combined dependent variables also significantly increased over time (within-subjects effect), Wilks' Lambda = .340, $F$ (2, 15) = 6.30, $p$ = .005, partial eta squared = .66. The within-subjects interaction term between time and gender with the combined dependent variables was not significant, Wilks' Lambda = .54, $F$ (2, 15) = 2.74, $p$ = .075, partial eta squared = .46. Each dependent variable was then examined separately. The univariate tests revealed a significant main effect of empathy over time, $F$ (2, 32) = 9.61, $p$ < .001, partial eta squared = .38, with empathy scores significantly increasing over the three time points. However burnout (depersonalization) did not change, $F$ (2, 32) = .78, $p$ = .466, partial eta squared = .05.

The interaction between empathy over time with gender was not significant, $F$ (2, 32) = .70, $p$ = .50, partial eta squared = .04. The interaction between burnout over time and gender was significant, $F$ (2, 43) =3.33, $p$ = .049, partial eta squared = .17. Figure 2 graphically represents the interaction between burnout and sex. Inspection of the figure suggests that for women burnout increased at Time Point 2 and decreased at Time Point 3. For men, burnout decreased at Time Point 2 and increased at Time Point 3. According to our analysis, there was not a significant difference in burnout between men and women at Time Point 1, $F$ (1, 16) = 1.00, $p$ =

.332, nor was there a significant difference at Time Point 3, $F$ (1, 16) = .01, $p$ = .914. There was a marginally significant difference in burnout between men and women at Time Point 2, $F$ (1, 16) = 4.23, $p$ = .056.

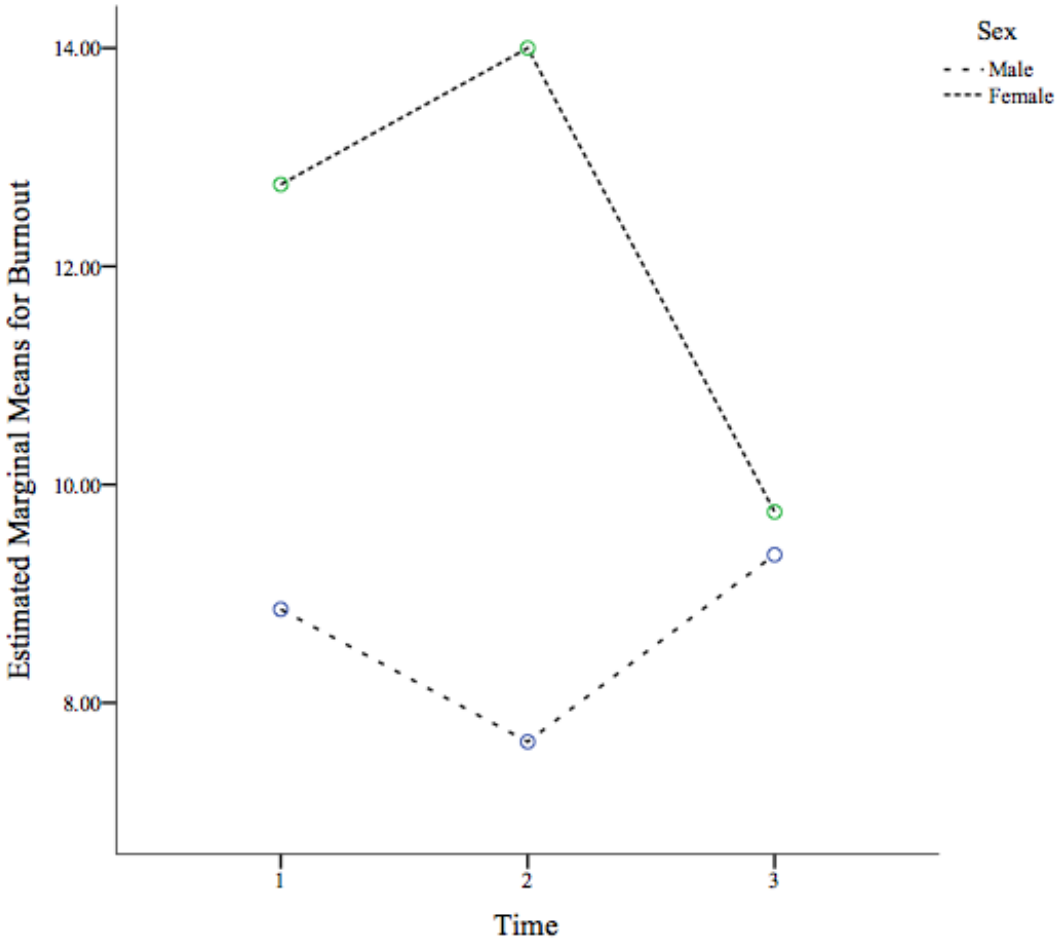


*Figure 2.* Results from a repeated measures ANOVA, the interaction between burnout scores over time and sex.

**Performance Evaluations**

Average performance scores for residents in the present sample across the three years of residency are presented in Table 9. These averages were used to determine where each

participant fell in relation to this average. For each of the 23 milestones for residents were categorized as either 1) below average or 2) at/above average. The criterion was determined by comparison of individual scores with the cohort average for each milestone. These categories were developed based on discussion with the internal medicine resident program director. Cohort averages for each of the 23 milestones are also presented in Table 9.

Table 9.

*Averages for each performance milestone for both the population and sample based on residency year.*

| | Population Average ($n$ = 124) | | | Sample Average ($n$ = 37) | | |
|---|---|---|---|---|---|---|
| | PGY1 | PGY2 | PGY3 | PGY1 | PGY2 | PGY3 |
| Gathers and synthesizes essential and accurate information to define each patient's clinical problem(s). (PC1) | 2.40 | 3.40 | 4.16 | 2.32 | 3.50 | 3.93 |
| Develops and achieves comprehensive management plan for each patient. (PC2) | 2.42 | 3.22 | 3.79 | 2.40 | 3.00 | 3.57 |
| Manages patients with progressive responsibility and independence. (PC3) | 2.40 | 3.17 | 3.93 | 2.37 | 3.00 | 3.75 |
| Skill in performing procedures. (PC4) | 2.09 | 3.17 | 3.53 | 2.08 | 3.00 | 3.50 |
| Requests and provides consultative care. (PC5) | 2.25 | 2.77 | 3.55 | 2.24 | 2.75 | 3.93 |
| Clinical knowledge (MK1) | 2.30 | 2.97 | 3.52 | 2.32 | 2.50 | 3.36 |
| Knowledge of diagnostic testing and procedures (MK2) | 2.36 | 3.07 | 3.62 | 2.42 | 3.00 | 3.43 |
| Works effectively within an interprofessional team (e.g. peers, consultants, nursing, ancillary professionals and other support personnel). (SBP1) | 2.69 | 3.38 | 3.90 | 2.78 | 3.50 | 3.89 |
| Recognizes system error and advocates for system improvement. (SBP2) | 2.55 | 2.91 | 3.27 | 1.63 | 1.25 | 3.04 |

Table 9 continues

Table 9 continued

| | Population Average ($n$ = 124) | | | Sample Average ($n$ = 37) | | |
|---|---|---|---|---|---|---|
| | PGY1 | PGY2 | PGY3 | PGY1 | PGY2 | PGY3 |
| Identifies forces that impact the cost of health care, and advocates for, and practices cost-effective care. (SBP3) | 2.25 | 2.90 | 3.40 | 2.24 | 3.00 | 3.18 |
| Transitions patients effectively within and across health delivery systems. (SBP4) | 2.53 | 3.00 | 3.74 | 2.50 | 3.25 | 3.68 |
| Monitors practice with a goal for improvement (PBLI1) | 2.76 | 3.37 | 3.71 | 2.84 | 3.75 | 3.68 |
| Learns and improves via feedback. (PBLI3) | 3.01 | 3.42 | 3.69 | 3.08 | 3.75 | 3.79 |
| Learns and improves at the point of care. (PBLI4) | 2.44 | 3.10 | 3.60 | 2.29 | 3.25 | 3.57 |
| Has professional and respectful interactions with patients, caregivers and members of the interprofessional team (e.g. peers, consultants, nursing, ancillary professionals and support personnel) (PROF1) | 2.81 | 3.48 | 3.95 | 2.82 | 3.75 | 3.93 |
| Accepts responsibility and follows through on tasks. (PROF2) | 2.58 | 2.17 | 2.60 | 2.61 | 2.00 | 2.61 |
| Responds to each patient's unique characteristics and needs. (PROF3) | 2.49 | 2.97 | 3.78 | 2.47 | 2.75 | 3.71 |
| Exhibits integrity and ethical behavior in professional conduct. (PROF4) | 2.47 | 2.93 | 3.62 | 2.53 | 3.00 | 3.57 |
| Communicates effectively with patients and caregivers. (ICS1) | 2.82 | 3.35 | 3.86 | 2.76 | 3.25 | 3.79 |
| Communicates effectively in interprofessional teams (e.g. peers, consultants, nursing, ancillary professionals and other support personnel). (ICS2) | 2.95 | 3.42 | 3.90 | 2.95 | 3.75 | 3.93 |
| Appropriate utilization and completion of health records. (ICS3) | 3.00 | 3.70 | 3.79 | 2.97 | 3.75 | 3.82 |

*Note:* PC = patient care, MK = medical knowledge, SBP = system-based practice, PBLI = practice-based learning and improvement, PROF = professionalism, ICS = interpersonal and communication skills.

Each of the 23 milestones were examined to evaluate their relationship to burnout criteria. Criteria for burnout were based on the previously reported determination, that is, if

scores on the depersonalization subscale were above 12 and/or if scores on the emotional exhaustion subscale were above 27 then burnout criteria were met. Burnout was transformed into a dichotomous categorical variable: 1) criteria for burnout was met during at least one time point on either or both the emotional exhaustion and depersonalization subscales and 2) criteria was not met for burnout. To reduce familywise error, crosstabs were used to inspect the data with both burnout and performance as dichotomous variables for each of the 23 milestones. Data are presented in Tables10-12.

Table 10.

*Crosstabs for milestone: "Manages patients with progressive responsibility and independence" (PC3)*

| | | Burnout Criteria | | |
|---|---|---|---|---|
| | | Not met | Met | Total |
| PC3 Criteria | Below average | 2 | 12 | 14 |
| | At or above average | 11 | 12 | 23 |
| | Total | 13 | 24 | 37 |

Note: PC = patient care

Table 11.

*Crosstabs for milestone: "Transitions patients effectively within and across health delivery systems" (SBP4)*

| | | Burnout Criteria | | |
|---|---|---|---|---|
| | | Not met | Met | Total |
| SBP4 Criteria | Below average | 7 | 4 | 11 |
| | At or above average | 6 | 18 | 24 |
| | Total | 13 | 22 | 35 |

Note: SBP = system-based practice

Table 12.

*Crosstabs for milestone:* "Accepts responsibility and follows through on tasks" *(PROF2)*

| | | Burnout Criteria | | |
|---|---|---|---|---|
| | | Not met | Met | Total |
| PROF2 Criteria | Below average | 10 | 10 | 20 |
| | At or above average | 3 | 14 | 17 |
| | Total | 13 | 24 | 37 |

Note: PROF = professionalism

As demonstrated in Tables 10-12, three milestones demonstrated comparative differences when broken down by burnout criteria: "Manages patients with progressive responsibility and independence" [patient care (PC3)], "Transitions patients effectively within and across health delivery systems" [systems-based practice (SBP4) domain], and "Accepts responsibility and follows through on tasks" [professionalism (PROF2) domain]. Inspection of crosstabs revealed that the performance on the milestone PC3 when considered dichotomously, produced equal sized groups for those meeting criteria for burnout, however a difference appeared between performance when criteria for burnout were not met, such that more performed at or above average. Surprisingly, performance on the milestone SBP4 produced relatively equal groups when criteria for burnout were not met, but more performed at or above average if criteria for burnout were met. Performance on the milestone PROF2 was slightly different, it showed that more residents performing at or above average met criteria for burnout than did not, while more residents performing below average did not meet criteria for burnout than those that did.

To evaluate statistical significance and strength of prediction, these three milestones were entered into separate logistical regression analyses as the dependent variables with burnout as the categorical independent variable. Results are presented in Table 13. All three milestones

were significantly predicted by burnout criteria. However, the confidence interval for burnout as the predictor of PC3 included '1' in the range and is therefore not interpreted as an important predictor of this performance milestone. Burnout significantly predicted below average performance on the milestone SBP4 63.6% of the time, and at or above average performance 75% of the time of the time (71.4% accurate prediction overall). Burnout significantly below average predicted performance on the milestone PROF2 50% of the time, and at or above average performance 82.4% of the time (64.9% accurate prediction overall).

Table 13.

*Logistic regression analyses with burnout criteria as the independent variable and performance milestones as the dependent variable.*

| DV | $\chi^2$ (df) | *p* | Nagelkerke $R^2$ | Wald | *p* | *OR* | CI | |
|---|---|---|---|---|---|---|---|---|
| PC3 | 4.65 (1) | .031 | .161 | 3.84 | 0.50 | 5.500 | .999 | 30.386 |
| SBP4 | 4.77 (1) | .029 | .179 | 4.47 | .034 | .190 | .041 | .886 |
| PROF2 | 4.40 (1) | .036 | .150 | 3.92 | .048 | .214 | .047 | .984 |

*Note:* PC = patient care, SBP = system-based practice, PROF = professionalism.

For the analysis of stress, burnout, depression, and empathy as continuous predictors of performance, the 23 milestones were aggregated based on the six domains to which they applied and averages were obtained for each resident (see Table 8 for each milestone and its corresponding domain). Similar to above, these performance domain averages were compared to the entire resident population based on residency year and a dichotomous category was made with 1) below the average of the population and 2) at/above the average of the population groups. This was completed in order to reduce the number of analyses needed. The data were examined descriptively to explore differences in mean levels of stress, burnout, depression, and empathy based on performance categories. Inspection of the data revealed that the domain system-based practice (SBP) was the only domain to demonstrate comparatively large

differences in mean levels of stress, burnout, or depression, while none of the domains demonstrated differences in empathy levels. Furthermore, these differences were largest at Time Point 2. Therefore, post hoc independent samples t-tests were performed with SBP as the comparison variable, and stress, burnout, and depression at Time Point 2 entered as dependent variables. All three comparisons were significant. Results are presented in Table 14. Mean levels of stress, burnout, and depression were lower for those with at or above performance on this milestone. Mean levels of stress, burnout, and depression were higher for those who received below average performance evaluations.

Table 14.

*Independent samples t-tests with performance on the System Based Practice (SBP) domain as the comparison variable and stress outcomes at Time Point 2 as the test variables.*

| | ***t (df)*** | ***p*** | SBP Performance | ***N*** | ***M*** | ***SD*** |
|---|---|---|---|---|---|---|
| **Stress 2** | -2.47 | .020 | Below | 21 | 6.81 | 3.17 |
| | (29) | | At/above | 10 | 4.00 | 2.45 |
| **Burnout 2** | -2.09 | .045 | Below | 21 | 34.68 | 14.18 |
| | (29) | | At/above | 10 | 30.08 | 10.41 |
| **Depression 2** | -2.29 | .029 | Below | 21 | 3.91 | 3.11 |
| | (29) | | At/above | 10 | 1.50 | 1.58 |

## Discussion

The purpose of the present study was to evaluate predictors of stress-related outcomes in internal medicine residents and their effects on performance. Stress, burnout, depression, and empathy were assessed at three separate time points over the course of the first half of a residency year and performance evaluations were gathered at the end of the semester.

### Stress, Burnout, and Depression

The first hypothesis predicted that stress would lead to subsequent burnout and depression; the hypothesis was supported. Stress significantly predicted burnout and depression

at subsequent time points. However, when controlling for baseline levels of burnout, stress no longer accounted for any unique variance in subsequent burnout; but, when controlling for baseline levels of depression, stress remained a significant predictor of subsequent depression, while baseline depression dropped to nonsignificance. These findings replicate the literature suggesting that stress leads to depression (Cohen, Janicki-Deverts, & Miller, 2007; Hammon, 2005). Stress and burnout are highly related conceptually, and were highly correlated in the present study. Conceptually, burnout is a measure of prolonged work-related stress (Maslach, Jackson, & Leiter, 1996). However, these findings suggest that burnout and stress may be so closely related that stress does not contribute independent variance not already captured by a measure of burnout. Given their conceptual similarity, it is possible that stress does not incrementally add to a measure of self-reported burnout. This is contrary to the present hypothesis and the generally accepted conceptualization that stress leads to burnout (Hillhouse et al., 2000; Maslach, Jackson, & Leiter, 1996). Therefore, when using self-report, burnout and stress may be measuring the same construct. Alternatively, burnout could represent a more trait-like construct, while self-reported general stress represents a state-construct, more subject to change. the two-month intervals between measurement periods may not have been sufficient time to capture unique variance explained by stress in subsequent burnout.

Burnout was also examined as a predictor of depression, based on findings by Hillhouse and colleagues (2000). The hypothesis was supported: burnout was a significant predictor of subsequent depression. After inspection of the data, stress was examined as a mediator of this relationship. It was found to be a significant mediator, suggesting that stress accounts for the relationship between burnout and subsequent depression. These findings demonstrate that although burnout significantly predicts depression, perceived stress accounts for this relationship.

It is possible that burnout does not add incremental prediction to subsequent depression over and above perceived stress.

Coupled with the findings discussed above, burnout successfully predicts later burnout and depression, but when accounting for levels of stress, burnout only remains a significant predictor of subsequent burnout, not depression. It is important to note that burnout is conceptualized as a result of chronic stress in the work place, and is often discussed as clinically similar to depression (Hakanene, Schaufeli, & Ahola, 2008; Maslach, Jackson, & Leiter, 1996; Toker & Biron, 2012). Clearly, stress, burnout, and depression are related, however burnout may not be capturing differences incremental to that already captured by the measurement of self-reported stress and depression. Because burnout is specific to the workplace, it may be that burnout leads to stress, which then leads to depression, suggesting a different temporal pathway then the current conceptual understanding (Maslach et al., 1996). Furthermore, burnout may capture a trait-like quality of stress in the workplace, whereas a general measure of stress captures a state quality more susceptible to short-term change. Future research should test this hypothesis by using a longitudinal design. Should burnout precede a general experience of stress, interventions for coping with burnout could be integrated into the workplace as preventative treatments for the development of chronic stress and depression.

**Job Strain, Burnout, and Depression**

The second main hypothesis predicted that job strain would be significantly related to burnout and depression. However, this hypothesis was not supported. Further, the measure of job strain that was constructed for this study demonstrated adequate reliability at only the second (but not the third) time point. Given the theoretical construct of job strain (Karasek, 1979; Karasek et al., 1998) there was adequate rationale to categorize participants based on the method

used (those reporting tasks higher in demand than in autonomy were placed in the job strain category, and all others were placed in a comparison category). However, the choice to use at least a three-point difference between demandingness and autonomy of tasks was made based on ad hoc inspection of the data from the present small sample rather than established criteria derived from normative data. This limits the reliability and validity of the categorization procedure. The current literature supports the use of this theoretical model in internal medicine residents (Eckleberry-Hunt et al., 2009; Karaseck et al., 1998; Tyssen et al., 2000), however more research needs to be done to validate a measure of job strain in this population before valid conclusions can be drawn. Discussions with internal medicine department directors, and internal medicine residents themselves, as well as close consideration of the current literature led to the development of the current study's JDC measure. However, future research should seek to validate and provide psychometric data for a measure similarly constructed using a larger sample size of internal medicine residents.

**Gender, Stress, Burnout, Depression, and Empathy**

The third hypothesis predicted gender differences in stress, depression, and burnout. Specifically, based on the previous literature (Rafferty et al., 1986; Thomas, 2004; Shanafelt et al., 2005), it was expected that female residents would report higher levels of stress, depression, and empathy, whereas male residents would report higher levels of burnout. This hypothesis was partially supported. Analyses revealed no gender differences in stress or depression. Gender differences were found for empathy scores. Specifically, female residents reported higher levels of empathy at all three time points, with significant differences at Time Points 1 and 3. Surprisingly, female residents reported significantly higher levels of burnout at Time Point 1 than male residents and, while nonsignificant, higher mean levels at Time Points 2 and 3.

Inspection of the data revealed that female residents reported mean levels of burnout in the moderate to high range at all three time points, while male residents reported mean levels below the cutoff for moderate burnout at all three time points. When considering the percentages of residents that met criteria for burnout at any time point, a larger percentage of female residents met criteria than male residents. Further, female residents accounted for a larger percentage of the residents meeting criteria for burnout than their proportionate size at Time Points 1 and 2. That is, female residents accounted for 28% and 23% of the sample at Time Points 1 and 2, respectively; yet, they accounted for larger percentages of those meeting criteria for burnout. These findings suggest that female residents may be particularly at risk for burnout.

The current literature has produced inconsistent findings regarding gender differences in stress related outcomes. Some studies have found that female residents report higher levels of stress and depression (Boerjan et al., 2010; Cohen & Patten, 2005; Gramstad et al., 2013; Levey, 2001; Toews, et al., 1993). Others found no gender differences in burnout (Lemkau et al., 1988; Shanafelt et al., 2002; Thomas, 2004), or that male residents reported higher levels of burnout (Hillhouse et al., 2000; Michels et al., 2003; Willcock et al., 2004). But many studies fail to report gender comparisons in stress related outcomes in residents and physician populations. Therefore, it is possible that female residents are at higher risk for burnout, which may be specific to internal medicine residency. The stressors of internal medicine residency and the characteristics of physicians choosing this specialty may pose a greater risk to female physicians. These findings have implications for the development of resident intervention for stress and burnout, with emphasis on those targeted to female residents.

**Trait Mindfulness, Burnout, and Depression**

The fourth hypothesis predicted that trait mindfulness would be inversely related to measures of stress. The present findings partially supported this hypothesis. The *acting with awareness* subscale of the mindfulness measure was inversely related to burnout and depression at Time Points 1 and 2. *Acting with awareness* is considered a more theoretically parsimonious measure of trait mindfulness than the other four facets measured by the FFMQ (Brown & Ryan, 2003; Brown & Ryan, 2004). The fact that all other subscales of the trait mindfulness measure showed no significant relationships with the stress measures is consistent with the theoretical model of mindfulness presented by Brown and colleagues (2003) which posits that attention and awareness are the core components of mindfulness, whereas *observing*, *describing*, *nonjudging*, and *nonreactivity* may be better conceptualized as results of mindfulness, but not part of the fundamental definition. Significant associations between trait mindfulness and stress, burnout, or depression were not found at Time Point 3. However, levels of burnout and depression were lower by the end of the study and the sample size was smaller, limiting ability to find significant differences and the variability in reported stress outcomes. These findings, coupled with past research, suggest that trait mindfulness may serve as a protective factor against the development of burnout and depression (Abenavoli et al., 2013; Barnhofer, Duggen, & Griffith, 2011; Olsen, Kemper, & Mahan, 2015). The finding that *acting with awareness* was negatively correlated with burnout and depression suggests that interventions that improve trait mindfulness may be uniquely helpful in improving resiliency in resident populations. Given that internal medicine residents cannot change the stressful situations of their jobs, acceptance strategies and resilience building (e.g., lowering physiological response to stress) may be the most effective way of coping with physician-related stressors (Regehr, Glancy, Pitts, & LeBlanc, 2014). One study found that improvements in the *observe* and *nonjudge* facets were correlated with reductions in

burnout and mood disturbance in primary care physicians (Krasner et al., 2009). Given the mixed findings and theoretical foundations (Baer et al., 2008; Brown & Ryan 2003), future research should explore the relationship between burnout and mindfulness using all five facets of the FFMQ in internal medicine resident populations.

**Gender, Burnout, and Empathy**

An exploratory analysis was conducted to examine the effects of the depersonalization subscale of the burnout measure with empathy over time as a function of gender differences. Because the depersonalization subscale of the MBI is conceptualized as a detached view from ones patients (Maslach et al., 1996), it is theoretically similar to empathy. That is, depersonalization and empathy are conceptually opposite of one another. Therefore, depersonalization and empathy were entered into the analysis together. Results of this analysis revealed that, together, both variables changed significantly over time, but when looked at separately, empathy was the only variable to significantly change over time. Inspection of the data revealed that empathy increased over time. The interaction between empathy and time by gender was not significant. However, the interaction between depersonalization and time by gender was significant. The results revealed that this interaction was only marginally significant at Time Point 2 and nonsignificant at all other time points. Inspection of Figure 1 revealed that depersonalization was lower for male residents than for female residents at Time Points 1 and 2, but this difference was most pronounced at Time Point 2. Further, at Time Point 3 depersonalization levels were similar for both male and female residents. However, it is important to note that at Time Point 3 only four female residents remained in the study. It is possible that those female residents who were experiencing the highest levels of burnout dropped

out of the study before the final wave of data collection. Therefore, these results should be interpreted as preliminary and require replication.

These findings, coupled with the findings that empathy and overall burnout were higher for female residents than male residents at given time points, are surprising. It is possible that depersonalization and overall burnout serve as a coping strategy for residents with higher levels of empathy. Burnout may be a maladaptive coping mechanism, but may serve a protective purpose for those residents higher in empathy, especially given the particular stressors faced by internal medicine physicians (Shanafelt, Sloan, & Haberman, 2003. Residents with a disposition towards higher empathy may use depersonalization as a way to cope. Importantly, empathy was measured as a general dispositional trait, whereas depersonalization was measured specific to the workplace. Therefore, those residents with a stronger disposition toward empathic concern and perspective taking may use depersonalization as a tool to manage the stressors of physician duties, which may result in greater emotional exhaustion. Future research is needed to replicate these findings. Further, researchers should look at changes in the interaction between empathy and depersonalization over time with gender before and after a stress management intervention to determine if teaching new coping skills will reduce depersonalization and overall burnout, and preserve empathic concern, especially since empathy has been shown to be associated with positive outcomes in physician populations (Shanafelt et al., 2005). These findings have implications for the development and implementation of interventions for internal medicine residence. Empathy should be considered and measured and gender should continued to be studied as a potential covariate.

**Performance Evaluations**

Given the paucity of research on qualitative performance evaluation for internal medicine residents, there was no formula to follow, therefore exploratory analyses were performed based on inspection of the data and discussion with the residency program director. The logistical analyses revealed surprising findings, partially disconfirming predicted relationships. Specifically, burnout criteria were found to be significantly predictive of three performance milestones. Specifically, one milestone, "Manages patients with progressive responsibility and independence" was predicted by burnout in the expected direction, such that meeting criteria for burnout predicted below average performance. Another milestone, "Transitions patients effectively within and across health delivery systems" was related to burnout in the opposite direction than was predicted, such that meeting criteria for burnout predicted higher performance levels, while not meeting criteria for burnout predicted relatively equal distribution in performance. Finally, the milestone, "Accepts responsibility and follows through on tasks" was also associated with burnout in the opposite direction of what was expected, such that meeting criteria for burnout was associated with above average performance and not meeting criteria predicted below average performance. Importantly, discussion with the internal medicine director revealed that the latter milestone reflects conference attendance and logging of duty hours, which can be difficult for many residents to manage effectively. It is possible that for those residents who make efforts to attend conferences and maintain paper work obligations, burnout is more of a risk because there is less time for self-care. Taken together these results suggest that some aspects of performance may be facilitated by burnout, such that more willingness to work hard, despite the sacrifices, is rewarded by higher performance evaluations. This interpretation is supported by the research; Shanafelt and colleagues (2005) note that supervising physicians model burnout behaviors (prioritizing professional life over personal life)

to physicians in training. Still, other aspects of performance may be negatively influenced by the presence of high burnout, specifically patient care performance. Given that not all performance scores of the residents differed as a function of burnout, more research is needed to better understand which aspects of performance are most influenced by burnout, and which are influenced positively and negatively. Further, given the small sample size these results should be interpreted with caution. Future research should explore the relationships between the 23 ACGME milestones and burnout criteria with a larger sample size of internal medicine residents to cross-validate these findings and explore more relationships.

Furthermore, the comparisons of means based on performance as a dichotomous variable and stress outcomes from Time Point 2 revealed significantly higher averages for stress, burnout, and depression for below average performance on one domain of performance, system-based practice. These results suggest that stress and dysphoric emotions negatively affect performance. Importantly, this domain of performance represents very nuanced and subtle behavior, which may be the first negatively affected performance domain when residents become stressed. Several of the items in this domain reflect the ability to recognize, improve, and advocate for systems-level duties. For the resident who is experiencing more stress there may be an inability or difficulty to respond to these 'big-picture' demands in adaptive ways.

Overall, a review and inspection of the data revealed some trends regarding performance below or at/above average and mean levels of stress outcomes. Specifically, data revealed consistently higher means on stress outcomes for below average performance on the *system-based practice* and *professionalism* domains, while the *patient care* and *interpersonal and communication skills* domains revealed inconsistent differences across stress outcomes, but the *medical knowledge* and *practice based learning and improvement* domains revealed consistently

lower means on stress outcomes for below average performance. Again, these results suggest that some domains of performance may be negatively affected by higher levels of stress related outcomes, while other domains may actually be improved by burnout. Based on this research future studies should explore the effect of a stress management intervention on cohort and individual performance to evaluate whether performance can be preserved while stress and burnout are decreased.

**Limitations**

The current study is not without limitations. First, the small sample size limits the study's findings considerably. Specifically, it makes finding significance difficult, prevents generalizability, and most importantly, limits the ability to run advanced statistical analyses. Also, male residents far outnumbered female residents in the present sample. While this proportion is reflective of the class percentages, future research should recruit a larger sample to establish more robust tests of gender differences. More research is needed with larger sample sizes to run structural equation and multi-level modeling. Analyses of these sorts would allow for examination of the relationship among all variables in the model and their change over time. Second, attrition was also a problem in the present study. Because only 18 participants completed measures at all three time points, missing data is an issue. In a larger sample multi-level modeling (MLM) would handle missing data with more robust calculations. Specifically, using MLM would allow for a closer examination of the relationship between empathy, burnout, and gender, with time as the level one variable, while robustly accounting for missing data.

A third limitation to the present study is the lack of a validated measure to assess task demand and control in internal medicine residency. Without a validated measure, valid conclusions cannot be drawn regarding the evaluation of the job-strain model in internal

medicine residents. Despite nonsignificant findings in the present study, there may be relationships between specific task demands and control on perceived stress, burnout, and depression. Fourth, while this is the first study to assess the effects of stress, burnout, and depression on the formal ACGME performance milestones, there is not an established norm to determine high and low performance; therefore, cohort averages were used. While this may be the best norm on which to base analyses, it is likely that separating the category 'at/above average' into two separate categories would lead to more nuanced findings regarding effects on performance. Finally, the lack of experimental manipulation of any kind in this research limits internal validity and ability to infer causal relationships. This is especially relevant when considering the results regarding trait mindfulness: without evaluation of a mindfulness intervention in this population, it is unclear whether increases in trait mindfulness would lead to decreases in stress, burnout, and depression. However, based on the longitudinal findings, trait mindfulness does seem to serve a protective factor against burnout and depression.

**Conclusion**

Overall the findings of this research project are compelling and speak to the larger body of research related to burnout in physician populations. Specifically, burnout may precede chronic stress and depression, in which case, burnout inventions could serve as protective treatment for chronic stress and depression in internal medicine residents. Female residents may be more at risk for burnout, suggesting intervention efforts be tailored to offer specific coping mechanisms for female residents, and residency programs be made aware of this potential risk factor in their female residents. Further, burnout and empathy may have unique relationships in physician populations, in which burnout may serve as a coping mechanism to manage higher levels of empathy. These findings suggest the need for interventions to provide positive coping

skills in handling the specific stressors of internal medicine residency. Given the findings regarding trait mindfulness, coupled with past research mindfulness-based interventions are highly indicated for this population (Krasner et al, 2009; Shapiro et al., 2005). It is possible that empathy may be a risk factor for burnout. Therefore, it may be more important to tailor stress management interventions toward coping skills for high empathy levels, than it is to tailor interventions toward female residents. Mindfulness training has been shown to improve resiliency to stress in 'front-line' providers (Epstein & Krasner, 2012; Jha, Rogers, & Morrison, 2014), and, therefore may address the negative effects of high empathy levels while preserving adaptive levels of empathy and compassion

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## Appendix A

Maslach Burnout Inventory – Human Services Survey

How Often 0-6

0 Never
1 A few times a year or less
2 Once a month or less
3 A few times a month
4. Once a week
5 A few times a week
6 Every day

1. I feel emotionally drained from my work.
2. I feel used up at the end of the workday.
3. I feel fatigued when I get up in the morning and have to face another day on the job.
4. I can easily understand how my recipients feel about things.
5. I feel I treat some recipients as if they were impersonal objects.
6. Working with people all day is really a strain for me.
7. I deal very effectively with the problems of my recipients.
8. I feel burned out from my work.
9. I feel I'm positively influencing other people's lives through my work.
10. I've become more callous toward people since I took this job.
11. I worry that this job is hardening me emotionally.
12. I feel very energetic.
13. I feel frustrated by my job.
14. I feel I'm working too hard on my job.
15. I don't really care what happens to some recipients.
16. Working with people directly puts too much stress on me.
17. I can easily create a relaxed atmosphere with my recipients.
18. I feel exhilarated after working closely with my recipients.
19. I have accomplished many worthwhile things in this job.
20. I feel like I'm at the end of my rope.
21. In my work, I deal with emotional problems very calmly.
22. I feel recipients blame me for some of their problems.

## Appendix B

Depression Anxiety Stress Scale 21 – Abridged

Please read each statement and circle a number 0, 1, 2 or 3, which indicates how much the statement applied to you ***over the past week***. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

| | | | | |
|---|---|---|---|---|
| 1(s). I found it hard to wind down | 0 | 1 | 2 | 3 |
| 2 (d). I couldn't seem to experience any positive feeling at all | | 0 | 1 | 2 |
| 3 | | | | |
| 3. I found it difficult to work up the initiative to do things | 0 | 1 | 2 | 3 |
| 4. I tended to over-react to situations | 0 | 1 | 2 | 3 |
| 5. I felt that I was using a lot of nervous energy | 0 | 1 | 2 | 3 |
| 6. I felt that I had nothing to look forward to | 0 | 1 | 2 | 3 |
| 7. I found myself getting agitated | 0 | 1 | 2 | 3 |
| 8. I found it difficult to relax | 0 | 1 | 2 | 3 |
| 9. I felt down-hearted and blue | 0 | 1 | 2 | 3 |
| 10. I was intolerant of anything that kept me from getting | | | | |
| on with what I was doing | 0 | 1 | 2 | 3 |
| 11. I was unable to become enthusiastic about anything | 0 | 1 | 2 | 3 |
| 12. I felt I wasn't worth much as a person | 0 | 1 | 2 | 3 |

| | | | | |
|---|---|---|---|---|
| 13. I felt that I was rather touchy | 0 | 1 | 2 | 3 |
| 14. I felt that life was meaningless | 0 | 1 | 2 | 3 |

## Appendix C

Interpersonal Reactivity Index

The following statements inquire about your thoughts and feelings in a variety of situations. For each item, indicate how well it describes you by choosing the appropriate letter on the scale at the top of the page: 1, 2, 3, 4, or 5. When you have decided on your answer, fill in the number on the answer sheet in the space provided. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can. Thank you.

ANSWER SCALE:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| DOES NOT DESCRIBE ME WELL | | | | DESCRIBES ME VERY WELL |

1. I often have tender, concerned feelings for people less fortunate than me. ____

2. I sometimes find it difficult to see things from the "other guy's" point of view. ____

3. Sometimes I don't feel very sorry for other people when they are having problems. ____

4. I try to look at everybody's side of a disagreement before I make a decision. ____

5. When I see someone being taken advantage of, I feel kind of protective towards them. ____

6. I sometimes try to understand my friends better by imagining how things look from their perspective. ____

7. Other people's misfortunes do not usually disturb me a great deal. ____

8. If I'm sure I'm right about something, I don't waste much time listening to other people's arguments. ____

9. When I see someone being treated unfairly, I sometimes don't feel very much pity for them. ____

10. I am often quite touched by things that I see happen. ____

11. I believe that there are two sides to every question and try to look at them both. ____

12. I would describe myself as a pretty soft-hearted person. ____

13. When I'm upset at someone, I usually try to "put myself in his shoes" for a while. ____

14. Before criticizing somebody, I try to imagine how I would feel if I were in their place.

# Appendix D

## *(ffmq-sf)*

Below is a collection of statements about your everyday experience. Using the 1–5 scale below, please indicate, in the box to the right of each statement, how frequently or infrequently you have had each experience in the last month (or other agreed time period). Please answer according to what really reflects your experience rather than what you think your experience should be.

| *never or very rarely true* | *not often true* | *sometimes true sometimes not true* | *often true* | *very often or always true* |
|---|---|---|---|---|
| *1* | *2* | *3* | *4* | *5* |

| | | |
|---|---|---|
| *1* | I'm good at finding the words to describe my feelings | |
| *2* | I can easily put my beliefs, opinions, and expectations into words | |
| *3* | I watch my feelings without getting carried away by them | |
| *4* | I tell myself that I shouldn't be feeling the way I'm feeling | |
| *5* | it's hard for me to find the words to describe what I'm thinking | |
| *6* | I pay attention to physical experiences, such as the wind in my hair or sun on my face | |
| *7* | I make judgments about whether my thoughts are good or bad. | |
| *8* | I find it difficult to stay focused on what's happening in the present moment | |
| *9* | when I have distressing thoughts or images, I don't let myself be carried away by them | |
| *10* | generally, I pay attention to sounds, such as clocks ticking, birds chirping, or cars passing | |
| *11* | when I feel something in my body, it's hard for me to find the right words to describe it | |
| *12* | it seems I am "running on automatic" without much awareness of what I'm doing | |
| *13* | when I have distressing thoughts or images, I feel calm soon after | |

| | | |
|---|---|---|
| *14* | I tell myself I shouldn't be thinking the way I'm thinking | |
| *15* | I notice the smells and aromas of things | |
| *16* | even when I'm feeling terribly upset, I can find a way to put it into words | |
| *17* | I rush through activities without being really attentive to them | |
| *18* | usually when I have distressing thoughts or images I can just notice them without reacting | |

*never or very rarely true 1* *not often true 2* *sometimes true sometimes not true 3* *often true 4* *very often or always true 5*

| | | |
|---|---|---|
| *19* | I think some of my emotions are bad or inappropriate and I shouldn't feel them | |
| *20* | I notice visual elements in art or nature, such as colors, shapes, textures, or patterns of light and shadow | |
| *21* | when I have distressing thoughts or images, I just notice them and let them go | |
| *22* | I do jobs or tasks automatically without being aware of what I'm doing | |
| *23* | I find myself doing things without paying attention | |
| *24* | I disapprove of myself when I have illogical ideas | |

## Appendix E

Job Demand and Control Questionnaire

Please rate the tasks listed below on the following dimensions. First, rate the degree to which you perceive each task to be ***demanding***, that is, **the extent to which you feel it is important to perform well, and requires you to work quickly, concentrate intensely, or deal with conflicting demands and interruptions**. Second, rate the extent to which you perceive the tasks to be ***under your control***, that is, **the extent to which you have flexibility to make decisions and use different skills to do the job**.

Rating scale

0 = not at all
1 = somewhat
2 = mostly
3 = very much or all the time

1. Inpatient admission
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

2. Morning report presentation
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

3. Night float cross covering
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

4. Interactions with patient family members
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

5. Communication with other providers and other health care professionals
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

6. Unexpected death disclosure
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

7. Restriction on inpatient duty hour work rules
    a. Demandingness 0 1 2 3
    b. Under your control 0 1 2 3

## Appendix F

Demographic Questionnaire

Identification Number (first letter of last name and last 4 digits of your social security number):

_____

*Please answer the following questions*

1. Age: _____

2. Sex:

Male: _____ Female: _____ Other: _____

3. Race: White: _____ African American: _____ Hispanic: _____

Asian: _____ Other: _____

4. Residency year (i.e., intern, 2nd or 3rd year): _____

5. Relationship status:

Married: _____ Separated:_____ Divorced:_____

Single: _____ Significant other: _____

6. Do you have children? Y: _____ N: _____

If so, how many? _____

7. Average amount of hours of sleep per night over the last week? _____

8. Rate the degree to which you felt supported from your home life (i.e., friends and family) over the last month by circling a number below

| 0 | 1 | 2 | 3 |
|---|---|---|---|
| Not at all or very little | Somewhat supported | Mostly supported | Very much or all the time |

# Vita

Sarah Ellen Braun was born on September 15th, 1987, in Lexington, Kentucky and is an American citizen. Sarah graduated from Bryan Station High School in Lexington, Kentucky in 2005. She received her Bachelor of Arts in Psychology from the University of Kentucky in Lexington, Kentucky, in December of 2012. During her time at the University of Kentucky, she completed an undergraduate thesis on brief mindfulness inductions in a nonmeditating sample under the direction of Ruth Baer, Ph.D. Sarah began her graduate work in the Clinical Psychology doctoral program at Virginia Commonwealth University in August 2013 under the direction of Stephen Auerbach, Ph.D.