Burnout:
Job Resources and Job Demands Associated With Low Personal Accomplishment in United States Radiology Residents

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Objective: We aimed to identify job resources and job demands associated with measures of personal accomplishment (PA) in radiology residents in the United States.

Materials and Methods: A 34-item online survey was administered between May and June 2017 to U.S. radiology residents and included the 8 Likert-type PA questions from the Maslach Burnout Inventory-Human Services Survey, 19 visual analog scale job demands-resources questions, and 7 demographic questions. Multiple linear regression was calculated to predict PA based on job demands-resources. Effects of binomial demographic factors on PA scores were compared with independent-samples t tests. Effects of categorical demographic factors on PA scores were compared with one-way between-subjects analysis of variance tests. A linear regression was calculated to evaluate the relationship of age on PA scores.

Results: "The skills and knowledge that I am building are important and helpful to society" ($P = 2 \times 10^{-16}$), "I have good social support from my co-residents" ($P = 4 \times 10^{-5}$), and "I regularly receive adequate constructive feedback" ($P = 4 \times 10^{-6}$) all positively correlated with PA. PA scores were significantly lower for individuals who were single vs those married or partnered ($P = .01$).

Conclusions: Radiology residents score higher in the PA domain of burnout when they receive adequate constructive feedback, have good co-resident social support, and feel that the skills and knowledge they are building are important to society. Improving constructive feedback mechanisms, enabling resident-only social time, and supporting opportunities that reinforce the importance of their contributions may therefore improve radiology residents' sense of PA.

Key Words: Burnout; resident; job; personal accomplishment.

INTRODUCTION

A recent study of burnout in New England radiology residents identified a high degree of burnout in over one third of respondents. The surveyed radiology residents scored particularly poorly in the personal accomplishment (PA) domain relative to residents in other specialties (1). A recent study of burnout in musculoskeletal radiology fellows also identified a high degree of burnout with poor scores in PA as well as depersonalization (2). In this study, we report how job resources and job demands impact U.S. radiology residents' sense of PA as identified in a new national survey.

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Burnout can lead to decreased effectiveness and productivity, reduced job commitment, negative effects on home life (3), negative effects on personal health (4), and compromised patient safety (5,6). Burnout occurs when job demands exceed job resources (7). As per the job demands–resources (JD-R) theory of organizational psychology and behavior, job demands include role ambiguity, role conflict, job insecurity, and work overload, whereas job resources include autonomy, social support from colleagues, performance feedback, and supervisory coaching (7–9). Because low PA was the dominating burnout domain in previously surveyed radiology residents and because job resources and job demands impact burnout, understanding the effects of job resources and job demands on radiology residents' sense of PA could help program directors and chief residents minimize the risk of burnout and establish effective burnout recovery solutions.

The objective of this study was to identify job resources and job demands associated with measures of PA in radiology residents in the United States. We hypothesized that high

job demands, such as role ambiguity, and poor job resources, such as lack of autonomy or colleague support, would correlate with low PA scores.

MATERIALS AND METHODS

This study was exempted by our institutional review board. Informed consent was implied by voluntary anonymous completion of the survey.

Survey

A 34-item electronic online anonymous survey was administered and was composed of the following 3 parts: the 8 Likert-type PA questions from the validated Maslach Burnout Inventory-Human Services Survey (MBI-HSS) (10), 19 statements scored on a visual analog scale regarding job resources and job demands, and 7 demographic questions. Demographic questions are listed in Table 1. The JD-R statements are listed in Table 2. The PA questions of the MBI-HSS cannot be reproduced per the licensing agreement with Mind Garden Inc.

Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools

hosted by Partners HealthCare Research Computing, Enterprise Research Infrastructure & Services group. REDCap is a secure, web-based application designed to support data capture for research studies. The survey was open for a total of 3 weeks.

The MBI-HSS measures three domains of the burnout syndrome—emotional exhaustion, depersonalization, PA—with 22 Likert-type scale questions. We were most interested in the PA domain, given the findings from a recently published study (1) and, thus, we administered only the 8 PA questions from the MBI-HSS to minimize the number of survey questions. The PA score is conceptualized as a continuous variable, with PA scores in the lower third of the normative distribution indicating a high degree of burnout in the PA category (10). Mean PA scores were calculated as recommended in the MBI manual (10). In medical professionals, low PA is defined as a score less than 34 (10).

The JD-R theory flexibly models all job characteristics, including both physical and cognitive, as either job demands or job resources (9). The theory can thus be applied to all work environments and be tailored to any specific occupation being considered (9). Based on the types of job demands and resources outlined by Bakker et al. (9), we developed a series of 19 statements related to common job demands and resources in the radiology residency environment. Respondents were asked to score their agreement with each statement using a visual analog scale of 0–100.

Although demographics did not correlate with PA scores in the previous study of radiology residents (1), demographics questions were included to both confirm the previous results and to acknowledge the distribution of respondents.

TABLE 1. Demographics

PGY Level	
PGY 1	10 (3%)
PGY 2	93 (30%)
PGY 3	94 (30%)
PGY 4	54 (17%)
PGY 5	63 (20%)
Average hours worked per week in last 6 mo	54.4 ± 8.9 h
Age	31.1 ± 2.8 y
Sex	
Male	217 (69%)
Female	97 (31%)
Married/Partnered	
Yes	220 (70%)
No	94 (30%)
Children	
Yes	89 (28%)
No	225 (72%)
Region	
New England (CT, MA, ME, NH, RI, VT)	35 (11%)
Mid-Atlantic (NJ, NY, PA)	74 (24%)
East North Central Midwest (IN, IL, MI, OH, WI)	41 (13%)
West North Central Midwest (IA, KS, MN, MO, NE, ND, SD)	41 (13%)
South Atlantic (DC, DE, FL, GA, MD, NC, SC, VA, WV)	45 (14%)
East South Central (AL, KY, MS, TN)	6 (2%)
West South Central (AR, LA, OK, TX)	20 (6%)
Mountain (AZ, CO, ID, MN, NV, NM, UT, WY)	22 (7%)
Pacific (AK, CA, HI, OR, WA)	30 (10%)

PGY, postgraduate year.

Subjects and Recruitment

E-mail addresses available on publicly accessible Internet pages for the radiology residency program director, program coordinator, or chief resident were gathered for each U.S. radiology residency program. E-mail addresses were gathered for a total of 166 residency programs. An e-mail with a link to the survey and with a request to forward the e-mail to all program residents was sent directly to this e-mail list on May 6, 2017. Reminder e-mails were sent on June 11, 2017 and June 23, 2017. The survey was closed on June 30, 2017. Survey respondents were given the option to submit their e-mail address into a lottery to win one of five $50 gift certificates. E-mail addresses were stored in a separate database to maintain anonymity.

Statistical Analysis

The significance level was set at .05. All analyses were performed in R 3.2.3 (11). A multiple linear regression was calculated to predict PA based on the job resources and job demands questions. A second multiple linear regression was calculated to predict PA based on those factors that demonstrated statistical significance and near-significance in the initial regression. The effects of the binomial demographic factors