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Analysis of Burnout and Career Calling in Undergraduate Pre-Medical Students

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Abstract: Burnout is a state of exhaustion, impaired performance, and decreased motivation and is associated with a heavy workload, disruptions to the balance between work and other aspects of life, and difficulty expressing or identifying emotions (alexithymia). Because of the demanding nature of the clinical environment, medical doctors are at significant risk of burnout. In response, studies have examined factors that contribute to burnout in physicians, medical residents, and medical students. However, less work has been done to explore burnout in pre-medical (pre-med) undergraduate students. One factor that may mitigate burnout is a strong sense of career calling. In this study, we designed a survey instrument to assess burnout, career calling, and several related social, environmental, and internal factors in undergraduate students at Southern Adventist University. Upper-class biology, chemistry, and pre-med students were recruited. Ninety students completed the survey of which 44 (60%) were pre-med and 46 (40%) were not. We compared several dimensions of burnout with pre-med status, career calling, and several demographic variables including sex and class standing. We found: (1) Female juniors reported greater feelings of being overwhelmed compared to male juniors. (2) Junior pre-med students tended to feel more overwhelmed than non-pre-med juniors, while pre-med seniors reported feeling less overwhelmed than non-pre-med seniors. (3) Supportive professors increased motivation and the perception that hard work will bring success. (4) Levels of daydreaming were higher in pre-med students. (5) Students that felt more settled in their career calling had higher motivation, a greater belief that their hard work will pay off, and lower levels of daydreaming.

Analysis of Burnout and Career Calling in Undergraduate Pre-Medical Students

According to the *Psychology Dictionary*, burnout is “a state of extreme physical, emotional, and mental exhaustion. It is characterized by a decrease in motivation and performance” (Nugent, 2013). It is often associated with several different dimensions, including prolonged stress, a heavy workload, an imbalance between work and other aspects of life, and various aspects of personality (Amofo, Hanbali, Patel, & Singh, 2014; Chopra, Sotile, & Forest, 2004; Creed, Rogers, Praskova, & Searle, 2014; Drummond, 2015; Epstein & Privitera, 2016).

Literature Review

Locus of Control and Alexithymia

Locus of control (the degree to which individuals feel control over their actions and the outcomes of those actions) and alexithymia (difficulty determining or expressing emotions) were two final factors that appeared to correlate with burnout. An external locus of control manifests in feelings of limited autonomy (possibly due to the perception of limited resources) and is linked to higher levels of burnout in both physicians and medical residents (Chopra, 2004; Kumar, 2016; Thomas, 2004). Epstein (2016) was able to show that physician burnout can be improved through “awareness of their ability to mitigate burnout,” suggesting a link between internal locus of control and lower burnout rates among doctors.

Alexithymia was the second psychological factor suggested by the literature. Meaningful conversation and social exchanges (seeking and cultivating contact with colleagues, talking about job-related stress, psychotherapy, etc.) have been associated with decreased instance of burnout among physicians (Epstein, 2016; Zwack & Schweitzer, 2013). Alexithymia would be a barrier to this type of constructive interaction. Among several other studies cited in Thomas’s (2004) study of resident burnout, he reports a 2002 study by Daly and Wilcock that found alexithymia to be a predictive dimension of burnout.

Workload

Workload has been identified as a dimension of burnout by several studies (Amofo et al., 2014; Chopra et al., 2004; Creed et al., 2014; Kumar, 2016; Thomas, 2004; Zwack & Schweitzer, 2013). Long work hours and a heavy workload are cited as factors associated with increased burnout among physicians and residents (Chopra et al., 2004; Creed et al., 2014; Thomas, 2004). A positive relationship between burnout and workload is also implied (Zwack & Schweitzer, 2013).

Work-Life Balance

Work-life balance was also mentioned in relation to burnout in several studies. A positive correlation exists between work-home interference (or “family-work balance”) and burnout (Kumar, 2016; Thomas, 2004). Physicians have a higher rate of both burnout and dissatisfaction with work-life balance compared to the average working adult in the United States (Shanafelt et al., 2012). Decreased time spent on interpersonal relationship and recreation and “not having a life” were additional dimensions associated with higher levels of stress and burnout in physicians (Creed et al., 2014; Drummond, 2015; Zwack & Schweitzer, 2013). Thus, we see an increased probability of burnout when an imbalance between work/school and life consume excessive amounts of an individual’s energy.

Burnout in Physicians

Several previous studies have examined the ubiquitous problem of burnout among physicians (Amofo et al., 2014; Drummond, 2015; Epstein & Privitera, 2016). Nearly 50% of U.S. physicians in a nationwide survey were found to have at least one symptom of burnout (Shanafelt et al., 2012). Physician burnout has been linked to several negative

effects for both care providers and patients. Physicians experience chronic stress and exhausting workloads, and many report having poor mental health (Cohen & Patten, 2005). An excessively stressful work environment has led to high rates of depression, job turnover, and early retirement (Dyrbye et al., 2014; Myers, Watkins, & Microys, 2003). One study found that 40% or more of U.S. physicians, medical residents, and medical students screened positive for depression (Dyrbye et al., 2014). Low job satisfaction and weekly considerations of leaving academic medicine were reported by about 50% of respondents in a survey of University of Ottawa physicians (Myers et al., 2003). Difficulty recruiting medical health professionals may be a potential result of such unfavorable statistics.

Patient care is also compromised as a result of physician burnout. Patients under the care of burned-out physicians may experience prolonged recoveries and decreased overall satisfaction with their healthcare outcomes (Halbesleben & Rathert, 2008). An increased risk of medical errors among burned-out surgeons was also found (Shanafelt et al., 2010).

Burnout also affects those still completing medical training. Burnout was examined in residents and medical students and results closely paralleled those found in physicians (Thomas, 2004; IsHak et al., 2013). It is a common problem, considering that over 75% of the participants in a university-based medical residency program experienced burnout (Shanafelt, Bradley, Wipf, & Back, 2002). The effects of burnout are seen in factors such as intense work schedules, poor work-life balance, and loss of control (Thomas, 2004). It is unsustainable for individuals to be investing so heavily (financially, emotionally, and physically) in medical training only to burnout after a handful of years in practice.

Burnout in Undergraduate Students

Burnout is not only related to professionals in the medical field. Due to the work-like nature of full-time enrollment in college or university, undergraduate students also experience symptoms of burnout. Maroco, Tecedeiro, Martins, and Meireles (2008) found that the high stress environment, significant workload, and decreased time spent with family and friends contributed to an overall increased level of burnout in college students. Internal and external motivation styles also influence an undergraduate student's likelihood of experiencing burnout with higher levels of burnout being found in students who lacked motivation and had an external locus of control (Pisarik, 2009). The sole study that examined burnout specifically in pre-med undergraduate students found that, compared with non-premedical students, premedical students had higher levels of both burnout and depression severity (Fang, Young, Golshan, Moutier, & Zisook, 2012).

Mitigating Factors

Work environment. The literature also presented mitigating factors that could decrease the effects of burnout. Work environment was one of these factors. In a study attempting to distinguish some of the factors associated with physician burnout, Amofo et al. (2014) showed that low job satisfaction was related to higher burnout rates. The importance of positive interactions within the workplace is also mentioned, stressing the value placed on pleasant and supportive work conditions (Bott et al.,

2017). A stressful work environment was associated with higher levels of burnout among physicians, but supportive supervisors and the environment they create can be preventative against physician burnout (Kumar, 2016; Shanafelt et al., 2015).

Career calling. Calling was another factor associated with decreased levels of burnout. Calling is “a transcendent summons experienced as originating beyond the self, to approach a particular life role in a manner oriented toward demonstrating or deriving a sense of purpose or meaningfulness and that holds other-oriented values and goals as primary sources of motivation” (Dik & Duffy, 2009). A correlation between the presence of calling and a decreased burnout rate among physicians has been established (Drummond, 2015), and calling may also be protective against dimensions of burnout like a heavy workload and work-family imbalance (Bott et al., 2017). Resident and medical student burnout can also be partially shielded by the presence of calling (Nath, 2017). However, little evidence exists on how calling affects students at the undergraduate level who are considering a career in medicine.

This research was designed to add to the scarce body of research regarding burnout and calling in pre-medical undergraduate students. As the second study investigating burnout in pre-med students, it explores how previous findings in the realm of calling and pursuit of a career in medicine are related to burnout in undergraduate pre-med students. The goal of this study was to determine whether the presence or search for calling correlated with lower burnout occurrence. We also hoped to pinpoint particular dimensions of burnout that are affected by calling or work environment.

Methods

Survey Development

We designed our instrument to assess burnout in a holistic way. Upon review of the literature, we identified and included several dimensions (called “factors” in the Statistical Methods section) of burnout and included questions assessing each dimension. The dimensions were: workload, school-life balance, locus of control, and alexithymia. Each of these dimensions of burnout has been assessed by multiple peer-reviewed articles on burnout using several instruments. In developing our questionnaire, we incorporated relevant questions from several of these instruments in our study.

Workload

The five questions assessing workload were taken from three sources (see Table 1). One of the questions was adapted from the Maslach Burnout Inventory (Maslach, Jackson, & Leiter, 1996), another was adapted from the Copenhagen Burnout Inventory (Kristensen, Borritz, Villadsen, & Christensen, 2005), and three questions were adapted from the Academic Stress Scale created by Rogers, Creed, & Searle (2012). See Table 1 for details.

School-Life Balance

One question, “My school schedule leaves me enough time for my personal/family life,” was used to assess school-life balance. It was adapted from the 2012 study by Shanafelt et al. exploring work-life balance in physicians in the United States. We used the word “school” in place of “work” in order for the prompt to apply to students.

Locus of Control and Alexithymia

Seven questions were taken from the TAS-20 Alexithymia scale to determine alexithymia levels in survey respondents (Leisig, Grande, & Faber, 2009). Questions were included from each of the three subscales: difficulty describing feelings, difficulty identifying feelings, and externally-oriented thinking. Locus of control was assessed using the validated 4-item scale developed by Kovaleva in 2012. “School” was used instead of “work” so the prompt applied more directly to students.

Work Environment

Work environment was adapted to academic environment in this study.

Table 1. Online undergraduate pre-med burnout survey questions excluding demographic questions with question identifiers (as used in statistical analysis), burnout dimension categorizations, and citations.

| Number | Question | Burnout Dimension | Citation |
|---------------|--|--------------------------|---|
| Q1 | I seem to make friends as easily as others do. | Control | Bagby, Parker, & Taylor, 1994 |
| Q2 | I'm my own boss. | Control | Kovaleva, 2012 |
| Q3 | I feel overwhelmed by the amount of school work I have to do. | Workload | Rogers, Creed, & Searle, 2012 |
| Q4 | My school schedule leaves me enough time for my personal/family life. | Balance | Shanafelt, et al., 2012 |
| Q5 | Whether at school or in my private life: what I do is mainly determined by others. | Control | Kovaleva, 2012 |
| Q6 | I feel stressed about how I am performing. | Workload | Rogers, Creed, & Searle, 2012 |
| Q7 | I like to let people know where I stand on things. | Control | Bagby, Parker, & Taylor, 1994 |
| Q8 | Fate often gets in the way of my plans. | Control | Kovaleva, 2012 |
| Q9 | I am exhausted in the morning at the thought of another day of school. | Workload | Kristensen, Borritz, Villadsen, & Christensen, 2005 |
| Q10 | I am able to describe my feelings easily. | Control | Bagby, Parker, & Taylor, 1994 |
| Q11 | My professors provide helpful feedback and coaching on my performance in school. | Environment | Shanafelt, et al., 2015 |
| Q12 | I feel burned out from my school work. | Workload | Maslach, Jackson, & Leiter, 1996 |
| Q13 | When I compare myself to others, I worry about how well I am doing. | Workload | Rogers, Creed, & Searle, 2012 |

| | | | |
|------------|--|--------------------|--|
| Q14 | If I work hard, I will succeed. | Control | Kovaleva, 2012 |
| Q15 | Being in touch with emotions is essential. | Control | Bagby, Parker, & Taylor, 1994 |
| Q16 | I have a calling to a particular kind of work. | Calling | Dik, Eldridge, Steger, & Duffy, 2012 |
| Q17 | I have a good understanding of my calling as it applies to my career. | Calling | Dik, Eldridge, Steger, & Duffy, 2012 |
| Q18 | I am trying to figure out my calling in my career. | Calling | Dik, Eldridge, Steger, & Duffy, 2012 |
| Q19 | I am searching for my calling as it applies to my career. | Calling | Dik, Eldridge, Steger, & Duffy, 2012 |
| Q20 | My professors encourage me to develop my talents and skills. | Environment | Shanafelt, et al., 2015 |
| Q21 | People tell me to describe my feelings more. | Control | Bagby, Parker, & Taylor, 1994 |
| Q22 | I spend much time daydreaming whenever I have nothing else to do. | Control | Bagby, Parker, & Taylor, 1994 |
| Q23 | It is difficult to find the right words for my feelings | Control | Bagby, Parker, & Taylor, 1994 |

Statistical Methods

Factor analysis of the responses to the Likert scale questions was used to determine the underlying structure and reduce the number of variables for subsequent analysis. Two separate factor analyses were used, one for questions deemed independent variables and another for questions deemed dependent variables. Each of these factor analyses made use of Varimax rotation and Keiser normalization. Factors were retained if their eigenvalues were greater than one.

The factors retained from the factor analysis (see results below) were combined with other demographic variables (e.g., academic major, pre-med status, and gender) and analyzed using six linear models. Each linear model used one of the six factors retained from factor analysis of the dependent variable Likert questions as a dependent variable. Each of the six models included the same independent variables. These included the three factors retained from factor analysis of the independent variable Likert questions, treated as continuous variables, as well as the demographic variables listed above, treated as categorical variables. All two-way interactions were also included for the demographic variables.

We conducted all statistical tests using SPSS v. 24 (IBM Corp., 2016), with alpha set at 0.05. For each linear model, we computed effect sizes as partial eta-squared (η^2). Partial eta-squared can be interpreted as percent of variance explained with values of ~ 0.01 , ~ 0.06 , and ≥ 0.14 corresponding loosely to small, moderate, and large effects, respectively (Cohen, 1988).

Results

Ninety students completed the online questionnaire. Of these, 44 were male (48.9%) and 46 were female (51.1%). Most respondents were upperclassmen, which included 47 seniors (52.2%) and 40 juniors (44.4%). The three lowerclassmen were

sophomores (3.3%). The most common academic major was biology (N = 62, 68.9%), followed by chemistry (N = 19, 21.1%) and biochemistry (N = 5, 5.6%). The majors of the remaining students were biophysics, business administration, finance, and medical laboratory science, with only one student (1.1%) assigning themselves to each of these majors. Fifty-four students (60.0%) reported being pre-med.

Factor Analysis

Factor analysis of dependent variable Likert questions retained six factors. After rotation, the first component accounted for 20.24%, the second 13.41%, the third 10.46%, the fourth 9.37%, the fifth 7.72%, and the sixth 6.81% for a total of 67.98% of variance explained. Loadings for each component are shown in Table 2. Based on the Likert questions each factor correlated most strongly with, the first through sixth component were named *Overwhelmed*, *Feelings Expression*, *Hard Work*, *Internal Motivation*, *Opinion Expression*, and *Daydreaming*, respectively.

Factor analysis of independent variable Likert questions retained three factors. After rotation, the first component accounted for 31.32%, the second 27.50%, and the third 25.51% for a total of 83.32% of variance explained. Loadings for each component are shown in Table 3. Using the same methodology as before, we named the first component *Career Searching*, the second *Career Settled*, and the third *Professor Support*.

Linear Models

The p and partial eta-square values for each model are shown in Table 4. The model with *Feeling Overwhelmed* as the dependent variable only showed two significant interactions. One for gender by class standing, $F(1,67) = 6.83$, $p = 0.011$, Partial $\eta^2 = 0.09$, and the other for pre-med status by class standing, $F(1,67) = 5.34$, $p = 0.024$, Partial $\eta^2 = 0.07$. Interaction plots (Figures 1 and 2) suggest that females report higher levels of burnout than males during their junior year and that pre-med students report higher burnout during their junior year than non-pre-med students and lower burnout during their senior year. The model using *Feelings Expression* as a dependent variable did not reveal any significant relationships. However, the model using *Hard Work* as the dependent variable revealed three significant relationships: *Career Searching*, $F(1,67) = 4.76$, $p = 0.033$, Partial $\eta^2 = 0.07$, *Career Settled*, $F(1,67) = 8.12$, $p = 0.006$, Partial $\eta^2 = 0.11$, and *Professor Support*, $F(1,67) = 4.65$, $p = 0.035$, Partial $\eta^2 = 0.07$. Model coefficients suggested an inverse relationship between *Career Searching* and *Hard Work* ($\beta = -0.24$) and a direct relationship between both *Career Settled* and *Professor Support* with *Hard Work* ($\beta = 0.32, \beta = 0.23$, respectively). The model with *Internal Motivation* as a dependent variable showed one significant, direct relation with *Professor Support*, $F(1,67) = 5.67$, $p = 0.020$, Partial $\eta^2 = 0.08$, $\beta = 0.27$. The model with *Opinion Expression* as a dependent variable also showed one direct, significant relationship with *Career Searching*, $F(1,67) = 8.48$, $p = 0.005$, Partial $\eta^2 = 0.11$, $\beta = 0.07$. The final model, with *Daydreaming* as a dependent variable, revealed two significant relationships. One with pre-med status, $F(1,67) = 5.40$, $p = 0.023$, Partial $\eta^2 = 0.08$, and the other with *Career Settled*, $F(1,67) = 8.71$, $p = 0.004$, Partial $\eta^2 = 0.12$. Model coefficient showed an inverse relationship between *Daydreaming* and *Career Settled* ($\beta = -0.33$). Coefficients also suggested that, compared to pre-med students, non-pre-med students have lower *Daydreaming* scores ($\beta = -1.55$).

Burnout and Career Calling in Undergraduate Pre-Med Students

Table 2

Principal Component Loadings for Each Factor Used as a Dependent Variable in Subsequent Analysis

| Likert Question | Factor | | | | | |
|--------------------|--------------|---------------|--------------|--------------|--------------|--------------|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | -0.051 | -0.501 | 0.560 | 0.119 | 0.090 | -0.060 |
| 2 | -0.052 | -0.079 | 0.380 | -0.713 | 0.269 | -0.015 |
| 3 | 0.849 | 0.155 | -0.115 | 0.008 | 0.029 | 0.073 |
| 4 | -0.426 | 0.139 | 0.469 | 0.037 | 0.076 | 0.177 |
| 5 | 0.138 | 0.009 | 0.143 | 0.679 | 0.030 | 0.126 |
| 6 | 0.770 | -0.045 | 0.053 | 0.271 | -0.215 | 0.087 |
| 7 | -0.031 | -0.187 | 0.018 | -0.055 | 0.831 | 0.156 |
| 8 | 0.272 | 0.418 | -0.209 | 0.288 | 0.456 | -0.301 |
| 9 | 0.728 | 0.105 | -0.150 | -0.101 | 0.087 | 0.110 |
| 10 | -0.017 | -0.831 | 0.107 | 0.042 | 0.099 | -0.039 |
| 12 | 0.800 | 0.183 | -0.138 | -0.126 | 0.210 | -0.009 |
| 13 | 0.723 | 0.050 | 0.014 | 0.299 | -0.139 | -0.081 |
| 14 | -0.197 | -0.106 | 0.838 | -0.076 | -0.126 | -0.040 |
| 15 | -0.123 | -0.230 | 0.048 | 0.564 | 0.392 | -0.133 |
| 21 | 0.218 | 0.511 | 0.509 | 0.000 | 0.080 | -0.352 |
| 22 | 0.138 | 0.197 | -0.047 | 0.086 | 0.108 | 0.866 |
| 23 | 0.182 | 0.814 | 0.037 | 0.014 | -0.108 | 0.255 |

Note. Largest loadings for each included Likert question are in bold. Loadings were calculated using Varimax rotation and Kaiser normalization. See Table 1 for questions.

Table 3

Principal Component Loadings for Each Factor Used as a Dependent Variable in Subsequent Analysis

| Likert Question | Factor | | |
|--------------------|--------------|--------------|--------------|
| | 1 | 2 | 3 |
| 11 | -0.054 | -0.061 | 0.918 |
| 16 | -0.007 | 0.922 | 0.144 |
| 17 | -0.418 | 0.800 | 0.060 |
| 18 | 0.887 | -0.182 | 0.035 |
| 19 | 0.923 | -0.075 | -0.045 |
| 20 | 0.048 | 0.343 | 0.813 |

Note. Principal component loadings for each factor used as an independent variable in subsequent analysis. Largest loadings for each included Likert question in bold. Loadings were calculated using Varimax rotation and Kaiser normalization. See Table 1 for questions.

Table 4
P and Partial η^2 values for multivariate linear models

| Independent Variables | Dependent Variable | | | | | | | | | | | |
|---------------------------------|--------------------|------------------|----------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|
| | Overwhelmed | | Feelings | | Hard Work | | Internal | | Opinion | | Daydreaming | |
| | <i>p</i> | Partial η^2 | <i>p</i> | Partial η^2 | <i>p</i> | Partial η^2 | <i>p</i> | Partial η^2 | <i>p</i> | Partial η^2 | <i>p</i> | Partial η^2 |
| | | | | | | | | | | | | |
| Major | 0.737 | 0.01 | 0.083 | 0.07 | 0.080 | 0.07 | 0.442 | 0.02 | 0.428 | 0.03 | 0.109 | 0.06 |
| Pre-Med | 0.846 | <0.01 | 0.218 | 0.02 | 0.926 | <0.01 | 0.657 | <0.01 | 0.676 | <0.01 | 0.023 | 0.07 |
| Class Standing | 0.275 | 0.04 | 0.319 | 0.03 | 0.415 | 0.03 | 0.604 | 0.01 | 0.527 | 0.02 | 0.281 | 0.04 |
| Gender | 0.305 | 0.02 | 0.218 | 0.02 | 0.200 | 0.02 | 0.408 | 0.01 | 0.122 | 0.04 | 0.471 | 0.01 |
| Career Searching | 0.985 | <0.01 | 0.153 | 0.03 | 0.033 | 0.07 | 0.894 | <0.01 | 0.005 | 0.11 | 0.658 | <0.01 |
| Career Settled | 0.249 | 0.02 | 0.387 | 0.01 | 0.006 | 0.11 | 0.196 | 0.02 | 0.557 | 0.01 | 0.004 | 0.12 |
| Professor Support | 0.579 | <0.01 | 0.129 | 0.03 | 0.035 | 0.06 | 0.020 | 0.08 | 0.684 | <0.01 | 0.139 | 0.03 |
| Class Standing \times Gender | 0.011 | 0.09 | 0.708 | <0.01 | 0.504 | 0.01 | 0.589 | <0.01 | 0.462 | 0.01 | 0.869 | <0.01 |
| Major \times Class Standing | 0.272 | 0.04 | 0.852 | <0.01 | 0.511 | 0.02 | 0.128 | 0.06 | 0.769 | 0.01 | 0.307 | 0.03 |
| Pre-Med \times Class Standing | 0.024 | 0.07 | 0.674 | <0.01 | 0.441 | 0.01 | 0.464 | 0.01 | 0.930 | <0.01 | 0.953 | <0.01 |
| Major \times Gender | 0.876 | <0.01 | 0.255 | 0.04 | 0.655 | 0.01 | 0.160 | 0.05 | 0.085 | 0.07 | 0.055 | 0.08 |
| Pre-Med \times Gender | 0.364 | 0.01 | 0.310 | 0.02 | 0.208 | 0.02 | 0.930 | <0.01 | 0.918 | <0.01 | 0.597 | <0.01 |
| Major \times Pre-Med | 0.963 | <0.01 | 0.104 | 0.07 | 0.187 | 0.05 | 0.784 | 0.01 | 0.522 | 0.02 | 0.087 | 0.07 |

Note. Separate models used for each dependent variable. Each dependent variable and the independent variables *Career Searching*, *Career Settled*, and *Professor Support* are derived from factor analysis of Likert scale questions. P-values in bold are significant at $\alpha = 0.05$.

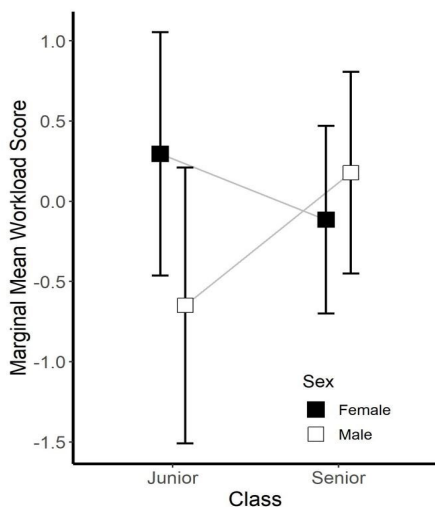


Figure 1. Interaction plot showing differences in burnout based on class standing and sex. Marginal means calculated from linear model holding other variables constant. 95% confidence intervals are shown.

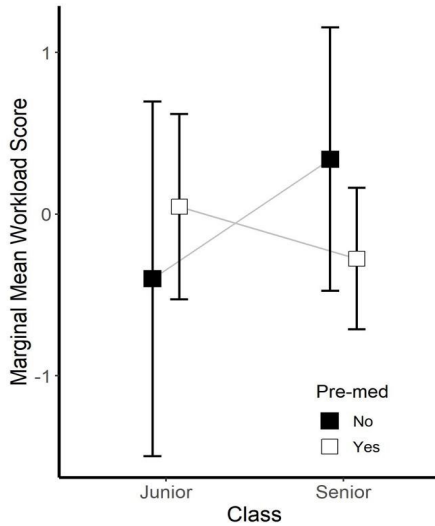


Figure 2. Interaction plot showing differences in burnout based on class standing and whether the student is pre-medical. Marginal means calculated from linear model holding other variables constant. 95% confidence intervals are shown.

Factor analysis of the responses to the Likert scale questions was used to determine the underlying structure and reduce the number of variables for subsequent analysis. Two separate factor analyses were used, one for questions deemed independent variables and another for questions deemed dependent variables. Each of these factor analyses made use of Varimax rotation and Keiser normalization. Factors were retained if their eigenvalues were greater than one.

Discussion

Our results suggest several things about the relationship between burnout (and its various dimensions) and a sense of calling on the lives of undergraduate students and, in particular, pre-medical students. First, our results suggest that the perception that a professor is supportive can mitigate at least one dimension of burnout (hard work) and increase internal motivation. Research by Wyland, Winkel, Lester, and Hanson-Rasmussen (2015) suggests that supportive professors help students feel that their hard work will pay off, thus increasing student satisfaction and mitigating feelings of burnout. In light of this information, educators in higher education should be made aware of their unique ability to improve students' academic experience by providing a supportive environment.

Second, our results suggest that career calling is another factor that can affect several dimensions of burnout. The Brief Calling Scale was designed to be a unidimensional measure of career calling with "search for calling" and "settlement on calling" at opposite ends of the spectrum (Dik, Eldridge, Steger, & Duffy, 2012). However, in our factor analysis, search for calling and settlement on calling came out as

separate factors. This indicates that the students we surveyed may view search for career calling and settlement on career calling as separate and unrelated entities rather than points along a common continuum. Regardless of these distinctions, search for calling was found to be related to predictors of burnout.

We also found that students who were searching for calling were less likely to feel that their hard work would pay off. These students also reported a reduced ability to express their opinions, suggesting that students who have not identified a career calling are more likely to be withdrawn from those around them. Social isolation and loneliness have been found to increase an individual's likelihood of experiencing depression, anxiety, and even suicidal thoughts (Beutel et al., 2017). Social isolation, whether perceived or real, is also a risk factor for early mortality (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015). As pointed out by Beiter et al. (2015), deteriorating mental health of undergraduate students is a major concern and should be seriously examined on university and college campuses. Students who have not settled on a career path should be especially monitored due to their increased risk of discouragement and social withdrawal.

On the other side of the spectrum, we found that students who indicated they were more settled in their career path felt more motivated and experienced a greater sense of control over their own success. Several studies show that feeling control over the outcome of life events (or an internal locus of control) is negatively associated with levels of stress and burnout (Gazelle, Liebschutz, & Riess, 2015; Schmitz, Neumann, & Oppermann, 2000; McIntyre, 1984). Therefore, students who are settled in their career path may have a more internal locus of control and, subsequently, may be at lower risk for burnout. We are able to conclude, then, that helping students determine their career calling can decrease the negative results of burnout.

One unexpected result of our research was that students who had settled on a career path indicated lower levels of daydreaming. Literature suggests that lower levels of daydreaming correspond with increased difficulty identifying and expressing one's feelings (Leising, Grande & Faber, 2009). Inability to describe feelings (or alexithymia) has generally been positively correlated with burnout (Bagby, Parker, & Taylor, 1994). Given our findings that an established career calling mitigated various aspects of burnout, we expected that a career calling would also be linked to lower levels of alexithymia. However, the results contrasted our expectations in that students who reported having a settled career calling indicated lower levels of daydreaming. Additionally, in our factor analysis, we did not detect a relationship between Feelings Expression, Opinion Expression, and Daydreaming even though previous literature suggested that these characteristics would be considered a single dimension of burnout. These unexpected findings may perhaps be explained by the fact that students who answered our survey viewed search for and settlement on career calling as distinct elements. Therefore, students may have indicated both a settlement on and a search for calling simultaneously. Answers may have been more distinctly delineated if calling had come out to be a unidimensional factor.

Our analysis also suggests a relationship between class standing, gender, and feelings of being overwhelmed. We found that females felt more overwhelmed than males during their junior year, but that feelings of being overwhelmed were similar between sexes during the senior year. While our analysis suggests this effect is not very

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large, it does suggest this relationship may be consequential. More research is needed in this area to explore hypotheses as to why a discrepancy exists between feelings of being overwhelmed in junior males and females.

Our findings also suggest that pre-med students may experience burnout differently from other undergraduate students. We found that junior pre-med students report greater feelings of being overwhelmed than non-pre-med students but feel less overwhelmed than non-pre-med students during their senior year. This could be due to the fact that the survey was administered toward the end of the academic year when junior pre-med students are preparing to take their MCAT and senior pre-med students already know about medical school acceptance. Non-pre-med students, on the other hand, do not have the pressure of studying for a high-stakes exam during their junior year but may be experiencing more pressures of finding a job as they come to the end of their senior year.

In summary, our research suggests the influential role of supportive professors in mitigating burnout by fostering the development of a more external locus of control, the complex interaction of career calling and burnout, and the potentially unique patterns of burnout in pre-med students compared to non-pre-med students. Involving undergraduate students in a supportive academic environment and providing them with career counseling may be beneficial in decreasing the effects of burnout, particularly in pre-med students. These methods may also encourage undergraduate pre-medical students to seek a career calling that helps them prevent future burnout as they continue pursuing their careers as health professionals.

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