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Grit, anxiety, and stress in emergency physicians☆,☆☆

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ABSTRACT

Introduction: The personality traits of emergency physicians are infrequently studied, though interest in physician wellness is increasing. The objective of this study is to acquire pilot data about the amount of grit, anxiety, and stress in emergency physicians using established psychological survey instruments, and to examine their associations of each of these traits with each other.

Methods: Thirty-six emergency medicine resident and attending physicians from an urban academic medical center consented for enrollment. Participants were administered the Duckworth 12-point Grit Scale, the State-Trait Anxiety Inventory (STAI), and the Perceived Stress Scale (PSS), which measure grit, anxiousness, and perceived stress, respectively. These are the gold standard psychological instruments for each of their areas. We analyzed the results with descriptive statistics, Spearman correlations, and linear regression.

Results: Nineteen residents and 17 attending physicians completed the surveys during the first quarter of a new academic year. The mean grit score was 3.7 (95% CI 3.5–3.8, SD: 0.56), the mean trait-anxiety score was 32.61 (95% CI 30.15–35.07, SD: 7.26), and the mean PSS score was 12.28 (95% CI 10.58–13.97, SD: 4.99). Only trait-anxiety and perceived stress were significantly correlated (Spearman's rho: 0.70, $p < 0.01$).

Conclusions: In this pilot study at a single institution, emergency physicians demonstrated a range of grit, trait-anxiety, and perceived stress. Trait-anxiety and stress were strongly associated, and individuals who were more anxious reported more stress. Levels of grit were not associated with trait-anxiety. These psychological concepts should be studied further as they relate to the function and health of emergency medicine providers.

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1. Introduction

Though it has not been rigorous examined, those who choose a career in emergency medicine may have different personality traits than other physicians [1-5]. Despite this, there is a little research investigating the personality traits of emergency physicians, and how they relate to stress. "Stress" is likely felt by every practitioner in every emergency department across the country every day. It can take a myriad of forms and exists in many different contextual situations. Despite its universality, there are multiple definitions of stress in the literature.

The conceptual framework of stress is relative to the individual, and when an individual is confronted with a new stimulus they appraise the demands that the situation asks of them and then they register it against their faculties. If the demands of the stimulus are too much for the person to manage, then the stimulus is deemed stressful, or alternatively if the stimulus is manageable, then it is not so much stressful as just a task [6,7]. The downstream biological effects of stress are still not completely understood, but it is known to be mediated through central nervous system activation, hypothalamic-pituitary-adrenal axis stimulation, as well as biological changes to parts of the brain involved with emotion, memory, and cognition [7,8].

Stress and how it affects physicians is an important concept to investigate not only because it is prevalent, but also because it affects performance, both positively and negatively. It is commonly believed that some degree of stress improves performance by promoting mental arousal [6]. However, research has also shown that the cumulative effects of stress over time can be detrimental to a physician's personal well-being, his or her career longevity, as well as his or her real time decision making during patient care [7,9,10].

While the causes of stress are variable, "perceived stress" is the final psychological outcome of personal experience that incorporates both the degree of the stimulus, and a person's ability to respond and manage it. Perceived stress is self-reported on the Perceived Stress Scale (PSS), which is the gold standard psychology survey used for research and clinical purposes [11]. This test is commonplace in psychological research, but it has not been used much in emergency physician cohorts.

Different people may not necessarily manage equivalent amounts of stress the same way, and individual personality differences may

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mediate the stress response. Grit is a personality trait that describes a person's ability to endure and maintain interest in pursuits over time. It is measured with a simple twelve-item questionnaire, and has been shown that people who are gritty are more likely to achieve their long-term goals. Research has shown that grit can predict who amongst West Point cadets will drop out after their summer term, it can predict success in National Spelling Bee competitions, and it can predict GPA in Ivy League college students [12]. The importance of grit in physicians in general, and emergency physicians in particular, has not been extensively investigated. Some early studies have suggested that grit may predict attrition amongst surgical trainees, and may be associated with physician well-being and burnout [13-15]. Other studies critique the concept and argue that it does not predict performance [16].

The effects of stress on an individual may vary based on their ability to manage anxiety. While some situations are anxiety provoking and others are not, some individuals are more prone to develop anxiety than others in any given situation. This natural predisposition for anxiety is stable, and is called trait-anxiety, in contrast to the anxiety one might feel in any particular situation, which is called state-anxiety. The concepts of state and trait-anxiety have been studied for over 40 years, and the gold standard measurement for them is State-Trait Anxiety Inventory (STAI) [17-19]. The STAI is an easy to administer and reproducible survey, and it has been used extensively using medical professionals as subjects as well [9,20-23].

Despite the intuitive relevance of these concepts to emergency physicians, not much research has been done to measure or correlate these different parameters. In this study, we seek to describe the frequency of these personality traits and study how well they correlate with each other. This research is important because the findings may influence how best to train emergency physicians during residency, how best to hire emergency physicians who are likely to succeed, and how to monitor emergency physicians throughout their career who are at risk of burnout.

2. Methods

2.1. Institutional review

This study was approved by the institution's Committee on Clinical Investigations, and the Department of Emergency Medicine's Medical Education Executive Committee.

2.2. Study setting and population

Subjects were recruited from an urban academic emergency department in XYZ,YXZ affiliated with a three year residency, in the first quarter of the 2016–2017 academic year. The department is the host of a three-year emergency medicine residency with 13 residents per class, and there are fifty-three academic faculty on staff. After an introductory information session during a scheduled conference, an email invitation was sent to all emergency medicine residents and attendings asking for them to participate in the study. Those who were interested were individually consented by a trained research assistant away from others. There was no compensation for participation.

2.3. Study protocol

Research subjects were given the State-Trait Anxiety Inventory (Mind Garden Inc.), the Duckworth 12-item grit scale, and the Perceived Stress Scale and were instructed to answer it in private when not working clinically, and were not advised to fill them out at a particular time of day, or a particular day of the week. Data was entered in a secure REDCap database administered by our institution on secure servers. The principal investigator (MLW) was the only attending physician with access to individual subject-level data. We calculated descriptive summary data for trait-anxiety, grit, and PSS. Fitted linear regression models for the variables, and non-parametric Spearman correlations were performed. Data analysis was performed with Stata 9.0 (College Station, Tx).

3. Results

There were a total of 36 participants, 19 residents and 17 attending physicians, who completed the surveys during the first quarter of the new academic year, which represents a 48.7% and a 32.0% response rate, respectively. The mean grit score of all responders was 3.7 (95% CI 3.5–3.8, SD: 0.56) from a possible range of 0–5 points (Table 1, Fig. 1). There was no significant difference between residents and attendings by grit score, trait-anxiety score, or Perceived Stress Scale by Wilcoxon Rank-Sum test.

The mean trait-anxiety score of all responders was 32.6 (95% CI 30.15–35.07, SD: 7.3) out of a possible 20 to 80 points, more points indicating more trait-anxiety (Fig. 2).

The mean PSS score overall was 12.3 (95% CI 10.6–14.0, SD: 4.99) out of a possible 40 points (Table 1, Fig. 3).

Grit and trait-anxiety did not correlate significantly (Spearman's rho: −0.27, $p = 0.11$). Grit and perceived stress also did not correlate significantly (Spearman's rho: −0.21, $p = 0.22$). Trait-anxiety and perceived stress were significantly correlated (Spearman's rho: 0.70, $p < 0.01$) (Table 2).

Univariate linear regression modeling predicting trait-anxiety score from just the Perceived Stress Scale score was statistically significant ($p < 0.01$), and PSS score accounted for 49.8% of the variance in trait-anxiety ($R^2 = 0.498$) (Fig. 4).

4. Discussion

In this study we measured a small cohort of emergency physicians' grit and trait-anxiety, and how those personality traits relate to stress. In our study population, trait-anxiety and perceived stress are significantly positively correlated. However, we did not find a correlation between grit and trait anxiety, or between grit and perceived stress.

To provide additional context of how these emergency physicians compare to other cohorts, these emergency physicians have similar grit scores (mean 3.7, SD: 0.56) as general adults aged 25 and older (mean 3.65, SD: 0.73), Ivy League undergraduates (mean 3.46, SD: 0.61), and West Point Cadets (mean 3.75, SD: 0.54) [12]. Previous surveys in other physicians, but not emergency physicians, have reported comparable grit scores of 3.7 (British consultants, general practitioners, and trainees), 3.78 (American general surgery residents), and 3.65 (American general and specialty surgery trainees) [13-15]. While one might surmise that a medical education cultivates grit or selects for individuals who have high levels of grit, compared to other groups of individuals our cohort of emergency physicians does not seem atypical at all.

The amount of trait-anxiety in our cohort (mean 32.61, SD: 7.26) is comparable to the reported averages of working men (mean 34.89, SD: 9.19) and women (mean 34.79, SD: 9.22) in North America [24,25]. The amount of trait-anxiety in our subjects is also interesting because working in the emergency department often requires acting on incomplete information, diagnostic uncertainty, and with time constraints, all of which can be anxiety provoking [26].

Table 1
Mean and 95% confidence intervals of age, grit, trait-anxiety and perceived stress in 36 emergency medicine residents and attendings. Grit, trait-anxiety, and Perceived Stress Scale (PSS) were not significantly different between residents and attendings by Wilcoxon Rank-Sum Test.

	Subjects	Age	Grit	Trait anxiety	PSS
Resident	19	30.0	3.6 (3.3–3.9)	32.6 (29.1–36.2)	12.6 (10.3–14.9)
Attending	17	43.9	3.8 (3.5–4.0)	32.6 (28.8–36.4)	11.9 (9.1–14.7)
Overall	36	38.5	3.7 (3.5–3.8)	32.6 (30.2–35.1)	12.3 (10.6–14.0)

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