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The Relationship Between Emergency Physicians' Creative Thinking Preference and their Risk of Burnout: An Opportunity to Make a Difference

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The Relationship Between Emergency Physicians' Creative Thinking
Preference and their Risk of Burnout: An Opportunity to Make a
Difference

by

Naghma S. Khan, MD

**An Abstract of a Project
in
Creativity and Change Leadership**

**Submitted in Partial Fulfillment
of the Requirements
for the Degree of**

Master of Science

August 2022

**Buffalo State
The State University of New York, Buffalo
Creativity and Change Leadership Department**

ABSTRACT OF PROJECT

The Relationship Between Emergency Physicians' Creative Thinking Preference and their Risk of Burnout: An Opportunity to Make a Difference

The FourSight theory contends that individuals exhibit a preference for the mental operations involved in creative problem solving. The four fundamental mindset preferences measured by FourSight are Clarifiers, Ideators, Developers and Implementers. Individuals can exhibit a peak preference for one, two, or three of these mindsets, or they can show an even distribution of energy across all four creative-thinking preferences. Robust and creative solutions to complex and recurrent problems are only possible if an individual or a team of individuals consciously move through the four stages of problem solving. Creative problem-solving can be taught. The ability to be creative at work confers some level of protection against job dissatisfaction. Emergency physicians as front-line workers in a high volume, high risk, problem prone and poorly resourced arena exhibit a high degree of burnout, with some studies citing a 60% burnout rate. The Maslach Burnout Inventory measures burnout along three dimensions, Emotional Exhaustion, Depersonalization, and Personal Accomplishment. This study empirically examined whether a relationship exists between an emergency physicians' level of burnout and their mindset as determined by their FourSight creative-thinking preference tool. Results showed that the Clarifying problem-solving preference was a significant predictor of burnout. Indeed, this creative-thinking mindset showed a stronger relationship to burnout than years of service and hours worked per week. Conversely, the Ideator mindset was shown to promote a sense of personal accomplishment and therefore serves to mitigate burnout among physicians. Burnout among emergency physicians is a substantial problem. The findings of the present study may lead to ways in which self-awareness and training, relative to creative-thinking preferences and creative problem solving, can be leveraged to promote greater resiliency among emergency physicians.

Keywords: creativity, burnout, physicians, emergency medicine, personality, CPS



Naghma Khan

September 2, 2022

Date

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The State University of New York, Buffalo
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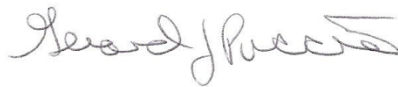
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Dr. Gerard Puccio
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September 2, 2022



Naghma Khan
Student

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SECTION ONE: BACKGROUND TO THE PROJECT

Purpose and Description of Project

Students choosing medicine as a profession potentially represent a homogenous group in terms of intellectual and cognitive ability and appear to share some common personality traits (Meit, Borges & Early, 2007). Medical school education has a uniform curriculum for all, however upon graduation, physicians enter a work force, that (based on choice of specialty) differs in work settings, job duties, requisite skills, and vocational interests, and each specialty becomes a distinct occupation. In essence, deciding to become a physician is an educational choice that leads to a medical degree, while selecting a specialty is an occupational and vocational choice. Mismatch between a physician's personality (McGreevy & Wiebe, 2002; Reeve, 1980) and choice of vocation appears to have an impact physician well-being (Mullola, et al., 2018).

The practice of medicine involves gathering information through history-taking, performing a physical exam and if needed, blood work and imaging, with the goal of identifying the patient's problem and ascertaining a diagnosis. A broad range of diagnoses are considered prior to homing in on the most likely cause of the problem. Solutions for managing the underlying concern are developed and prioritized and then a plan of action is initiated which involves further testing, treatment, or surgery. Practitioners in different subspecialties follow these steps but with a different degree of energy and detail based on their specialty. For example, an emergency physician focuses on immediate decision making and actions necessary to prevent death and disability both before (pre-hospital) and after patient arrival to the emergency department. The detailed care, prolonged stabilization and final diagnosis is relegated to the specialist who assumes care of or provides follow-up for the patient. Primary care physicians, on

the other hand, specialize in the physical, emotional, and social health of their patients. They perform routine health checks and tests that screen for disease. They treat minor illnesses and refer to subspecialists or the emergency department when needed. They provide answers to health-related questions and maintain their patients' complete medical records and coordinate all care. In contrast, surgeons are trained in diagnosing and managing acute, chronic, and congenital problems that would benefit from surgical intervention. They manage the patient in the setting of a specific condition and provide preoperative, intraoperative, and postoperative care (AAMC, n.d.).

The present investigation focused on the work hours, creative thinking preferences and burnout in Pediatric Emergency physicians. Given the fact that the work of emergency physicians is, by nature, a form of creative problem-solving, the purpose of the present study was to examine the degree of relationship between these physicians' creative-thinking preferences and the burnout they experience relative to their jobs.

Person-Job Fit

The Person-Job fit theory postulates that an individual's ability to adapt to their job is dependent on a match between the demands of the job and the individual's knowledge, skills, and abilities, plus a fit between an individual's needs, aspirations, and preferences and what the job provides (Hassan, Akram, & Naz, 2012; Memon, Salleh & Baharom, 2015). Person-Job fit positively correlates with job satisfaction, quality of life and organizational adjustment (Cable & DeRue, 2002; Edwards, Caplan & Van Harrison, 1998; Lee, Trahan, Maltby, Hemraj & Hughes, 2018; Spokane, 1985). In the medical profession, there is significant focus on attaining the knowledge, skills and abilities needed to fulfill the work demands of the specialty. This is achieved through years of education and training which includes 4-years of medical school, 3-5

years of residency and 2-5 years of fellowship training. However, upon entering the workforce a physician's needs, aspirations, and preferences may not always meld with the expectations of the organization or group they work with, and this could potentially lead to dissatisfaction, stress and ultimately burnout. The negative influences of job demands can be moderated by internal (cognition and capacity) and external (organization and social) resources (Demerouti, Baker, Nachreiner, & Schaufeli, 2001; Derakhshanrad, Piven, & Ghoochani, 2019,). The Job Demands-Resources (JD-R) Model of burnout focuses on how external resources (social support, job security and rewards) can help with coping (Demerouti et al., 2001). However, studies that focus on the internal resources needed to cope with the job demands are difficult to find (Derakhshanrad et al., 2019). The stress of job demands can potentially be mitigated by an individual's cognitive capacity of problem solving and creativity (Schmitt, Zacher, & Frese, 2012).

Creative Problem Solving

Problem-solving involves the use of previously acquired knowledge, skills, and expertise to resolve an unfamiliar situation (Kruglanski & Rudnick, 1987). While creativity alone involves the development of something that is novel, unusual and uncommon, the product (ideas, processes and/or procedures) of creative problem-solving must exhibit both novelty as well as usefulness (Guilford, 1950; Runco & Jaeger, 2012; Stein, 1953). Individuals who work in dynamic, complex and multi-dimensional jobs like medicine, are constantly exposed to ill-defined and poorly structured problems, that challenge the individuals' cognitive resources (Mumford, Whetzel, & Reiter-Palmon, 1997). Creativity and problem-solving mindsets have been shown to have a protective influence against burnout in healthcare professionals (Derakhshanrad et al., 2019).

The theory of “applied creativity”, introduced in the 1950’s contends that creativity can be taught using a set of steps and strategies that enable individuals, teams, and organizations to become more effective at creativity and innovation. Central to creative problem solving is divergent and convergent thinking which involves brainstorming and generating many ideas to solve a problem and then evaluating each option systematically before making decisions. Since its introduction 70 years ago, the creative process has been refined and research has established its applicability and effectiveness (Osborn, 1952; Osborn, 1953; Puccio, Wheeler, Cassandro, 2004; Treffinger, 1995; Treffinger, Isaksen & Stead-Dorval, 2006). While creative problem solving involves a set of mental operations, individuals express differing levels of enthusiasm for each step of the process based on their innate cognitive style. Factor analysis described four distinct creative preferences profiles: Clarifier, Ideator, Developer and Implementer (Puccio et al., 2004). These form the basis of the FourSight Profile tool used to determine individual creative-thinking preference. The Clarifier preference is measured through such items as “I like taking the time to clarify the exact nature of the problem.” A sample Ideator item is “I enjoy coming up with unique ways of looking at a problem.” The following statement represents an item used to identify the Developer preference: “I like to generate criteria that can be used to identify the best options.” A sample Implementer item is “I enjoy putting ideas into action.” These peaks determine the individual’s profile. It is important to recognize that both creativity and the ability for creative problem solving can be taught, and numerous studies have shown the efficacy of creativity training (Parnes, Meadow, 1959; Puccio, Firestien, Coyle & Masucci, 2006; Scott, Leritz & Mumford, 2004;) in enhancing individual abilities.

Burnout

One of the known impacts of job-related stress is burnout. Emotional Exhaustion (EE), Depersonalization (DP), and a decreased sense of Personal Accomplishment (PA) define burnout (Maslach, 1997). In the medical profession, the burnout syndrome impacts not only the individual (Arora, Asha, Chinnappa & Diwan., 2013; Patterson & Gardner, 2020; Shanafelt et al., 2012; Testo, Gershaw, Kellogg, 2019) but also has negative outcomes on patient care and patient satisfaction (Halbesleben & Rathert, 2008; Lu, Dresden, McCloskey, Branzetti & Gisoni, 2015; Shanafelt et al., 2010;). Emergency physicians are especially prone to burnout with numerous studies reporting ranges between 40% and 60% burnout rates (Arora et al., 2013; Goldberg, Boss, Chan et al., 1996; Patterson & Gardner, 2020; Testo et al., 2019). This high rate of burnout can be attributed to shift work, workload, scarcity of resources, work-time pressures, critical life-death decision making with limited information, repeated exposure to traumatic events and death, litigation concerns, and provider-patient as well as provider-provider discordance (Goldberg et al., 1996). In essence, the environment in an emergency department is volatile, uncertain, complex, and ambiguous (VUCA) and this type of environment demands that emergency physicians modulate these job-related stressors through both external (organizational and social) and maybe more importantly internal (cognition and capacity) resources.

Certain personality traits like low levels of hardiness, coping with stress in a passive and defensive way, low self-esteem, high level of neuroticism, and a Type A personality directly correlate with burnout (Brown, Slater & Lofters, 2019; Maslach, Schaufeli & Leiter, 2001; Somville, Mieren, Cauwer, Bogaert & Franck, 2022). Strategies to mitigate and modulate the impact of personality on burnout can be beneficial, but these are cost and time inhibitive and require participation, cooperation, and time away from patient care which are usually not possible to accommodate given a physicians job demands. While personality and coping skills

play a role in burnout, a major contributor is the social environment in which the individual works, and the focus on reducing burnout has, rightly so, shifted to organizations (Maslach et al., 2001; Maslach & Leiter, 2008). This, however, does not fully shift the onus of mitigating burnout from the individual to the organization.

Study Aim

There are very few studies that have investigated the association between job burnout and problem-solving and/ or creativity and the findings are conflicting, one study finding a very strong correlation and the other no correlation (Asad & Khan, 2003; Derakhshanrad et al., 2019) between a creative mindset and job-related burnout. The aim of this study was to empirically test the degree to which creative-thinking preferences, as measured by the Foursight self-assessment tool, relate to burnout, assessed using the Maslach Burnout Inventory, specifically among Pediatric Emergency Physicians. The literature supports that creative problem solving can be taught (Osborn, 1952; Osborn, 1953; Puccio et al., 2004; Treffinger, 1995; Treffinger et al., 2006), and if this study does find a relationship between creativity and burnout, early education and effective interventions may be possible.

SECTION TWO: PERTINENT LITERATURE & RESOURCES

Overview of Relevant Literature

The aim of this study was to explore whether there is a relationship between a physician's cognitive style and the risk of burnout, with the hope that if a relationship exists, in the future interventions could be developed to reduce burnout. Towards this end articles were reviewed and selected that answered the following questions:

- a) Does the Person-Job Fit theory apply to the practice of medicine

It was important to understand the theory itself, how it relates to turnover and attrition, specifically in medicine and finally is there a relationship between personalities and cognitive styles and choice of medical profession.

- b) How is creativity and creative problem solving related to burnout?
 c) How is creativity and creative problem-solving defined and measured
 d) Can creative problem-solving be taught effectively?

Unless creativity can be taught, there is no reason to explore whether a relationship exists with burnout.

- e) What is the prevalence of burnout, specifically in emergency medicine and how does it impact patient care?
 f) Is there a relationship between personality and possibly creative mindset traits and burnout?
 g) Is there good reliability and validity for both the Maslach Burnout Inventory and FourSight?

Person-Job Fit Theory

AAMC, Careers in Medicine, Specialty Profiles (n.d.). Retrieved from

<https://www.aamc.org/cim/explore-options/specialty-profiles>

Job profiles on the American Association of Medical Colleges is available for medical students to review the job expectations in different fields of medicine.

Cable, D. M., & DeRue, D. S. (2002). The convergent and discriminant validity of subjective fit perceptions. *Journal of applied psychology, 87*(5), 875.

Job and career focused outcomes (job and career satisfaction and occupational commitment) were directly correlated with a perception of a fit between what one needs to do the job and what one is given to do the job.

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied psychology, 86*(3), 499.

The job demands-resources (JD-R) model proposes that working conditions can be categorized into 2 broad categories, job demands and job resources. The demands of the job correlate to the exhaustion component burnout while the lack of job resources correlates with the disengagement component of burnout.

Edwards, J. R., Caplan, R. D., & Van Harrison, R. (1998). Person-environment fit theory. *Theories of organizational stress, 28*(1), 67-94.

Lee, C. C., Trahan, J., Maltby, P., Hemraj, V., & Hughes, H. (2018). Mindset, job satisfaction and employee engagement at workplace: Preliminary results. *In 2018 Annual Conference, (47th), (p. 640)*.

In fixed-mindsets job satisfaction is significantly related to employee engagement, but this was not true of growth mindsets.

McGreevy, J., & Wiebe, D. (2002). A preliminary measurement of the surgical personality. *The American journal of surgery, 184*(2), 121-125.

Meit, S. S., Borges, N. J., & Early, L. A. (2007). Personality profiles of incoming male and female medical students: results of a multi-site 9-year study. *Medical Education Online*, 12(1), 4462.

While the personality of female and male medical students show some differences on the 16-Factor Personality Questionnaire, medical student personalities differ significantly from the general population.

Memon, M. A., Salleh, R., & Baharom, M. N. R. (2015). Linking Person-Job Fit, Person-organization fit, employee engagement and turnover intention: A three-step conceptual model. *Asian Social Science*, 11(2), 313.

The Hassan and Memon papers stress the importance of person-job fit and person-organization fit on reduction in turnover of employees.

Reeve P. E. (1980). Personality characteristics of a sample of anaesthetists. *Anaesthesia*, 35(6), 559-568.

The McGreevy and Reeves studies show a linkage between personality and choice of specialty. While anesthesiologists are more reserved, intelligent, assertive, serious, conscientious, self-sufficient, and tense and less socially bold and self-assured, surgeons

Spokane, A. R. (1985). A review of research on person-environment congruence in Holland's theory of careers. *Journal of vocational behavior*, 26(3), 306-343.

Edwards and Spokane articles review the importance of the Pers-n Job Fit theory.

The Role of Creativity in Burnout

Derakhshanrad, S. A., Piven, E., & Zeynalzadeh Ghoochani, B. (2019). The relationships between problem-solving, creativity, and job burnout in Iranian occupational therapists. *Occupational therapy in health care*, 33(4), 365-380.

This paper from Iran studies the correlation between cognitive resources, like problem solving (using the Social Problem-Solving Inventory- Revised Short Form) and creativity (using the Rendsip Creativity Questionnaire) and the risk of burnout. The study showed that both creativity and problem-solving were inversely associated with burnout ($R^2 = 0.38$, $F(4, 45) = 6.94$, $p < 0.001$).

Mullola, S., Hakulinen, C., Gimeno Ruiz de Porras, D., Premeau, J., Jokela, M., Vänskä, J., ... & Elovainio, M. (2019). Medical specialty choice and well-being at work: Physician's personality as a moderator. *Archives of environmental & occupational health*, 74(3), 115-129.

Personality traits play a role in physician well-being based on choice of specialty. For person-oriented specialties (internal medicine, occupational therapy) extraversion, openness to experience and agreeableness shows a high correlation with well-being. For technique-oriented specialties (surgery, radiology) high conscientiousness and low openness and agreeableness improve well-being.

Schmitt, A., Zacher, H., & Frese, M. (2012). The buffering effect of selection, optimization, and compensation strategy use on the relationship between problem solving demands and occupational well-being: a daily diary study. *Journal of occupational health psychology*, 17(2), 139-149.

Defining Creativity

Guilford, J. P. (1950). Creativity. *American psychologist*, 5(9), 444.

Krulik, S., & Rudnick, J. A. (1987). *Problem solving: A handbook for teachers (2nd ed.)*.

Boston: Allyn and Bacon.

Mumford, M. D., Whetzel, D. L., & Reiter-Palmon, R. (1997). Thinking creatively at work:

Organization influences on creative problem solving. *The Journal of Creative Behavior*, 31(1), 7-17.

No study on creativity is complete without defining problem solving (Krulick), creativity (Runco, Guilford), creative problem solving (Guilford, Stein) and the importance of creativity for individuals and organizations (Mumford).

Runco, M. A., & Jaeger, G. J. (2012). The standard definition of creativity. *Creativity research journal*, 24(1), 92-96.

Stein, M. I. (1953). Creativity and culture. *Journal of Psychology*, 36, 31–322.

The Creative Problem-Solving (CPS) Model and Teaching Creativity

Osborn, A. F. (1952). *Wake up your mind: 101 ways to develop creativeness*. New York: Charles Scribner's Sons.

Osborn, A. F. (1953). *Applied imagination: Principles and procedures of creative thinking*. New York: Charles Scribner's Sons.

Parnes, S. J., & Meadow, A. (1959). Effects of "brainstorming" instructions on creative problem solving by trained and untrained subjects. *Journal of educational psychology*, 50(4), 171.

Puccio, G. J., Wheeler, R. A., & Cassandro, V. J. (2004). Reactions to creative problem-solving training: Does cognitive style make a difference? *The Journal of Creative Behavior*, 38(3), 192-216.

Puccio, G. J., Firestien, R. L., Coyle, C., & Masucci, C. (2006). A review of the effectiveness of CPS training: A focus on workplace issues. *Creativity and Innovation Management*, 15, 19–33.

Scott, G., Leritz, L. E., & Mumford, M. D. (2004). The effectiveness of creativity training: A quantitative review. *Creativity research journal*, 16(4), 361-388.

Treffinger, D. J. (1995). Creative problem solving: Overview and educational implications. *Educational psychology review*, 7(3), 301-312.

Treffinger, D. J., Isaksen, S. G., & Stead-Dorval, K. B. (2006). *Creative problem solving: An introduction*. Prufrock Press Inc.

This group of references defines creative problem solving (Osborn), creative problem-solving – the CPS model (Parnes, Treffinger) as well as an introduction to the CPS teaching model and its effectiveness (Puccio, Scott, Treffinger) and how well the training is accepted by individuals (Puccio).

The Impact of Burnout

Arora, M., Asha, S., Chinnappa, J., & Diwan, A. D. (2013). Burnout in emergency medicine physicians. *Emergency Medicine Australasia*, 25(6), 491-495.

Asad, N., & Khan, S. (2003). Relationship between job-stress and burnout: Organizational support and creativity as predictor variables. *Pakistan Journal of Psychological Research*, 139-149.

Brown, P. A., Slater, M., & Lofters, A. (2019). Personality and burnout among primary care physicians: an international study. *Psychology Research and Behavior Management*, 12, 169.

Goldberg, R., Boss, R. W., Chan, L., Goldberg, J., Mallon, W. K., Moradzadeh, D., ... McConkie, M. L. (1996). Burnout and its correlates in emergency physicians: four years' experience with a wellness booth. *Academic Emergency Medicine*, 3(12), 1156-1164.

Halbesleben J. R., & Rathert C. (2008). Linking physician burnout and patient outcomes: exploring the dyadic relationship between physicians and patients. *Health Care Manage Rev*, 33, 29–39.

- Lu, D. W., Dresden, S., McCloskey, C., Branzetti, J., & Gisondi, M. A. (2015). Impact of burnout on self-reported patient care among emergency physicians. *Western Journal of Emergency Medicine, 16*(7), 996.
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1997). *Maslach burnout inventory*. Scarecrow Education.
- Maslach, C., & Leiter, M. P. (2008). The truth about burnout: How organizations cause personal stress and what to do about it. John Wiley & Sons.
- Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual review of psychology, 52*(1), 397-422.
- Patterson J., Gardner A. (2020). Burnout rates in pediatric emergency medicine physicians. *Pediatric emergency care, 36*(4), 192-195.
- Shanafelt, T. D., Balch, C. M., Bechamps, G., Russell, T., Dyrbye, L., Satele, D., Collicutt, P., Novotny, P. J., Sloan, J. & Freischlag, J. (2010). Burnout and medical errors among American surgeons. *Annals of surgery, 251*(6), 995-1000.
- Maslach was one of the pioneers in the syndrome of physician burnout, identifying the triad that defines physician burnout (EE, DP, and PA). Over the years she and her collaborators have identified causes and developed solutions for alleviating burnout at the individual and more importantly the organization level. Burnout is a well-researched phenomenon with significant impact on individuals and the clients. Burnout is especially pervasive in medicine and the impact on patient care is well documented in different specialties, specifically emergency medicine.

Personality and Burnout

- Brown, P. A., Slater, M., & Lofters, A. (2019). Personality and burnout among primary care

physicians: an international study. *Psychology Research and Behavior Management*, 12, 169.

Shanafelt, T. D., Boone, S., Tan, L., Dyrbye, L. N., Sotile, W., Satele, D., West, C. P., Sloan, J., Oreskovich, M. R. (2012). Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Archives of internal medicine*, 172(18), 1377-1385.

Somville, F., Van der Mieren, G., De Cauwer, H., Van Bogaert, P., & Franck, E. (2022). Burnout, stress, and Type D personality amongst hospital emergency physicians. *International Archives of Occupational and Environmental Health*, 95(2), 389-398.

Testo Z., Gershaw R., Kellogg A. (2019). Burnout, Drop Out, Suicide: Physician Loss in Emergency Medicine, Part I. *Western Journal of Emergency Medicine*, 20(3), 485-494.

This smaller grouping of studies focuses on the impact of personality on burnout. These studies report the correlation of personality types with burnout, but no strategy for modifying the impact of personality.

FourSight

Acar, S., Puccio, G., Miller, B., & Thurber, S. (2018). FourSight Research Supplement: Updated Evidence of Reliability and Validity. Retrieved from <https://www.dropbox.com/s/z9f9dok4va6pqn2/FourSight%20Research%20Supplement%20Feb%202018.pdf?dl=0>

Gurak-Ozdemir, S., Acar, S., Puccio, G. J., & Wright C. (2019). Why do teachers connect better with some students than others? Exploring cognitive style bias using teachers' creative-thinking preferences. *Gifted & Talented International*, 34, 102-115.

Study demonstrated how teachers' creative-thinking preferences led to implicit biases relative to their students.

Puccio, G. J. (1999). Creative Problem-Solving preferences: Their identification and implications. *Creativity and Innovation Management*, 8, 171-178.

Original paper that first introduced the FourSight creative-thinking preferences.

Puccio, G. J. (2002). Foursight: the breakthrough thinking profile-Presenter's guide and technical manual. *Evanston, IL: THinc Communications*.

Resource provided by the FourSight company to support practioners' use of the FourSight measure.

Puccio, G. J., & Grivas, C. (2009). Examining the relationship between personality traits and creativity styles. *Creativity and Innovation Management*, 18, 247-255.

Study that examined the relationship between FourSight and the DISC profile.

Puccio, G. J., Miller, B., & Acar, S. (2018). Differences in creative problem-solving preferences across occupations. *The Journal of Creative Behavior*, 53, 576-592.

Study showed that vocational choice might reflect creative-thinking preferences as 14 different occupations showed different FourSight profiles.

Puccio, G. J., Szalay, P. A., Acar, S., & Boyer, A. (2019). Understanding the intersection between well-being and creative process: An exploratory study of creative-thinking preferences and aspects of mental health. *The International Journal of Creativity & Problem Solving*, 29, 5-15.

This study established relationships between the FourSight preferences and six different dimensions of well-being.

Puccio, G. J., Wheeler, R. A., & Cassandro, V. J. (2004). Reactions to creative problem-solving training: Does cognitive style make a difference. *The Journal of Creative Behavior*, 38, 192-216.

This study illustrated how people with different thinking preferences respond to and find different forms of value from creativity training.

Tsai KC. Development and Validity Testing of a Chinese-Language Version of FourSight. *Journal of Educational Issues*. 2016;2(1):22-35.

We will be using the FourSight Questionnaire to evaluate physicians' preference for the creative problem-solving process. These studies provide evidence of the reliability and validity of this tool.

Maslach Burnout Inventory

Iwanicki, E. F., & Schwab, R. L. (1981). A cross validation study of the Maslach Burnout Inventory. *Educational and psychological measurement*, 41(4), 1167-1174.

Maslach, C., Jackson, S. E., & Leiter, M. P. (1997). *Maslach burnout inventory*. Scarecrow Education.

Powers S, Gose KF. (1986). Reliability and construct validity of the Maslach Burnout Inventory in a sample of university students. *Educational and Psychological Measurement*, 46(1), 251-255.

Wheeler DL, Vassar M, Worley JA, Barnes LL. (2011). A reliability generalization meta-analysis of coefficient alpha for the Maslach Burnout Inventory. *Educational and Psychological Measurement*, 71(1), 231-244.

We will be using the Maslach Burnout Inventory to evaluate a physicians' risk of burnout. These studies provide evidence of the reliability and validity of this tool.

Research Electronic Data Capture (REDCap)

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of biomedical informatics*, 42(2), 377-381.

Harris, P. A., Taylor, R., Minor, B. L., Elliott, V., Fernandez, M., O'Neal, L., ... & REDCap Consortium. (2019). The REDCap consortium: Building an international community of software platform partners. *Journal of biomedical informatics*, 95, 103-208.

REDCap is the electronic data repository and aids in deidentifying the data.

SECTION THREE: METHODOLOGY

Design

This was a prospective, non-experimental, cross-sectional empirical study that was designed to assess the relationship between an emergency physicians' creative problem-solving preferences, as measured by the FourSight Inventory, and their level of burnout, determined by the Maslach Burnout Inventory.

Participants

The convenience sample consisted of active medical staff members in the section of Pediatric Emergency Medicine (PEM) at a tertiary care Children's hospital, who were either Board-Certified or Board Eligible in PEM. Eighty-eight PEM's on active medical staff were invited to participate in the study. Seventy-eight (88.6%) physicians responded, 76 (86%) provided demographic data and completed the FourSight self-assessment inventory, while 75 (85.2%) completed all three surveys (Demographics, FourSight and Maslach Burnout Inventory). All participants were volunteers and individual results were kept confidential. IRB approvals were provided by the participating hospital and by Buffalo State.

Instruments

The research instruments included an electronic consent form and a demographic questionnaire accessed through REDCap™ and two electronic standardized questionnaires accessed through their individual proprietary websites.

Demographic Questionnaire

The demographic questionnaire on REDCap™ included: age, gender, race, marital status, number of dependents, specialty (in this case, all were PEM's), years of practice, distribution of

time spent in clinical, administrative, research and teaching work, clinical hours per week in emergency medicine and, if applicable, a secondary area of work (e.g., Sedation), average number of total hours worked per week, educational debt, and 5-year plans. Questions pertaining to individual 5-year plans included: have no idea, don't plan on changing anything, plan on reducing time at work, plan on shifting my time towards non-clinical activities, plan on shifting my time towards a secondary clinical activity (sedation etc.), plan on leaving/ retiring.

Maslach Burnout Inventory, Human Services Survey for Medical Personnel

The Maslach Burnout Inventory (MBI), Human Services Survey for Medical Personnel (Maslach, Jackson, & Leiter, 1996) is a 22-item self-reported questionnaire that assesses how frequently a physician feels Emotional Exhaustion (MBI-EE), Depersonalization (MBI-DP) and a sense of Personal Accomplishment (MBI-PA) which may predict resiliency in the face of burnout. The data was electronically collected and administered on the Mindgarden™ site: <https://www.mindgarden.com/315-mbi-human-services-survey-medical-personnel>. The results were stored on MindGarden™, accessible to the primary investigator who transferred the data from MindGarden™ to REDCap™ for deidentification and collation with the other two surveys. Individual reports were generated by Mindgarden™ and emailed directly to the participants.

High scores on MBI-EE and MBI-DP and low scores on MBI-PA define the burnout syndrome. A high score on statements like “I feel emotionally drained at work”, “I don't really care what happens to some patients” and a low score on “I have accomplished many worthwhile things in this job” demonstrate detachment and lack of engagement from work. MBI uses a seven-point Likert scale with values that range from 0 (never) to 6 (every day). The total score of the scales (range 0-132) and the response scores of the individual items for each of the three scales were used for statistical analysis in this study.

Several studies support the reliability and validity of MBI. Cronbach alpha ratings were high for all three scales: MBI-EE (0.90), MBI-DP (0.76) and MBI-PA (0.76). Test-retest reliability over 0-6 months were also high (0.60-0.82). The Maslach Inventory is not a static measure and may change over time with changes in the individuals' priorities, job expectations, work-life balance and the work environment (Iwanicki & Schwab, 1981; Maslach, Jackson & Leiter, 1997; Powers & Gose, 1986; Wheeler, Vassar, Worley & Barnes, 2011).

FourSight

The FourSight tool was completed on-line at <https://www.foursightonline.com/>. The results were stored on FourSight and were accessible to the primary investigator. Results were transferred from FourSight to REDCap™ for deidentification and collation with the other two surveys. Each physician who completed the questionnaire received their personal scores as well as an interpretation guide immediately after submission for their own personal use.

FourSight consists of 36 self-reported items that measure four different creative-thinking preferences: Clarifier, Ideator, Developer, and Implementer. Each of these four preferences is measured by nine items each (Acar, Puccio, Miller & Thurber, 2018). Respondents use a five-point Likert scale (1 = Not like me at all, 2 = Not much like me, 3 = Like me, 4 = Very much like me, 5 = Always like me) for each item. All four scales had good internal reliability (Cronbach alpha > 0.78) and demonstrate high levels of construct validity with other personality tests (Puccio, 1999, 2002). While test-retest reliability has not been measured, individuals confirm that their preferences do not change over time (see Acar et al., 2018; Puccio, 2002; Tsai, 2016).

FourSight generates an individual profile of problem-solving preference as a combination of the four preferences. The Clarifier preference is measured through such items as "I like taking the time to clarify the exact nature of the problem." A sample Ideator item is "I enjoy coming up

with unique ways of looking at a problem.” The following statement represents an item used to identify the Developer preference: “I like to generate criteria that can be used to identify the best options.” A sample Implementer item is “I enjoy putting ideas into action.” An individual is said to have a peak preference when any scale score is greater than a half-standard deviation above the mean for their own highest and lowest scale scores. There are 15 FourSight profiles.

FourSight has a database of over 150,000 profiles. Fifty percent have a single high preference, 25% have a double high preference, 10% have a triple high preference, and 20% have equal preference for all four steps and are termed “Integrators”. The distribution across the 15 profiles is as follows: Clarifier: 12%; Ideator: 10%; Developer: 6%; Implementer: 23%; Integrator: 18%; Early Bird 2%; Analyst: 7%; Accelerator: 7%; Theorist: 1%; Driver: 7%; Finisher: 2%; Hare: 1%; Idea Broker: 1%; Realist: 3%; Optimist: 1% (Puccio, 2002).

Since *FourSight* is a measure of cognitive preference, and not ability, there are no right or wrong answers. FourSight research has demonstrated broad applicability to many areas of human behavior including personality traits (Puccio, G., & Grivas, C. (2009)), entrepreneurial intentions (Campos, Rubio, Atondo & Chorres, 2015), occupational choice (Puccio, Miller & Acar, 2019) and well-being (Puccio, Szalay, Acar & Boyer, 2019).

Procedure

This research was approved by Research Ethics Committee of Children’s Healthcare of Atlanta, Emory University School of Medicine, and SUNY - Buffalo State. Informed consent was obtained from all participants.

Participants were emailed a link to the consent form and demographic questionnaire. Once the demographic questionnaire was completed, they received a separate email with personalized

links to the FourSight and the MBI (Mindgarden™) websites. Automatically generated weekly reminders were sent until all three electronic forms were completed.

Study data were collected between May and July 2022 and managed using REDCap™ electronic data capture tools hosted at Children’s Healthcare of Atlanta (Harris, Taylor, Payne, Gonzales & Conde, 2009; Harris, Taylor & Minor, 2019). REDCap™ is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources.

Data Analysis

Data was analyzed using descriptive statistics, Pearson correlations, and linear regression analysis. Linear regression involves entering all independent variables into the regression equation and evaluating each independent variable (i.e., demographic data and FourSight scores) in terms of what it adds to prediction of the dependent variable (i.e., burnout indices of EE, DP and PA). IBM SPSS Version 28.0.0.0 was used to analyze the data. Significance was set at $p < 0.05$ for each test. In checking the Multicollinearity, Outliers, Normality, Linearity, Homoscedasticity, and Independence of Residuals, no violation of the assumptions was found.

SECTION FOUR: RESULTS

Between May and July 2022, 88 Pediatric Emergency Physicians (PEMs) were invited, to participate in the study, via email. All were board certified or eligible in PEM. Seventy-eight physicians responded (88.6%), 76 (86%) completed the demographic and FourSight questionnaire and 75 (85.2%) completed all three surveys.

The studies descriptive statistics are tabulated in Table 1 and Table 2. The mean age of the participants was 47 years (Median: 43, Range 34-73 years), with 59% female and 41% males. The majority were white (38%), Asian (23%), and Black or African American (21%) and 83% were married. The number of dependents per individual averaged 1.6 (Median: 2; Range: 0 - 5). At the time of starting their job, 47 (60%) had an educational debt, and at the time of study enrollment 11 (14%) carried a debt that was greater than their annual income.

Table 1

Demographics of Participants

Demographics		<i>n</i>	%
Gender	Male	32	41
	Female	46	59
	Other	0	0
Race	Asian	18	23
	Black or African American	16	21
	Hispanic or Latino	4	5
	Multiracial	2	3
	White	38	38
Marital status	Divorced	5	6
	Married	65	83
	Single	8	10
Educational debt post training	Yes	47	60
	No	31	40
	Current debt > annual income		
	Yes	11	23
	No	36	77
Caring for dependents	Yes	53	68
	No	25	32

Average years of practice in PEM were 14 years (Median: 11; Range: 1-36) and average total hours worked/week were 41 hours (Median: 40; Range: 12-75 hours). Average percent clinical hours worked were 73% (Median: 80%; Range: 5%-100%).

Table 2

Demographics, FourSight Scores and Maslach Burnout Inventory (MBI) scores

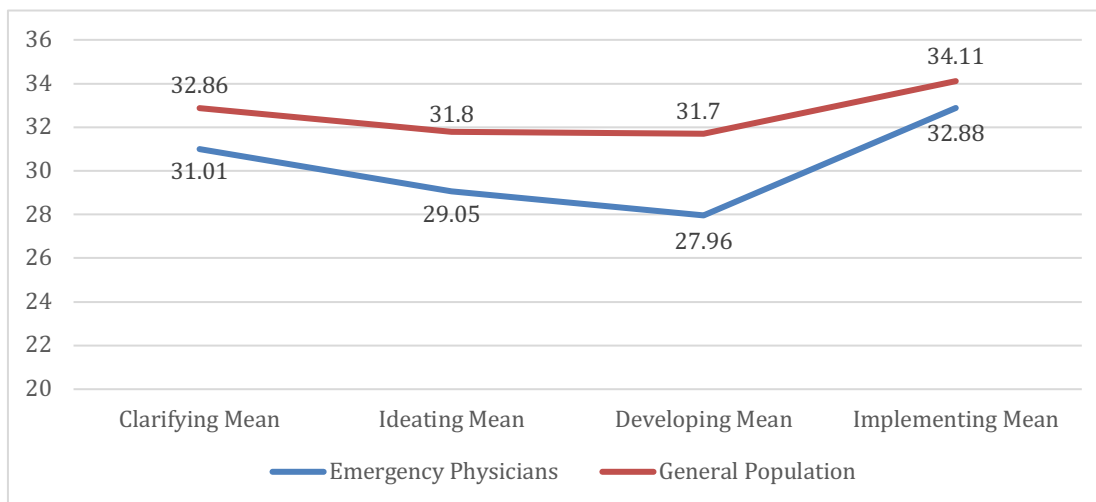
Descriptive Statistics	<i>N</i>	<i>M</i>	<i>Mdn</i>	<i>SD</i>
Age	78	47	43	10.17
Number of dependents (children, parents, etc.)	78	1.6	2	1.40
Years of practice	78	14	11	10.07
Total work hours/week	78	41	40	11.54
Clinical percent	78	73	80	22.18
Clarifier score	76	31.01	31	5.06
Ideator score	76	29.05	29	5.17
Developer score	76	27.96	28	5.17
Implementer score	76	32.88	33	5.16
Emotional exhaustion score	75	2.64	2.80	1.33
Depersonalization score	75	1.89	1.80	1.35
Personal Accomplishment score	75	4.97	5.10	0.76

The mean FourSight scores for PEM physicians (see Table 2) were as follows: Clarifier: 31.01 (Median: 31; SD= 5.06); Ideator: 29.05 (Median: 29; SD= 5.17); Developer: 27.9 (Median: 27.96, SD= 5.17) and Implementer: 32.88 (Median: 33, SD= 5.16). When compared to 7,211 individuals in the general population, the overall scores for PEM's were lower in all four categories. Both groups were similar in that they had a higher preference for Clarifying and Implementing, compared to Ideating and Developing (see Figure 1). Interestingly, PEM's had lower developer scores compared to general population norms (27.96 vs. 31.7).

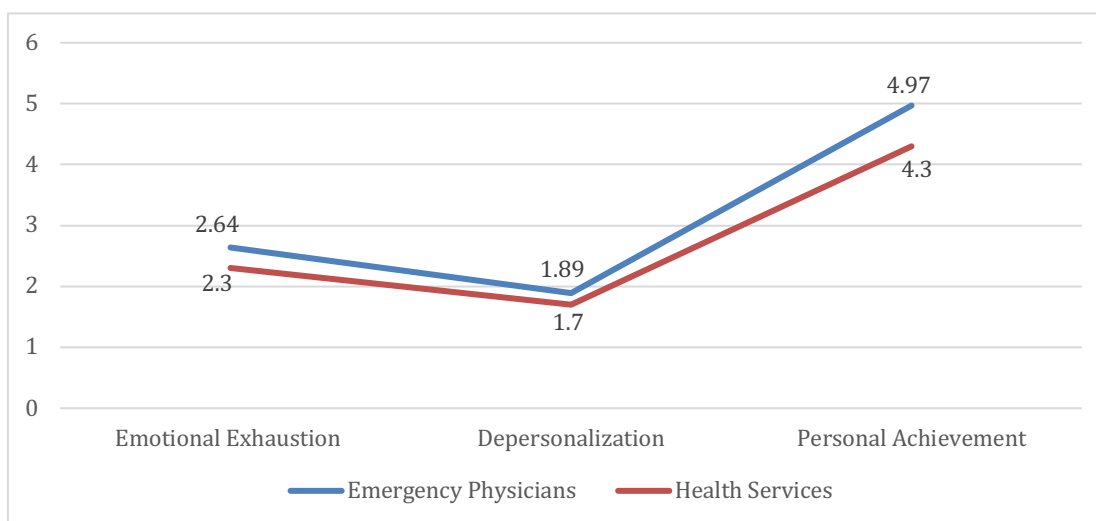
We did not analyze FourSight mindset average scores by age, gender, or race in this study sample due to small sample size, but the raw data and the difference in mean scores compared to the general population is included (see Appendix tables 12-17). The scores of all age groups were lower than matched general population norms.

Figure 1

FourSight scores for Emergency Physicians (n=76) vs. General Population Norms (Version 8.0, n=7,211)

**Figure 2**

Maslach Burnout Inventory: Emergency Physicians (n=75) vs. Medical Personnel Norms (n= 11,000+)



The mean MBI scores for PEM physicians (see Figure 2) were slightly higher than the scores for health service worker norms (n= 11,000+), suggesting a higher rate of emotional

exhaustion and depersonalization, but also a slightly higher sense of personal accomplishment. For PEM's, EE score were higher ($M= 2.64$, Median= 2.8, $SD= 1.33$) compared to DP ($M= 1.89$, Median= 1.8, $SD= 1.349$), while MBI-PA scores were higher than both EE and DP ($M= 4.97$, Median= 5.1, $SD= 0.764$).

Table 3

Correlation: FourSight with Burnout (N=75)

MBI Variables	<i>r</i>	Creative Thinking Preference			
		Clarifier	Ideator	Developer	Implementer
Emotional Exhaustion	Pearson Correlation	.356**	-.073	.298**	.049
	Sig (2-tailed)	.002	.533	.009	.676
Depersonalization	Pearson Correlation	.043	-.104	.071	-.136
	Sig (2-tailed)	.714	.375	.547	.245
Personal Accomplishment	Pearson Correlation	-.161	.281*	-.119	.201
	Sig (2-tailed)	.166	.014	.308	.085

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

To explore the relationship between PEM burnout and creative-thinking preferences, Pearson correlations were carried out between the MBI and FourSight scales. As shown in Table 3, EE showed a statistically significant and positive correlation with both the Clarifier ($r= .356$, $p= .002$) and Developer ($r= .298$, $p= .009$) mindsets, while DP showed no significant correlations with any of the thinking preferences. PA showed a statistically significant and positive correlation with the Ideator mindset ($r= .281$, $p= .014$).

Further analysis was performed on the individual items in the three MBI burnout scales to see which showed the strongest correlation with the four creative thinking preferences (see Table 4). EE descriptors that showed a significant and positive correlation with the Clarifier mindset included (in order of significance), feelings of burnout ($r= .369$, $p= .001$) and frustration ($r= .360$, $p= .002$), feeling used up ($r= .336$, $p= .003$), emotionally drained ($r= .329$, $p= .004$),

fatigued ($r = .297, p = .010$) and working too hard ($r = .294, p = .011$). EE items that showed a significant and positive correlation with the Developer mindset were the same as for the Clarifying mindset but in a different order of significance: feelings of burnout ($r = .315, p = .006$), and fatigue ($r = .289, p = .012$), feeling used up ($r = .285, p = .012$), emotionally drained ($r = .281, p = .015$), frustrated ($r = .256, p = .027$) and working too hard ($r = .250, p = .030$).

Table 4

Correlation: FourSight with Items in the Emotional Exhaustion Inventory (N=75)

EE Variables	<i>r</i>	Creative Thinking Preference			
		Clarifier	Ideator	Developer	Implementer
Emotionally Drained	Pearson Correlation	.329**	-.004	.281*	.108
	Sig (2-tailed)	.004	.974	.015	.358
Used Up	Pearson Correlation	.336**	-.008	.285*	-.011
	Sig (2-tailed)	.003	.948	.012	.928
Fatigued	Pearson Correlation	.297**	-.059	.289*	.066
	Sig (2-tailed)	.010	.612	.012	.576
People Strain	Pearson Correlation	.174	-.147	.119	.015
	Sig (2-tailed)	.135	.209	.309	.895
Burned Out	Pearson Correlation	.369**	-.100	.315**	.013
	Sig (2-tailed)	.001	.394	.006	.910
Frustrated	Pearson Correlation	.360**	-.101	.256*	-.032
	Sig (2-tailed)	.002	.389	.027	.784
Working Too Hard	Pearson Correlation	.294*	.018	.250*	.203
	Sig (2-tailed)	.011	.875	.030	.080
People Stress	Pearson Correlation	.127	-.063	.134	-.134
	Sig (2-tailed)	.278	.589	.250	.251
End Of Rope	Pearson Correlation	.209	-.061	.163	.085
	Sig (2-tailed)	.072	.603	.162	.469

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

The same item analysis was conducted for the DP scale and FourSight. While the cumulative score on the DP component of burnout (see Table 5) showed no statistical correlation with creative thinking preferences, one item addressing a lack of caring for some patients had a significant negative correlation with the Ideator mindset ($r = -.261, p = .024$).

Table 5

Correlation: FourSight with Items in the Depersonalization Inventory (N=75)

DP Variable	<i>r</i>	Creative Thinking Preference			
		Clarifier	Ideator	Developer	Implementer
Impersonal Objects	Pearson Correlation	-.091	.176	-.042	-.112
	Sig. (2-Tailed)	.436	.131	.719	.338
Hardening Me	Pearson Correlation	.093	-.032	.123	-.107
	Sig. (2-Tailed)	.427	.786	.292	.360
Callous	Pearson Correlation	.079	.032	.109	-.109
	Sig. (2-Tailed)	.499	.785	.352	.354
Do Not Care	Pearson Correlation	-.145	-.261*	-.109	-.212
	Sig. (2-Tailed)	.215	.024	.351	.068
Patients Blame	Pearson Correlation	.174	-.022	.143	-.022
	Sig. (2-Tailed)	.136	.850	.220	.854

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

There are both positive and negative correlations between PA and all four mindset preferences for creative problem-solving (see Table 6). There is a significant negative correlation between the Clarifier mindset and the feeling of positively influencing lives ($r = -.230, p = .047$) and dealing calmly with emotional problems ($r = -.230, p = .047$). There is also a statistically significant negative correlation between the Developer mindset and the feeling of positively influencing lives ($r = -.256, p = .026$). There is a significant positive correlation between the Ideator mindset and feeling exhilarated when working with patients ($r = .328, p = .004$), as well as being relaxed with patients ($r = -.290, p = .012$). Finally, there is also a positive correlation between the Implementor mindset and feeling exhilarated ($r = .289, p = .012$), and energized ($r = .245, p = .034$).

Further analysis showed no significant correlation between workload (total hours worked, total clinical hours worked, clinical hours in a non-emergency setting, or time spent in non-clinical work) and burnout (see Table 7).

Table 6*Correlation: FourSight with Items in the Personal Accomplishment Inventory (N=75)*

PA Variables	<i>r</i>	Creative Thinking Preference			
		Clarifier	Ideator	Developer	Implementer
Patients' Feelings	Pearson Correlation	.078	.139	.033	.126
	Sig. (2-Tailed)	.505	.233	.776	.280
Effective With Patients	Pearson Correlation	-.096	.045	-.030	-.044
	Sig. (2-Tailed)	.414	.704	.796	.709
Positive Influence	Pearson Correlation	-.230*	.169	-.256*	.055
	Sig. (2-Tailed)	.047	.146	.026	.636
Energetic	Pearson Correlation	-.116	.215	-.121	.245*
	Sig. (2-Tailed)	.321	.064	.301	.034
Relaxed Atmosphere	Pearson Correlation	-.127	.290*	-.010	.217
	Sig. (2-Tailed)	.277	.012	.931	.062
Exhilarated	Pearson Correlation	.014	.328**	.099	.289*
	Sig. (2-Tailed)	.908	.004	.397	.012
Accomplish	Pearson Correlation	-.098	.138	-.166	.142
	Sig. (2-Tailed)	.402	.238	.154	.226
Calmness	Pearson Correlation	-.230*	.058	-.095	-.082
	Sig. (2-Tailed)	.047	.624	.415	.482

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.**Table 7***Correlation: Burnout with Workload (N=76)*

Workload Variables	<i>r</i>	Maslach Burnout Index		
		EE	DP	PA
Clinical Hours (PEM)	Pearson Correlation	-.032	.167	.070
	Sig. (2-Tailed)	.785	.152	.550
Clinical Hours (Other)	Pearson Correlation	-.048	.038	.029
	Sig. (2-Tailed)	.680	.748	.803
Total Hours/Week	Pearson Correlation	.141	.018	.036
	Sig. (2-Tailed)	.228	.879	.758
% Clinical Hours/Week	Pearson Correlation	-.132	.132	.027
	Sig. (2-Tailed)	.258	.261	.818
% Admin. Hours/Week	Pearson Correlation	-.020	-.180	.048
	Sig. (2-Tailed)	.863	.121	.682
% Teaching Hours/Week	Pearson Correlation	.143	-.042	.008
	Sig. (2-Tailed)	.220	.722	.945
% Research Hours/Week	Pearson Correlation	.146	.045	-.105
	Sig. (2-Tailed)	.211	.701	.369

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

EE: Emotional Exhaustion; DP: Depersonalization; PA: Personal Accomplishment

Table 8 shows correlations between workload (total hours worked, total clinical hours worked, clinical hours in a non-emergency setting, or time spent in non-clinical work) and FourSight mindset. While the Clarifier mindset showed a negative correlation with both clinical hours worked in emergency medicine ($r = -.224, p = .052$) and percent clinical time ($r = -.225, p = .051$), the results fell just short of statistical significance. The Ideator mindset had significant positive correlation with total hours worked per week ($r = .279, p = .015$), while the Implementer mindset has a significant negative relationship with both clinical hours worked in emergency medicine ($r = -.226, p = .049$), and the total percentage clinical time worked per week ($r = -.316, p = .005$). There was also a significant positive correlation between the Implementer mindset and percentage time spent in research ($r = .274, p = .017$).

Table 8

Correlation: FourSight with Workload (N=76)

Workload Variables	<i>r</i>	Creative Thinking Preference			
		Clarifier	Ideator	Developer	Implementer
Clinical Hours (Emergency Medicine)	Pearson Correlation	-.224	-.096	-.168	-.226*
	Sig. (2-Tailed)	.052	.407	.147	.049
Clinical Hours (Other)	Pearson Correlation	.006	-.038	.040	.036
	Sig. (2-Tailed)	.960	.742	.731	.756
Total Hours/Week	Pearson Correlation	-.026	.279*	.134	.164
	Sig. (2-Tailed)	.823	.015	.247	.157
Clinical Hours/Week (%)	Pearson Correlation	-.225	-.221	-.117	-.316**
	Sig. (2-Tailed)	.051	.055	.313	.005
Admin. Hours/Week (%)	Pearson Correlation	.186	.109	.091	.172
	Sig. (2-Tailed)	.108	.351	.433	.137
Teaching Hours/Week (%)	Pearson Correlation	.042	-.018	-.013	-.004
	Sig. (2-Tailed)	.717	.879	.910	.973
Research Hours/Week (%)	Pearson Correlation	.092	.216	.075	.274*
	Sig. (2-Tailed)	.432	.061	.521	.017

* $p < .05$, two-tailed. ** $p < .01$, two-tailed.

It was hypothesized that years of practice in Pediatric Emergency Medicine, total hours worked per week (clinical and non-clinical time combined) and creative thinking mindset

(Clarifier, Ideator, Developer and Implementer) could predict one or all components of burnout (EE, DP and PA). To test this hypothesis multiple regression analysis was used.

For the dependent variable EE (see Table 9), results show that 16.3% of the variance in EE can be accounted for by the six predictors collectively, $F(6,68)=3.398$, $p < .05$. Looking at the unique individual contributions of the predictors, the result shows that a Clarifying mindset ($\beta = .417$, $t = 2.225$, $p = .029$) positively predicts EE while years of practice ($\beta = -.227$, $t = -2.094$, $p = .040$) negatively predicts burnout.

Table 9

Linear Regression Analysis, Dependent Variable Emotional Exhaustion (EE)

Model Summary

Model	R	R ²	ADJ R ²	RMSE
1	.480 ^a	.231	.163	10.943

ANOVA^b

Model		SS	df	MS	F	p
1	Regression	2441.482	6	406.194	3.398	.005 ^a
	Residual	8142.198	68	119.738		
	Total	10583.680	74			

Coefficients

Model		B	SE	β	t	p
1	(Constant)	4.430	11.257		.394	.695
	YRSpractice	-.268	.128	-.227	-2.094	.040
	TotalHoursWeek	.182	.109	.190	1.673	.099
	ClarifyingScore	.981	.441	.417	2.225	.029
	IdeatorScore	-.337	.281	-.146	-1.198	.235
	DeveloperScore	-.030	.375	-.015	-.079	.937
	ImplementerScore	-.119	.254	-.056	-.467	.642

a. Dependent Variable: EmotionalExhaustionTotal

b. Predictors: (Constant), ImplementerScore, YRSpractice, TotalHoursWeek, DeveloperScore, IdeatorScore, ClarifyingScore

For the dependent variable DP (see Table 10), none of the independent variables collectively or individually predicted the level of depersonalization.

Table 10

Linear Regression Analysis, Dependent Variable Depersonalization (DP)

Model Summary

Model	<i>R</i>	<i>R</i> ²	<i>ADJ R</i> ²	<i>RMSE</i>
1	.243 ^a	.059	-.024	6.827

ANOVA^b

Model		<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
1	Regression	199.060	6	33.177	.712	.641 ^a
	Residual	3169.526	68	46.611		
	Total	3368.587	74			

Coefficients

Model		<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
1	(Constant)	14.962	7.023		2.130	.037
	YRSpractice	-.091	.080	-.137	-1.147	.256
	TotalHoursWeek	.024	.068	.044	.350	.727
	ClarifyingScore	.020	.275	.015	.073	.942
	IdeatorScore	-.111	.176	-.085	-.632	.529
	DeveloperScore	.127	.234	.114	.541	.590
	ImplementerScore	-.185	.159	-.154	-1.164	.25

a. Dependent Variable: DepersonalizationTotal

b. Predictors: (Constant), ImplementerScore, YRSpractice, TotalHoursWeek, DeveloperScore, IdeatorScore, ClarifyingScore

For the dependent variable PA (see Table 11), results show that 8.9% of the variance in EE can be accounted for by the six predictors collectively, $F(6,68)=2.207$, $p=.05$. Looking at the unique individual contributions of the predictors, the result shows that only an Ideator mindset ($\beta = .272$, $t = 2.132$, $p = .037$) positively predicts a sense of personal accomplishment. None of the other independent variables reached statistical significance.

Table 11

Linear Regression Analysis, Dependent Variable Personal Accomplishment (PA)

Model Summary

Model	<i>R</i>	<i>R</i> ²	<i>ADJ R</i> ²	<i>RMSE</i>
1	.404 ^a	.163	.089	5.825

ANOVA^b

Model		<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
1	Regression	449.208	6	74.868	2.207	.05 ^a
	Residual	2306.978	68	33.926		
	Total	2756.187	74			

Coefficients

Model		<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
1	(Constant)	33.358	5.992		5.567	<.001
	YRSpractice	.052	.068	.087	.768	.445
	TotalHoursWeek	-.029	.058	-.060	-.508	.613
	ClarifyingScore	-.231	.235	-.193	-.986	.327
	IdeatorScore	.319	.150	.272	2.132	.037
	DeveloperScore	-.086	.200	-.085	-.431	.668
	ImplementerScore	.211	.135	.195	1.560	.123

a. Dependent Variable: PersonalAccomplTotal

b. Predictors: (Constant), ImplementerScore, YRSpractice, TotalHoursWeek, DeveloperScore, IdeatorScore, ClarifyingScore

Finally, we examined the relationships among self-reported workload variables from the demographic forms completed by the PEMs. Significant findings included the following. Years in practice inversely correlated with clinical hours worked in PEM ($r = -.323, p = .004$), % clinical time ($r = -.261, p = .021$) and significantly positively correlated with administrative time ($r = .462, p < .001$). Percent clinical time was significantly inversely correlated with percent administrative time ($r = -.694, p < .001$) and percent research time ($r = -.580, p < .001$) and negatively correlated with total hours worked per week ($r = -.391, p < .001$). Percent research is positively correlated with clinical hours worked in a non-emergency setting ($r = .510, p < .001$).

SECTION FIVE: CONCLUSIONS AND KEY LEARNINGS

Discussion

The “VUCA” concept (volatility, uncertainty, complexity, ambiguity) was coined by US military leaders to describe strategic challenges post the fall of the Soviet Union. VUCA has since been adopted by the corporate world in the context of leadership and management. To overcome the challenges of VUCA, it is essential to have a creative mindset, adaptability, flexibility, and responsiveness to change (Malterud & Kamps, 2021). There isn’t a better way to describe the practice of emergency medicine. There is volatility related to patient volumes, acuity and patient and department needs fluctuate constantly as do resources needed to provide care i.e., staff, space, supplies and technology. There is uncertainty in the face of undifferentiated, undiagnosed, and unknown patients. There is complexity caused by variations in age (birth-geriatrics), acuity (minimally ill or injured to terminal) and presentations (medical, surgical and trauma). There is ambiguity caused by communication needs and barriers, diagnostic dilemmas, treatment and diagnostic modalities, interactions with consultants, and medico-legal risk. Emergency medicine involves solving complex multi-faceted problems in real time. In essence, the qualities of creative thinking which include adaptability, flexibility, and responsiveness to change are integral to the practice of emergency medicine.

No study to date has explored the relationship between a physician’s creative mindset and burnout. This study suggests that a relationship does indeed exist. Most significantly, regression analysis demonstrated that a physician’s creative mindset was a stronger predictor of burnout than work characteristics like years in practice and hours worked per week. Since creativity and creative thinking are trainable skills, the findings from this study could help mitigate burnout through focused education on creative problem solving for physicians. Key findings from this

study are described below, beginning with each of the three dimensions of burnout measured by the MBI.

Emotional Exhaustion

Overall results for the EE scale demonstrated that Pediatric Emergency Medicine physicians exhibited slightly higher levels of EE compared to other medical personnel in the Maslach database. This is not surprising given the intensity of work associated with making life and death decisions every day, lack of control of workload and shift work related sleep disruptions. In depth analysis demonstrated specific relationships between EE and the independent variables included in the present study and these more precise findings are explored next, both in terms of empirical outcomes and their implications.

Emotional Exhaustion and Years of Practice

Physicians who had spent more years in the practice of Pediatric Emergency Medicine were less likely to have emotional exhaustion. This is an interesting finding that could potentially suggest that a lack of emotional exhaustion may afford some level of resilience and lead to longevity in the profession, or in contrast it may be related to the long termers developing coping mechanisms to counteract emotional exhaustion. In either case it's possible that early attrition from the specialty of Pediatric Emergency Medicine could be counteracted through focused interventions, attrition rates from this specialty can be reduced.

Emotional Exhaustion and Clarifier Mindset

The Clarifier mindset directly and significantly correlates with EE. Indeed, subsequent examination using multiple regression analysis demonstrated that while length of professional service negatively correlated with EE, the Clarifying mindset strongly predicted EE. The

subscales of EE that significantly contributed to EE included the feelings of being burned out, frustrated, used up, and emotionally drained at work. These individuals expressed fatigue and felt they were working too hard. Given that Clarifiers need order, work better when provided with facts, want to spend time obtaining a history, and take their time making decisions this is not a surprising finding. In the VUCA world of emergency medicine where there are competing priorities, limited time, the need to make life and death decisions with less than 10% of the total information 99% of the time, a Clarifier is being asked to work outside their comfort zone. It is possible that if a physician with a Clarifier mindset is made aware of how their mindset contributes to burnout, self-awareness by itself may help them better manage their expectation and thus reduce emotional exhaustion.

Emotional Exhaustion and Developer Mindset

There was also a significant positive correlation between a preference for Developing and EE. The feelings that contributed to EE were the exact same as for the Clarifier mindset. Individuals with Developer mindsets are reflective, careful, and need time to consider and evaluate every option, it is not surprising that given the time constraints and multi-tasking involved in the practice of emergency medicine physicians with this mindset feel emotionally exhausted. However, on regression analysis the ability of the Developer mindset to predict EE disappeared, perhaps further distinguishing the Clarifying mindset from the Developing mindset. In FourSight theory, both Clarifying and Developing represent analytical thinking. Where the former relates to the kind of analytical thinking used to understand reality and deal with the present, the Developing preferences employs analytical thinking to examine and refine future possibilities. Recent research has helped to distinguish these forms of analytical thinking relative to the Clarifying and Developing preferences (Puccio, Szalay, Acar & Boyer, 2019). Linear

regression analysis seems to reinforce the fact that the Clarifying mindset which involves close scrutiny of the present situation and a desire to get the facts right, may have a much greater tendency to promote burnout due to emotional exhaustion.

Depersonalization

Pediatric Emergency Medicine physicians exhibited slightly higher levels of DP compared to other medical personnel in the Maslach database. The level of DP was lower than the level of EE. While the study did not find any significant correlations between creative problem-solving preferences and DP, there was a negative correlation between the Ideator mindset and the feeling of not caring what happens to patients. People with an Ideator mindset tend to be social, playful, and adaptable and this mindset positively relates to the perceiving style rather than the judging style on the Myers-Briggs indicator (Acar et al., 2018). These traits may be protective against DP.

Personal Accomplishment

Pediatric Emergency Medicine physicians exhibited high levels of PA. As a matter of fact, the score was 10% higher than the comparison group of medical personnel in the Maslach database. Of the independent variables tested against PA, the Ideator mindset was the only variable that made a significant contribution to a sense of PA. This is explained in further detail below.

Personal Accomplishment and the Ideator Mindset

There was a positive correlation between a sense of PA and the Ideator mindset. The ability to create a relaxed atmosphere and the feeling of exhilaration associated with working closely with patients correlated with a sense of PA. Given an Ideators' playful, social, imaginative, and adventurous nature, these individuals may be well-suited to see the positives,

overlook the negatives and just enjoy themselves, hence making them more resilient. When comparing both demographic variables and mindset, this creative-thinking preference showed that it was a much stronger predictor of personal accomplishment than both hours worked per week and years of service. It is noteworthy that years of service was not significantly related to a sense of personal accomplishment, even though it seems natural to assume that longevity in a profession would correspond to a deeply held sense of accomplishment. That was not the case. Somewhat surprisingly, one's Ideator mindset was the only independent variable to significantly predict this form of resiliency.

Personal Accomplishment and the Implementer Mindset

There was a positive correlation between a few items related to PA and the Implementer mindset, even though collectively the correlation did not reach statistical significance. Implementers, like Ideators, feel a sense of exhilaration working with their patients and feel energized. Given that Implementers are decisive, action-oriented and determined, these qualities may contribute to a sense of accomplishment regardless of the obstacles faced at work.

Personal Accomplishment and the Clarifier and Developer Mindsets.

There were negative correlations between a few items related to PA and the Clarifier and Developer mindsets. Collectively though these correlations did not reach statistical significance. High Clarifiers and Developers did not feel that they were positively influencing lives and Clarifiers in particular also felt an inability to deal with emotional problems calmly. Overanalyzing the situation, judging rather than perceiving, trying to come up with perfect solutions in an imperfect environment, may explain these feelings.

Other Findings

Ideators worked more total hours per week (clinical and non-clinical work). Their energy, enthusiasm and sense of adventure may stimulate them to take on more responsibility and do more. Implementers spent more time doing research and less time in clinical work. Clinical work in emergency medicine does not afford as much autonomy as research and Implementers like control and autonomy, that is more available in the research environment.

Implications

In this cohort of Pediatric Emergency Medicine physicians, the syndrome of burnout is most closely associated with emotional exhaustion. While the Ideator mindset protects against burnout, the Clarifier and to a lesser degree the Developer mindsets increase the risk of burnout. Of note, a Clarifier mindset showed the greatest predictive value with respect to emotional exhaustion, while total hours worked did not predict EE. The finding that years of service negatively correlated with EE needs to be studied further to see if this is a generational issue, less time in the clinical arena, or related to some other contributing factors. This finding is promising and affords an opportunity for mentorship for younger physicians. While one's mindset did not predict DP, an Ideator mindset seems to promote empathy towards patients. Finally, the Ideator mindset appears to predict a sense of PA.

Burnout occurs when there is a mismatch between the individual and their work environment as relates to workload demands, loss of control, lack of rewards, breakdown of community, an environment of unfairness and an absence of shared values. Potentially control of the work environment can be regained through creative problem solving, making a concerted effort to be involved in making choices and decisions as well as shared decision making with organizational leaders. Given that one's creative problem-solving preferences impact burnout,

introducing creative thinking skills early in the medical curriculum and ensuring that these skills are utilized and enhanced constantly through a physicians career can have a major impact on physician burnout. Simple skills and tools that promote an Ideating mindset can help individuals develop mindfulness, be open to novelty, be tolerant of ambiguity, be flexible and non-judgmental. This simple intervention has the capacity to improve engagement, increase satisfaction, reduce burnout and ultimately improve clinical care.

Future Research

This was an exploratory study to determine if a relationship exists between physicians' creative mindsets and their level of burnout. The significant findings in this study should form the basis for further qualitative studies in other Pediatric Emergency Medicine groups, General Emergency Medicine groups, and finally other medical and surgical specialties to see if the findings can be replicated. Given the diverse practice environment each specialty works in, another issue to explore is whether creative thinking preferences that contribute to burnout differ by specialty. Most importantly, having identified a causation between a physicians creative thinking preference and burnout, future studies also need to focus on the efficacy of these interventions at different levels of a physicians training and career.

Limitations

One serious limitation of this study is the small sample size. While the sample was a homogenous group of physicians from one specialty, the distribution of gender, race and age groups was not a representative sample of Pediatric Emergency Medicine physicians, so the findings are not generalizable for this specialty, general emergency medicine or other specialties in medicine.

Conclusions

This study provides preliminary insight into the relationship between a physicians creative thinking preference and burnout. Linear regression demonstrated that a Clarifier mindset rather than total hours worked per week contributed to emotional exhaustion and that an Ideator mindset protected against burnout. These findings suggest the possibility that creative problem-solving training could prevent burnout and that this needs to be studied further.

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APPENDICIES

Table 12

FourSight Mindset Scores age 30-39 Years (n=22) vs. General Population Norms (n= 1,568)

Mindset	PEM	General Population	Difference
Clarifier	30.05	32.85	-2.8
Ideator	29.82	32	-2.18
Developer	27.68	31.81	-4.13
Implementer	32.45	34.34	-1.89

Table 13

FourSight Mindset Scores age 40-49 Years (n= 29) vs. General Population Norms (n= 1,549)

Mindset	PEM	General Population	Difference
Clarifier	31.07	32.62	-1.55
Ideator	26.96	31.82	-4.86
Developer	27.75	31.36	-3.61
Implementer	32.43	34.66	-2.23

Table 14

FourSight Mindset Scores age > 50 Years (n=27) vs. General Population Norms (n= 1,337)

Mindset	PEM	General Population	Difference
Clarifier	31.77	32.51	-0.74
Ideator	30.65	31.85	-1.2
Developer	28.42	31.04	-2.62
Implementer	33.73	34.4	-0.67

Table 15

FourSight Mindset Scores PEM Females (n=46) vs. General Population Female Norms (n= 3,005)

Mindset	PEM	General Population	Difference
Clarifier	31.27	32.52	-1.25
Ideator	27.98	31.05	-3.07
Developer	27.98	31.16	-3.18
Implementer	33.87	34.13	-0.26

Table 16*FourSight Mindset Scores PEM Males (n=32) vs. General Population Male Norms (n= 3,176)*

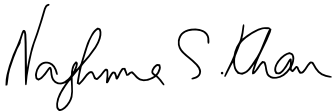
Mindset	PEM	General Population	Difference
Clarifier	30.65	33.13	-2.48
Ideator	30.61	32.57	-1.96
Developer	27.94	32.17	-4.23
Implementer	31.45	34.19	-2.74

Table 17*FourSight Mindset Mean Scores by Race (General Population Norms not available)*

Mindset		Race				
		Asian (N=18)	Black or African American (N=16)	Hispanic or Latino (N=4)	Multiracial (N=2)	White (N=38)
Clarifier	<i>M</i>	29.39	32.13	29.75	34.50	31.28
	<i>SD</i>	4.80	5.69	7.63	0.71	4.68
Ideator	<i>M</i>	27.72	27.25	33.00	30.50	30.00
	<i>SD</i>	5.13	5.34	4.90	2.12	4.99
Developer	<i>M</i>	27.11	27.44	28.50	31.50	28.36
	<i>SD</i>	5.99	6.04	9.33	4.95	5.92
Implementer	<i>M</i>	34.17	32.00	33.00	35.00	32.50
	<i>SD</i>	5.70	5.07	4.24	2.83	6.11

PERMISSION TO PLACE THIS PROJECT IN THE DIGITAL COMMONS ONLINE

I hereby grant permission to the International Center for Studies in Creativity at Buffalo State college permission to place a digital copy of this master's project "The Relationship between Emergency Physicians' Creative Thinking Preference and Their Risk of Burnout: An Opportunity to Make a Difference", as an online resource.



Naghma S. Khan

September 2, 2022

Date