



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at ScienceDirect

## Journal of Radiology Nursing

journal homepage: [www.sciencedirect.com/journal/journal-of-radiology-nursing](http://www.sciencedirect.com/journal/journal-of-radiology-nursing)

## Discussion

## NURSE: Five Micropractices to Reduce Stress

Jyoti Valluri, MS Ed, BSN, RN <sup>a,\*</sup>, Karen L. Gorton, PhD, RN, FNP, MS <sup>b</sup><sup>a</sup> University of Missouri, School of Nursing and Health Studies, Kansas City, Missouri, USA<sup>b</sup> ACUE Credential – Effective College Instruction, School of Nursing and Health Studies, University of Missouri, Kansas City, Missouri, USA

## A B S T R A C T

## Keywords:

Stress  
Self-care  
Micropractices  
Nurses

The Coronavirus pandemic affected patients' health and heightened stress among the frontline care-givers, especially radiology nurses. Although there is literature on the effects of stress on nurses, there is a gap on interventions to mitigate the impact of stress. There are evidence-based mindful interventions to maintain balance in stressful situations and reduce perceived stress in sports, neuroscience, and positive psychology. Studies show that even brief periods of self-care reduce stress and cortisol levels. Nurses work long hours and have personal, family, and community responsibilities. Nurses may not have the luxury of extra time to devote to self-care. Therefore, this essay summarizes what stress does to the body; the tangible and intangible costs associated with unmanaged stress among nurses. Five self-care micropractices requiring no additional time called NURSE are offered. When practiced consistently, these micropractices can enhance nurses' well-being, leading to the retention of nursing talent and improved patient care.

© 2022 Association for Radiologic &amp; Imaging Nursing. Published by Elsevier Inc. All rights reserved.

## Introduction

During the Coronavirus 2019 (COVID-19) outbreak radiology nurses experienced a higher risk of infection due to invasive procedures on high acuity patients (Ayyala et al., 2020). Radiology nurses experienced high levels of stress similar to nurses in the emergency department, intensive care, medical-surgical units, and all frontline workers during the pandemic (Couper et al., 2022; Williams et al., 2022). The effects of unprecedented stress experienced by nurses have been reflected in the elevated national intention to leave rates (Dyrbye et al., 2019). Stressful events are a constant in nursing yet nurses receive little training to deal with workplace stress (Onieva-Zafra et al., 2020). Unmanaged chronic stress can lead to changes in neurobiological pathways that can affect workplace satisfaction, quality of care, and personal well-being (Morera et al., 2020). However, consistent positive actions activate reward centers in the brain, decrease cortisol levels, and increase well-being (Jackson et al., 2021). Although nurses understand the benefits of self-care, we do not practice them due to a lack of time, energy, and motivation (Williams et al., 2022). This essay

presents tangible and intangible costs of current stress experienced by nurses, the effects of brief mindful self-care practices based on the theory of neuroplasticity, and recommend five micropractices known by the acronym NURSE. These micropractices are effective, can be performed whenever needed, particularly in stressful times, and will require no additional time (Fessell & Cherniss, 2020). With consistent practice these tools can become sustained self-care routines and prevent stress-related disease.

## Current state of stress experienced by nurses

Radiology nurses serve a unique role. They possess a high degree of knowledge and clinical skills to work independently or with interdisciplinary teams. They administer moderate sedation, use advanced equipment, and care for patients of varying acuity in all departments (Blevins, 1994; Werthman et al., 2020). Due to the COVID-19 pandemic, radiology nurses' stress was heightened due to inconsistencies in the protocol, lack of personal protective equipment, inadequate staffing, and inadequate workers' compensation (Ayyala et al., 2020). Similarly, 27.9 million nurses globally (including 3.7 million in the United States) experienced increased patient acuity, census, and workload contributing to nurses' high stress (Specht et al., 2021; World Health Organization, 2020). Due to increased stress nurses' intent to leave their current job is 18% in Germany (Schug et al., 2022), 37.8% in the United Kingdom, and 40% to 54% in the United States (Kelly et al., 2021;

The author(s) have no relevant disclosures. There was no grant funding or financial support for this manuscript.

\* Corresponding author: Jyoti Valluri, MS Ed, BSN, RN, University of Missouri, School of Nursing and Health Studies, 2464 Charlotte St, Kansas City, Missouri, USA 64108.

E-mail address: [jvz39@umssystem.edu](mailto:jvz39@umssystem.edu) (J. Valluri).

<https://doi.org/10.1016/j.jradnu.2022.09.002>

1546-0843/\$36.00/© 2022 Association for Radiologic & Imaging Nursing. Published by Elsevier Inc. All rights reserved.

2022; Taylor-Clark et al., 2022). Stress has tangible and intangible costs to nurses and the healthcare system.

### Tangible costs

An average US hospital spends 3 months and an average of \$48,050 to fill one nurse vacancy, with costs of replacement ranging from \$4.4 million to \$6.9 million annually (Jun et al., 2021). These costs include advertisement recruitment interviews, background checks, orientation, and new staff training (Lockhart, 2020). In addition, according to the American Institute of Stress (AIS) the cost of unmanaged work-related stress to all US businesses is \$300 billion due to reduced productivity, accidents, and absenteeism (AIS, 2022). The cost to provide healthcare for stress-related occurrences is \$190 billion (AIS, 2022).

### Intangible costs

The COVID-19 epidemic caused radiology nurses to experience reduced satisfaction with work, increased psychological distress, and the intent to leave work (Williams et al., 2022). The intangible costs of such stress are loss of work productivity, impact on family and community, increased medical costs, workers' compensation, and loss of wages and tax dollars (AIS, 2022). Unmanaged stress leads to increased obesity, hypertension, high cholesterol, anxiety, and anger (Jordan et al., 2016). High stress can also lead to depression, suboptimal mental, decreased physical well-being, that can lead to burnout (Dyrbye et al., 2019; Melnyk et al., 2018). Work-related stress is positively linked to high rates of substance abuse among nurses (Batalla et al., 2019; Ivey, 2015). Additionally, the risk of the suicide rate for nurses increases five-fold when professional stress is compounded by personal stress (Hooley et al., 2014; Quarshie et al., 2019).

### Neurobiology of stress

Experiences of radiology staff during COVID-19 increased their anxiety, fear, and stress. These experiences affected nurses' health, patient safety, and work efficiency (Huang et al., 2020). Basic neurobiology is offered to understand the impact of stress on personal and professional outcomes. The brain is the organ that manages responses to stimuli through personal, behavioral, and physiological responses (McEwen et al., 2015). When frontline nurses face constant stress at work, cortisol levels rise and can stay elevated for several hours. Repeated exposure to stress causes damage to the body and brain (Alhawatemeh et al., 2022). Untreated stress can cause structural changes in the amygdala, hippocampus, and prefrontal cortex which can lead to stress-related diseases (Ortiz & Conrad, 2018). Brain, or neural changes, result in decreased ability to retain knowledge impacting short-term memory storage and retrieval which are critical for the profession of nursing (Shaffer and Curtin, 2020; Quaedflieg & Schwabe, 2018). Thus, chronic exposure to stress impacts our mental, physical, and emotional health and general well-being (Nabizadeh-Gharghozar et al., 2020; Yao et al., 2018). Less than optimum health in nurses is linked to falls, secondary needle sticks, medication errors, decreased quality of care, and increased healthcare costs (Bakhamis et al., 2019; Chesak et al., 2019; Melnyk et al., 2018). As the response to stress is uniquely personal, developing healthy behavioral and cognitive self-care practices can positively affect one's neurobiology leading to better coping stress control, well-being, and resilience (McEwen et al., 2015; Tabibnia & Radecki, 2018).

### Ripple effects of self-care behaviors

The difficulty of nurses in practicing healthy self-care behaviors is complex and includes a lack of time, money, motivation, and support (Riegel et al., 2021; Ross et al., 2017). Sapolsky (2004) points out that zebras are stressed as they run away from predators. At the end of the chase their stress is gone as they are either dead or go back to grazing. Humans, on the other hand, ruminate on stressful events long after the events have ended (Sapolsky, 2004). Nurses face many stressful and uncontrollable situations during the workday. Without consistent self-care we may not be fully present for ourselves or our patients and loved ones (Williams et al., 2022). Nursing theorist Dr. Dorothea Orem calls self-care a cornerstone of nursing science where nurses are both the benefactors and the recipients of such care (Denyes et al., 2001). Furthermore, Dr. Jean Watson emphasizes that mindful, loving, compassionate, self-care is the foundation for caring for others and can result in a more fulfilled work and life (Sitzman & Watson, 2018). Additionally, Williams et al. (2022) caution that if nurses neglect self-care we can potentially become patients in need of specialized care.

Self-care through mindfulness practices has captured the interest of the scientific community in the last 2 decades. Researchers find that mindfulness practices are effective in reducing depression, chronic pain, anxiety, and stress. Mindful practices improve emotional well-being and work performance, in fields of business, education, sports, and medicine (Alhawatemeh et al., 2022; Goodman & Howard, 2022). Knowledge of self-care is one thing. However, the current state of affairs has some nurses asking if self-care is enough (Laker, 2022). Systemic changes that support nurses' well-being practices can create an atmosphere of self-care. However, the systemic changes cannot take away personal responses to the perceived stressors faced by nurses daily (Wei et al., 2019). Empowering a few nurses can ripple the healing effect on nurses, their patients, families, and communities (Sitzman & Watson, 2018; Sitzman, 2022). To assist nurses in the practice of evidenced-based micro-practices, that take only moments to practice, but have positive lasting healing effects on the neurobiology are presented below. These quick tools can help nurses respond to the constant stress present in our profession (Fessell & Cherniss, 2020; Ortiz & Conrad, 2018).

### NURSE: five brief self-care micropractices

Radiology nurses face unique challenges during COVID-19 such as exposure to infections, radiation, lifting, and performing invasive procedures on high acuity patients with inadequate help. Such working conditions can lead to infections, and physical and moral injury in nurses (Ayyala et al., 2020; Williams et al., 2022). Many nurses report that working long hours and family responsibilities do not afford them the luxury of time for self-care activities (Williams et al., 2022). Based on neuroplasticity, even brief mindfulness self-care strategies can help reduce the intensity of stress and help develop an adaptive response to perceived threat stimuli (Aguilar-Raab et al., 2018; Bottaccioli et al., 2019). Just as stress affects the whole body, mindful self-care activities should involve our whole being, spirit, mind, heart, and body (Sitzman & Watson, 2018). Evidence demonstrates that a brief mindful practice effectively reduces stress, pain, and cortisol levels (Bottaccioli et al., 2019; Tang et al., 2015; Wu et al., 2019). Additionally, these brief practices promote physical, spiritual, and emotional wellness by decreasing stress, pain, fear, anxiety, and depression (Deng, 2019). The following acronym NURSE stands for *notice, unconditional, response, strengths, and empower*. NURSE practices are offered as stress relief tools that can be practiced by radiology and all nurses (Table 1). If practiced with regular intervals multiple times a day, micropractices can add up to several minutes a day and promote well-being (Sitzman, 2022).

**Table 1**  
NURSE micropractices

Notice without judgement Observe behaviors that work and that do not work (Coyne et al., 2020)	Micropractice To become more aware of ourselves and surroundings (a) Take 3 deep nourishing breaths while (b) Completely relaxing your body tension These actions help us respond better to our environment
Unconditional acceptance Accept, evaluate situation without exaggeration. Respond with self-kindness (Neff et al., 2020)	Micropractice Place our hand on our heart and acknowledge, “I feel anxious/sad/exhausted/stressed” (a) Unconditionally accept the content of our feeling (b) Choose to respond with self-kindness in the form of any positive thoughts about ourselves
Response-able Use special phrases to create a gap between the difficult circumstances and our automatic responses (Covey, 2020)	Micropractices Take control of how we respond verbally and in your thinking. Like elite athletes we can pick our favorite chant: “I am a good nurse,” “I make a difference,” or any empowering quote allowing us to do the following: (a) First pause and (b) Then respond to situations and acknowledge our full abilities
Strengths focused We can flourish under challenging situations by focusing on our strengths (Seligman, 2002)	Micropractice Making a list of positive personal strengths. Use existing task time to do this. (a) While walking or getting dressed (b) At a stop light (c) Before going into a patient’s room (d) While washing your hands (e) At the end of the shift Allow this knowing to radiate a sense of pride and accomplishment
Empowered Brief self-compassionate physical actions build inner strength (Andersen et al., 2022; Neff & Germer, 2018)	Micropractice The Tree yoga pose can be practiced quickly and helps build core strength. (a) Stand with our feet shoulder-width apart (b) Take a slow deep breath while lifting the hands above our heads towards the sky. Lift the heels off the floor if comfortable. (c) Hold the position for a few seconds then gently bring our arms back to our side while exhaling completely. Yoga improves anabolic, lymphatic, and metabolic health

### Notice without Judgement

The first step to changing behaviors is to notice practices that work and ones that do not (Coyne et al., 2020). For example, by consciously observing breathing patterns and muscle tension one can acknowledge that breath or muscle tension increases in response to increased stress/cortisol levels (Giannakakis et al., 2019). *Micropractice*: Consciously taking three deep nourishing breaths every few minutes while completely relaxing the body tension has significantly reduced compassion fatigue in nurses (Sitzman & Craven, 2021; Owens et al., 2020). Focused deep breathing allows for the more profound exchange of oxygen activation of the parasympathetic system increase in oxytocin and reductions in cortisol help one to respond better to current stressful stimuli (Drigas & Mitsea, 2021; Pascoe et al., 2017; Yuliana, 2021).

### Unconditional Acceptance

Most nurses are type A personalities who enjoy professional accomplishments but are linked to increased fatigue, stress, depression, irritability, and burnout (Yao et al., 2018). Unconditionally accepting our personal feelings in the present moment allows us to evaluate the situation without exaggeration and respond with self-kindness and compassion (Neff et al., 2020). *Micropractice*: Place our hand on our heart and acknowledge our feelings honestly, “I feel anxious/sad/exhausted/stressed.” It is essential to be mindful of the content of the self-talk as it can help one respond with self-kindness instead of automatic harsh self-judgment (Hardy, Comoutos, & Hatzigeorgiadis, 2018; Neff et al., 2020).

### Response-able

According to Stephen Covey (2020), the short gap between a stimulus and our response can be robust. In this gap, we have the

ability and freedom to respond in a way that either supports growth and our happiness or not. Monitoring one’s responses to situations by consciously practicing positive self-talk can boost self-confidence, improve mood, relax the body, and increase our ability to handle stressful situations (Crane & Ward, 2016). Our profession deals with life and death situations daily. Like elite athletes, we can enhance “our game” by using positive self-talk, imagery, and goal setting to boost self-confidence (Park et al., 2020; Walter et al., 2019). *Micro-practices*: We can adopt favorite chants such like the athletes such as “I choose my reactions,” “I am doing my best with the resources I have,” “I am a good nurse,” and “I have what it takes to make a difference today.” Or adopt a verse from our favorite holy book or favorite teacher that allows us to pause and respond to situations with our full abilities instead of looking for someone to blame (Covey, 2020).

### Strengths Focused

In trying situations, we can stand on the strengths of our interpersonal skills, faith, perseverance, and honesty, and less on what needs to be fixed which allows us the opportunity to flourish under challenging situations (Seligman, 2002). By increasing personal support for our positive attributes, we may be able to improve our health and professional satisfaction and decrease burnout (Crane & Ward, 2016). *Micro-practice*: Making a list of positive personal strengths during the workday or at home during time that finds you waiting for something. By identifying and appreciating unique strengths one can experience positive consequences of happiness and pride as well as a sense of accomplishment at work (Bakker et al., 2019).

### Empowered Mentally and Physically

We can empower and equip ourselves by practicing self-care and health-promoting behaviors before we are faced with



stressful events (Huang et al., 2020). Brief self-compassionate mindfulness actions can build our inner strength (Neff & Germer, 2018). Quick physical exercises can also elevate feelings of vitality, build team spirit, and improve mental and physical functions (Andersen et al., 2022). Improper lifting techniques cause repeated strain within our bodies and when combined with overuse of specific motions and faulty postures, we are more susceptible to microtraumas that need to be addressed (Villafañe et al., 2020). Gentle stretching or yoga can benefit improved blood and lymphatic flow, develop body awareness, muscular strength, and flexibility (Mandal et al., 2021; Narahari et al., 2021). Yoga also improves anabolic and metabolic health (Narahari et al., 2021). *Micro-practice*: The Tree yoga pose can be practiced quickly and helps build core strength (Krucoff et al., 2021). To initiate the Tree pose stand with our feet shoulder-width apart, taking a slow deep breath while lifting the hands above our heads towards the sky. At the same time, lift the heels off the floor if comfortable. Hold the position for a few seconds then gently bring our arms back to our side while exhaling deeply. Several excellent free YouTube channels (Yoga with Adriene or YogaTX) exist for nurses interested in beginning yoga practice.

## Conclusion

Globally, nurses are reporting higher stress due to the effects of COVID-19. Due to their unique working requirements in radiology, nurses face unprecedented stress during this period. Unmanaged stress has long-term adverse health effects and affects nurses' job satisfaction, self-esteem, and general well-being. The tangible costs of chronic stress range in the billions of dollars. However, the intangible costs of loss of passion, talent, and nursing knowledge are immeasurable. Although systematic changes and managerial support are critical to nurses' well-being, they cannot help individual responses to daily stressors. Radiology nurses can positively impact their well-being if they practice any of the five micro-practices throughout their day. Consistent self-care practice can lead to positive changes in neurology. Sustained practice of NURSE micropractices can become automatic habits which reduce stress and improve overall health. These self-care habits can then have ripple effects and can carry well-being from radiology nurses to their interdisciplinary colleagues, patients, and to the larger healthcare community.

## CRedit authorship contribution statement

**Jyoti Valluri**: Conceptualization, Methodology, Writing – original draft. **Karen L. Gorton**: Conceptualization, Methodology, Writing – review & editing.

## References

- Aguilar-Raab, C., Jarczok, M.N., Warth, M., Stoffel, M., Winter, F., Tieck, M., et al. (2018). Enhancing social interaction in depression (SIDE study): protocol of a randomized controlled trial on the effects of a cognitively based compassion training (CBCT) for couples. *British Medical Journal Open*, 8(9), e020448. <https://doi.org/10.1136/bmjopen-2017-020448>.
- Alhawatemeh, H.N., Rababa, M., Alfaqih, M., Albataineh, R., Hweidi, I., & Abu Awwad, A. (2022). The benefits of mindfulness meditation on trait mindfulness, perceived stress, cortisol, and c-reactive protein in nursing students: a randomized controlled trial. *Advances in Medical Education and Practice*, 13, 47–58. <https://doi.org/10.2147/AMEP.S348062>.
- Andersen, L.L., Skovlund, S.V., Vinstrup, J., Geisler, N., Sørensen, S.I., Thorsen, S.V., et al. (2022). Potential of micro-exercise to prevent long-term sickness absence in the general working population: prospective cohort study with register follow-up. *Scientific Reports*, 12(1), 2280. <https://doi.org/10.1038/s41598-022-06283-8>.
- Ayyala, R.S., Taylor, G.A., & Callahan, M.J. (2020). Stresses and anxieties in the time of the COVID-19 pandemic - what we can learn. *Pediatric Radiology*, 50(8), 1052–1054. <https://doi.org/10.1007/s00247-020-04727-9>.
- Bakhamis, L., Paul, D.P., 3rd, Smith, H., & Coustasse, A. (2019). Still an epidemic: the burnout syndrome in hospital registered nurses. *The Health Care Manager*, 38(1), 3–10. <https://doi.org/10.1097/HCM.0000000000000243>.
- Bakker, A.B., Hetland, J., Olsen, O.K., & Espevik, R. (2019). Daily strengths use and employee well-being: the moderating role of personality. *Journal of Occupational and Organizational Psychology*, 92(1), 144–168. <https://doi.org/10.1111/joop.12243>.
- Batala, V., Barrameda, A., Basal, J., Bathan, A., Bautista, J., Rebueno, M., et al. (2019). Moderating effect of occupational stress on spirituality and depression of registered nurses in tertiary hospital: A structural equation model. *Journal of Advanced Nursing*, 75(4), 772–782. <https://doi.org/10.1111/jan.13856>.
- Blevins, S.J. (1994). The role of the radiology nurse. *Radiology Management*, 16(4), 46–48.
- Bottaccioli, A.G., Bottaccioli, F., & Minelli, A. (2019). Stress and the psyche-brain-immune network in psychiatric diseases based on psychoneuroendocrinology: a concise review. *Annals of the New York Academy of Sciences*, 1437(1), 31–42. <https://doi.org/10.1111/nyas.13728>.
- Chesak, S.S., Cutshall, S.M., Bowe, C.L., Montanari, K.M., & Bhagra, A. (2019). Stress management interventions for nurses: Critical literature review. *Journal of Holistic Nursing*, 37(3), 288–295. <https://doi.org/10.1177/0898010119842693>.
- Couper, K., Murrells, T., Sanders, J., Anderson, J.E., Blake, H., Kelly, D., et al. (2022). The impact of COVID-19 on the wellbeing of the UK nursing and midwifery workforce during the first pandemic wave: A longitudinal survey study. *International Journal of Nursing Studies*, 127, 104155. <https://doi.org/10.1016/j.ijnurstu.2021.104155>.
- Covey, S.R. (2020). *The 7 Habits of Highly Effective People*. New York: Simon & Schuster.
- Coyne, L.W., Gould, E.R., Grimaldi, M., Wilson, K.G., Baffuto, G., & Biglan, A. (2020). First things first: Parent psychological flexibility and self-compassion during COVID-19. *Behavior Analysis in Practice*, 14(4), 1092–1098. <https://doi.org/10.1007/s40617-020-00435-w>.
- Crane, P.J., & Ward, S.F. (2016). Self-healing and self-care for nurses. *Association of Perioperative Registered Nurses Journal*, 104(5), 386–400. <https://doi.org/10.1016/j.aorn.2016.09.007>.
- Deng, G. (2019). Integrative medicine therapies for pain management in cancer patients. *Cancer Journal (Sudbury, Mass.)*, 25(5), 343–348. <https://doi.org/10.1097/PP0.0000000000000399>.
- Denyes, M.J., Orem, D.E., & Bekel, G. (2001). Self-care: A foundational science. *Nursing Science Quarterly*, 14(1), 48–54.
- Drigas, A., & Mitsea, E. (2021). Metacognition, stress-relaxation balance & related hormones. *International Journal of Recent Contributions Engineering, Science, and Information Technology*, 9(1), 4–16.
- Dyrbye, L.N., Shanafelt, T.D., Johnson, P.O., Johnson, L.A., Satele, D., & West, C.P. (2019). A cross-sectional study exploring the relationship between burnout, absenteeism, and job performance among American nurses. *BMC Nursing*, 18, 57. <https://doi.org/10.1186/s12912-019-0382-7>.
- Fessell, D., & Cherniss, C. (2020). Coronavirus disease 2019 (COVID-19) and beyond: micro-practices for burnout prevention and emotional wellness. *Journal of the American College of Radiology*, 17(6), 746–748. <https://doi.org/10.1016/j.jacr.2020.03.013>.
- Giannakakis, G., Grigoriadis, D., Giannakaki, K., Simantiraki, O., Rionotis, A., & Tsiknakis, M. (2019). Review on psychological stress detection using bio signals. *Institute of Electrical and Electronics Engineers (IEEE) Transactions on Affective Computing*, 13(1), 440–460.
- Goodman, A., & Howard, J.S. (2022). Mindfulness matters: Use and perceptions of mindfulness practices among athletic trainers. *Journal of Athletic Training*, 57(3), 264–274. <https://doi.org/10.4085/698-20>.
- Hardy, J., Comoutos, N., & Hatzigeorgiadis, A. (2018). Reflections on the maturing research literature of self-talk in sport: Contextualizing the special issue. *The Sport Psychologist*, 32(1), 1.
- Hooley, J.M., Franklin, J.C., & Nock, M.K. (2014). Chronic pain and suicide: understanding the association. *Current Pain and Headache Reports*, 18(8), 435. <https://doi.org/10.1007/s11916-014-0435-2>.
- Huang, L., Wang, Y., Liu, J., Ye, P., Cheng, B., Xu, H., et al. (2020). Factors associated with resilience among medical staff in radiology departments during the outbreak of 2019 novel Coronavirus disease (COVID-19): A cross-sectional study. *Medical Science Monitor: International Medical Journal of Experimental and Clinical Research*, 26, e925669. <https://doi.org/10.12659/MSM.925669>.
- Ivey, M. (2015). Substance abuse among nurses. *Kentucky Nurse*, 63(4), 8–10.
- Jackson, P.A., Sirgy, M.J., & Medley, G.D. (2021). Neurobiology of well-being. In *Research Anthology on Mental Health Stigma, Education, and Treatment* (pp. 32–52). Hershey, PA: IGI Global.
- Jordan, T.R., Khubchandani, J., & Wiblishauser, M. (2016). The impact of perceived stress and coping adequacy on the health of nurses: A pilot investigation. *Nursing Research and Practice*, 2016, 5843256. <https://doi.org/10.1155/2016/5843256>.
- Jun, J., Ojemeni, M.M., Kalamani, R., Tong, J., & Crecelius, M.L. (2021). Relationship between nurse burnout, patient, and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, 119, 103933. <https://doi.org/10.1016/j.ijnurstu.2021.103933>.
- Kelly, C., Barattucci, M., & Shakil Ahmad, M. (2022). Job satisfaction as a mediator between structural empowerment and intent-to-leave: A study of critical care nurses. *Intensive & Critical Care Nursing*, 70, 103194. <https://doi.org/10.1016/j.iccn.2021.103194>.

- Kelly, L.A., Gee, P.M., & Butler, R.J. (2021). Impact of nurse burnout on organizational and position turnover. *Nursing Outlook*, 69(1), 96–102. <https://doi.org/10.1016/j.outlook.2020.06.008>.
- Krucoff, C., Carson, K., & Krucoff, M. (2021). Relax into yoga for seniors: An evidence-informed update for enhancing yoga practice benefits by reducing risk in a uniquely vulnerable age group. *Open BioMedical Publishing Corporation (OBM) Geriatrics*, 5(1), 1. <https://doi.org/10.21926/obm.geriatr.2101150>.
- Laker, E.S. (2022). Nurses need more than self-care. *The American Journal of Nursing*, 122(6), 11. <https://doi.org/10.1097/01.NAJ.0000833848.85402.50>.
- Lockhart, L. (2020). Strategies to reduce nursing turnover. *Nursing Made Incredibly Easy*, 18(2), 56. <https://doi.org/10.1097/01.NME.0000653196.16629.2e>.
- Mandal, S., Misra, P., Sharma, G., Sagar, R., Kant, S., Dwivedi, S.N., et al. (2021). Effect of structured yoga program on stress and professional quality of life among nursing staff in a tertiary care hospital of delhi-A small scale phase-II trial. *Journal of Evidence-Based Integrative Medicine*, 26. <https://doi.org/10.1177/2515690X21991998>, 2515690X21991998.
- McEwen, B.S., Gray, J., & Nasca, C. (2015). Recognizing resilience: Learning from the effects of stress on the brain. *Neurobiology of Stress*, 1, 1–11. <https://doi.org/10.1016/j.yinstr.2014.09.001>.
- Melnyk, B.M., Orsolini, L., Tan, A., Arslanian-Engoren, C., Melkus, G.D., Dunbar-Jacob, J., et al. (2018). A national study links nurses' physical and mental health to medical errors and perceived worksite wellness. *Journal of Occupational and Environmental Medicine*, 60(2), 126–131. <https://doi.org/10.1097/JOM.0000000000001198>.
- Morera, L.P., Gallea, J.I., Trógolo, M.A., Guido, M.E., & Medrano, L.A. (2020). From work well-being to burnout: A hypothetical phase model. *Frontiers in Neuroscience*, 14, 360. <https://doi.org/10.3389/fnins.2020.00360>.
- Nabizadeh-Gharghozar, Z., Adib-Hajbaghery, M., & Bolandianbafghi, S. (2020). Nurses' job burnout: A hybrid concept analysis. *Journal of Caring Sciences*, 9(3), 154–161. <https://doi.org/10.34172/jcs.2020.023>.
- Narahari, S.R., Aggithaya, M.G., & Ryan, T.J. (2021). Advances in understanding the use of yoga as therapy in lymphedema. In S. Telles, & R. Gupta (Eds.), *Handbook of research on evidence-based perspectives on the psychophysiology of yoga and its applications* (pp. 263–282). Hershey, PA: IGI Global.
- Neff, K., & Germer, C. (2018). *The Mindful Self-Compassion Workbook: A Proven Way to Accept Yourself, Build Inner Strength, and Thrive*. New York, NY: Guilford Publications.
- Neff, K.D., Knox, M.C., Long, P., & Gregory, K. (2020). Caring for others without losing yourself: An adaptation of the Mindful Self-Compassion Program for healthcare communities. *Journal of Clinical Psychology*, 76(9), 1543–1562. <https://doi.org/10.1002/jclp.23007>.
- Onieva-Zafra, M.D., Fernández-Muñoz, J.J., Fernández-Martínez, E., García-Sánchez, F.J., Abreu-Sánchez, A., & Parra-Fernández, M.L. (2020). Anxiety, perceived stress, and coping strategies in nursing students: a cross-sectional, correlational, descriptive study. *BMC medical education*, 20(1), 370. <https://doi.org/10.1186/s12909-020-02294-z>.
- Ortiz, J.B., & Conrad, C.D. (2018). The impact from the aftermath of chronic stress on hippocampal structure and function: Is there a recovery? *Frontiers in Neuroendocrinology*, 49, 114–123. <https://doi.org/10.1016/j.yfrne.2018.02.005>.
- Owens, R.A., Alfes, C., Evans, S., Wyka, K., & Fitzpatrick, J.J. (2020). An exploratory study of a 3-minute mindfulness intervention on compassion fatigue in nurses. *Holistic Nursing Practice*, 34(5), 274–281.
- Park, S.H., Lim, B.S., & Lim, S.T. (2020). The effects of self-talk on shooting athletes' motivation. *Journal of Sports Science & Medicine*, 19(3), 517–521.
- Pascoe, M.C., Thompson, D.R., Jenkins, Z.M., & Ski, C.F. (2017). Mindfulness mediates the physiological markers of stress: Systematic review and meta-analysis. *Journal of Psychiatric Research*, 95, 156–178. <https://doi.org/10.1016/j.jpsychores.2017.08.004>.
- Quaedflieg, C., & Schwabe, L. (2018). Memory dynamics under stress. *Memory (Hove, England)*, 26(3), 364–376. <https://doi.org/10.1080/09658211.2017.1338299>.
- Quarshie, E.N., Cheataa-Plange, H.V., Annor, F., Asare-Doku, W., & Lartey, J. (2019). Prevalence of suicidal behaviour among nursing and midwifery college students in Ghana. *Nursing Open*, 6(3), 897–906. <https://doi.org/10.1002/nop.2.271>.
- Riegel, B., Dunbar, S.B., Fitzsimons, D., Freedland, K.E., Lee, C.S., Middleton, S., et al. (2021). Self-care research: Where are we now? Where are we going? *International Journal of Nursing Studies*, 116, 103402. <https://doi.org/10.1016/j.ijnurstu.2019.103402>.
- Ross, A., Bevans, M., Brooks, A.T., Gibbons, S., & Wallen, G.R. (2017). Nurses and health-promoting behaviors: Knowledge may not translate into self-care. *Association of periOperative Registered Nurses Journal*, 105(3), 267–275. <https://doi.org/10.1016/j.aorn.2016.12.018>.
- Sapolsky, R.M. (2004). *Why Zebras don't get Ulcers: The Acclaimed Guide to Stress, Stress-Related Diseases, and Coping* (3rd ed.). New York, NY: Henry Holt.
- Schug, C., Geiser, F., Hiebel, N., Beschoner, P., Jerg-Bretzke, L., Albus, C., et al. (2022). Sick leave and intention to quit the job among nursing staff in German Hospitals during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19(4), 1947. <https://doi.org/10.3390/ijerph19041947>.
- Seligman, M.E.P. (2002). Positive psychology, positive prevention, and positive therapy. In C.R. Snyder, & S.J. Lopez (Eds.), *Handbook of Positive Psychology* (pp. 3–9). London: Oxford University Press.
- Shaffer, F.A., & Curtin, L. (2020). Nurse turnover: Understand it, reduce it. *My American Nurse*, 15(8), 57–59.
- Sitzman, K., & Craven, I. Caring during COVID-19. [www.myamericannurse.com](https://www.myamericannurse.com/caring-during-covid19/). <https://www.myamericannurse.com/caring-during-covid19/>. Accessed February 21, 2021.
- Sitzman, K. (2022). Self-care as a catalyst for authentic caring. *International Journal for Human Caring*, 1–2. <https://doi.org/10.1891/IJHC-2021-0028>.
- Sitzman, K., & Watson, J. (2018). *Caring Science, Mindful Practice: Implementing Watson's Human Caring Theory*. New York, NY: Springer Publishing Company.
- Specht, K., Primdahl, J., Jensen, H.I., Elkjær, M., Hoffmann, E., Boye, L.K., et al. (2021). Frontline nurses' experiences of working in a COVID-19 ward—A qualitative study. *Nursing Open*, 8(6), 3006–3015. <https://doi.org/10.1002/nop2.1013>.
- Tabibnia, G., & Radecki, D. (2018). Resilience training that can change the brain. *Consulting Psychology Journal: Practice and Research*, 70(1), 59–88. <https://doi.org/10.1037/cpb0000110>.
- Tang, Y.Y., Hölzel, B.K., & Posner, M.I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, 16(4), 213–225. <https://doi.org/10.1038/nrn3916>.
- Taylor-Clark, T.M., Swiger, P.A., Anusiewicz, C.V., Loan, L.A., Olds, D.M., Breckenridge-Sproat, S.T., et al. (2022). Identifying potentially preventable reasons nurses intend to leave a job. *The Journal of Nursing Administration*, 52(2), 73–80. <https://doi.org/10.1097/NNA.0000000000001106>.
- The American Institute of Stress Workplace stress. [stress.org](https://www.stress.org/workplace-stress). <https://www.stress.org/workplace-stress>. Accessed April 22, 2022.
- Villafañe, J.H., Pedersini, P., Bertozzi, L., Drago, L., Fernandez-Carnero, J., Bishop, M.D., et al. (2020). Exploring the relationship between chronic pain and cortisol levels in subjects with osteoarthritis: results from a systematic review of the literature. *Osteoarthritis and Cartilage*, 28(5), 572–580. <https://doi.org/10.1016/j.joca.2020.02.836>.
- Walter, N., Nikoleizig, L., & Afermann, D. (2019). Effects of self-talk training on competitive anxiety, self-efficacy, volitional skills, and performance: An intervention study with junior sub-elite athletes. *Sports (Basel, Switzerland)*, 7(6), 148. <https://doi.org/10.3390/sports7060148>.
- Wei, H., Roberts, P., Strickler, J., & Corbett, R.W. (2019). Nurse leaders' strategies to foster nurse resilience. *Journal of Nursing Management*, 27(4), 681–687. <https://doi.org/10.1111/jonm.12736>.
- Werthman, J.A., Dietrich, M.S., Maxwell, C.A., Jordan, L.M., & Minnick, A.F. (2020). The administration of moderate sedation and the role of the radiology nurse. *Journal of Radiology Nursing*, 39(2), 92–98. <https://doi.org/10.1016/j.jradnu.2019.12.009>.
- Williams, S.G., Fruh, S., Barinas, J.L., & Graves, R.J. (2022). Self-care in nurses. *Journal of Radiology Nursing*, 41(1), 22–27. <https://doi.org/10.1016/j.jradnu.2021.11.001>.
- World Health Organization. (2020) State of the world's nursing 2020: investing in education, jobs, and leadership (2020). WHO Director-General's opening remarks at the media briefing on COVID-19. <https://www.who.int/docs/default-source/coronaviruse/situation-reports/20201012-weekly-epi-update-9.pdf>. Accessed October 11, 2020.
- Wu, R., Liu, L.L., Zhu, H., Su, W.J., Cao, Z.Y., Zhong, S.Y., et al. (2019). Brief mindfulness meditation improves emotion processing. *Frontiers in Neuroscience*, 13, 1074. <https://doi.org/10.3389/fnins.2019.01074>.
- Yao, Y., Zhao, S., Gao, X., An, Z., Wang, S., Li, H., et al. (2018). General self-efficacy modifies the effect of stress on burnout in nurses with different personality types. *BioMed Central Health Services Research*, 18(1), 667. <https://doi.org/10.1186/s12913-018-3478-y>.
- Yuliana, Y. (2021). Amygdala changes through breathing exercise in coping with the COVID-19 pandemic. *International Journal on Research in STEM Education*, 3(1), 07–16. <https://doi.org/10.31098/ijrse.v3i1.457>.