Peer Review File

Article Information: https://dx.doi.org/10.21037/apm-22-916

Reviewer A

Millis et al have constructed an important and interesting qualitative study to study the phenomenon of moral distress amongst surgeons. The author point out that moral distress is an important concept that has been established in the literature, but has not adequately differentiated the special role that surgeons and the surgeon-patient relationship play in this phenomenon.

The authors, very wisely, utilize a clear and reasonable definition for moral distress. (Many articles on this subject make the mistake of using more ambiguous definitions, or failing to explicitly state a definition at all).

The authors employ an established qualitative methodology (mixed method meta-synthesis) to a dataset they constructed from selection of published articles that were collected using a reasonably exhaustive search and acceptable exclusion/inclusion criteria.

Comment 1: The authors identify the model they used for the subsequent thematic analysis and summary (Social Ecological Model), but do not provide much more detail then to describe its basic characteristics. An additional sentence or two added to last paragraph in the Introduction and/or to the last paragraph in the Methods section (under the Data-analysis sub-section) to explain why they decided that that model was the best to apply for the purposes of this particular research (differentiating moral distress of surgeons from a pool of undifferentiated literature on the subject) would help to strengthen this article.

Reply 1: We thank the reviewer for their encouraging thoughts about the importance of this topic and their suggestion that we further clarify why we selected the SEM in this review. We agree that insufficient justification was provided for why we selected the SEM for use in this analysis. The SEM captures factors that drive moral distress at multiple levels. Additionally, the model allows drivers of distress to be applied at the individual surgeon level, and to the surgeon cohort as a whole. We added the following summary.

Changes in the text: The SEM is a conceptual framework introduced in the 1970s to facilitate the understanding of human development. The model has previously been used to better understand patient health-related behaviors and the process of forming individual surgeon identity (21-23). The SEM posits that personal development and subsequent behavior is a function of individual, interpersonal, environmental, community and policy factors. The SEM enables us to examine how particular factors, and the interplay between factors, influence the formation of moral distress in individual surgeons while identifying shared factors that all surgeons experience.

Comment 2: The strongest aspect of this very interesting and important paper is the Discussion, which is extensive, honest, well-organized and well-written and supports the assertion that the moral distress of surgeons is probably distinct and this finding suggests several other important questions that are both interesting and important.

Excellent paper. I really enjoyed reading it and hope that there is more to come from this group.

Reply 2: Thank you again for your review and insightful comments.

Changes in the text: N/A

Reviewer B

Studying different forms of moral suffering in surgeons is necessary work to strengthen the workforce and improve patient care. The manuscript is well-organized and the SEM model is an excellent fit to describe the data.

My general/conceptual recommendations are as follows:

Comment 3: Overall the manuscript could use some editing to remove passive language and increase specificity.

Reply 3: Thank you for your comment. We agree that passive language and greater

specificity are needed throughout the text. As such we have made these edits throughout the text.

Changes in the text: Throughout revised manuscript and denoted by "track changes" as requested by publisher. .

Comment 4: In the conceptual model I believe something is missing between the workplace stressor and burnout/moral distress/moral injury. There are the arrows on top representing protective factors, but it's not clear how these protective factors relate to the rest of the model.

All healthcare professionals are exposed to workplace stressors, yet not all healthcare professionals experience burnout or moral injury. Is the theory here that this is because of protective factors?

I'm thinking of Rushton's definition of moral resilience "the capacity of an individual to sustain or restore their integrity in response to moral adversity." Would you describe this as a protective factor in your model? Rushton and colleagues have shown that resilience is linked to decreased burnout among healthcare professionals (including, but not limited to surgeons). It seems like coping - or the lack thereof - occurs in between the workplace stressor and the occurrence of burnout, moral distress, and/or moral injury, just as it occurs after. Do you think it would be possible to further explain the role of the protective factors?

Reply 4: We agree that all healthcare providers are exposed to stressors. Whether those stressors manifest in burnout, moral distress or injury depends on the mix of risk and protective factors that an individual inherently has, or has acquired through life experience. If an individual has sufficient "protective" attributes, it is possible that they may experience an occupational stressor and sufficiently cope with this encounter without having experienced burnout, distress or injury.

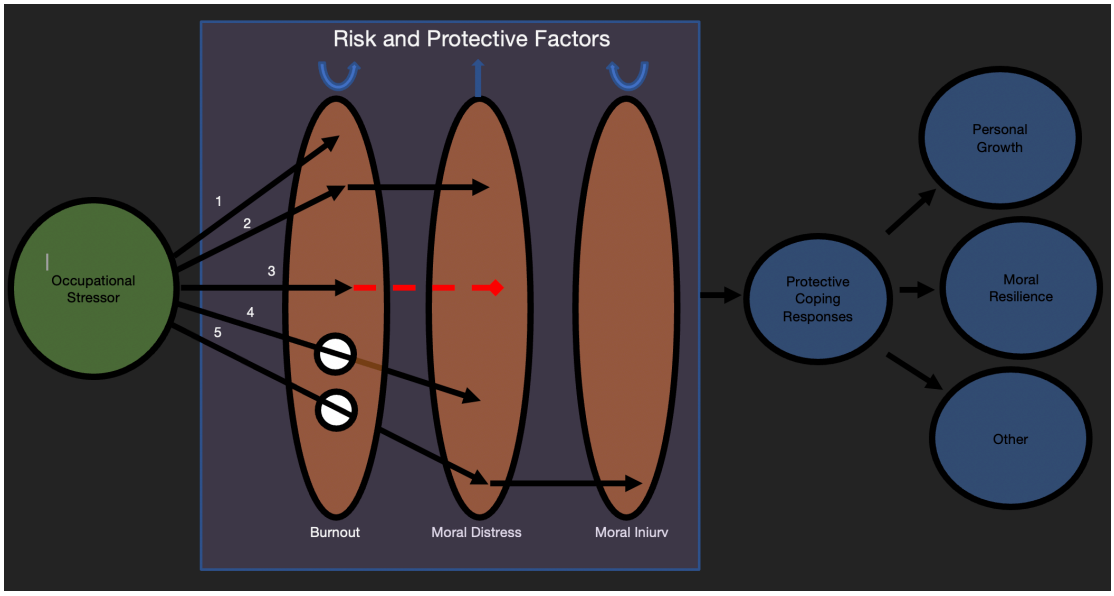
With respect to Rushton's definition of moral resilience, we believe an individual's restoration of integrity following moral adversity is a unique form of personal growth that best fits as its own protective coping response. It is very possible that personal growth, moral resilience or other introspective, reflective responses to a stressor may serve as protective risk factors going forward.

We understand the reviewers belief that coping may also fit between the stressor and the occurrence of burnout, distress, and injury. However, the presence or absence of protective coping responses fits within the umbrella of "Risk and Protective Factors" that facilitate or prevent burnout, distress and injury from occurring. If an individual can cope, they may not manifest a response to the stressor, if they cannot cope, they may have a response. By emphasizing that protective factors include those that may come from coping responses, we do not believe an additional coping token is necessary in the figure. However, we did modify the existing coping token to state "protective coping responses", in order to emphasize that this response plays into the protective factors and individual possesses.

Recognizing that moral resilience is an introspective, post hoc process following moral injurious stressors, we have included it among our coping responses. We have also altered the text to embrace that coping may, or may not occur. Figure 1 has been modified, explicitly showing "protective coping responses" and "moral resilience"

Changes in the text: These factors result from prior life experiences, including previous exposure to stressors and the introspective reflection individuals may experience in the coping process following burnout, moral distress and moral injury. Coping may manifest in various positive ways, including but not limited to discovering enlightenment and personal growth, avoidance of future stressors, or development of moral resilience. Alternatively, individuals may fail to cope and reflect, putting them at risk of experiencing burnout, distress and injury from future stressors, or developing ambivalence toward their experiences. This coping process has previously been described as an intellectual response to a stressor (42). Suppose an individual intrinsically possesses sufficient protective factors or has acquired these through the process of prior coping responses. In that case, they may never experience burnout, distress or injury following exposure to a stressor.

Figure 2 was modified to include Moral Resilience.



Comment 5: One of the main critiques of the moral injury literature in healthcare is that it has tended to focus too heavily on the individual, and places the burden of change on the individual

rather than also including organizational factors. The authors did a nice job in this article of pointing out that addressing moral distress in surgeons cannot be placed solely on the individual, but also must include organizational and political intervention.

The authors also point out promising areas for intervention on the individual/team level staring on line 334, but then seem to say that they don't believe these would be effective in the paragraph that starts on line 353. I was wondering if the authors think it's possible these are both promising directions, or do they believe future interventions should be exclusively organizational/political? A community of ethical practice is dependent on the individual and the organization.

Reply 5: Thank you for your comment. Mitigating moral distress requires action on several fronts. We agree that approaching distress at an individual level is important. However, research by Fainstad et al. and Zimmerman et al. suggest that individual level interventions aimed at reducing moral distress are not yet effective. We are optimistic that, as research in this field grows, and the drivers of moral distress in surgeons are discovered, better directed interventions will be created to address moral distress at the individual level. In the meantime, we believe interventions at the organizational level may be worth investigating, as these have shown to be beneficial in the burnout literature.

Changes in the text (Page 17 Line 509): Early work assessing the impact of interventions on moral distress at the individual level has yet to show a statistically significant impact (9,43). While such individual-level interventions are critical to mitigating moral distress, investigators might consider drawing from "burnout" literature, which has demonstrated that interventions to reduce rates of burnout are most successful when directed by the organization rather than individual-level interventions (44-46).

Comment 6: My further comments are as follows, arranged by line number.

Reply 6: Thank you for your detailed review. We have made changes accordingly.

42: The PRISMA acronym is used before it is delineated in line 45.

Changes in the text (Page 2, Line 49): Using the systematic review guidelines established by Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA), relevant articles were identified in EBSCOhost PsycINFO, Elsevier EMBASE, Ovid MEDLINE, and Wiley Cochrane Central Register of Controlled Trials Library from January 1, 2009 to September 29, 2022.

53: The manuscript states a "magnitude of instruments" but later the manuscript says there were 21. In general, I think that specificity is best.

Changes in the text (Page 2, Line 58): Of these, 10 focused only on surgeons. Our analysis revealed numerous definitions of moral distress and 25 instruments used to understand the sources of distress.

75: There is a reference to surgeons' unique role in caring for patients, but this isn't really delineated until line 337. I think it would help the reader to state up front exactly what it is about the surgeon-patient relationship that is unique.

Changes in the text (Page 3, Line 101): Surgeons may be particularly vulnerable to moral distress given their unique relationship with patients, which requires healing through harm, embracing a high degree of accountability for their actions, and forming a profoundly intimate and physical connection with patients.

77: This example is confusing. Is the patient terminally ill because of surgery complications? Then in the next sentence there is a claim that these types of situations lead to cynicism, anger, burnout, mental health issues, and attrition, but there's not a citation.

Reply: With the inclusion of the unique attributes inherent between the surgeon and patient, we agree that this example and the sentence following it may be confusing to the reader. These two sentences have therefore been removed from the text.

87: Citations 1-9 are cited in the introduction, and then the methods section picks up with citation 22. I'm assuming the numbering will be fixed in the editing process, but I wanted to mention this just in case. Citations 10-21 aren't cited until line 381.

Reply: Thank you for identifying this error. We have since corrected this.

88: I'm not sure what you mean when you say that surgeons have accountability over patients. Maybe there's a different way to phrase this?

Reply: Perhaps responsibility is a more appropriate term here. The intent is to emphasize that surgery, compared to other disciplines of medicine, has a unique culture of responsibility (or accountability for actions) toward their patients. This unique culture is evidenced weekly at surgical M&M conferences, which most medicine specialties do not conduct.

Changes in the text (Page 3, Line 109): The invasive nature of a surgeon's craft and the responsibility surgeons have over patients place this group at unique risk for moral distress.

90: There is a statement that existing studies have shown moral distress is present in surgeons, but there is no specificity. It would help a lot to report the levels of moral distress that have been found in surgeons? Is it 5%? 95%?

Changes in the text (Page 3, Line 111): . The few studies assessing surgeons reveal variability in the prevalence of moral distress. Maftei et al. recently reported moral distress was present among 48% of neurosurgeons in their study(10). However, other studies show variability in the prevalence of distress among surgeons and it is unclear how burdensome the distress is in this cohort compared to other healthcare professionals (7,8).

102: There is a statement that a better understanding of moral distress could lead to intervention development to better "protect surgeons and the profession of surgery." The first thought I had was to protect them from what? Why do surgeons need protecting? I think this could be strengthened by being more specific, such as "to prevent moral injury," "promote moral well-being," or "promote better patient outcomes," for example.

Changes in the text (Page 4, Line 143): Here, a summative understanding of the complex interplay of factors at the SEM levels (e.g., individual, interpersonal, environmental, community, and policy) help facilitate a detailed investigation into this critical problem and may potentially facilitate targeted interventions that protect surgeons from psychological harm and promote better patient outcomes.

150: It is stated that no articles exhibited "major issues" in methodologic quality. This is vague claim, and I think the authors should expand a little more here.

Changes in the text (Page 7, Line 215): No study deviated from these established methodologic quality metrics.

153: Thorough description of data analysis – very nice!

Reply: Thank you for your comment. We strongly believe in the ability of others to reproduce our findings and hope that this is conveyed in our Methods section.

179: It's an important critique to note that several studies did not define moral distress. This is a good thing to point out.

Reply: Just to reiterate your comment, this is mentioned at the end of the first paragraph in the results section "Several studies discussing moral distress did not include any explicit definition of moral distress"

189: Once again I would encourage specificity here. Rather than saying "commonly considered" it would be more precise to say "Individual factors were considered in 14 articles."

Changes in the text (Page 9, Line 271): In 19 articles, individual factors were considered in relation to their association with moral distress among surgeons

203: I would be curious to hear a little bit more about the perceived knowledge deficit. Is this related to their ability to perform surgery?

Changes in the text (Page 10, Line 289): Other individual factors included the perception of a knowledge deficit about disease processes or how to conduct an operation (3,5,27,34) and concerns of spreading infection to self/other patients/family (e.g., COVID-19) (2,27,32).

236: I'd encourage the authors to use person-centered language here and say "patients in a critical care setting" rather than "critical care patients."

Changes in the text (Page 11, Line 326): They also report higher rates of moral distress among surgeons whose patient census contained more patients in a critical care setting compared to surgeons who did not

Reviewer C

Comment 7: I usually deliver major criticism reviewing manuscripts, but regarding your manuscript I am just impressed! It is rigorous, structured and well-written. Furthermore, it deals with an important issue, knowledge about moral distress and surgeons is indeed needed!

I share your reflections of the complexity of definitions of moral distress and agree with your result: "numerous definitions of moral distress and a multitude of instruments used to understand the sources of distress" and the conclusion of "confounded by various definitions of moral distress, multiple measurement tools, and frequently conflated terms of moral distress, moral injury, and burnout". This is in line with our findings in our study about Covid-staffs' experiences of moral distress and anxiety: "Stress was described differently and varied between and within the two open-ended questions 'Please, describe something you were anxious about' and 'Please describe one or more situations where you felt moral stress'. We interpreted several responses about anxiety instead as descriptions of moral stress/distress in concern of patients/family. In a similar manner, several responses to the question about moral stress were interpreted as rather being related to anxiety and exhausting distress as self-concern in an uncontrollable work situation. Respondents described that the respondents interpreted this stress as either a concern for others or a self-concern". We concluded that a broader definition is needed and how ethics and psychology is intertwined. Svantesson et. al. Moral and exhausting distress working in the frontline of COVID-19. 2022 BMJ Open.

I am impressed of your stringent methodology, particularly your choice of mixed-methods meta-synthesis and the Social Ecological Model in analysis.

Reply 7: Thank you for your comments. We very much appreciate your expertise in this subject matter and read your study with great interest. We too hope that as greater attention is being made to distress among healthcare workers, efforts to explore the interplay of ethics and psychology within this space are needed.

Comment 8: I have only one question about your search terms. They seem adequate and I agree with including moral injury and damage.

But how have you reasoned not including 'ethics' and 'ethical'? My moral distress doctoral student tested your search terms (surgeon, surgery, moral, distress, stress, damage, injury, harm) in combination with clinical ethics, ethical, moral resilience and ethcial challenge. She found for instance these:

Moral Distress and Moral Injury Among Attending Neurosurgeons: A National Survey - PubMed (nih.gov)

Surgeons, Ethics, and COVID-19: Early Lessons Learned - PMC (nih.gov)

Response 8: Again, we thank the reviewer for their generous praise of our study and reiterating the need to assess moral distress among surgeons. We concur that including ethics and ethical within our search criteria is of value to capture any other relevant studies. Our research librarian has revised the search terms to include "ethics" and "ethical," and updated our search through September 29, 2022. Our updated search identified four additional articles for full review, including that by Mackel et al addressing moral distress among neurosurgeons. Angelos' article "Surgeons, Ethics, and Covid 19: Early Lessons Learned" was not included, as this did not contain primary data.

Changes in the text: In the third phase (in-depth review), we excluded an additional 23 articles and then performed a hand-search of the references from the 19 remaining articles, which yielded a total of 22 articles for full review. Finally, we included the search terms "ethics" and "ethical" to our searches based on expert review and performed an updated search (September 29, 2022), which yielded an additional four articles for full review (Figure 1).

The PRISMA diagram and Supplement 1 were appropriately updated

Mackel et al.	173 neurosurgeons	Cross-sectional	47.7% reported significant moral distress in the past year with the most common cause originating from managing critical patients lacking a clear treatment plan and the most intense cause being from families pressuring surgeons to perform futile surgery. Moral distress led to 10% of surgeons leaving a position and 26.6% contemplating doing so.	x	x			
Arslan et al.	190 members of the International Pediatric Transplant Association	Cross sectional	Among the 190 professionals working in pediatric transplantation, 38% respondents experienced ethical issues. Surgeons, relative to physicians, were more likely to encounter ethical issues. European clinicians were more likely to experience ethical issues compared to North American clinicians. Ethical issues most commonly were associated with psychosocial evaluation and donor follow up care.		x	x	x	
Fainstad et al.	101 female residents, 18 of which were from surgical subspecialities	Randomized clinical trial. Intervention arm offered 6 month coaching program to reduce burnout,	Among the intervention group, emotional exhaustion decreased, impostor syndrome was less frequent, and self-compassion was greater. There was no difference in					

		moral injury and imposter syndrome.	depersonalization, professional accomplishment or moral injury scores.					
Peetz et al.	31 trauma surgeons	Cross-sectional	Many respondents encounter resuscitations where the goal is to preserve the potential for organ transplantation. Notable range in complexity of interventions used in order to preserve organs (from intubation to thoracotomy). Respecting the dying process and future organ quality were most frequent concerns when deciding whether to stop resuscitation.		x	x	x	