PEER REVIEW HISTORY

ARTICLE DETAILS

TITLE (PROVISIONAL)	Burnout, Wellbeing and Defensive Medical Practice amongst Obstetricians and Gynaecologists in the United Kingdom: cross-sectional survey study
AUTHORS	Bourne, Tom; Shah, Harsha; Falconieri, Nora; Timmerman, Dirk; Lees, Christoph; Wright, Alison; Lumsden, Mary Ann; Regan, Lesley; Van Calster, Ben

VERSION 1 – REVIEW

REVIEWER	Dr. Steven G. Gabbe Department of Obstetrics and Gynecology The Ohio State University College of Medicine Columbus, Ohio United States
REVIEW RETURNED	21-May-2019

GENERAL COMMENTS	I wish the authors had also asked the study participants the question posed by Tawfik (reference 48), "Are you concerned you have made any major medical errors in the past 3 months?" The authors should define "secondary hospitals."

REVIEWER	van Pampus OLVG Amsterdam The Netherlands
REVIEW RETURNED	05-Jun-2019

GENERAL COMMENTS	General comments This is well designed survey with interesting results and implications, that once again shows the importance of physician well-being. Not much is known on burn-out among this group in the UK, making this study an addition to what is known. The response rate is high for this kind of research and the amount of respondents is vast. Introduction Page 5, sentence 28: You mention only a few large studies in Europe, however, there is quite a bit more literature on burn-out, adverse events and depression among physicians and ObGyn in Europe. See Ruitenburg BMC Health Serv Res. 2012, Baas, M. BMC Psychiatry 2018. Methods Page 7 , sentence 17: all registered physicians were contacted, however, it is unclear whether registration at RCOG is obligatory or not. If not, this would mean the total response rate is lower and give bias. Please add a phrase to clarify this.

	Discussion: Page 13, sentence 17: a poorer physical well-being is mentioned, however, it is unclear what is meant with physical (cardiovascular?). As far as described in the methods, nothing physical is measured. I would say mental well-being. Also the term psychosocial well-being is somewhat unclear, this implies that the burn-out has an influence on their psychosocial functioning (so on relationships, social life, work-life balance, etc). However this is not measured or explained later in the manuscript? Page 13, sentence 43: how high was the prevalence of suicidal thoughts in that study? Concerning suicidality, I am missing some information and references on completed suicides among doctors. There is literature on this, showing high numbers of completed suicides among physicians. Page 14, sentence 55: this is quite a bold conclusion, something that is very hypothetical. One could also argue that burn-out is less likely to be recognized by these minorities. Page 15, sentence 14: the response rate is high compared to comparable surveys, and thus should not be mentioned as a limitation. Page 15: A limitation of measuring depression and anxiety is that no validated psychometric instruments were used. These complaints were self-reported and this data must be interpreted with caution. Please mention this in this section. Conclusion Page 15, sentence 50: this correlation with substance abuse is not mentioned earlier in the results or discussion. Please remove here or clarify earlier. eFigure 1: I find this figure hard to interpret. This may need some more explanation. Questionnaire: possibly the survey itself could be shared as well, to see all the questions and variables that were measured.

REVIEWER	Shilpa Babbar, MD, MS, FACOG Assistant Professor Saint Louis University USA
REVIEW RETURNED	26-Jun-2019

GENERAL COMMENTS	This large cross-sectional survey study assessed the rate of burnout in OBGYN practitioners in the UK. A burnout rate of 36% was identified amongst over 3000 survey responders; however, a higher rate of 43% was noted amongst trainees. Those who experienced burnout had a higher rate of defensive practice, depression, anxiety and suicidal thoughts. Introduction: 1. In general, I would advise to shorten the introduction, as there appears to be some redundancy in the effects of burnout in the health care system. 2. Paragraph 2: A few other issues with OBGYN in particular that may be worth mentioning are the acuity of the patient care

	specifically in obstetrics and the rapid turnover that occurs. These are two important factors that impact health care providers in this field. 3. Paragraph 2: Discusses the concept and impact of defensive medical practices. Are there any studies in the UK population that assesses the effects of this? Specifically in the OBGYN population? If not, please mention that. Methods 1. The Survey: can you please clarify how the surveys differed based on participant group? 2. Main outcomes and measures: Was there a total MBI or DMP score that was used? Some literature describes a total MBI score utilizing all 3 components. Please describe why a total score was not utilized. Also, there is a degree of burnout on the MBI survey that is defined as low, moderate and high. It's understandable that people with a high score are defined as having burnout, but those in the moderate category are at a higher risk that those with a low score. Please consider providing this breakdown for the MBI survey. 3. Doctor wellbeing: Since this was additional information not included in a validated survey, please describe how these data points collected? Where they yes or no questions? Open-ended? Multiple choice? Results 1. Is the data from the RCOG TEF published? If so, please provide a reference. If not, please clearly state this. 2. Since the data was divided into 3 categories based on level of training, why was the data not compared by these 3 groups? It may be that consultants who have been in practice for a longer time and have experienced negative outcomes are more likely to practice defensive medicine. I would recommend providing p values and comparisons for your data amongst the 3 groups. Discussion 1. The problem of burnout in OBGYN is clearly defined by your paper and others. Please provide a paragraph on ways that burnout can be addressed and mitigated especially in trainees. What can be done to alleviate this problem? Please review this recent publication below: Babbar S, Renner K, Williams K. Addressing Obstetrics and Gynecology Trainee Burnout Using a Yoga-Based Wellness Initiative During Dedicated Education Time. Obstet Gynecol. 2019 May;133(5):994-1001. PubMed PMID: 30969208. Table 1: The mean scores under each MBI category are confusing. Is the reported number the mean score for that category? For EE, the score can be between 0 to 54, with a high scored defined as greater than 27. Was the average score in this category around 2 for each group??

REVIEWER	Francine Hughes, MD Montefiore Medical Center/Albert Einstein College of Medicine USA
REVIEW RETURNED	04-Jul-2019

GENERAL COMMENTS	The authors present the results of a nationwide online cross-sectional survey of burnout and defensive medical practice given

	to over five thousand practicing obstetrician-gynaecologists registered with the Royal College of Obstetricians and Gynaecologists. They found the overall burnout rate to be 36% using the MBI with 43% of trainees reporting burnout. In addition, they found that physicians with burnout were significantly more likely to report practicing defensive medicine. Lastly, young, white or other ethnicity and those with a medical degree from the UK or Ireland were characteristics strongly associated with burnout. Overall the manuscript is clearly written, well-designed and careful not to overstate results give the study design and response rate. The finding of increased defensive practice among physicians with burnout has important implications for medicine as a whole. Comments to the authors: 1. The most striking finding from the study is that the rate of burnout is significantly lower than what has been reported for obstetrician-gynecologists in the United States using the same validated instrument (MBI-HSS). Specialties such as Internal Medicine, Emergency Medicine and Obstetrics & Gynecology have routinely been shown to have burnout rates above 50% as the authors state. While the rate identified here is concerning, it is still at the lower end of the spectrum for U.S physicians in fields such as Pathology and Dermatology. Can the authors comment on why such a difference may have been found? 2. The authors find no differences based on sex but higher rates of burnout among younger physicians and trainees. Can the author comment on why they believe this is the case given that almost 80% of trainees identify as female? What is the significance of a young burned out cohort of physicians for the future? And why did older physicians have higher defensive medicine practices? 3. I personally am not entirely clear about the difference between consultants and SAS. Could the authors clarify these for international readers? 4. In the discussion, page 14, the authors state that older physicians or physicians who stay in medicine may be more resilient and thus have lower burnout scores. The authors might consider other reasons why older physicians may lower burnout in this and other studies. For instance, benefits of higher rank, difference in career expectations and generational differences. 5. The authors report on “parity”. Are they referring to having children? It seems an odd term to use for fatherhood.

REVIEWER	Helen Kang Morgan University of Michigan Medical School, USA
REVIEW RETURNED	17-Jul-2019

GENERAL COMMENTS	This is a comprehensive study of members of the Royal College of OBGYNs examining the association of burnout and defensive practices. This is an important study, and there are multiple strengths to this manuscript. • In the introduction, the authors did a nice job linking their research question to the UK governmental initiative of “The Maternal and Neonatal Health Safety Collaborative” • Large number of participants with an impressive response rate (greater than 50%) for all three subgroups examined • The response rate is especially notable given that the authors used the full 22-item MBI validated measure of burnout • The discussion is a nice summary of the significance of their findings, and there are many notable findings.

	I have minimal concerns with this manuscript, my only question of clarification was that it was unclear whether the defensive medical practice instrument had validity evidence. I suspect that it does not, but this could be clarified and listed as a limitation in the discussion section. Thank you for the opportunity to review this impressive paper.

VERSION 1 – AUTHOR RESPONSE

Comments from Reviewer 1:

1. I wish the authors had also asked the study participants the question posed by Tawfik (reference 48), "Are you concerned you have made any major medical errors in the past 3 months?"

Response: Thank you. Unfortunately we did not include this question when creating the survey but agree that it would have been very interesting to pose. We will keep this in mind for future work in this area.

2. The authors should define "secondary hospitals."

Response: Thank you. We have deleted the word “secondary” and changed it just “hospitals” to avoid any ambiguity. The terms primary and secondary care are quite UK-specific and may be unclear to an international audience.

Comments from Reviewer 2:
This is a well designed survey with interesting results and implications, that once again shows the importance of physician well-being. Not much is known on burn-out among this group in the UK, making this study an addition to what is known. The response rate is high for this kind of research and the amount of respondents is vast.

1. Introduction. Page 5, sentence 28: You mention only a few large studies in Europe, however, there is quite a bit more literature on burn-out, adverse events and depression among physicians and ObGyn in Europe. See Ruitenburg BMC Health Serv Res. 2012, Baas, M. BMC Psychiatry 2018.

Response: Thank you. The highlighted studies certainly support the concern that work-related events and burnout can have significant impact on both work ability and mental health and we have now referenced them in the manuscript.

2. Methods. Page 7, sentence 17: all registered physicians were contacted, however, it is unclear whether registration at RCOG is obligatory or not. If not, this would mean the total response rate is lower and give bias. Please add a phrase to clarify this.

Response: Thank you. All trainees and consultants have to be registered with the RCOG to practice. We have amended the following sentence to clarify this:

‘All consultants..... working in Obstetrics and Gynaecology in the United Kingdom and registered with the Royal College of Obstetricians and Gynaecologists (RCOG) were invited to participate in this study between December 2017 and March 2018. Registration with the RCOG is mandatory.

3. Discussion: Page 13, sentence 17: a poorer physical well-being is mentioned, however, it is unclear what is meant with physical (cardiovascular?). As far as described in the methods, nothing physical is

measured. I would say mental well-being. Also the term psychosocial well-being is somewhat unclear, this implies that the burn-out has an influence on their psychosocial functioning (so on relationships, social life, work-life balance, etc). However this is not measured or explained later in the manuscript?

Response: Thank you. We asked participants to self-report on cardiovascular, gastro-intestinal and respiratory illnesses as well as mental well-being, hence the term physical has been included. We agree that the term psychosocial wellbeing is ambiguous and does not reflect what has been measured. We have amended the text as follows:

'Furthermore, our data suggest that burnout is associated with higher levels of defensive medical practice, and with poorer mental and physical wellbeing.'

4. Page 13, sentence 43: how high was the prevalence of suicidal thoughts in that study? Concerning suicidality, I am missing some information and references on completed suicides among doctors. There is literature on this, showing high numbers of completed suicides among physicians.

Response: Thank you. The prevalence of suicidal thoughts in the referenced study was 6.3%. We have now included the following information to reflect this, and additional information and references on doctor suicide in the discussion:

'Our study reported a particularly strong relationship between burnout and suicidal thoughts; worryingly, suicidal ideation has been shown to be strongly associated with actual suicide attempts and death (56). Furthermore, suicide rates in doctors are known to be much higher than for the general population (57). A study of surgeons in the USA (58) found the prevalence of suicidal ideation in this group to be 6.3%; although this is higher than the prevalence in this study (2.9%), we found the association between burnout and suicidal ideation to be higher in our cohort (odds ratio, 6.37 versus 1.910 (58)). This may reflect a vulnerability amongst doctors working in O&G compared to other specialties (28, 29) or the differences in healthcare services and culture internationally.'

56. Chu C, Buchman-Schmitt JM, Stanley IH, Hom MA, Tucker RP, Hagan CR, et al. The interpersonal theory of suicide: A systematic review and meta-analysis of a decade of cross-national research. Psychol Bull. 2017;143(12):1313-45.
57. Schernhammer ES, Colditz GA. Suicide rates among physicians: a quantitative and gender assessment (meta-analysis). Am J Psychiatry. 2004;161(12):2295-302.

We have had to balance expanding on this theme with keeping within a reasonable word count for the journal.

5. Page 14, sentence 55: this is quite a bold conclusion, something that is very hypothetical. One could also argue that burnout is less likely to be recognized by these minorities.

Response: Thank you. We have amended the text to reflect that this is hypothetical, it now reads:

'Similar findings have been reported in studies of trainees and medical students in the USA (69-71) however the reasons for this are unknown. It has been proposed that that these differences may be explained by differences in upbringing and life stressors, which may make doctors from ethnic minorities more resilient (69).'

6. Page 15, sentence 14: the response rate is high compared to comparable surveys, and thus should not be mentioned as a limitation.

Response: Thank you. We have removed this as a limitation.

7. Page 15: A limitation of measuring depression and anxiety is that no validated psychometric instruments were used. These complaints were self-reported and this data must be interpreted with caution. Please mention this in this section.

Response: Thank you. We have now amended the limitations section as follows:

'Thirdly, we asked doctors to self-report on medical conditions including depression and anxiety and the questionnaire used to assess DMP, although used in previous studies (40-42), has not been formally validated.'

8. Conclusion. Page 15, sentence 50: this correlation with substance abuse is not mentioned earlier in the results or discussion. Please remove here or clarify earlier.

Response: Thank you. The correlation with substance abuse can be seen in Table 4 and we have now also included it in the results section.

9. eFigure 1: I find this figure hard to interpret. This may need some more explanation.

Response: Thank you. We have removed this figure as we agree that it is rather complex and therefore difficult to interpret. We have however kept a scatter plot from this eFigure to answer a question posed by Reviewer 3, question 5.

10. Questionnaire: possibly the survey itself could be shared as well, to see all the questions and variables that were measured.

Response: Thank you. We are unfortunately unable to include the Maslach Burnout Inventory questionnaire items, as these are copyright restricted. We have however now included all of the other questions and variables pertaining to demographics, job and organisational characteristics and the Defensive Medical Questionnaire items in the supplement (eMethods).

Comments from Reviewer 3:
This large cross-sectional survey study assessed the rate of burnout in OBGYN practitioners in the UK. A burnout rate of 36% was identified amongst over 3000 survey responders; however, a higher rate of 43% was noted amongst trainees. Those who experienced burnout had a higher rate of defensive practice, depression, anxiety and suicidal thoughts.

1. In general, I would advise to shorten the introduction, as there appears to be some redundancy in the effects of burnout in the health care system.

Response: Thank-you. We have removed some material from the introduction to shorten it and avoid repetition.

2. Paragraph 2: A few other issues with OBGYN in particular that may be worth mentioning are the acuity of the patient care specifically in obstetrics and the rapid turnover that occurs. These are two important factors that impact health care providers in this field.

Response: Thank you. We have now included this point within the introduction whilst trying to be mindful of the length of this section. It now reads as follows:

'Evidence from studies in Europe(15, 28) and the USA(2) suggest that burnout may be experienced by up to half of doctors in obstetrics and gynaecology (O&G),(29, 30) and that the prevalence of

burnout in O&G is one of the highest of any specialty. This may be related to the high-acuity and rapid turnover of patients associated with the specialty (31).'

3. Paragraph 2: Discusses the concept and impact of defensive medical practices. Are there any studies in the UK population that assesses the effects of this? Specifically in the OBGYN population? If not, please mention that.

Response: Thank you. To our knowledge, no studies in the UK population have assessed the effect of defensive medical practice. One study has however assessed the prevalence of self reported defensive practice in doctors including O&G and we have now included this and commented on it in the revised manuscript as follows:

'A small study of DMP among UK doctors demonstrated that 26.4% of O&G doctors report practising some form of defensive medicine (35,43). Although the overall effect and cost of the practice of defensive medicine has not been established in the UK, it is thought to represent a highly significant strain on healthcare resources and in the USA, is estimated to cost $46 billion annually.(44)'

4. The Survey: can you please clarify how the surveys differed based on participant group?

Response: Thank you. We have amended the text as follows to clarify this point and also included a copy of the survey in the supplement (eMethods):

'All participants were asked to provide information on demographic variables, including age, gender, ethnicity (Office of National Statistics classification (47)), relationship status and if they have children. In addition, they were asked about some job and organisational factors such as rota design and career or retirement plans which were tailored to the participant group. These parameters were chosen based on previous studies suggesting that they have an association with burnout.(48) The main outcomes and measures – the Maslach Burnout Inventory Human Services Survey for Medical Personnel(49) (MBI), defensive medical practice questionnaire and questions concerning wellbeing were the same for all groups. A copy of the survey (excluding the copyright restricted MBI) can be found in eMethods in the Supplement.'

5. Main outcomes and measures: Was there a total MBI or DMP score that was used? Some literature describes a total MBI score utilizing all 3 components. Please describe why a total score was not utilized. Also, there is a degree of burnout on the MBI survey that is defined as low, moderate and high. It's understandable that people with a high score are defined as having burnout, but those in the moderate category are at a higher risk that those with a low score. Please consider providing this breakdown for the MBI survey.

Response: Thank you. In Table 1, we have now included mean scores (and ranges) for each of the subscales to provide further information on each. We decided to use 'caseness' for MBI with cut off values of EE□27 and/or DP□10 (as opposed to a total score utilizing all 3 components) so that the reader is more easily able to interpret our results within the context of other published work in the area that have used comparable scoring and cut-off values utilizing 2 components of the MBI.

We agree that burnout should be seen as a scale and not binary and have therefore amended eFigure1 (supplement) to provide more information on this. If we look at eFigure1, we demonstrate all of the values obtained for EE and DP and the cut offs for each scale that are labelled as burnout using our definition. It is clear that there are a range of scores which demonstrate a 'moderate' level of burnout which will have an impact on clinicians but do not meet the threshold defined. However, for the purposes of this paper we felt that it would be easier to define associations with DMP and wellbeing if we categorized only those participants with a high score as having burnout.

6. Doctor wellbeing: Since this was additional information not included in a validated survey, please describe how these data points collected? Where they yes or no questions? Open-ended? Multiple choice?

Response: Thank you. The questions were yes or no and can be seen in the survey which is now attached as supplementary material (eMethods). We have also amended the text as follows to clarify this:

‘Doctors were asked to self-report on the presence or absence (yes or no) of a variety of common medical symptoms and conditions including...’

7. Is the data from the RCOG TEF published? If so, please provide a reference. If not, please clearly state this.

Thank you. The RCOG TEF 2018 data can be found via the RCOG website for which we have now included the following reference - https://www.rcog.org.uk/en/careers-training/about-specialty-training-in-og/assessment-and-progression-through-training/training-evaluation-form-tef/.

8. Since the data was divided into 3 categories based on level of training, why was the data not compared by these 3 groups? It may be that consultants who have been in practice for a longer time and have experienced negative outcomes are more likely to practice defensive medicine. I would recommend providing p values and comparisons for your data amongst the 3 groups.

Response: Thank you. This is a descriptive study, hence we did not plan to test hypotheses or declare statistical significance. Table 5 shows crude and adjusted odds ratios of burnout for doctor grade which provides information of how these 3 categories compare.

9. The problem of burnout in OBGYN is clearly defined by your paper and others. Please provide a paragraph on ways that burnout can be addressed and mitigated especially in trainees. What can be done to alleviate this problem? Please review this recent publication below: Babbar S, Renner K, Williams K. Addressing Obstetrics and Gynecology Trainee Burnout Using a Yoga-Based Wellness Initiative During Dedicated Education Time. Obstet Gynecol. 2019 May;133(5):994-1001. PubMed PMID: 30969208.

Response: Thank you. We have included the following paragraph in the discussion and cited the publication mentioned:

Better understanding the relationship between burnout, wellbeing and staff turnover intentions is of great importance to ensure retention of the workforce going forward. This knowledge will also help to inform the content of interventions aimed at identifying and preventing burnout, and improving the wellbeing of doctors early in their careers(61). The majority of interventions proposed to date have been individual-focused strategies which include mindfulness (62), personal coping strategies and exercise (63), or some combination of these. However, a recent meta-analysis of interventions to reduce doctor burnout found that organisation-directed interventions (such as reducing workload, changing rota/shift patterns, or group sessions to enhance teamwork) had a more significant effect on reducing burnout than individual approaches alone(23). This highlights the importance of implementing organisational strategies(64,65) along with continual assessment of burnout, to develop a healthy workplace environment to effectively tackle this problem (5).

10. Table 1: The mean scores under each MBI category are confusing. Is the reported number the mean score for that category? For EE, the score can be between 0 to 54, with a high scored defined as greater than 27. Was the average score in this category around 2 for each group??

Response: Thank you for noticing this, we reported mean score per item rather than mean score for the subscale total. We now provide mean and range for the subscale total.

Comments from Reviewer 4:
The authors present the results of a nationwide online cross-sectional survey of burnout and defensive medical practice given to over five thousand practicing obstetrician-gynaecologists registered with the Royal College of Obstetricians and Gynaecologists. They found the overall burnout rate to be 36% using the MBI with 43% of trainees reporting burnout. In addition, they found that physicians with burnout were significantly more likely to report practicing defensive medicine. Lastly, young, white or other ethnicity and those with a medical degree from the UK or Ireland were characteristics strongly associated with burnout.

Overall the manuscript is clearly written, well-designed and careful not to overstate results give the study design and response rate. The finding of increased defensive practice among physicians with burnout has important implications for medicine as a whole.

Thank you.

1. The most striking finding from the study is that the rate of burnout is significantly lower than what has been reported for obstetrician-gynecologists in the United States using the same validated instrument (MBI-HSS). Specialties such as Internal Medicine, Emergency Medicine and Obstetrics & Gynecology have routinely been shown to have burnout rates above 50% as the authors state. While the rate identified here is concerning, it is still at the lower end of the spectrum for U.S physicians in fields such as Pathology and Dermatology. Can the authors comment on why such a difference may have been found?

Response: Thank you. We have amended the text as follows to try to explain this difference:

‘The overall prevalence of burnout in this study is consistent with smaller international studies conducted within obstetrics and gynaecology (28, 29, 51) but lower than reported in some studies from the United States (2, 52, 53). This may be explained by differences in the way burnout has been measured, the small number of subjects included in some studies, differences in healthcare systems as well as medical training, and the hours of work in the UK which are restricted by the European Working Time Directive.’

2. The authors find no differences based on sex but higher rates of burnout among younger physicians and trainees. Can the author comment on why they believe this is the case given that almost 80% of trainees identify as female?

Response: Thank you. We believe that the reviewer is referring to the crude odds ratios in Table 5. When looking at the adjusted results (based on logistic regression including all predictors), the adjusted odds ratio for trainees (vs consultants) was 1.00 (95% CI 0.77-1.31), that for being female was 0.97 (95% CI 0.81-1.16), and that for age was 0.92 (95% CI 0.87-0.98) for each 5-year difference in age. These results suggest that age would be a larger determinant than gender or grade, when the correlations between these variables are taken into account (trainees are younger and more often female). This would explain why the crude odds ratio for trainees (vs consultants) was larger than 1 because this group contains more young people, but not so much because this group contains more females.

What is the significance of a young burned out cohort of physicians for the future? And why did older physicians have higher defensive medicine practices?

Response: Thank you. A young burned out cohort of doctors has implications for future workforce retention and is something that we have commented on in the revised text. Regarding higher rates of defensive medical practice amongst older physicians, although we do not have sufficient information to comment on the exact causes for this, we have amended the text as follows to elaborate on this further:

‘Our study shows that consultants with burnout are three times more likely to report both avoidance (avoiding cases or procedures) and hedging (overprescribing or over-referral) which may have significant and serious consequences on patient care. This may be because consultants are less ‘protected’ than trainees in terms of litigation as they take ultimate responsibility for a patient’s care. Furthermore, due to their seniority, they are likely to have experienced more complaints or adverse events during their careers which have been shown to be associated with DMP(42).’

3. I personally am not entirely clear about the difference between consultants and SAS. Could the authors clarify these for international readers?

Response: Thank you. We have included the definitions below in the methods section to more clearly define what each of the categories of doctors are. We hope the changes we have made in response to your comments have made the paper more accessible to international readers.

‘All consultants (equivalent to an attending physician in the USA), specialty and specialty associate (SAS) doctors (doctors who have completed specialist training but do not have a staff position) and trainees (equivalent to a resident or fellow in the USA)...’

4. In the discussion, page 14, the authors state that older physicians or physicians who stay in medicine may be more resilient and thus have lower burnout scores. The authors might consider other reasons why older physicians may lower burnout in this and other studies. For instance, benefits of higher rank, difference in career expectations and generational differences.

Response: Thank you. We have introduced this idea now in the discussion. However we have had to balance expanding on this theme with keeping within a reasonable word count. The revised text now reads:

'The observation in our study that age is inversely associated with burnout is also in keeping with other studies.(66) This may be explained by the fact that doctors who remain within the specialty are inherently more resilient, and that those more affected by burnout may be accounted for in the attrition rate from the specialty(67). It has also been suggested that the lower rate of burnout seen in more senior doctors is because they may have a better work-life balance and career (67, 68).

5. The authors report on “parity”. Are they referring to having children? It seems an odd term to use for fatherhood.

Response: Thank you. We agree and have changed parity to ‘children’ in the methods section and results (including tables).

Comments from Reviewer 5:

This is a comprehensive study of members of the Royal College of OBGYNs examining the association of burnout and defensive practices. This is an important study, and there are multiple strengths to this manuscript.
•In the introduction, the authors did a nice job linking their research question to the UK governmental initiative of “The Maternal and Neonatal Health Safety Collaborative”
•Large number of participants with an impressive response rate (greater than 50%) for all three subgroups examined
•The response rate is especially notable given that the authors used the full 22-item MBI validated measure of burnout
•The discussion is a nice summary of the significance of their findings, and there are many notable findings.

I have minimal concerns with this manuscript, my only question of clarification was that it was unclear whether the defensive medical practice instrument had validity evidence. I suspect that it does not, but this could be clarified and listed as a limitation in the discussion section.
Thank you for the opportunity to review this impressive paper.

Response: Thank you. The defensive medical practice questionnaire we used has been used in another large study on UK doctors (Bourne et al. BMJ Open 2015), however no formal validation study has been carried out. In this 2015 study, twenty items measuring
current defensive medical practise were generated from a literature review. A pilot questionnaire of the survey was then trialled on 20 medical doctors of varying grades and specialties. Twelve additional items were generated from this pilot study and were incorporated in the final defensive medical practice questionnaire design used in that study and ours. We have clarified this and included it as a limitation in the discussion which now reads:

‘Thirdly, we asked doctors to self-report on medical conditions including depression and anxiety and the questionnaire used to assess DMP, although used in previous studies (40-42), has not been formally validated.’

VERSION 2 – REVIEW

REVIEWER	van Pampus OLVG, The Netherlands
REVIEW RETURNED	10-Sep-2019

GENERAL COMMENTS	Perfect now

REVIEWER	Shilpa Babbar Saint Louis University USA
REVIEW RETURNED	10-Sep-2019

GENERAL COMMENTS	The authors adequately addressed most of my comments within the manuscript. Methods 1. Methods, page 7, first paragraph: “Registration with the RCOG is mandatory”. Is this referring to those who were included in the study or for any practicing physician in the UK? Please rephrase this.

	Table 1: A more meaningful analysis of this data would be to compare the 3 groups and provide p values to show whether or not there is a statistical difference between the groups. Table 4: The way the Odds Ratios are presented is a bit confusing. Is the OR for each variable for the total group? If so, then place the value in the “All” column.

VERSION 2 – AUTHOR RESPONSE

Comments from Reviewer 3:

1. Methods, page 7, first paragraph: “Registration with the RCOG is mandatory”. Is this referring to those who were included in the study or for any practicing physician in the UK? Please rephrase this.

Response: Thank you. All obstetrics and gynaecology doctors practicing in the UK have to be registered with the RCOG. We have amended the following sentence to clarify this:

‘All consultants..... working in Obstetrics and Gynaecology in the United Kingdom and registered with the Royal College of Obstetricians and Gynaecologists (RCOG) were invited to participate in this study between December 2017 and March 2018. Registration with the RCOG is mandatory for all obstetricians and gynaecologist practicing in the UK.

2. Table 1: A more meaningful analysis of this data would be to compare the 3 groups and provide p values to show whether or not there is a statistical difference between the groups.

Response: Thank you. As there was no prespecified hypothesis relating to differences between these groups, we believe that p-values are not warranted. We have now added 95% confidence intervals on the observed percentage of doctors that meet criteria for burnout in the results section (page 11), as this is certainly important information that was missing. In addition, Table 5 presents a univariable analysis of type of doctor as a predictor of burnout. The results we report are odds ratios with 95% confidence intervals. For those who want, statistical significance of type of doctor at the 5% level can be derived from that. The OR of burnout for SAS doctors versus consultants was 0.93 (95% CI 0.70 to 1.24), suggesting very similar levels. The OR of burnout for trainees vs consultants was 1.63 (95% CI 1.39 to 1.90), suggesting higher levels of burnout for trainees vs consultants. Of note, in the multivariable analysis, the odds ratios for type of doctor are close to 1. This suggests that the difference between trainees and other types of doctors appears to be explained by other factors, such as age, having children, or having their qualification in UK/Ireland.

3. Table 4: The way the Odds Ratios are presented is a bit confusing. Is the OR for each variable for the total group? If so, then place the value in the “All” column.

Response: Thank you for noticing this. The odds ratios refer to the total group. We have amended the table to reflect this as well as rounding the percentages to make the results clearer.