Author’s response to reviews

Title: Stressors and resources related to academic studies and improvements suggested by medical students: a qualitative study

Authors:

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Author’s response to reviews:

Dear Dr. Choi-Lundberg,

we would like to thank you and the reviewers for the detailed and thoughtful assessment of our manuscript “Stressors and resources related to academic studies and potential improvements suggested by medical students: a qualitative study” and for the possibility to submit a revised version.

We strongly believe that the suggestions and comments contributed to an improvement of our manuscript. Enclosed you will find a detailed response to all comments with a description of all changes that were made during revision. Furthermore, all changes were marked in the text.

Yours sincerely,

Peter Angerer, Jeannette Weber, Thomas Muth, Stefanie Skodda and Adrian Loerbroks
Editor Comments:

1. Thank you for your manuscript ‘Stressors and resources related to academic studies and potential improvements suggested by medical students: a qualitative study’. Four reviews were received, which have recommended a number of improvements to the manuscript. Please address most of these recommendations in your revised manuscript; however, I have indicated below which of these are not essential. I have also provided some additional recommendations.

   Title (Reviewer 1) – I think the title is fine as is, although the word ‘potential’ could be deleted.

   Authors: In response to your comment we deleted ‘potential’ from the title.

2. I agree with Reviewer 1 that quotes should be incorporated into the main text of the study, as is usual practice in reports of qualitative studies. Quotations can be indented to set them off from the main text. It would be good to indicate which focus group each quote came from, e.g., FG3, FG5, and/or participant number, as this would give an indication of the range of viewpoints you are drawing from.

   Authors: Thank you very much for this comment. We have added a selection of quotes to the main text.

3. You mention in the acknowledgements that focus group transcripts were translated by a certified translator. This should be mentioned in the methods (Focus groups were conducted in German, and translated for analysis or for presentation in this paper?).

   Authors: Thank you very much for your suggestion. We included the following statement in the method section:

   Page 7, lines 11-12: “Focus groups were conducted and content-analyzed in German. Relevant quotes were translated into English by a certified translator after data analysis.”
4. I disagree with Reviewer 1 that the number of focus groups and participants should be moved to the methods, as these are results since you conducted additional focus groups until saturation was achieved. However, I agree that the length of focus groups (90 minutes), and range of number of participants per group, and whether they were from similar stages of education or mixed should go into the methods.

Authors: In response to your comment we now moved the information about the duration of focus group into the method section. Furthermore, we included the following statement in the method section:

Page 6, lines 17-18: “Hence, participants in each focus group studied in the same academic year. Six to eleven students participated in each focus group, except for one small focus group with only two participants.”

5. The statement on page 6 line 12-13 ‘Respectively four focus groups…’ is unclear. I suggest ‘Four focus groups were conducted with students in the preclinical stage of studies, and four with students in the clinical stage.’

Authors: We have corrected this sentence also in accordance with your next comment (page 8, lines 21-23).

6. It would be helpful for readers outside of Germany if you indicated which years of study correspond to which stages, e.g., Years 1-3 are preclinical, years 4-6 clinical.

Authors: Thank you very much for your advice. We believe that the labeling of “preclinical” and “clinical stages” was a bit misleading, because there was no such distinction for students studying in the new curriculum at our Medical School. We now take this issue into account by stating that the inclusion criterion was enrollment in the human medical studies only:

Page 6, lines 19-20: “Inclusion criterion was enrollment in the human medical studies.”

Accordingly we have also revised the relevant segment in the abstract:

“Eight focus groups were conducted with medical students enrolled at a medical school in Germany until thematic saturation was reached.”

Furthermore, we now report the number of participating students by academic year:

Page 8, lines 21-23: “Four focus groups were conducted with students in the fifth year, two with students in the second year and two with students in the first year of medical education.”
7. Do the percentages of female vs male participants reflect the composition of the cohorts? If not, this should be noted in the discussion.

Authors: Thank you very much for your advice. We have added a statement to the strength and limitation section:

Page 24, line 25 – Page 25, line 7: “Qualitative research cannot necessarily claim to yield representative or generalizable findings. Instead, the aim is to explore the full breadth of potential opinions and experiences (43). We aimed to ensure such diversity by including participants of different academic years, age and sex. It needs mentioning though that, the proportion of female participants was 77%, which is higher than the actual proportion at this particular medical school (i.e. 62% to 63% of female students during the period of data collection). Therefore, perspectives of female students may be somewhat overrepresented in our study.”

8. There are differing opinions amongst the reviewers as to the extent to which you discuss your findings in the context of existing literature on the subject. I would suggest conducting another literature review on stress and medical students specifically searching for papers published in 2017 to 2019 and add these to the introduction and/or discussion as appropriate.

Authors: In line with your request the following references were added to the introduction and discussion section:


- Heinen I, Bullinger M, Kocalevent RD. Perceived stress in first year medical students - associations with personal resources and emotional distress. BMC Medical Education. 2017


9. As Reviewer 2 recommends, please provide the focus group guide and coding system (as an appendix to be published online). Additionally, ensure all information of the COREQ checklist has been addressed in the manuscript (Tong A, Craig J, Sainsbury P. 2007. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. International Journal for Quality in Health Care. 19(6):349-357) – you have addressed most of these already.

Authors: Thank you very much for these recommendations. We accordingly provide the topic guide as supplemental online material. Furthermore and in line with comment 4 of Reviewer 4, we have also provided a figure showing the clustering of main- and sub-categories, but without sub-categories at the third or fourth level due to limited space. We have also addressed the remaining points of the COREQ checklist in the manuscript and uploaded the completed checklist and revised the paper accordingly:

Transcripts returned to participants/participant checking (page 8, lines 16-18): “Corrections and feedback on transcripts and research findings were not obtained from study participants due to logistic constraints.”

Participant knowledge of the interviewer (page 7, lines 7-9): “Being the coordinator and contact person for elective courses at our institute, especially TM has close contact to medical students. We can further assume that most study participants were aware that TM’s main research focus pertains to medical students’ health.”

Non-participation (page 6, lines 11-14): “Study participants were approached via social media or recruited through personal contacts of doctoral students (StS, CB [see acknowledgements]) of the research team. Regretfully, we do not know how many students were exposed to the recruitment materials and therefore participation rates cannot be calculated.”

Setting of data collection (page 7, lines 9-10): “The focus groups were held at a conference room at our institute”
10. As Reviewer 2 notes, please ensure your reference list is consistently formatted as per BMC Medical Education journal requirements [https://bmcmededuc.biomedcentral.com/submission-guidelines/preparing-your-manuscript](https://bmcmededuc.biomedcentral.com/submission-guidelines/preparing-your-manuscript), including use of National Library of Medicine (NLM) abbreviations [https://www.ncbi.nlm.nih.gov/nlmcatalog/journals](https://www.ncbi.nlm.nih.gov/nlmcatalog/journals) (e.g., BMC Med Educ).

Authors: We have checked and revised all references in accordance to journal requirements.

11. Reviewer 3 believes that it is not ethical to reward participants in a focus group; however, this is common practice to compensate participants for their time, so I am not concerned about this. Perhaps you could rephrase the relevant statement: instead of ‘Participation in the study was rewarded by…’ to ‘Participants were compensated for their time with a cinema or bookshop voucher’.

Authors: This sentence was changed accordingly (page 6, lines 21-22).

12. Page 5 line 19-20. The statement ‘Furthermore, the balance between private and academic life…’ would be better situated at the end of the introduction, to give an indication of what is in versus out of scope of the manuscript.

Authors: Thank you very much for your remark. This statement has now been moved to the end of the introduction (page 6, lines 1-2) and a footnote was added in the method section instead (page 7). However, we wonder whether it improves the flow of the introduction.

13. Please have a native English speaker edit the manuscript. The following are just some examples: Page 3 line 21, ‘Especially focus groups constitute…’, change to ‘In particular, focus groups constitute…’ and in the next sentence, ‘Particularly’ can be deleted. Page 5, line 15: change ‘was exploring’ to ‘explored’. Line 17, delete ‘during’.

Page 6, line 20: ‘missing persons in charge’ would be less amusing as ‘inability to contact coordinators’ or similar.

Page 7 line 14. Please provide a concise English translation for ‘Modellstudiengang’ if possible.

Page 8 line 6: ‘Also some educational contents were experienced…’ to ‘Some educational content was considered…’

Articles (a, an, the) are frequently overused. For example, often when you write ‘…the medical studies…’, ‘the’ should be deleted.

Authors: We implemented the revisions you suggested. Further, the manuscript has now been thoroughly and linguistically edited.
14. It would be illuminating to give indicative failure and exclusion rates from the medical course at your university, number of students per year, as well as some more detail about the new ‘Modellstudiengang’ curriculum, including a description of ‘internships’ (this probably varies around the world – in Australia it is the first year of work after graduation from the medical course), which would provide a context for some of the students’ comments.

Authors: In line with your advice, we added the following information to the method section:

Page 6, lines 6-11 “Each year, approximately 400 students embark on their studies at our medical school. In 2013, a new competence-oriented curriculum was introduced. That new curriculum builds on an interdisciplinary approach and emphasizes hands-on training (i.e. earlier in the curriculum and to a larger extent). Furthermore, internships with a total duration of four months in hospitals, family practices and outpatient care are mandatory in all German medical schools. Moreover, before graduation a full practical year in medical care has to be completed.”

Unfortunately, valid information on failure rates is not available. This is because only few students finally fail on all repeat exams and many likely quit before. Furthermore, we think that information on exclusion rates may be misleading, because we do not have information on whether students might follow medical studies in other countries or completely stop with their studies.

Reviewer reports:

Authors: We would like to thank all reviewers for their time and expertise devoted to our manuscript and the large number of helpful comments, suggestions and advice.

Jan C. Frich (Reviewer 1):

1. The title: «Stressors and resources related to academic studies and potential improvements suggested by medical students: a qualitative study» is a bit long. Consider shortening/revising.

Authors: In line with the Editor’s advice (see comment 1), we deleted “potential” from the title.
2. The aim of the study (abstract) is: «to identify stressors, resources and suggestions for improvement as perceived by medical students». The needs to specify and make explicit what these factors are related too (academic studies?). Also, use the same aim in a consistent way at the end of intro.

Authors: Thank you very much for your comment. We accordingly revised the abstract and study aim at the end of the introduction:

Abstract: “This qualitative study therefore aims to improve our understanding of medical students’ perceptions of i) stressors related to their academic studies, ii) resources that may facilitate coping with those stressors and iii) suggestions to potentially reduce the stress.”

Introduction, page 5, lines 22-26: “Doing so, we will explore medical students’ perceptions of i) stressors related to their academic studies, ii) resources that help to handle those stressors and iii) suggestions for improvements that may potentially reduce the stress experienced during medical studies”

3. The study has a broad scope and includes students from all parts of the medical school program in one university. The findings are in line with existing knowledge, but some new themes emerged related to organisational structure (information flow, repeat exams etc). What was the rational for doing this study? The manuscript now covers a wide range of themes. The manuscript would be more interesting if it focused on how this study adds to existing knowledge.

Authors: In response to your comment, we have revised our manuscript to ensure that we communicate more clearly the specific focus and novel contribution of our study (please also see the responses to your comments 2 and 6).

4. To me, it is unusual to place all quotes in an appendix. I think quotes are illustrations that should be incorporated into the text in the result section.

Authors: Thank you very much for this comment. We have now added key quotes to the main text and – due to limited space - present additional illustrative quotes in an appendix.
5. The first section under results: «In total, eight focus groups were conducted with overall 68 participants. Each focus group lasted for about 90 minutes …» I do not consider this as a result, but as a description of the sample that could be referred to in the methods section.

Authors: Thank you very much for your advice. Details on the duration of focus groups were now moved to methods section, but in keeping with the editors recommendation (see comment 4) we did not move the description of the study sample.

6. The methods discussion covers strengths and weaknesses properly.

I would encourage the authors to revise the manuscript, making the rational for the study more explicit and focusing more on what is already known and what new this study adds.

Authors: Thank you very much for your suggestion. We have revised our manuscript accordingly and have stated more explicitly which of our findings were already known and which findings are new:

Page 22, lines 14-19: “Not surprisingly, exams have often been identified as major stressors in higher education and our study is not an exception (22, 23, 30, 32). However, not only the high quantity and difficulty of exams were perceived as stressful, but we also identified some new aspects on how exams contribute to stress, in particular among medical students. Those new aspects were mainly associated with organizational factors that pertain to repeat exams and grading systems that were perceived to be unfair.”

Page 24, lines 2-6: “Our study expands the current knowledge by highlighting that this unfavorable atmosphere is already perceived to be established during undergraduate medical education through unfair treatment, allegedly unfair grading, inconvenient scheduling of exams, unclear regulations regarding absenteeism and a lack of support.”

Page 24, lines 6-9: “Furthermore, selection pressure in medical schools has also been identified as a major stressor in previous quantitative research (11). Such selection pressure was also experienced by our study participants, who felt that a high workload was utilized to test students’ stamina and to select students based on their stamina.”
Thomas Kötter, MPH (Reviewer 2): I commend the authors for conducting a qualitative study exploring stressors and resources related to medical education from the students' point of view. The authors have managed to conduct eight focus groups with close to 70 participants and distilled the results into actionable points for both practice and research. I also appreciate that the authors discuss their results, as well as strengths and limitations of their work, thoroughly in the context of the existing literature.

A few points to consider to strengthen the manuscript:

1. I am not a native speaker myself, but I recognize that this manuscript needs a thorough language revision.

Authors: Based on your comment, we thoroughly edited our paper to ensure it better meets international standards with regard to English-language scientific writing.

2. The keywords should be taken from the MeSH database.

Authors: Thank you very much for your advice. We accordingly revised the keywords to ensure that they conform with the MeSH database: “Qualitative Research; Focus Groups; Stress, Psychological; Health Resources; Education, Medical”

3. In order to enhance the transparency of the methodology, I would recommend to provide the interview guideline, the category system, as well as the completed COREQ checklist to the readers.

Authors: Thank you very much for this suggestion. The interview guideline (focus group guide) was added as supplemental material and the category system was integrated in the manuscript (figure 1). We have now also addressed the remaining points of the COREQ checklist in the text and provide the completed checklist below:

Transcripts returned to participants/participant checking (page 8, lines 16-18): “Corrections and feedback on transcripts and research findings were not obtained from study participants due to logistic constraints.”
Participant knowledge of the interviewer (page 7, lines 7-9): “Being the coordinator and contact person for elective courses at our institute, especially TM has close contact to medical students. We can further assume that most study participants were aware that TM’s main research focus pertains to medical students’ health.”

Non-participation (page 6, lines 11-14): “Study participants were approached via social media or recruited through personal contacts of doctoral students (StS, CB [see acknowledgements]) of the research team. Regretfully, we do not know how many students were exposed to the recruitment materials and therefore participation rates cannot be calculated.”

Setting of data collection (page 7, lines 9-10): “The focus groups were held at a conference room at our institute”

No Item Description

Domain 1: Research team and reflexivity

Personal characteristics
1. Facilitator Thomas Muth
2. Credentials Jeannette Weber (MPH), Stefanie Skodda, Dr. Thomas Muth, Prof. Dr. Peter Angerer, PD Dr. Adrian Loerbroks
3. Occupation JW: research associate; SS: medical student; TM, AL: senior research associate; PA: university professor
4. Gender JW, SS: female; TM, PA, AL: male
5. Experience and training JW: educational background in biomedical science and public health, practical experience in occupational health research; SS: medical student; TM: educational background in psychology and public health, experience in occupational health research, qualitative research and teaching; PA: educational background in human medical studies, experience as a clinical doctor and in occupational health research; AL: educational background in epidemiology and health sciences, experience in occupational health research, qualitative research and teaching
Relationship with participants

6. Relationship established  No

7. Participant knowledge of facilitator  Participants knew that TM was working as a research associate on student health

8. Facilitator characteristics  No other characteristics were reported about the facilitator

Domain 2: Study design

Theoretical framework

9. Methodological orientation and theory  Qualitative content analysis by Mayring

Participant selection

10. Sampling  Convenience sampling

11. Method of approach  Via social media or personal contact

12. Sample size  68 participants

13. Non-participation  Not applicable

Setting

14. Setting of data collection  Conference room at university

15. Presence of non-participants  Two doctoral students who took field notes

16. Description of sample  Mean age = 24 (range: 18-34 years); female = 77%, male = 23%
Data collection
17. Interview guide Provided as supplemental material
18. Repeat interviews None
19. Audio/visual recording Audio recording
20. Field notes Yes
21. Duration Circa 90 minutes
22. Data saturation Yes
23. Transcripts returned No

Domain 3: Analysis and findings
24. Number of data coders Two
25. Description of coding tree Provided as supplemental material
26. Derivation of themes Deductive coding: Stressors, resources, suggestions for improvement; all other categories were inductively coded
27. Software MaxQDA 12
28. Participant checking No

Reporting
29. Quotations presented Yes
30. Data and findings consistent Yes
31. Clarity of major themes Yes
32. Clarity of minor themes Yes
4. Why didn't you collect and report sociodemographic data of all participants? This should be explained.

Authors: The first two focus groups were conducted without the initial intention to publish their results. Therefore sociodemographic data has unfortunately not been collected for these focus groups. We have added a similar explanation in the manuscript:

Page 9, lines 3-5: “The first two focus groups were conducted following exactly the methods as described, but with the aim to simply learn about students’ experiences in their medical studies. For this reason, sociodemographic data has not been gathered from the first two focus groups.”

5. The authors state, that most identified stressors involved organizational structures. These may be suboptimal and this is in line with earlier results. But the significant imbalance between external factors named as stressors and suggestions for improvement by the participants and internal stressors / personal characteristics is considerable. Could this be in part socially-desirable answering and / or reduction of cognitive dissonance among the participants? This should be discussed by the authors.

Authors: Thank you very much for this interesting comment. We have now added the following paragraph to the limitation section:

Page 26, lines 1-12: “Due to a high numerus clausus in Germany (i.e. a grade cut-off that governs admission to medical studies), most students accepted for medical studies have graduated from high school with top grades and thereby likely have high confidence in their academic abilities. At medical schools however, a considerable number will for the first time experience average grades or even failure on exams despite high efforts. The high confidence in one’s academic skills is likely perceived incompatible with the fact that one failed on an exam and may induce an unpleasant state of so-called “cognitive dissonance” (44). Attributing one’s failure to external aspects could be one approach to reduce such dissonance. This may explain why the medical students in our study rather discuss organizational aspects of their studies instead of personal characteristics. In addition, students may have preferably come up with suggestions for organizational improvements, because consideration of individual-level interventions may imply that individual deficiencies are discussed, which is socially undesirable, especially when surrounded by other top-grade high school graduates.”

6. There are numbers missing (page 15, lines 21 and 22).

Authors: We have now added those numbers.
7. Please check all references carefully regarding compliance to the journals’ requirements.

Authors: During revisions, we have checked and revised all references to ensure that they meet the journal requirements.

Maria Alves Barbosa, Ph.D (Reviewer 3): The work is interesting although in the literature we already find publications on the subject. Some recommendations are needed:

1. please check the meaning of the sentence in lines 18 and 19 of the INTRODUCTION item, p. 3

Authors: Thank you very much for your review. We have now emphasized and differentiated between new and existing knowledge (also in accordance to comment 6 of reviewer 1):

Page 22, lines 14-19: “Not surprisingly, exams have often been identified as major stressors in higher education and our study is not an exception (22, 23, 30, 32). However, not only the high quantity and difficulty of exams were perceived as stressful, but we also identified some new aspects on how exams contribute to stress, in particular among medical students. Those new aspects were mainly associated with organizational factors that pertain to repeat exams and grading systems that were perceived to be unfair.”

Page 24, lines 2-6: “Our study expands the current knowledge by highlighting that this unfavorable atmosphere is already perceived to be established during undergraduate medical education through unfair treatment, allegedly unfair grading, inconvenient scheduling of exams, unclear regulations regarding absenteeism and a lack of support.”

Page 24, lines 6-9: “Furthermore, selection pressure in medical schools has also been identified as a major stressor in previous quantitative research (11). Such selection pressure was also experienced by our study participants, who felt that a high workload was utilized to test students’ stamina and to select students based on their stamina.”

We hope that we could clarify the meaning of the following sentence:

Page 4, lines 12-13: “Furthermore, only interventions that are considered useful by medical students will be accepted and utilized by members of this population.”
2. I do not agree that the participant (subject of the study) is rewarded to participate in a survey. I do not think it's ethical. (see Methods - study participants)

Authors: Thank you very much for your comment. We agree that our phrasing of this sentence was misleading. Also the ethics committee of our university only allowed for adequate compensation and would not have allowed payment for study participation. We have now reworded that sentence as follows (in line with a suggestion by the editor, see comment 11 by the editor):

Page 6, lines 20-21: “Participants were compensated for their time with a cinema or bookshop voucher.

3. RESULTS: Questions: Where did the focus groups occur?

Authors: In reply to your comment, the following information was added to the method section:

Page 7, line 9-10: “Focus groups were held at a conference room at our institute”

4. In total there were 68, but how many participated by Group?

Authors: The following information was added to the method section based on your comment:

Page 6, lines 18-19: “Six to eleven students participated in each focus group, except for one small focus group with only two participants.”

5. Why did the authors receive additional information about age and sex from only six groups?

Authors: We have added the following explanation to the manuscript:

Page 9, lines 3-6: “The first two focus groups were conducted to simply learn about students’ experience in their medical studies, but without the initial intention to scientifically publish those results. For this reason, sociodemographic data has not been gathered from the first two focus groups.”

6. How did VALIDATION and interpretation of results occur?

Authors: After coding was reviewed by and discussed with a second analyst, a second coding round was conducted. This has also been outlined in the method section. However, participant checking was not possible and the following sentence was added to the method section:

Page 8, lines 16-18: “Corrections and feedback on transcripts and research findings were not obtained from study participants due to logistic constraints.”
7. DISCUSSION: It is necessary to bring more authors, other researches to discuss the data
Authors: We are afraid that we do not fully grasp what you mean to suggest by your comment. We assume that you suggest adding more references. We addressed this in the response to your following comment.

8. REFERENCES: It is necessary to look for more recent references. The most recent ones used by the authors are from 2016.
Authors: Thank you very much for your comment. More recent references have now been added to the introduction and discussion section:


- Heinen I, Bullinger M, Kocalevent RD. Perceived stress in first year medical students - associations with personal resources and emotional distress. Bmc Medical Education. 2017


Rebecca Erschens (Reviewer 4): I would like to thank you very much for the opportunity to review this exciting and well written qualitative study. I hope I can help the authors with my feedback. The study examines stressors, resources and improvements related to the education of medical students using a qualitative design. In focus groups, students of a German university were interviewed. With the authors' proposal to achieve thematic saturation, they emphasized the students' frequent criticism of organizational structures. In addition, they discussed the strengths, limitations and possible conclusions of the studies.

1. I would recommend to the authors a renewed native-language revision and to focus here in particular on common "medical educational expressions". Overall, as a reader I would ask myself what is the intrinsic strength of researching the parameters attached here in qualitative design. Perhaps the authors could go into more detail here. I would like to read whether the authors have found a difference in the perception of the investigated factors between German and international medical students. German and international literature shows that especially international medical students show different stress rates, stressors and academic performance than German medical students.

Authors: Thank you very much for those valuable comments.

The manuscript was thoroughly and linguistically revised.

Another advantage of researching stressors, resources and intervention needs using a qualitative design is now presented in the introduction section:

Page 4, lines 5-16: “Those quantitative studies have provided important data that helps to identify stressors related to medical studies (i.e. observational studies) and to test approaches to reduce students’ distress (i.e. experimental studies). However, quantitative studies usually rely on pre-conceived notions regarding relevant stressors or resources. Therefore, stressors, resources and starting points for interventions which may be specifically important for medical students themselves might have been overlooked by using standardized data collection tools (17) […] Qualitative research, by contrast, offers the opportunity to gain such in-depth information without prior pre-conceived notions regarding stressors, resources and intervention needs due to its focus on the experience of individuals in everyday life (17,18).”

Unfortunately we did not collect information regarding nationality of students, because differences between German and international medical students were not at focus of this study.

2. in the following I would like to go into the individual passages within the manuscript with some more suggestions.
Introduction

Altogether the introduction is well written, I recognize a "red line" and through the style (slowly going into detail from a broader perspective with finally following own research questions) the reader may follow generally well. In some parts I would have wished for more German and international relevant quantitative literature about, mental health, study situation, stressors and resilience coefficients.

Maybe as a possible optional you can refer to the study (Erschens, R., Herrmann-Werner, A., Keifenheim, K. E., Loda, T., Bugaj, T. J., Nikendei, C., ... & Junne, F., 2018. Differential determination of perceived stress in medical students and high-school graduates due to private and training-related stressors. PloS one, 13(1), e0191831.) as a German study on the association of stress with specific stressors in medical education.

On the other hand, there are already German quantitative studies on the association of mental distress and coping strategies, e.g. Erschens, R., Loda, T., Herrmann-Werner, A., Keifenheim, K. E., Stuber, F., Nikendei, C., ... & Junne, F., 2018. Behaviour-based functional and dysfunctional strategies of medical students to cope with burnout. Medical education online, 23(1), 1535738.

Authors: Thank you very much for this suggestion. We have included a paragraph about quantitative studies in this field and also included the citations you have proposed:

Page 3, line 19 – Page 4, line 4: “In quantitative research (e.g. surveys), academic factors were identified as main stressors for medical students including exams, time management, a high workload, dissatisfaction with lectures as well as selection and performance pressure (10-13). Psychosocial resources are factors that have an intrinsic value or are useful to pursue goals and cope with demands and stress in everyday life (19). They may include self-esteem, health, skills, knowledge, social support or other factors and may decrease students’ stress. During medical education, resources such as joy, optimism, social support and self-care (e.g. adequate nutrition, physical activity, social relationships) have been found to be associated with reduced perceived stress and to buffer against potentially negative effects of stress on mental health (4, 14, 15). Further, several intervention studies have demonstrated the effectiveness of mindfulness-based training to reduce stress in medical students (16).”
3. I would suggest to the authors at the end of the part of the introduction to describe the aims and issues or hypotheses of the study even more explicitly, perhaps also by means of paragraphs (I-III), etc.

Authors: Thank you very much for your suggestion. Also in accordance with the comment of the first reviewer, we revised the description of our study aim as follows:

Page 5, lines 22 – 26: “Doing so, we will explore medical students’ perceptions of i) stressors related to their academic studies, ii) resources that help to handle those stressors and iii) suggestions for improvements that may potentially reduce the stress experienced during medical studies.”

However, we think that a presentation of hypotheses is unsuitable for our qualitative study. After all, hypotheses cannot be statistically tested in such studies. Also, hypotheses may be understood as pre-conceived notions prior to data collection, which would introduce bias into qualitative research.

4. Methods and Results

Methods and Results are very precise and well described and the reader can follow every step. It would be great if I could have a schematic diagram in which the category system and the considerations of clustering and perhaps also a potential model could emerge.

Authors: Thank you very much for this recommendation. We have added a figure to the manuscript.

5. Discussion, Implications and conclusion

Perhaps it would be possible for the authors, by enumerating the research questions on the basis of paragraphs, then within the discussion to take a position again on each question in the sense of a synthesis.

Authors: Thank you very much for this comment. In the first paragraph of the discussion section we summarize the results in the order of our research questions (page 21, lines 11 – 21). However, in the following parts of the discussion section we aimed to combine the discussion on our results on stressors, resources and suggestions for improvement. For example different properties of repeat exams were mentioned either as stressors or resources by our study participants. Furthermore, teaching quality was often criticized, whereas practical education was also mentioned as an important resource. We therefore think that a combined discussion is more integrative and convenient to readers.
6. The authors could decide even more about how to better separate the Implications and Conclusion part in terms of content. I would like to read more about the implications that can be deduced from the results of the current study at the behavioral-level and at the organizational-level. I would also like to read about the efforts or programs that may already exist at the respective university or at other German or international universities.

Authors: Thank you very much for your suggestions. Implications such as improved information systems, stating of specific learning objectives, interweaving of practical and theoretical training have already been discussed in the implication section. Furthermore, the registration for repeat exams as an effort to reduce medical students’ distress due to repeat exams was outlined in the discussion section. New curricula that are introduced at various German universities to focus on more practical training were discussed in the discussion section and have now also been added to the implication section. Furthermore, we added a paragraph referring to a research project at our university which seeks to improve the educational conditions for medical students:

Page 28, lines 5-12: “At our university, a new project relating to health management for medical students was recently initiated. This project aims to improve study conditions through the development and implementation of support services for students who are in need. In addition, organizational-level (e.g. curriculum, communication) and individual-level (e.g. stress management, relaxation and learning techniques) preventive measures are currently being devised in a participatory approach involving medical students and other relevant stakeholders. The results of this study are thereby a first step to identify promising starting points for interventions.”