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Review of the doctoral dissertation of Sadia Zaman, MA, entitled:

„The Pursuit of Multiple Identity Goals among Women in Science, Technology, Engineering, and Mathematics (STEM)”, prepared under the supervision of dr hab. Katarzyna Byrka, professor of the SWPS University.

The doctoral dissertation of Ms. Sadia Zaman addresses the topic of how women in STEM pursue dual identity goals through compensatory strategies and symbolizing activity. The dissertation contains an introductory chapter, a description of the methods and results from six empirical studies along with discussion, and a general discussion section. Study 1 and Study 2 address the role of affective compensation in the pursuit of STEM and feminine identity goals (with a special focus on the emotions of guilt and pride). Study 3 additionally examines the role of symbolizing behavior as a way to manage identity goal (in)completeness. Studies 4 and 5 further explore the role of outfits as symbols for overlapping feminine and STEM identity goals. Finally, Study 6 addresses the topic of overlapping identity goals among STEM employees and the imposter syndrome occurrence. The main results from the first line of research indicated that incompleteness induced by failure in pursuing both identity goals enhances feelings of guilt, whereas completeness related to the success in pursuing both goals increases feelings of pride. Furthermore, the possibility to compensate for incompleteness in one identity goal made women experience pride, whereas the absence of such compensation made them experience guilt. However, when the state of (in)completeness was experimentally induced (as in Study 3), there was no

difference between the groups in symbolizing behavior (operationalized as decoration of a wall with renown female STEM scientists). The second line of research showed that when choice of outfits that serve both or just one identity goal was considered, then the choice of a particular outfit was not related to identity goals overlap. However, higher goal overlap was positively related to the evaluation of outfit choices as multifinal. In the last, sixth study of the dissertation, the Author found that, consistent with the main hypothesis, women reported an overall higher level of the imposter syndrome, but contrary to the initial predictions, women had a higher identity goal overlap than men. Additionally, identity goal overlap was associated with a lower imposter syndrome, although to a comparable degree amongst women and men.

The work presented in this dissertation has lots of strengths and positive aspects. Just to mention the main ones: On a theoretical level it proposes an integration of different conceptual frameworks - the goal system theory (Kruglanski et al., 2002) and the symbolic self-completion theory (Wicklund & Gollwitzer, 1982) that is innovative and coherent. All the empirical research is methodologically sound, in terms of the design of the studies, preparation of procedures and materials but also the data analysis and results presentation. All the research is performed in line with open-science good practices, such as preregistrations (for two experiments), power analyses, clear exclusion criteria, transparent analysis plan, open data and materials. The results are interpreted with caution, referring to relevant theoretical models, potential limitations and alternative explanations are also described in a precise way. Importantly, the chosen topic has a high practical relevance, as understanding how women and men successfully deal with often conflicting identity goals can have implications in many personal and social domains, especially in the context of science and education.

In the next part of this revision, I would like to focus on a few general questions and doubts that came up when reading this dissertation.

1) In terms of the specific identity goals, I was wondering why the goal of being a “feminine woman” was chosen? What would be the mental representation associated with this type of identity? Would you consider that it can overlap to some degree with cultural stereotypes, potentially creating a goal conflict with the STEM goals? What is the rationale for choosing this type of narrower identification, instead of a broader notion of identification with women? Perhaps a more fine-grained distinction and assessment of identification with women, feminists and their interaction (as depicted in the multiple identity approach to gender; see van Breen et al., 2017) would help to focus more precisely in your research on the type of goal overlap or conflict? Overall, it seems crucial to explore more in depth the type of identification and self-categorization of the study participants as it might have impacted how they reacted to the presented symbols.

2) With regard to the choice of symbolic means and symbolizing activities, a question that might arise is whether the chosen symbols used in your studies serve as means that are indeed instrumental to the goal? More specifically, do you know, whether the posters presented to decorate a virtual wall as symbolizing activity in Study 3, were self-evident, in terms of who is the person represented on the poster so the participants could identify with that scientist? Why only surnames were presented on the posters and not also first names, which would additionally make the gender of the scientist salient?

Task relevance, which seems like a very important variable here, was in general quite high in this study and did not differ between double completeness and incompleteness conditions. Would you consider it to be useful to control for task relevance when testing the

relation between the completeness manipulation and decisions regarding the poster choice and number of posters chosen, or even treat it as a moderating variable?

In the studies presented in Chapter 3 outfits were introduced as means to symbolic compensation. I wonder to what extent outfits can be treated as symbols and if they in fact are treated as such by the participants, then what do they symbolize? They may certainly make specific identities more or less salient but is this sufficient to serve as a means for symbolic compensation? For example, if for someone the goal overlap between female and STEM identities would reside in promoting equality, fairness and social inclusion of women in STEM, then in what sense dressing code would be a valid means to this goal? Finally, what would seem to be a straightforward strategy for choosing symbolic means is to contact women in STEM and asking them directly what symbols are important for them (so running a qualitative study). Have you considered doing it or maybe you do have some pilot data on this topic that you could share?

3) The next question is about the experience of incompleteness. How can incompleteness be experienced in the domains of the two identity goals (women vs. STEM)? Is this experience comparable or distinct in some emotional aspects (like guilt associated with one of the goals but different emotions like anger with the other)? Would some additional reanalyses be possible to conduct to find out what these emotional profiles based on the data you collected are (i.e., more refined analyses that contain the results for specific affective states measured with the PANAS in Study 2, also considering experimental conditions and time of measurement at t0, t1 and t2)? Or perhaps a qualitative analysis of what participants wrote in response to the manipulation (they were asked to describe feelings and thoughts) would be possible? Linguistic analyses that you used might also help to tear apart emotional categories, not only verbs that indicated action involvement.

This question touches upon a related issue of whether incompleteness can be experienced as a threat. If so, then what type of threat (to identity or agency motives)? Could for some female participants imagining that STEM identity goals were not completed induce a similar state like a stereotype threat manipulation? A content analysis might help to reveal whether anxiety, fear and frustration, which might indicate a sense of threat, are reported in the incompleteness condition. Also, can incompleteness induce passivity and withdrawal (instead of action orientation) for some individuals who experience it as a threat, not challenge?

4) Regarding the goal compensation process itself: What do you think about a compensation process of goal incompleteness via engagement in specific actions (individual or collective) aimed at promoting higher level goals (in the goal system hierarchy)? For example, engagement in science can be based on a focus on benefits for the society or a focus on personal growth and self-enhancement. Would you consider engagement in specific actions aimed at boosting personal or group agency as an example of a symbolic compensation process or rather as a (non-symbolic but direct) engagement in goal compensation or pursuit?

5) Relatedly to the previous point, compensation effects might also occur between the communal (feminine) and agentic (STEM) dimensions of social perception. Some women might prefer to choose more STEM stereotypical outfits to boost the agentic (vs communal) aspect of their identity. Do you think that it is likely that in your research women working or studying in STEM might have shown this type of compensatory effects between the two dimensions of social perception (e.g., choosing outfits that seem unifinal for the STEM self-categorization but also serve the goal of boosting the agentic part of the female identity)?

I would like to invite you to address also some minor, more specific or even technical questions:

- How would you interpret the lack of interaction effects (including time, compensation and identity goals) for the emotion of pride in Study 2? Could it be that the study was underpowered for such and complex design and analyses plan or could it be also due to some other issues?
- Could you say something more about the sample recruited via Prolific in Study 3? Were these STEM students or researchers, or both?
- What does the email sending dependent variable applied in Study 3 indicate? It looks like an interesting behavioral outcome measure. Would perhaps asking for sending the posters back to the participant (to use it as a decoration of their own desktop etc.) be also a possible direct measure of involvement?
- Regarding the interpretation of the Study 5 results: Identity goal overlap was not related to the choice of a multifinal outfit but to the evaluation of the chosen outfit as multifinal or unifinal. Does this finding support the symbolizing idea or is it rather the case of perceiving certain objects (symbols) consistently with one's identity? So, those who have a more integrated, dual identity perceive and evaluate outfits as more multifinal? Would it be possible that some kind of projection process of certain attributes important for one's identity is taking place here?
- Why was there no relation between sense of belonging overlap and imposter syndrome in Study 6? Could you elaborate a bit more on this?
- The relationship between overlap and imposter syndrome for women was not significant in Study 6, suggesting that the goal overlap does not significantly

predict the imposter syndrome. Why, apart from the sample size and lack of variance that you already discuss, could it be happening in this study? Is it possible that a goal overlap is not enough and there has to be also a lack of conflict or even a presence of congruence and balance between goals activated to have an impact the occurrence of the imposter syndrome?

Conclusion

In sum, Ms. Sadia Zaman (MA) is addressing in her doctoral dissertation a series of original and novel research questions, approaches them from an interesting and integrative theoretical perspective, revealing very high methodological and analytical skills across five empirical studies. She also shows high abilities in the interpretation of the findings and the discussion of limitations of the presented research. The dissertation is also very well-structured and written and follows current open-science practices. In my opinion, this dissertation fully completes the statutory requirements for doctoral theses set by the Polish Ministry of Science and Higher Education. Therefore, I recommend that the Doctoral Candidate – Ms. Sadia Zaman (MA) – will be admitted to the subsequent stages of the doctoral procedure.

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