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REJOINDER

Response to comment on “Chemosignalling effects of human tears revisited: Does exposure to female tears decrease males’ perception of female sexual attractiveness?”

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Gelstein et al. (2011; Gelstein) reported dampening effects of sniffing emotional female tears on males’ ratings of attractiveness of female faces in pictures (Study 1); reduced self-reported sexual arousal, physiological arousal, and salivary testosterone levels after a sad movie presentation (Study 2); and reduced activation of brain areas relevant for sexual arousal (Study 3). The authors concluded that “women’s emotional tears contain a chemosignal that reduces sexual arousal in men” (p. 230). Gračanin, van Assen, Omrčen, Koraj, and Vingerhoets (2016; Gračanin) conducted three conceptual replication studies and extensions of Gelstein’s Study 1, by including different pictures, an additional experimental condition (sniffing reflex tears), and additional dependent variables. All three studies, separately or combined in a meta-analysis, failed to demonstrate Gelstein’s inhibitory effects of tears.

Sobel criticises our work using the following main arguments: (i) he emphasises the importance of the same experimental context as in the original study, that is, “the sad context”, and he stresses the numerous design and procedural differences of Gelstein and Gračanin; (ii) The effect observed by Gelstein can also be found when re-analysing subsets of Gračanin’s data. Our response to Sobel’s comment first addresses theory and the role of replications in science, then continues with addressing Sobel’s two main arguments, and ends with our conclusion.

Generally, a causal theory should state that “under conditions X, it holds that if A then B”. Relevant to our discussion in particular and evaluating results of replications in general are conditions X, which are called

scope conditions. Suppose an original study concludes that “if A then B”, but fails to specify conditions X, while the hypothesis was tested under condition X_O. The replication study subsequently tested under condition X_R and concludes that “if A then B” does NOT hold. Leaving aside statistical errors, two different conclusions can be drawn. First, the theory holds in condition X_O (and perhaps many other conditions) but not in condition X_R. Second, the theory is not valid. We argue that the second explanation should be taken very seriously, and we see two problems with the first conclusion. Foremost, the stipulation of conditions under which the theory holds after subsequent replication(s) is ad hoc, which resolves the contradiction of original and replication study in an unscientific way (Lakatos, 1970, 184). One may consider it “theory-hacking” analogous to *p*-hacking. We therefore refer to Lakatos (1970), and recommend researchers to list the scope conditions of a theory a priori. Additionally, the combination of low statistical power, biases in conducting research, and a low pre-study probability of a theory being true makes it likely that reported positive evidence in favour of a theory is actually false (Ioannidis, 2005). To conclude, we argue that considering conflicting evidence as evidence that a theory does not hold makes more sense than the ad hoc stipulation of conditions under which the theory holds.

What seems remarkable and inconsistent is that Sobel regards some of our as well as Oh, Kim, Park, and Cho’s (2012; Oh) findings as strong support for his theory, despite the fact that there was no sad context present in these studies. Apparently, in case of a failure to find corroborating results, the sad

context is regarded crucial, but if some of our and Oh's findings point in the same direction as his original findings, the lack of sad context and exact procedures are no longer important issues. And more generally, we wonder about the ecological validity and the biological significance of Gelstein's findings, if an effect of female tears on male's behaviour can only be observed in a sad, sterile laboratory setting after exposure to an extremely high dose (multiple, deep inhalations) of substance X, only with pictures of not too attractive women as stimuli. How can we expect that this might ever have (had) a significant impact on male's everyday sexual functioning?

Sobel concludes that we did not dig very deep in our data to probe for a possible effect. That is true. We did not try to dig at all. Our aim was to test if human emotional tears act as a social chemosignal, using a different research methodology and with more statistical power than the original study; we were not on a fishing expedition. Finally, a meta-analysis on our four studies (after splitting the two samples of Study 2 as suggested by Sobel) still does not yield a significant effect ($g = 0.037$, $z = 0.50$, CI interval from $-.11$ to $.18$).

To summarise, we concluded:

Being aware that our studies do not provide a definitive answer, we nevertheless feel that there is now sufficient reason to conclude that, if there is any substance in

females' tears that has a dampening effect on the sexual arousal of males, this influence is very modest at best and certainly does not always impact every male in his sexual functioning. (p. 11)

Sobel's critique of our work does not provide any convincing reasons to change this conclusion.

Disclosure statement

No potential conflict of interest was reported by the authors.

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