Answers to recommender's comments.

Thanks for all the comments and suggestions. All suggestions have been incorporated, and a new figure in the supplementary has been added as suggested (see track-change version). Answers to more developed comments (in bold) are detailed below.

Pages 8. This paragraph is a bit confusing. First you talk about your methodological developments (that are lacking from the Methods section) and then you hang on the statistical approaches. I understand that you need to derive the relationship between birth rank and population fecundity on order to test whether birth ranks of different classes of individuals differ. However I think this paragraph needs to be broken up into one about the derivation of the relationship to generate your null hypothesis and 2, a second paragraph about the data analyses. [second comment on the same point , p. 9] **This needs to be (slightly) expanded and given a new paragraph about your analytical methods. These "two approaches" come as a surprise. The reader does not know what they are two approaches for. If I understand they refer to analyses of the population and individual data, which is rather different from the "methodological advances". Why are these things in the same paragraph?**

We presented differently the paragraph, and suppressed the mention to the confusing "two approaches". Hopefully, the structure is cleared in the edited version. The methodological development is now present in the Methods section.

Page 10. **You fail to mention your methods for the methodological developments. At least send us to the Appendices and state here that you developed models to generate null hypotheses for the analyses to come or something like that. As it stands we get a bunch of results for which there are no corresponding methods.**

As short section on methodological developments is now presented in the Methods section.

Page 16. What you draw here is the sexual orientation of a male if he had been firstborn, no?. For AE you multiply the p0 by 2 or 3 before drawing I think, and for FBOE you determine his sexual orientation from his birth rank after drawing his orientation if he had been firstborn. I appologise but I find your description here rather unclear.

The text of this paragraph has been modified to increase clarity.

Page 16. why don't you include this in Table S1?

This has been added in Table S1.

Page 16. We are in the results section here. Do you present these results anywhere? In fact most of this paragraph reads like Methods and not Results.

Yes, this is indeed correct. This paragraph has been moved to the Methods section. The results corresponding to these methods are described at the end of the "Aggregated family data", paragraph starting with: "*Data simulation was used to decipher which phenomenon could generate such a higher slope for the relationship between mean number of sons and mean birth rank of men among brothers for homosexuals.*"

Page 22. "**OK ... I am having trouble understanding where these values come from or I am having trouble with your notation. As far as I understand alpha is always 2, so p0 here is 0.28.**

I really thought that p0 was drawn from a binomial distribution with p0=0.05 (page 16). Is this really p0 or is it the probability that a sampled individual is homosexual?"

Alpha and p_0 (as well as others parameters such as beta, c1, c2, etc) are here estimated from the population data, and their values are presented Table 3.
In other parts of the paper, when population samples are generated (e.g. to verify equation (2)), sexual orientation of the first born was drawn from a binomial with parameter p_0=0.05. The same name (p_0) is used, because this variable refers to the same concept, despite that it is estimated in one case (Bayesian modelling), and given in the other (simulation).
The presentation of p_0 was indeed unclear here, it is now indicated (page 15, material and methods, section Bayesian modelling) that it is the probability to sample an homosexual among the first born individuals in the dataset. This precision is repeated in the result section, page 22, so that it should be clearer.

Page 25. "It would be nice to see these results."

An additional figure as been added to display those results (see new figure S3).

Page 25. « *Do the data bear this out? My impression is that you find no evidence that having more older brothers, i.e. more than one - there is an effect of having at least one older brother - really leads to higher probabilities of homosexuality. That the same effects will be more VISIBLE in larger sibships, perhaps, but that the effects are STRONGER? I do not think the data show this* »

This section was indeed insufficiently explained, and has been thoroughly edited. Whether FBOE is stronger or not when fertility increases is now clearly explained.

Page 26. « I note here that your parameter values in your simulations are rather extreme, with a=0.2 and a1=0.4 such that all males with 5 older brothers or more are homosexual under the linear model and 40 % of males with at least one older brother are homosexual under the threshold model. «

These simulation were not intended to reproduce exactly the observed data, but just to evaluate which effect affects the slope of the regression line between mean birth rank and mean fertility. These values used in simulation (cf. Table S2) are not necessarily extreme. For example, from the aggregated data, the estimate was a = 0.24, see Results. For the Indonesian dataset, a1= 0.155, see Table 3). Anyway, the section "*The shape of the older brother effect remains elusive*" has largely been edited, and comments on the linear relationship between number of older brother and probability of being homosexual have been added.

Figure 1. « *I am perplexed by this figure. For both f5 and f7 the probability that a sampled male is homosexual should be p0 when there are no older brothers (or sisters). I thought that p0 was 0.05 ». « do you really expect half of all men to be homosexual? I had understood that p0 was 0.05. Why is the expectation here 0.5?* »

The expected value is not p_0, because an equal number of homosexuals and heterosexuals are sampled (thus the expected value of the ratio is indeed 0.5), as explained in details in the Results (section « Simulating SBOE and FBOE »). For clarity, this is now indicated in the figure legend.

Figure 4. **Why is this figure rectangular and not square? Why is the x-axis so long? Do we not see the (small) variation on the x-axis if if is shorter?**

The figure is now square.