**Castration meta-analysis: Questions and proposal for analysis**

**Does sterilization increase survival?** This would be predicted if investment in reproduction reduces lifespan.

1. Test across the whole dataset with Control versus Treatment survival data (both %percentage survival and mean/median lifespan).
2. Does this effect differ according to sex?
   1. There are various hypothesizes that would predict the responses to be different in each sex. Testosterone is hypothesized to reduce male lifespan to that of females, so castration and loss of testosterone should increase lifespan in this sex. In females, it is often suggested that ovarian hormones lead to longer female lifespan, so females that are ovariectomized should have a shorter lifespan. Alternatively, in females, particularly in the wild, there may be beneficial effects of sterilization because it removes the trade-offs associated with reproduction after fertilization in this se.
3. Does environment moderate this effect? – Stronger effects may be expected in wild conditions where trade-offs are exposed. This might also be an appropriate time to break down individual effects in different clusters of species, e.g. laboratory rodents, cats and dogs, and humans. These individual comparisons will be of interest to people.

**Does the type of sterilization influence lifespan extension?** Only castration and ovariectomy remove gonadal hormone production, so these manipulations should have a stronger effect on lifespan than sterilization that does not interfere with gonadal hormone production (e.g. tubul-ligation or hysterectomy). All studies of males except for one uses castration, so this is not relevant, but in females we will want to compare whether ovariectomy has a different effect than hysterectomy and tubul-ligation.

**Does sterilization reduce the sex-difference in survival?**  Sex-differences in survival are often attributed to sex-differences in gonadal hormone production. As a consequence, removal of gonads should reduce the sex-difference in survival. Where studies have presented data on the survival/lifespan of the opposite sex in a comparable manner (e.g. within the same study, assessed in the same way), I have included this data as an extra column. We can test whether the sex difference in survival is reduced when individuals are sterilized (e.g. the comparison between treatment group and opposite sex group should be smaller than the comparison between the control group and opposite sex group).

**Does age at sterilization influence change in survival?** Some studies have suggested that age at sterilization can influence the change in survival, particularly whether it is conducted pre- or post-puberty. We can test whether age at treatment influences change in survival. Haven’t worked out the best way to code age at sterilization to make it comparable across species. Could split studies into prepuberty, at puberty and post-puberty. Can also do a correlative analysis within mice and rats with the actual age at surgery and change in survival.

**Meta-data (not obvious ones)**

**Control treatment**: what was done to the controls, i.e. was a sham surgery undertaken or are we comparing simply to an intact group

**Duration of treatment:** This is only relevant to those that were treated with a non-permanent contraceptive

**Shared control:** This factor accounts for whether the control data is used twice for two different comparisons (e.g. two different ages at treatment), in which case they have the same number. I also used this if the same treatment data is used twice (e.g. if castrated lifespan is compared against both intact animals and those that have gone through a sham surgery).

**Opposite sex lifespan:** This value is present if there is an opposite sex survival variable (for example females) available to compare the treatment effect (e.g. effect of castration in males).

**Lifespan unit:**