**Xylitol Gum and Tooth Caries**

**Literature Activity**

The goal of this activity is to practice interpreting the results of survival analyses in the literature.

First, skim through the article:

“A Practice-Based Study on the Effect of a Short Sucrose/Xylitol Exposure on Survival of Primary Teeth Caries Free” by Anttonen et al., which you can find using the “**Access Course Readings: Library Reserves**” link near the top of the Moodle course site.

Then go back and read the article carefully, looking for the answers to the following questions.

**RESEARCH QUESTION AND FINDINGS**

1. State in your own words the authors’ primary scientific question.
2. State in your own words the authors’ primary finding.

**METHODS**

1. What sampling method and study design was used for this study? (e.g., Was it observational or experimental? Random sample? Control group? Randomized? Blinded?)
2. What were the treatments used in this study and approximately how many pieces of gum is that? How often and for how long were the treatments administered?
3. Do you think that the treatment amount and duration seems reasonable given that the participants were preschoolers? Explain.
4. *Exactly* how is the event of interest defined? Where in the article does it say this?
5. Is the event determined at the person-level or the individual tooth-level? How do you know?
6. How is time zero defined for a given child (e.g., starting date)?
7. If a tooth survived to shedding, did it count as having the event of interest?
8. How long were the children followed?
9. What was the follow-up rate? Is this a high or a low rate?

**RESULTS**

***Table 1***

Let us assume for purposes of this class that the variable *d* listed in Table 1 refers to the number of teeth in which caries lesions (cavities) were observed.

1. What was the *overall* effect of xylitol gum (relative to sucrose gum) on the number of decayed teeth (i.e., (mean *d* for xylitol) – (mean *d* for sucrose)?
2. Is the overall effect of xylitol gum beneficial or harmful? Explain your reasoning.
3. What was the effect of xylitol gum on number of decayed teeth among the subset of children who tested positive for streptococcus mutans (sm) (i.e., (mean *d* for xylitol sm+) – (mean *d* for sucrose sm+)?
4. What was the effect of xylitol gum on number of decayed teeth among the subset of children who tested negative for sm (i.e., (mean *d* for xylitol sm-) – (mean *d* for sucrose sm-)?
5. Does it surprise you that the effect of xylitol gum on number of decayed teeth changes *direction* in the subset groups? [This isn’t unusual. When it happens, the two variables (sm level and gum type, in this case) are said to ‘interact’. The effect of the one variable depends on the level of the other variable.]

***Figure 2***

1. What do the two curves represent? Why do the curves not drop to 0% by age 11 years?
2. For Figure 2a specifically, guesstimate the survival in each treatment group at 11 years. How different are the numbers? We won’t talk about formal ways of comparing survival curves until a later unit, but for now: Look at the plot in 2a, along with the plots in 2b,c, and d. Are the differences in survival in the two treatment groups large enough to convince you that the xylitol gum treatment really works better than the sucrose gum control?

***Figure 3***

1. What do the four curves represent? Which group has the best survival? Which group has the worst? Does xylitol improve survival in the sm- group? In the sm+ group?
2. Look specifically at Figure 3d. Is there evidence of a difference between the xylitol-SM+ group and the sucrose-SM+ group here?
3. The authors state that they tested whether the sucrose-SM+ group differed from the other three groups put together. Why do you think they did the testing that way? Do you think that if they had tested whether xylitol-SM+ differed from sucrose-SM+, they would have come to the same conclusions (especially for Figure 3d)? Given the serious implications of this study (see below), which comparison do you think is more appropriate?

**LIMITATIONS**

1. What limitations to the primary finding do the authors discuss in the article? What other potential limitations (if any) do you see in their study?
2. Does it surprise you that chewing gum five times a day for two months would have such a noticeable effect on tooth decay years later? Explain your reasoning.
3. Xylitol gum may have a beneficial effect relative to sucrose gum. Does this article give us any indication about whether xylitol gum is beneficial relative to doing nothing at all (no gum)?

**IMPLICATIONS**

1. What are the implications of this article for future clinical trials of the effect of xylitol on tooth decay? What about for the effect of xylitol on acute otitis media? Xylitol gum may have a beneficial effect in both cases, relative to sucrose gum, but there appear to be ethical issues with using sucrose gum as a control. Are there other possible control treatments that could be used? Or is it now impossible to conduct any further tests of the effects of xylitol gum due to ethical concerns?

***OPTIONAL*: AUTHORS, FUNDING, AND JOURNAL**

1. How qualified and reputable are the authors? How reputable are their institutions?
2. Who funded this study? Are there any potential conflicts of interest?
3. How recently was this article published? In what journal was this article published? Is it peer-reviewed? How does this journal rank in reputation among the journals in this field? [See <https://www.lib.umn.edu/researchsupport/impact/journals> for information about assessing the rank of a journal.]