

Does Tylenol Cause Autism?

Isolated statisticians 9/27/2025

Schield's post on isostat@oberlin.edu

Cornfield conditions: Why is there no mention of the necessary conditions for a measured confounder to nullify or reverse an observed association? In the 1950s, statisticians noted that smokers were about 10 times as likely to die of lung cancer as non-smokers. Fisher, a smoker -- but a very intelligent smoker -- presented data from a twins registry showing a connection between the type of twinship (fraternal vs identical) and smoking preference. This data supported the idea that a genetic factor might provide a common cause for smoking and for dying of lung cancer. Cornfield, a history major, noted that although there was no statistical test for confounding, there was a necessary condition for a measured binary confounder to nullify or reverse an observed two-group association. In simplest terms, the confounder had to be bigger than the binary predictor. The weaker the binary predictor, the more likely that unobserved confounders could nullify or reverse the association. Fisher's twins' data involved a relative risk of less than 2 -- much, much less than Cornfield's RR of 10. Fisher never replied to Cornfield's rejoinder.

Tylenol Effect Size: Suppose that the hazard ratio in this case is 1.05. The fact that this ratio is statistically-significant is mildly interesting. But this extremely small effect size makes this evidence all but irrelevant in warding off confounding. [Although hazard ratio and odds ratio measure different things in different kinds of studies, their ability (or inability) to ward off confounders as a function of their effect size is very similar. For very small effect sizes, the odds ratio and relative risk are almost identical.] For more on the Cornfield conditions, see Schield (2018). <https://statlit.org/pdf/2018-Schield-ICOTS.pdf>

Conclusion: Confounding is the elephant in the room in statistical education. It has been almost a quarter of a century since Rubin, Pearl and Schield received a major grant to focus on causal inference in observational studies with emphasis on teaching this at the undergraduate -- introductory -- level. For an overview of the absence and presence of confounding in statistical education, see Schield 2019: <https://statlit.org/pdf/2019-Schield-ASA.pdf>

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