Methodological Biases in Meta-analytic Techniques: Investigating the Impact of Different Types of Drinker Misclassification Errors on Risk Estimates in Alcohol-disease Associations

Dr. Cornelia Zeisser

University of Victoria

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Abstract

Background: Statistical analyses have linked alcohol consumption to various disease outcomes. Few prospective analyses of the relationship between drinking and health have controlled for drinker misclassification errors. It has been shown that including former or occasional drinkers with the abstainer reference group creates a bias that can exaggerate protective effects against certain diseases from low risk drinking. We explored the potential impact of such methodological biases on the magnitude of risk estimates in the alcohol-breast cancer relationship.
Methods: Meta-analyses of population case-control, hospital case-control, and cohort studies to examine relationships between alcohol use and breast cancer and the potential impact of different types of drinker misclassification errors.
Results: Of 57 included studies, 5 controlled for former drinker bias, 28 for occasional drinker bias, and only 7 controlled for both biases. We clearly demonstrate that failure to rigorously eliminate drinker misclassification errors in statistical analyses distorts risk estimates in the meta-analytic outcome. Specifically, our results highlight that only when all types of drinker misclassification error are rigorously controlled, even so called 'low risk drinking' carries significantly increased risk for breast cancer.
Conclusions: We strongly recommend that statisticians report and use separate risk estimates for occasional or infrequent drinkers, apart from low risk drinkers, as a preferred and more rigorous way of measuring alcohol consumption. This would allow for more valid comparisons to the reference group in future analyses of the alcohol-disease relationship.

Key words: meta-analysis, methodological bias, misclassification errors, risk estimates