Commonly used tests for treatment effect in kx2 frequency data are Poisson regression, negative binomial regression, and Cochran-Mantel-Haentzel. In practice, Poisson regression or CMH is used as default, and NB regression is used only when there is reason to believe the data has overdispersion beyond what is expected of Poisson counts.

This study shows that the Poisson regression is sensitive to the Poisson assumption, and does not maintain its size in the presence of overdispersion. In particular, it tends to interpret overdispersion as significant treatment effect. Thus, there is a need for a reliable pretest for the Poisson assumption. A commonly used diagnostic for overdispersion is a Wald test of the estimated overdispersion parameter, however this has convergence problems. This study proposes a simpler Hogg-type diagnostic that has no convergence problems and is easy to compute.