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**Judgment of association between potential factors and associated risk in  $2 \times 2$  tables: a study with psychology students.**

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Summary: This study was aimed to evaluate the accuracy and strategies used in the estimation of association between potential factors and associated risks when data are presented in  $2 \times 2$  tables. A sample of 414 undergraduate Psychology students from three different Spanish universities was given three different tasks (direct and inverse association and perfect independence) where they had to estimate such association. Most participants judged association in the task where there was perfect independence, but the data contradicted the students' previous expectations. The estimation of association was consistent with the perception of association and the accuracy of estimates increased with correct strategies. Our participants performed worse than secondary school students in a previous study and we found no difference in the three participating universities. We classify the students' strategies in the tasks in levels of complexity and explain the incorrect strategies using the idea of semiotic conflict.

*Classification:* K75 K95 D75

*Keywords:* risk; stochastics; probability theory; statistics; university teaching; research; perception of risk; risk factors; perception of association; independence; 2-way tables; semiotic conflicts; psychology students; student errors; misconceptions; problem solving strategies

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