

A researcher is concerned with the possible effects of marital status on the academic progress of college students. Do married students, with their extra burden of family responsibilities, suffer academically as compared to unmarried students? (Or: Is academic performance dependent on marital status?) A random sample of 453 students is gathered, and each student is classified as either married or unmarried, and—using grade-point average (GPA) as a measure—as a good, average, or poor student. Results are presented in Table 12.5.

H_0 : The variables are independent

TABLE 12.5 GRADE-POINT AVERAGE (GPA) BY MARITAL STATUS FOR 453 COLLEGE STUDENTS

GPA	Marital Status		Totals
	Married	Not Married	
Good	70	90	160
Average	60	110	170
Poor	45	78	123
Totals	175	278	453

observed $f_e = \frac{\text{row margin} \times \text{column}}{N}$

61.8	98.2
65.7	104.7
49.5	75.5

$$\chi^2 = \sum \frac{(f_o - f_e)^2}{f_e}$$

$$= \frac{(70 - 61.8)^2}{61.8} + \frac{(90 - 98.2)^2}{98.2} + \dots = 2.99$$

$\chi^2_{(critical)} = 5.991$
when $DF = (r-1)(c-1) = (3-1)(2-1) = 2$
 $\alpha = 0.05$

Fail to reject H_0 $\chi^2_{(obs)} < \chi^2_{(crit)}$