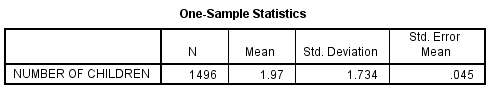
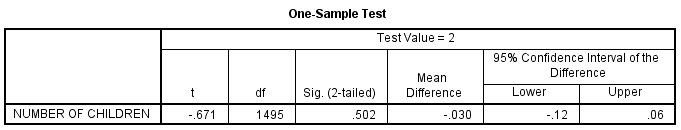
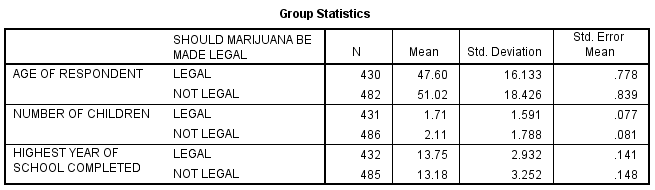
**Chapter 8: SPSS Solutions**

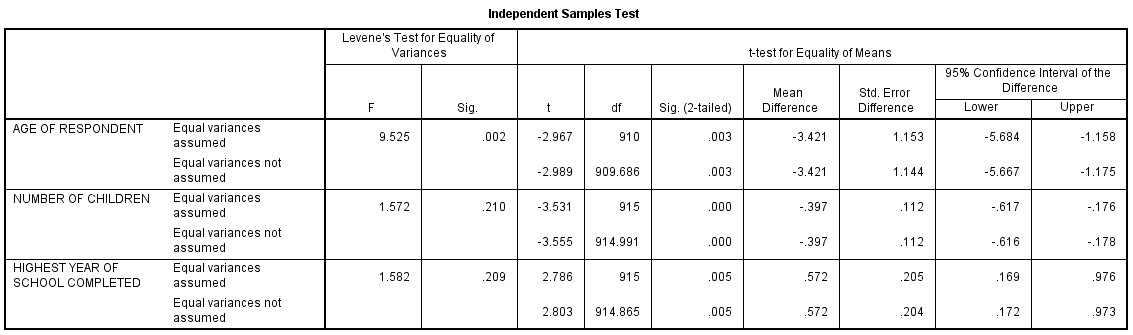
1. With a statistic of –.671 and p value of .502, we find that Americans (those included in the GSS 2010 survey) do not have 2 children or more. The average number of children reported was 1.97.



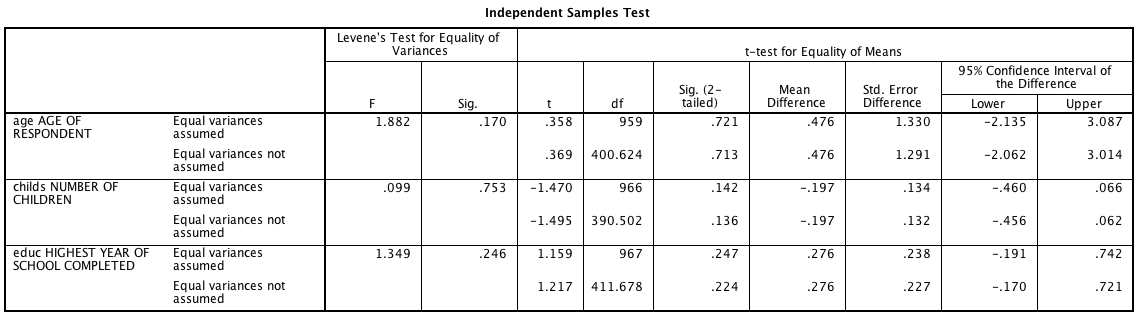
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2. We would reject the null hypotheses for all three variables, because the p-levels for a two-tailed test (.003, .001, and .005, for age, number of children, and education, respectively) are all smaller than the specified α level of 0.05. Those who think that marijuana should be legal are younger (47.60 vs. 51.02 years), have less number of children (1.71 vs. 2.11 children) and have more education (13.75 vs. 13.18 years) than those who think marijuana should not be legal.

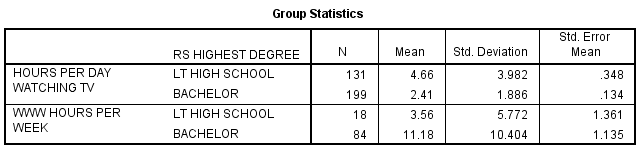


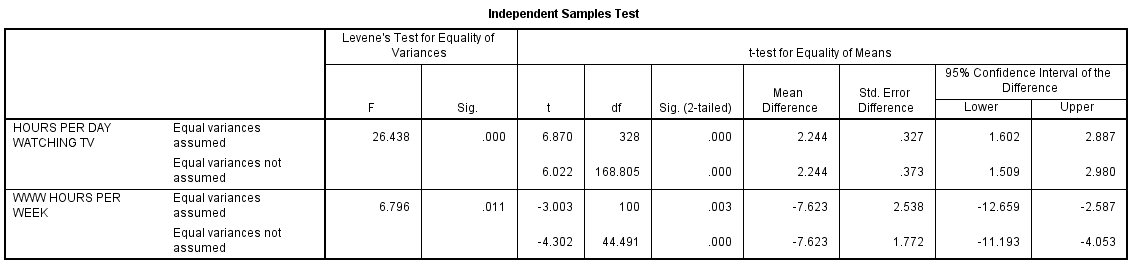


3. In contrast to Question 2, none of the t-test models are significant. For all of the models, we would fail to reject the null hypothesis. There is no significant difference in age, education, or number of children between those who favor or oppose gun permits.



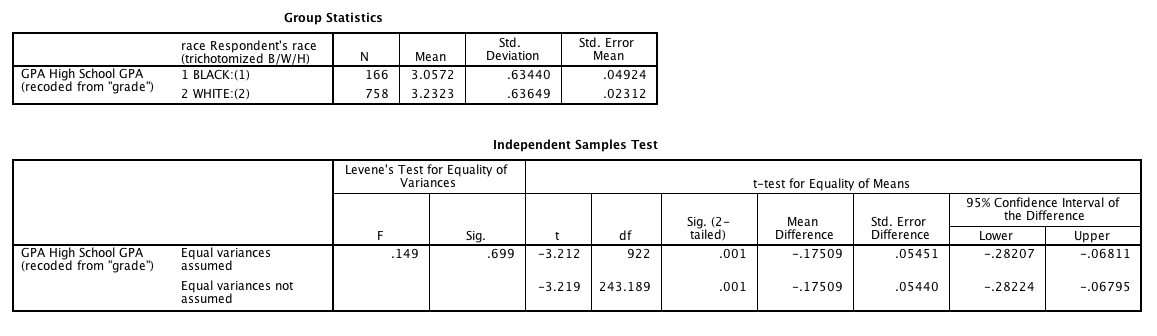
4. Both of the models are significant. Those with a less than high school degree watched more television per week than bachelor’s degree respondents (t=6.022,p=.000). Those with a less than high school degree spend less time on the internet than bachelor’s degree respondents (t=-4.302, p=.000). Note that we use t-obtained from the equal variances not assumed line.





5.

For white vs. black students. GPA is significantly lower for black students (3.06 vs. 3.23, for white students). The t-obtained is -3.212, significant at the .001 level. We would reject the null hypothesis.



**Chapter 8 – Answers to Exercises**

Please note that in this chapter, small differences in calculations may occur between student results and those listed below due to rounding.

1. a. *H*0: *Y* = 13.5 years; *H*1: *Y* < 13.5 years.

b. The Z value obtained is -4.19. The P value for a Z of -4.19 is less than .001 for a one-tailed test. This is less than the alpha of .01, so we reject the null hypothesis and conclude that the doctors at the HMO do have less experience than the population of doctors at all HMOs.

2. a. The research hypothesis is a one-tailed left test.

b. Z = -2.50. The one-tailed probability of -2.50 is .0062. Comparing .0062 to our alpha, we reject the null hypothesis of no difference. We conclude that a significantly higher proportion of second-generation Asian Americans (55%) have a bachelor’s degree or higher compared with first-generation Asian Americans (50%). The 5% difference is significant at the .0062 level.

3. a. Two-tailed test, 1  $50,054; null hypothesis, 1 = $50,054

b. One-tailed test, 1 > 3.2; null hypothesis, 1 = 3.2

c. One-tailed test, 1 < 2; null hypothesis, 1 = 2

d. Two-tailed test, 1  2; null hypothesis, 1 = 2

e. One-tailed test, 1 > 2; null hypothesis, 1 = 2

f. One-tailed test, 1 < 2; null hypothesis, 1 = 2

4. a.

For research problem a: Type I error would be to conclude that your state's average household income is different from the national average when it is not. Type II error would be to conclude that your state's average household income is the same as the national average when it is actually different.

For research problem b: Type I error would be to conclude that students at small liberal arts colleges attend more parties than the national average when they do not. Type II error would be to conclude that students at small liberal arts colleges attend the same number of parties as the national average when they actually attend more.

For research problem c: Type I error would be to conclude that elderly women have lower income than elderly men when they do not. Type II error would be to conclude that elderly women have the same income as elderly men when they actually have lower incomes.

For research problem d: Type I error would be to conclude that on-campus and off-campus students study for different amounts of time when they do not. Type II error would be to conclude that on-campus and off-campus students study for the same amount of time when they are actually different.

For research problem e: Type I error would be to conclude that the reading scores of third graders in an accelerated reading program are higher than those of nonenrolled third graders when they are not. Type II error would be to conclude that the reading scores of third graders in an accelerated reading program are the same as those of nonenrolled third graders when they are actually higher.

For research problem f: Type I error would be to conclude that adults with dogs have lower stress scores than non-pet owners when they do not. Type II error would be to conclude that adults with dogs have the same stress scores as non-pet owners when they are actually lower.

b. Making a Type I error means rejecting the null hypothesis when it is, in fact, true. Since in most research the hypothesis of interest is not the null hypothesis, the implication of making a Type I error is to conclude that one’s hypothesis is correct when it is not. Making a Type II error means accepting the null hypothesis when it is actually false. Thus, a type II error leads you to reject a potentially valuable hypothesis or theory.

c. Making a Type II error might seem to be a less serious error, but in studies of new drugs and procedures in medicine, rejecting a potentially valuable new procedure has serious consequences. If an illness is very severe and life threatening, then Type II error might be minimized for a drug or procedure that cures that illness. On the other hand, if a drug has serious side-effects, it might be best to minimize Type I errors so that we are very sure that the drug has a positive side effect on an illness – the research hypothesis – before administering it to patients. Balancing Type I and Type II errors is an important consideration in any study based on samples.

5. a. 

b. The t-obtained is 48.32. and its P level is <.001.



c. We conclude that we can reject the null hypothesis in favor of the research hypothesis. There is a difference between the mean age of the GSS sample and the mean age of all American adults. Relative to age, the GSS sample is not representative of all American adults (the GSS sample is significantly older).

6. We rely on the t-statistic for equal variances assumed. The t-obtained of 3.614 is significant at the .000 level. We reject the null hypothesis and conclude that black students first tried alcohol at a later grade than Hispanic students. The difference of .96 grades (5.74-4.78) is significant at the .000 level.

7. a. The appropriate test statistic is Z for proportions.

b. Z obtained is -5.00, P <.0001. Since P(.0001)<.05, we reject the null hypothesis. This indicates that there is a statistical difference between conservatives and liberals on their views on affirmative action. Liberals are more likely to support affirmative action policies in the workplace than conservatives.





c. If alpha was .01, there would be no change to our final decision (.0002<.01).

8. T-critical for a one-tailed test (alpha = .01) is 2.326, larger than the t-obtained of .757. We would fail to reject the null hypothesis of no difference between males and females and their internet use.

9. a. “Less than” indicates a one-tailed test.

b. Z = -3.00 with a significance of .0014. We can reject the null hypothesis and conclude that the proportion of males who support President Obama is significantly less than proportion of female voters who support the President (.49-.58 = .09).



c. The significance of -3.00 is less than .01 (.0014 < .01). The decision to reject the null hypothesis does not change.

10. a. Since no direction is implied in the problem, we’ll use a two tailed test: H0: π1 = π2; H1: π1 ≠ π2.

b.





The probability of obtaining Z(1.80) is .0359x2=.0718. P is larger than our alpha of .05, so we

fail to reject the null hypothesis.

c. The probability of obtaining Z (1.80) is larger than .01. We would still fail to reject the null hypothesis.

11. a. The t-obtained = -1.17. We fail to reject the null hypothesis. Based on 123 degrees of freedom, the t-obtained is less than the t-critical of 1.658.





b. The t-obtained = 3.23. We reject the null hypothesis. Based on 355 degrees of freedom, the t-obtained is larger than the t-critical of 1.960. High school graduates spend more hours per week watching television than college graduates. The difference of .84 hours (3.25-2.41) is significant.





12. Based on the reported t obtained of 8.424 (equal variances not assumed), we reject the null hypothesis. The probability of obtaining this t-statistic is .000 (less than our alpha of .05). Based on the reported means, we know that on average, men have their first child at an older age than women. The difference is 3.36 years - 25.78-22.42.

13. Based on the t-obtained of -8.593 (equal variances assumed), we reject the null hypothesis. The probability of obtaining this t-statistic is .000 (less than our alpha of .05). Respondents with a high school degree have their first child at a younger age than respondents with a bachelor’s degree. The age difference between the two groups is 4.09 years (22.66-26.75).

14. a. The obtained z-test is -2.33.



The probability of obtaining this z-test statistic is .0198 (.0099 x 2), less than our alpha level. We reject the null hypothesis and conclude that there is a significant difference in the proportion of homeowners between first generation and second generation Hispanic Americans. There is a lower proportion of home ownership among first generation Hispanic Americans than second generation Hispanic Americans (.43-.50=.07).

b. The obtained z-test is 3.50.



The probability of obtaining this z-test statistic is .0004 (.0002 x2), less than our alpha level. We reject the null hypothesis and conclude that there is a significant difference in the proportion of homeowners between first generation and second generation Asian Americans. First generation Asian Americans have a higher proportion of homeownership than second generation Asian Americans (.58-.51 = .07).