

1.
 - a. Self-selected (volunteers) because they choose to return the survey.
 - b. Schools/children in this region could be systematically different from schools/children where the investigator does not have a working relationship with the educational leaders.
 - c. Children in the top 10% of schools may have very different perspectives from that of children in (for example) the bottom 10% of schools.
 - d. Although this is a random sample, the sampling frame excludes families without home telephones.
2. Counts describe only how the sample is divided. Proportions describe how the sample is divided in relation to the whole. This description is better for making comparisons because you do not have to know the sample size.
3. Assessing the change would be difficult if the scale did not provide a reliable measure of weight. In other words, if it varied from measurement to measurement. In order to see that the program is impacting the weight, the scale must provide consistent measurements.
4. Not every sample will result in exactly the same numerical summaries/results. Different samples give different results. If both samples are random and representative, the variation between samples is expected.
5. Power is the probability that the null will be rejected when it should. A sample size is planned by considering an expected effect size. If the effect size or the sample size is smaller, then there may not be enough power to detect a significant effect. Sometimes the observed effect is meaningful to the authors but there was not enough evidence to reject the null; so authors speculate that if the same trend was observed with a larger sample, significant results would be found.

CHAPTER 2

1.
 - a.
Median (range), box-and-whiskers plots, Wilcoxon or Mann-Whitney U test
 H_0 : The level of pain in the inpatient group has the same distribution as the level of pain in the outpatient group
 H_A : The level of pain in the inpatient group does not have the same distribution as the level of pain in the outpatient group
 - b.
Mean (SD), means plots with error bars, two-sample t -test
 H_0 : The average difference in the expression levels of those who participated in strength training versus those who did not is 0.
 H_A : The average difference in the expression levels of those who participated in strength training versus those who did not is not 0.
 - c.
Mean (SD), means plots with error bars, ANOVA
 H_0 : The true mean compliance is the same for parents who received instruction from the dentist, a paper information packet, or a DVD.
 H_A : The true mean compliance for at least one of the groups of parents who received instruction from the dentist, a paper information packet, or a DVD is not the same.
 - d.
Histogram, mean (SD), paired one-sample t -test
 H_0 : The true mean HbA1c change for type 2 diabetics is 0.
 H_A : The true mean HbA1c change for type 2 diabetics is not 0.
 - e.
Histogram, median (range), signed rank test
 H_0 : The true median change in cotinine levels is 0.
 H_A : The true median change in cotinine levels is not 0.
Note: Could also provide in terms of distribution before and after
 - f.
Box-and-whiskers plots, median (range), Kruskal-Wallis
 H_0 : All of the working environment groups come from the same population
 H_A : At least one of the working environment groups comes from a different population.
2.
 - a. ANOVA is appropriate because the investigators want to compare the **mean** NV reduction for **more than two groups** and the authors must have considered that the outcome was **normally distributed** and that the groups had equal variances
 - b. Groups are independent; the variance for the groups is constant; outcome is from a normal distribution
 - c.

H_0 : The true mean NV reduction for dry control, water rinse, hand sanitizer, and liquid soap are the same for all the groups:

$$\mu_{\text{dry control}} = \mu_{\text{water rinse}} = \mu_{\text{hand sanitizer}} = \mu_{\text{liquid soap}}$$

H_A : The true mean NV reductions are different for at least two of the groups:

$$\mu_{\text{dry control}} \neq \mu_{\text{water rinse}} \text{ OR } \mu_{\text{dry control}} \neq \mu_{\text{hand sanitizer}} \text{ OR } \mu_{\text{dry control}} \neq \mu_{\text{liquid soap}} \text{ OR } \mu_{\text{water rinse}} \neq \mu_{\text{hand sanitizer}} \text{ OR } \mu_{\text{water rinse}} \neq \mu_{\text{liquid soap}} \text{ OR } \mu_{\text{hand sanitizer}} \neq \mu_{\text{liquid soap}}$$

3.
 - a. Similar baseline (and standard deviation at baseline) between the two groups is important because it indicates that the groups started from a similar place. Because change is the outcome of interest, it is important that the groups have similar baselines so that the change is comparable
 - b. The confidence interval represents a set of plausible values for the true mean difference in change between the two groups. Because 0 is covered by this interval, it is possible that 0 is the true parameter. A 0 mean difference would indicate that the two groups have similar changes.
 - c. The difference in the HbA1c levels between the therapeutic and placebo groups is 0.12. To be able to detect a difference of this size at the chosen significance level and power, the sample size would become large.
Often we hear, "Wasn't significant, need a larger sample." But we have to consider what the effect is. In this case, there is reason to believe that such a small effect size is not clinically meaningful. In other words, a larger sample size may give a statistically significant result, but it could still be clinically insignificant
4.
 - a. One-sample, paired data that is not necessarily normally distributed
 - b. Hypothesis test is to determine whether the median change is 0. Significant p -value indicates that the median is not 0.
 - c. The authors report the mean (measure of center) and the SD (measure of spread), which is correct. However, the authors believe that a nonparametric test is necessary, implying that the median may be a better measure of center. The problem is that the authors do not include a measure of spread that corresponds to the median. The SD corresponds to the mean. The authors should report a range or an interquartile range with the median.