

# SPSS Survey Tips

**A handy  
guide to  
help you  
save time  
and money  
as you  
plan,  
develop  
and  
execute  
your  
survey**

**SPSS<sup>®</sup>**  
*Real Stats. Real Easy.<sup>SM</sup>*

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# Preface

Are you currently involved in survey research? Or, are you developing a survey for the first time? Regardless of your survey experience, *SPSS Survey Tips* is a handy guide that provides tips to help you plan, develop and execute your survey.

This booklet is divided into 16 sections that provide tips for different considerations throughout the survey process. As you read the booklet, you will see a few symbols. These symbols, described below, are designed to help you better understand the information in this booklet.



You'll see the  symbol throughout the document. This symbol signifies an illustration of a tip.

The \* indicates a word defined in the glossary at the end of this booklet.

The § indicates that the figure is based on performing a survey on a very large population, such as a national survey.

Keep *SPSS Survey Tips* by your side during the survey process and use its advice to save money, execute your survey in a timely manner, get the highest response rate and much more.

If you have any other questions about conducting or analyzing your survey, call your local SPSS office. We offer a variety of training and consulting programs to assist you.

*P.S. If you have a survey tip that you think would be helpful to other people, send it to us at:*

SPSS Inc.  
SPSS Survey Tips  
444 N. Michigan Ave.  
Chicago, IL 60611

*or call 1 (800) 543-2185*

*If we use your tip in the next edition, we'll pay you \$20.*

# Intention

Understand the reasons and background for your survey.

## 1 Define your survey's mission

Do you know why you and your organization want to conduct this survey? If so, you can use those reasons to develop your survey's mission. Once developed, you can refer to your mission throughout the survey process whenever you get stuck.

If you don't know why you and your organization want to conduct this survey, you may be collecting unnecessary data. Make sure there's a real purpose for this effort.



When questioning your organization, if you get an answer like, "we do it every year," dig for the real motivation.

## 2 Outline your research

Develop a plan to implement your mission. Be prepared to know which statistics to run, and what initial relationships and patterns you expect to find.



If you want to predict purchase patterns based on known demographic characteristics, you need to know which demographics you think may be relevant.

# Audience

You need to consider your audience before you can develop questions and format your survey.

## 3 Consider age

The age of respondents affects their ability to pay attention or their capacity to understand.



A young child may be able to pay attention to your questions for as little as five minutes or may not understand all of the content. Or, older respondents may not understand new phrases or jargon.

## 4 Consider the respondents' attention span

For telephone surveys, your audience may be unable to focus or unwilling to devote much time to an interview.



A consumer reached by telephone at home may be distracted by household activities.

Or, someone called at work may be under pressure and unwilling to give you more than 10 minutes.

## 5 Consider gender

Are any of your questions gender-specific? Make sure your phrasing is directed at the right audience and is not offensive.

# Sample size

Determining your sample size will help you decide which type of survey to use.

## 6 Consider budget (and other resources)

Can you afford a large enough sample\* size to attain useful results? Do you have the resources available to make the calls, stuff the envelopes or tabulate the results?

## 7 1,500<sup>s</sup> respondents should be your limit

There is usually no reason to survey more than 1,000 - 1,500 respondents.

Gallup pollsters consider this range a good balance between precision and cost. In fact, you will get shrinking returns on precision as the sample size goes up.

## 8 Sample size: a better rule of thumb

Base the sample size on the minimum adequate sample size of the important subgroups in the population. Many analysts suggest that there should be at least 100<sup>s</sup> cases in each subgroup. Although, if you use crosstabulations\* or some nonparametric tests\* there are procedures such as exact tests\* which work very well with small subgroups.

- If possible, know what proportion of the population (in the real world) is in each subgroup and calculate the total sample size required.
- Take into account the expected non-response rate\* of this population and increase the sample size by that factor.

## 9 Determining the appropriate sample size

One conservative formula you can use to determine the appropriate sample size, N, is



$$N = \frac{.25}{(\text{standard error})^2}$$

Where the standard error is:

$$\frac{\text{Acceptable level of error}}{z \text{ or } t \text{ distribution* coefficient}}$$

For a chosen acceptable level of error of 5 percent, the standard error would be:

$$\frac{.05}{1.96} = .0255$$

Plugging that into the rest of the equation, we can solve for N.

$$(.0255)^2 = .0006507 \quad \frac{.25}{.0006507} = 384$$

# Sampling techniques

Once you have determined the size of your sample, you can select the sampling technique that best fits your needs.

## 10 A sample versus a census\*

A sample is a part of an entire population that possesses attitudes, opinions, habits or characteristics that you wish to study. A census makes up an entire population. Consider the size of the population you're sampling, and then decide whether you want to survey a sample or a census.

## 11 Purposive sampling\*

Use non-probability\* or purposive sampling\* if you to want learn about people with special characteristics.



You want to survey males between the ages of 18 and 25 who watch television at least 10 hours a week. Make sure you include all of the relevant characteristics and weed out groups that don't fit into these requirements. Then, you can purposefully sample a group with special characteristics.

## 12 Using every "nth" name

Systematic sampling\* the easiest random sampling\* method, generates a multiple of a number: for example, every 5th, 10th or 34th name from a list. But beware of hidden patterns in your population list that could compromise the integrity of the sample. The patterns may include names sorted by:

- Frequency or recency of contact.
- Geographic origin.
- Similar company size.

## 13 Random digit dialing

Random digit dialing for telephone surveys enables interviewers to call unlisted, new and recently changed numbers.

## 14 Using more than one method

You may use more than one sampling method for your survey.



You may do a simple random sample, but purposely over-sample one stratum: households with a certain level of income. With these additional data, you can perform two studies – one on the whole population and the other on a specific subset.



You can compare a purposive sample with a control group representing the entire population.

### Method

There are two basic methods to conducting a survey: self-administered and interviewer-administered. Self-administered surveys include mail and other written surveys. Interviewer-administered surveys include telephone and in-person surveys.

## 15 Consider your budget

Telephone interviewing can be more expensive than other surveys when you consider long-distance charges, wages for interviewers and supervisory costs (in-person interviews also incur many of these charges).

Mail surveys are more economical if you have a large sample or if your sample spans a large geographical area. Although, the method of returning the survey can vary the price. By including postage on the return envelope, supplying a drop box or including a fax number for return, you can alter your cost, and affect your returns.

## 16 Consider speed

Telephone surveys are the most timely method of surveying. You don't need to wait for a response through the mail, and you can tally how many respondents you have throughout the process. The typical time frame for collecting data through a telephone survey ranges from a few days to a few weeks, whereas a mailed survey can add at least a month to the process.

## 17 Methods for long surveys

- If you must ask a lot of questions, or expect the respondent to spend an hour or more with your survey, perform in-person surveys.
- If you can't afford to perform in-person surveys, the second-best option is a self-administered survey.
- A lengthy mail survey is more likely to be completed than a 15-20 minute telephone survey.

## 18 Consider the subject matter

If questions are personal or require a lot of thought, written surveys are a good choice.

## 19 Consider the new methods

You may want to consider some of the emerging forms of self-administered surveys, including fax, e-mail, kiosk, computer-assisted adaptive and internet. They are so new that few cost comparison and response bias studies exist, but their prospects look promising in terms of speed of response and ease-of-use for respondents.

## Length

The length of your survey is dependent on the audience and type of your survey.

### 20 Consider type of survey

You need to limit the length of your survey to encourage prospective respondents to participate. Consequently,

- Telephone interviews should run no longer than 10 minutes.
- Face-to-face interviews can continue for an hour or longer.
- Self-administered surveys should not exceed 100 questions.

### 21 Balance length and information

With a shorter survey, you should get a higher response rate and should reduce the chance of error and missing data\* However, you will also get less information from your respondents and may have a less comprehensive study.

## Questions

The key to a successful survey is ensuring that your questions are concise, easy-to-understand and give you valid and reliable information.

### 22 Keep the questions short

Try to keep each question under 25 words so they remain short and easy-to-understand.

### 23 Don't lead with responses

With interview surveys, avoid beginning questions with a phrase like:

“Do you very often, frequently, seldom or never...”

Since people pay attention to what they hear first, respondents listening to a question with this structure will focus on the choices, and not the question.

### 24 Avoid loaded questions

Obviously loaded questions will discredit your results. It's easy to edit yourself and steer away from questions like:

“Many doctors recommend exercise as a way of maintaining good health. Do you agree?”

However, other questions may have more subtle errors.



Consider how responses might vary to the following questions:

“Do you think the president is doing a good job of handling foreign policy?”

Or, “Please rate how the president handles foreign policy.”

### 25 Avoid double-barreled questions

Double-barreled questions ask for opinions about two subjects at the same time.



“Are you satisfied with the amount and kind of information you receive from your benefits administrator?”

When you receive the answers, you won't know which part of the question the respondent is answering. Are they responding to the *amount* of information or the *kind* of information?

## 26 Don't antagonize your respondents

Give respondents a way out of answering questions to which they might feel there is a “right” answer. Respondents are more likely to respond truthfully, if they feel their answer is socially accepted.



“Did you vote in the last election?” is more likely to alienate a non-voter than, “There are many reasons why people might not vote in a given election. Sometimes they are ill, or very busy, or have to take care of an emergency. Thinking back to the last election, did you happen to vote?”

## 27 Give your respondents a chance to remember

If respondents have a hard time remembering details about past behavior:

- Let them take time to “think back” if you are doing a phone or in-person survey.
- Ask them to check personal records.
- Help them fix a time period in their minds by referring to events or specific dates rather than “in the past five years.”

## 28 Limit open-ended questions

Open-ended questions give you a lot of good feedback from your respondents: but since they are hard to analyze, they should be kept to a minimum.

## 29 Consider analyzing open-ended questions

There are two types of open-ended questions. With one type of question, you have a predetermined list of answers that you expect to receive.



A question might ask, “Which breakfast cereals have you eaten in the past month?” In this example, you already know the breakfast cereals on the market, yet, have not supplied a list for the respondent.

When you analyze the responses, you can assign a code for each response, instead of typing in each name. You also want to assign codes for answers that you might not have expected.



Someone might give the answer, “PopTarts,<sup>®</sup>” something you don't consider a breakfast cereal. However, that answer might affect your overall results, especially if more than one person has the same answer.

The other type of open-ended question has multiple combinations of answers.



If you ask the question, “Do you have any additional comments about our product?” In order to better analyze the results, you can develop a list of categories into which the comments are sorted. After sorting, you will have an idea of how many people had positive or negative comments about different attributes of the product.

## 30 Where to place open-ended questions

Since open-ended questions take more time to answer than close-ended questions, place them at the end of your survey so they won't affect the flow. If the survey is divided into sections, place open-ended questions at the end of the section to which they pertain.

## 31 Problems coding responses

Coding responses to open-ended questions is time-consuming and may require data entry personnel to have a good understanding of the subject matter and the aim of the survey.

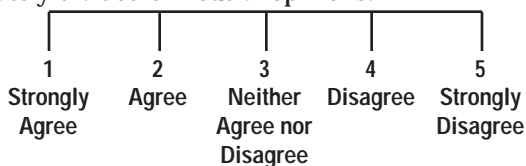
## Response choices

If you provide a scale or choice of answers for the respondent, it's important that the provided answers accurately reflect the respondent's intended response.

### 32 Likert scales: offer a middle choice?

The Likert scale is a ranked list of responses, often five or seven, ranging from one pole to an opposite pole.

Many researchers include a middle response option in a scale. The middle answer offers a comfortable response for subjects who have legitimately divided or neutral opinions.



Or, if you prefer to force respondents to make a choice, you can use a four-point scale that offers no middle choice.



### 33 "Don't know"

Should you offer "Don't know" as a response option or not? By including it, you don't leave out respondents who genuinely "don't know."

However, including this alternative enables some respondents not to state an opinion.

Research has shown that using "Don't know" doesn't affect the proportion of other responses. You also might find patterns in the groups of people who respond "Don't know" to specific questions.

Statistical software, like SPSS, can help you find and understand patterns in the respondents who answer "Don't know" if they share similar characteristics.

### 34 "Couldn't say" or "Not applicable"

Depending on the question, you could offer respondents the option to not answer, if their opinion is not grounded on experience. Then the respondent can tell you, "I couldn't say," or "Not applicable," rather than "I don't know." By giving the respondent the opportunity to give a more precise answer, you will gain more information about your respondents.

Again, statistical software, like SPSS, can help you find and understand patterns in the respondents who answer "I couldn't say," or "Not applicable," if they share similar characteristics.

## Format

A survey with poor formatting can deter people from responding and can also give skewed results. Make sure you create an aesthetically pleasing document that is easy to understand and follow.

### 35 Borrow from the pros

You don't necessarily have to start from scratch when developing your survey. You can borrow style from the large national surveys such as NORC's (National Opinion Research Center's) General Social Survey. Or, use survey research books that provide examples for business, academic or government environments. If the Gallup organization groups income categories in a certain way, those breaks may be good for your survey, too.

### 36 Leave enough space for comments

If you add a space for respondents to make comments, make sure you leave enough room.



## 37 Aesthetic considerations

The presentation of a written survey can either encourage or deter a person from responding. Make sure your survey is inviting by:

- Including plenty of white space\* so the document does not appear intimidating.
- Including color, if possible, but no more than two colors.
- Using no more than two fonts.

## 38 Don't forget to give instructions

To ensure that your respondent doesn't get confused, at the beginning of a self-administered survey, tell the respondent what instrument (pen, pencil) to use. At the beginning of each section, give instructions on how to respond to the questions. Also, don't forget to tell the respondent how to return the form when it's completed.

## 39 Give respondents examples

Show respondents:

- How to fill in their address.
- How to shade-in a circle.
- How many circles or boxes to mark.

## 40 Interview in sections

With telephone or in-person surveys, ask respondents questions in chunks to reduce their fatigue and to keep them focused on the subject. Include pauses and announce the beginning of each section.

## 41 Make your presentation look professional

Spending the extra time and money to produce the document will show that you take the survey seriously. Likewise, your respondents will take the same attitude. If the survey runs to several pages, you shouldn't staple the pages together and risk losing the bottom or loose pages. Instead, print the survey as a booklet.

## 42 Distinguish questions from answers

Make it as easy as possible for your respondents to fill out the survey.



Put questions in upper- and lower- case and responses in **bold** or UPPER CASE.

Did you purchase a car in the last year?  
(Please circle one choice)

YES

NO

## 43 Don't use lines

If you include open-ended questions, don't supply lines on which respondents must write responses. The lines limit the amount of feedback you'll receive. Instead, leave plenty of white space.

## 44 Use checkboxes rather than blanks

Make it obvious where the respondent is supposed to make marks so it's easier for him/her to fill out the survey. You can use:

- Boxes
- Parentheses ( )
- Brackets [ ]
- Circle
- Or another form of enclosure

Rather than a blank \_\_\_\_\_

## 45 Scannable forms

As your survey gets longer and the respondent pool gets larger, scannable forms provide quicker and more accurate automatic data entry than manual data entry. If the survey is over three pages long or has more than 50 questions, it may be more economical to use scannable forms than to pay for manual data entry.

## Pre-test

**You shouldn't cut corners by eliminating the trial phase. There will always be problems that can be spotted only through pre-testing, and it may be too late to fix them once the survey hits the field.**

### 46 Perform two pre-tests of a new study

For a new study, you should perform at least two pre-tests.

- The first pre-test aims to correct problems with the self- or interview-administered survey, openly asking for help and comments.
- Conduct the second pre-test as you plan to conduct the actual survey.



In a mail survey, go ahead and mail the surveys to a test sample to gauge response time and other factors.

### 47 Whom you should include in the pre-test

Usually, no more than 75<sup>s</sup> respondents are needed for a pre-test. The pre-test population\* should be similar in characteristics (not in size) to the population of the real survey.

### 48 How to find problems in your survey

The following tactics will help you find flaws in your survey.

- Read questions aloud or to someone else and observe how they sound. If the subject or sentence is complicated, split the question in two or rephrase it.
- Look for overuse of conjunctions such as “and,” “or” and “but” that create compound sentences and try to eliminate them.
- Minimize the use of common prepositions used as phrase connectors such as “with,” “except” and “by.”

- Ask respondents to write in comments and additional responses. Response options you never considered will surface, which can be added to your list of alternatives. Then you can reduce data entry problems by cutting down on the number of write-in responses or “other” responses.

Look for the following common problems in surveys:

- Answers in the wrong section.
- Weaknesses in individual questions as well as problems with the survey or interview as a whole.
- Unclear instructions.
- Time it takes to complete the survey is longer than you anticipated.
- Too much clutter.
- Redundant questions.
- Too little space for open-ended questions.

### 49 Potential problems from your pre-test analysis

When analyzing the responses from a pre-test, you may find the following problems:

- Little or no variance among responses.
- Too many “don't know” responses.
- Too many “other” responses.
- Unclear skip patterns.\*
- Misinterpretation of open-ended questions.

If you find these problems, consider the relevance of a question and its wording.

## Telephone surveys

**Make special considerations when writing and formatting a telephone survey.**

### 50 Remember, respondents can't see the questions

Since respondents can't reread items on a page, make sure they understand and remember the question that the interviewer is reading.

- Keep the questions short – no more than 25 words.
- Offer few response options – no more than five.
- Limit number of items to rank – no more than three or four.

## 51 Prompt the interviewer

There are tactics the interviewer can use to help the respondent answer the questions. In the interviewer's script, tell him/her to:

- Mention response alternatives within the question (but not at the beginning).
- Repeat a portion of the question for items in a series so respondents don't forget what is being asked.

## 52 Break long surveys into sections

Give your respondents a breather. Breaking your written survey into sections will hold the respondent's interest longer. Even if there is not a logical subject change, make one. You need to keep respondents interested and alert during a long stretch of questions.

## 53 Help the interviewer

During a survey, phone interviewers must concentrate on talking, listening and recording responses. To make their job easier and to attain more accurate responses:

- Devise a simple coding scheme.



Use numbers to record answers when respondents rate something on a scale so the interviewers don't have to write a long answer.

- List instructions (anything NOT to be read to the respondent) in upper case.
- Place boxes on the right side of the page (assuming most interviewers are right-handed).
- List common answers to questions in advance so interviewers don't have to write out the same response multiple times.

- Conduct a practice session so you can listen to the interviewer and give feedback.

## Interviewer-administered surveys

Make special considerations when planning telephone and in-person interviews.

## 54 Anticipate unavailability of respondents

For telephone surveys, give the interviewer a long list of names in case your sample isn't available or is unwilling to participate. To be safe, you should have between seven and 15 times more names than the number of completed surveys you want.

## 55 Reduce the barriers to interview response

Lack of respondent availability and lack of cooperation are the main barriers to response for telephone or in-person interviews. To compensate for lack of availability, interviewers must keep calling.

As the interviewer you should keep the introduction concise and not mention the length of the interview unless it is short or if the respondent asks. Also, mention any incentives that the survey offers at the beginning. If the person does not want to participate, don't press, say "Thank you," and move on to the next name.

## 56 Qualities of a good interviewer

A good interviewer is essential to a successful telephone or in-person survey. The following qualities make good interviewers:

- Understands respondents and is empathetic.
- Listens well.
- Maintains attitude of genuine interest: not mechanical.
- Is articulate.
- Can be objective.
- Accepts rejection – doesn't take "no" personally.
- Doesn't let mood affect performance.

## Self-administered surveys

Make special design and notification considerations when distributing written surveys.

### 57 Explain your survey

To increase response, write a straightforward cover letter, no longer than one page, explaining:

- The purpose of the survey.
- The benefits of the respondent's participation.
- The seriousness/importance of the survey.
- How the respondent's opinions will be used.
- Who is sponsoring the survey.

If possible, have an important or influential person sign the letter to give the survey more purpose or legitimacy.

### 58 Certified mail can increase response rate

Sending a lengthy survey via certified mail can greatly increase your response rate. Surveys can show an almost 100 percent increase in response rate. However, with a short form, response is not affected.

### 59 Express mail improves response and timeliness

Express mail can be especially effective if sending a survey to a business setting. It increases both the response and the timeliness of the return.

### 60 Notify respondents in advance

Send respondents a postcard, or pre-notification card,\* to alert them that the survey will arrive in approximately one week. This card will increase the likelihood of response because the respondents are more likely to expect or recognize the survey when it arrives. The card may also spark curiosity in the respondents and they will look for the document.

**61** Use commitment cards\* to estimate response  
Commitment cards ask prospective respondents to return a postcard agreeing to participate in the survey. Pre-notification cards generally give a larger response rate than commitment cards. However, commitment cards give you an estimation of the response rate.

### 62 Postcard reminders increase response

Send postcards approximately one or two weeks after the initial survey mailing. These postcards thank people who completed the survey while also reminding those who have not yet responded. Research shows that these cards greatly increase the response rate.

### 63 Telephone follow-up can improve response

Telephone follow-up can increase response rates when personnel are well-trained. The personal contact and having someone explain the importance of the survey can encourage respondents to participate. However, don't forget your budget, since this can be a costly effort.

### 64 Remail surveys to increase response

Send out duplicate surveys to non-respondents or to the entire sample group approximately one week after the thank you and reminder postcard. Although this will cost more, it should increase your response rate.

### 65 Wait about six weeks to start analysis

Six weeks after the initial survey was sent, you should have received about as many completed surveys as you ever will. Waiting another week or two can't hurt – unless you need to begin processing and analyzing right away.

## Incentives

Use incentives to enhance respondents' motivation to complete the survey.

### 66 The best incentive depends on your audience

- A six-year-old might cooperate for an hour in exchange for a treat or game.
- Academics and some business audiences are motivated by the promise to share results with them.
- In general, everyone is more motivated by personal rewards.

### 67 Examples of concrete incentives

- Gift certificates.
- Cash.
- Chances to win prizes in drawings.
- Promotional or premium items, such as key chains or calendars.

### 68 Examples of intangible incentives

Some respondents will react better to non-concrete incentives. Communicate tangible rewards to enhance respondent motivation.



“Help our organization better understand this learning disability for the benefit of other sufferers.”

Or, “By telling us how you feel about our product, you will help us understand consumers' needs, which will result in the development of better, more useful and convenient products for you.”

## Response rate\*

Response rate is an important issue to consider since it can have a great impact on your results.

### 69 No “ideal” response rate

There is no ideal response rate for all types of surveys. A variety of factors can influence the rate, including:

- Administration method.
- Subject matter.
- Presence of incentives/perceived awards.
- Level of difficulty.
- Aesthetic appeal.
- Perceived cost of completion.

### 70 What does non-response\* imply?

Non-response, by itself, should not be a cause for concern. But when non-respondents differ from respondents in relevant ways, you have to do something to account for the bias. If you find that non-respondents share similar characteristics, then:

- Re-sample the missing strata\* with a purposeful\* re-sample, or
- Weight your results by assigning more value to members of a similar group who respond (although this is mathematically tricky and takes expertise), or
- Ensure that the conclusions you draw from your data account for a missing subpopulation.

# Data analysis

Analysis delivers the value from your survey data. There are several ways to evaluate your data.

## 71 Use a unique identification variable

After the surveys are returned, always place a unique identification number on each survey or record. This unique number, sometimes called a “case ID,” will help you track down problems in data cleaning as well as flag cases of particular interest during analysis.

## 72 Don't skip data verification and cleaning

When examining a new data set, perform data verification and cleaning. As the analyst, you should have an idea of how your file should look.



- How many people should be managers versus staff.
- The average number of years of education of the sample.
- The proportion of missing cases you should have for a question that did not pertain to everyone.

Run a series of crosstabulations\* before doing further analysis to look for:

- Inconsistent relationships (such as someone saying they are a female, but whose relationship to the head of household is “son”).
- Unexpected averages.
- A large number of missing values.

## 73 Keep track of the analyses you run

When performing complex analyses, keep a record of the procedures you perform or the way you created new variables. This record will help you reconstruct your analyses if any questions arise.

## 74 What are your data like?

Different statistical procedures are appropriate for variables depending on what you want to learn and the level of measurement\* of the variable (refer to tips 75-77 for types of variables).

## 75 Using nominal variables\*

Nominal variables provide a list of choices with no meaningful order to the list.



Examples include gender, type of organization that a person works for and hair color.

An arithmetic mean\* of nominal variables has little value. Instead, look at the mode\* or run frequencies\* and crosstabulations using nominal variables. To display these data, use pie and bar charts.

## 76 Using ordinal variables\*

Ordinal variables have an implied order between the response choices.



You may ask about an opinion on a particular issue where a code of 1 (strongly agree) means more than a code of 2 (somewhat agree), but how much more is unknown.

Examine the mean, median\* and mode for these variables, and run one-way ANOVAs\* (analysis of variances) and crosstabulations. Bar charts display the choices well.

## 77 Using interval\* or continuous\* variables

Interval or continuous variables have an implied order and an implied distance between the response options. With a variable such as age in years, a one-unit difference is the same throughout the distribution.



The difference between 20 and 21 is the same as that between 45 and 46.

These variables lend themselves to a much broader range of powerful statistics than do the previous variable types.

Regression\* is one of the more popular statistical procedures using interval-level variables. Scatterplots\* and histograms\* are appropriate graphical displays for these kinds of variables. Don't be afraid to use continuous variables if appropriate; they will give you more information. If necessary, you can always collapse a continuous variable into a categorical variable (variable whose response options are categories – either nominal or ordinal). However, there are some instances where it is appropriate to use a continuous variable, but the respondent may not be able or willing to answer the question.



For example, income in dollars, is a sensitive and difficult question to answer. Respondents may feel uncomfortable or unable to answer the question in exact dollars. To reduce non-response, offer respondents a range from which to choose.

## 78 Crosstabulations

Crosstabulations are appropriate when you have two or more categorical variables. Continuous variables don't lend themselves to crosstabulation, since you would get as many rows or columns as there are response options.

When looking at crosstabulations, if the probability of a chi-square\* is .05 or less, it is usually small enough for the analyst to feel that the distribution did not result from chance. The chi-square statistic does not measure the strength of the relationship; instead, it measures if a relationship is likely due to chance. The smaller the probability of the chi-square statistic, the more comfortable you can be that the patterns you see are "real."

Just because your chi-square statistic is significant, it does not necessarily mean that you can draw any conclusions about the distribution. You should look carefully at the crosstabulation to see if more conclusions can be drawn.

## 79 Differences in the mean

Use a t-test\* to learn about differences in means between two groups.



Are men who receive a certain surgical procedure more likely to be younger than women receiving the same procedure?

You can determine the average age for each group, but you need a procedure like a t-test to confirm if the observed difference is due to chance, or if it can be considered "real." If the significance score is less than .05, you will usually conclude that the differences in the observed averages are not due to chance, and that they are "real."

When presenting the results of a t-test, use a bar chart in which the height of each bar is the average score for each group. Error bar charts\* show both the group means and the precision with which the mean was estimated (often the 95 percent confidence band\*).

If you have more than two groups that you would like to compare, use the ANOVA procedure instead of a t-test.

# Glossary

**Analysis of variance (ANOVA)** – a method of analysis used when dealing with one intervally scaled dependent variable and one or more nominally scaled independent variables; used primarily in the analysis of experiments to determine whether treatment population means are equal.

**Arithmetic mean** – the sum total of all observations divided by their number.

**Census** – an entire population that is of interest, as opposed to a sample of that population.

**Chi-square** – a test statistic often used in crosstabulations to test the hypothesis that the row and column variables are independent. That is, it measures whether the observed distribution is likely due to chance.

**Commitment card** – card which asks prospective respondents to commit to participating in a survey.

**Confidence band** – probability that, in the long run, a specified interval around the value of a statistic estimated from a sample actually includes the value that would be calculated from the whole population (if that were possible). Such “confidence intervals” are commonly calculated for confidence levels of 0.95 or 0.99.

**Continuous variable** – variable whose response options have an implied order and distance where one unit represents the same quantity throughout the scale. For example: age in years or weight in pounds or kilograms.

**Crosstabulation** – a table showing the relationship between two or more variables by presenting all combinations of categories of variables.

**Error bar chart** – plots the confidence intervals, standard errors or standard deviations of individual variables.

**Exact tests** – calculate the probabilities exactly, rather than using estimates to determine if a relationship exists, and the strength of the relationship. Necessary when you have small data sets, small subgroups or unbalanced distributions.

**Frequencies** – univariate distribution of responses to a question, also known as marginals.

**Histogram** – bar chart representation of a continuous variable where continuous responses are grouped.

**Interval variable** – see continuous variable.

**Level of measurement** – refers to the way your questions can be answered. Three levels of measurement include nominal, ordinal and interval. (See other entries for descriptions).

**Mean** – see arithmetic mean

**Median** – a measure of central tendency for ordinal data, defined for ungrouped data as the middle value when the data are arranged in order of magnitude.

**Missing data** – questions that are left blank. It is important to understand the reasons behind blank questions because respondents could have left a question blank for a variety of reasons: intentionally, by accident, because the question isn't relevant, etc.

**Mode** – category of a variable that occurs with the greatest frequency.

**Nominal variable** – variable whose response options have no implied order. For example, hair color or department of company.

**Nonparametric tests** – statistical tests that require either no assumptions or very few assumptions about the population's distribution.

**Nonprobability sampling** – a sampling procedure in which the selection of population elements is based in part on the judgment of the researcher or field interviewer.

**Non-response** – proportion of sample population that doesn't respond to the survey. Look for patterns in non-response.

**Ordinal variable** – a variable whose response options have an implied order but no implied distance. For example, a scale that ranges from strongly agree to strongly disagree.

**Pre-notification card** – a card alerting prospective respondents that a survey will arrive.

**Pre-test population** – a group of people who perform the initial testing of one of more aspects of the research design. This group should have similar characteristics to the survey sample.



**Probability sampling** – a sampling procedure in which each element in the population has a known chance of being selected for the sample.

**Purposive sampling** – a sampling procedure in which each element in the population is purposely selected.

**Random sampling** – a sampling procedure which gives you a small, accurate reflection of the entire survey population.

**Regression** – estimation of the linear relationship between a dependent variable and one or more independent variables or covariates.

**Response rate** – the proportion of people who were given a survey that responded.

**Sample** – a part of an entire population that possesses attitudes, opinions, habits or characteristics that you wish to study.

**Scatterplot** – a graph of data points based on two variables. One variable defines the horizontal axis and the other variable defines the vertical axis. Most frequently used for displaying continuous data.

**Skip pattern** – a method of questioning that requires the respondent to skip ahead to another question if the information in the current question is not relevant to him/her.

**Strata** – (plural of stratum) in sampling, are groups defined by certain characteristics in a stratified sample (see stratified sample).

**Stratified sample** – sample which selects respondents according to strata or characteristics of interest. For example, race or business title.

**Systematic sampling** – a random sampling method which generates multiples of a number.

**t-distribution** – is much like the normal or z-distribution. It just shifts the area in the normal distribution to adjust for the fact that we don't know what the standard deviations really are. When sample sizes are large, the *t*-distribution looks very much like the normal distribution.

**t-test** – a hypothesis test that uses the *t* statistic and the *t* distribution to determine whether to reject or retain the null hypothesis.

**White space** – an area on a page that contains no graphic or text.

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