A step by step guide to data analysis using IBM SPSS

SPSS

Survival Manual

Worldwide Bestseller

Julie Pallant

For the *SPSS Survival Manual* website, go to www.openup.co.uk/spss

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This is what readers from around the world say about the *SPSS Survival Manual*:

‘The book provides a no-nonsense approach to understanding SPSS. With step by step explanations t carrying out data analysis it is a welcome addition to the resources for any social science student.’
Gail Steptoe Warren, University of Coventry, UK

‘I just wanted to say how much I value Julie Pallant's *SPSS Survival Manual*. It's quite the best text o SPSS I've encountered and I recommend it to anyone who's listening!’
Professor Carolyn Hicks, Health Sciences, Birmingham University, UK

‘An excellent introduction to using SPSS for data analysis … It provides a self-contained resource, with more than simply (detailed and clear) step by step descriptions of statistical procedures in SPSS There is also a wealth of tips and advice, and for each statistical technique a brief, but consistently reliable explanation is provided.’
Associate Professor George Dunbar, University of Warwick, UK

‘This most recent edition of Julie Pallant's SPSS bible continues to combine a number of essential elements: clear explanations of different use cases for SPSS; guides on interpreting the (often voluminous and poorly labelled) output; and example data files (from real studies) to practice on … I had PhD students, this would be their welcome gift on their frst day. Essential.’
Dr. P. J. A. Wicks, Research Psychologist, London

‘Having perceived myself as one who was not confdent in anything statistical, I worked my way through the book and with each turn of the page gained more and more confdence until I was running off analyses with (almost) glee. I now enjoy using SPSS and this book is the reason for that.’
Dr Marina Harvey, Centre for Professional Development, Macquarie University, Australia

‘I have two copies of Julie Pallant's *SPSS Survival Manual*—one for the home offce and one for school— which are both well-worn from lending. I never miss a chance to recommend this useful guide to other doctoral students as a “24-hour TA” to review syntax, interpretation of output, or presentation of results. The coordinating data sets available online are useful for conducting a frst ru through on each technique for labs or tutoring. I highly recommend this resource.’
Doctoral student, University of California, Los Angeles, USA

‘This book really lives up to its name … I highly recommend this book to any MBA student carrying out a dissertation project, or anyone who needs some basic help with using SPSS and data analysis techniques.’
Business student, UK

‘This book is simple to understand, easy to read and very concise. Those who have a general fear or dislike for statistics or statistics and computers should enjoy reading this book.’
Lloyd G. Waller PhD, Jamaica

‘There are several SPSS manuals published and this one really does “do what it says on the tin” … Whether you are a beginner doing your BSc or struggling with your PhD research (or beyond!), I wholeheartedly recommend this book.’

British Journal of Occupational Therapy

‘I love the *SPSS Survival Manual* … I can't imagine teaching without it. After seeing my copy and hearing me talk about it many of my other colleagues are also utilising it.’
Wendy Close PhD, Psychology Department, Wisconsin Lutheran College, USA

‘… being an external student so much of the time is spent teaching myself. But this has been made easier with your manual as I have found much of the content very easy to follow. I only wish I had discovered it earlier.’
Anthropology student, Australia

‘This book is a “must have” introduction to SPSS. Brilliant and highly recommended.’
Dr Joe, South Africa

‘The strength of this book lies in the explanations that accompany the descriptions of tests and I predict great popularity for this text among teachers, lecturers and researchers.’
***Roger Watson,* Journal of Advanced Nursing**

‘I didn't think it was possible for me to love SPSS but with the help of this book I do! The step by ste guide is everything I need to use this diffcult software. I would recommend it to anyone!’
Alissa Johnston, Occupational Therapy student

‘I love this book! I haven't touched stats or SPSS in nearly ffteen years. This book told me everything I needed to know to do my job better with clear, concise language. It's like she knew what all my questions were before I asked them! Awesome!’
T. James, Australia, Amazon.com

‘For me, this is the essential guide to data analysis using SPSS. From getting started with SPSS to explaining the sometimes complex output produced by it, from deciding which analysis to use to providing practice materials to hone your skills, this guides you through the process using simple, clear instructions, appropriate to both the novice and experienced researcher.’
Julia Robertson, University of Buckinghamshire, UK

‘I have four SPSS manuals and have found that this is the only manual that explains the issues clearly and is easy to follow. SPSS is evil and anything that makes it less so is fabulous.’
Helen Scott, Psychology Honours student, University of Queensland, Australia

‘To any students who have found themselves faced with the horror of SPSS when they had signed up for a degree in psychology—this is a godsend.’
Psychology student, Ireland

‘This is the best SPSS manual I've had. It's comprehensive and easy to follow. I really enjoy it.’
Norshidah Mohamed, Kuala Lumpur, Malaysia

‘I am currently in a doctoral-level Methods and Analysis of Quantitative Research class, and I was struggling to understand SPSS. The university provided web-based tutorial videos, but the videos wer too fast and skipped over important steps. I am so glad I found this book! The author breaks everything down into plain English and makes the software very easy to understand. I am now gettin an A in my course, due in no small part to this book.’
L. E. Eastman, Doctoral statistics student, USA

‘Simply the best book on introductory SPSS that exists. I know nothing about the author but having bought this book in the middle of a statistics open assignment I can confdently say that I love her and want to marry her. There must be dozens of books that claim to be beginners’ guides to SPSS. This one actually does what it says. Totally brilliant.’
J. Sutherland, Amazon.co.uk

SPSS SURVIVAL MANUAL

A step by step guide to data analysis using IBM SPSS

5th edition

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Contents

Preface

For many students, the thought of completing a statistics subject, or using statistics in their researc is a major source of stress and frustration. The aim of the original *SPSS Survival Manual* (published 2000) was to provide a simple, step-by-step guide to the process of data analysis using IBM SPS Unlike other statistical titles it did not focus on the mathematical underpinnings of the techniques, b rather on the appropriate use of IBM SPSS as a tool. Since the publication of the four editions of t *SPSS Survival Manual*, I have received many hundreds of emails from students who have be grateful for the helping hand (or lifeline).

The same simple approach has been incorporated in this ffth edition. Over the last few years SPS has undergone a number of changes—including a brief period when it changed name. During 20 version 18 of the program was renamed **PASW Statistics**, which stands for Predictive Analyti Software. The name was changed again in 2010 to **IBM SPSS**. All chapters in this current edition hav been updated to suit version 21 of the package (although most of the material is also suitable for use of earlier versions).

I have resisted urges from students, instructors and reviewers to add too many extra topics, b instead have upgraded and expanded the existing material. This book is not intended to cover a possible statistical procedures available in IBM SPSS, or to answer all questions researchers mig have about statistics. Instead, it is designed to get you started with your research and to help you ga confdence in the use of the program to analyse your data. There are many other excellent statistic texts available that you should refer to—suggestions are made throughout each chapter in the boo Additional material is also available on the book's website (details in the next section).

Data files and website

Throughout the book, you will see examples of research that are taken from a number of data fil included on the website that accompanies this book: **www.allenandunwin. com/spss**.

From this site you can download the data files to your hard drive or memory stick by following th instructions on screen. These files can be opened only in IBM SPSS.

The **survey5ED.sav** data file is a 'real' data file, based on a research project that was conducted b one of my graduate diploma classes. So that you can get a feel for the research process from start fnish, I have also included in the Appendix a copy of part of the questionnaire that was used generate this data and the codebook used to code the data. This will allow you to follow along with th analyses that are presented in the book, and to experiment further using other variables. The fu questionnaire can be downloaded from the website.

The second data file (**error5ED.sav**) is the same file as the **survey5ED.sav**, but I have deliberate added some errors to give you practice in Chapter 5 at screening and cleaning your data file.

The third data file (**experim5ED.sav**) is a manufactured (fake) data file, constructed an manipulated to illustrate the use of a number of techniques covered in Part Five of the book (e. Paired Samples t-test, Repeated Measures ANOVA). This file also includes additional variables tha will allow you to practise the skills learnt throughout the book. Just don't get too excited about th results you obtain and attempt to replicate them in your own research!

The fourth file used in the examples in the book is **depress5ED.sav**. This is used in Chapter 16, c non-parametric techniques, to illustrate some techniques used in health and medical research.

Two other data files have been included, giving you the opportunity to complete some addition activities with data from different discipline areas. The **sleep5ED.sav** file is a real data file from study conducted to explore the prevalence and impact of sleep problems on aspects of people's live The **staffsurvey5ED.sav** file comes from a staff satisfaction survey conducted for a large nation educational institution.

See the Appendix for further details of these files (and associated materials). Apart from the da files, the *SPSS Survival Manual* website also contains a number of useful items for students an instructors, including:

- guidelines for preparing a research report
- practice exercises
- updates on changes to IBM SPSS as new versions are released
- useful links to other websites
- additional reading

Introduction and overview

This book is designed for students completing research design and statistics courses and for tho involved in planning and executing research of their own. Hopefully this guide will give you t confdence to tackle statistical analyses calmly and sensibly, or at least without too much stress!

Many of the problems that students experience with statistical analysis are due to anxiety a confusion from dealing with strange jargon, complex underlying theories and too many choice Unfortunately, most statistics courses and textbooks encourage both of these sensations! In this book try to translate statistics into a language that can be more easily understood and digested.

The *SPSS Survival Manual* is presented in a structured format, setting out step by step what yo need to do to prepare and analyse your data. Think of your data as the raw ingredients in a recipe. Yo can choose to cook your 'ingredients' in different ways—a frst course, main course, desse Depending on what ingredients you have available, different options may, or may not, be suitabl (There is no point planning to make beef stroganoff if all you have is chicken.) Planning a preparation are an important part of the process (both in cooking and in data analysis). Some thin you will need to consider are:

- Do you have the correct ingredients in the right amounts?
- What preparation is needed to get the ingredients ready to cook?
- What type of cooking approach will you use (boil, bake, stir-fry)?
- Do you have a picture in your mind of how the end result (e.g. chocolate cake) is supposed look?
- How will you tell when it is cooked?
- Once it is cooked, how should you serve it so that it looks appetising?

The same questions apply equally well to the process of analysing your data. You must plan yo experiment or survey so that it provides the information you need, in the correct format. You mu prepare your data file properly and enter your data carefully. You should have a clear idea of yo research questions and how you might go about addressing them. You need to know what statistic techniques are available, what sort of variables are suitable and what are not. You must be able t perform your chosen statistical technique (e.g. t-test) correctly and interpret the output. Finally, yo need to relate this 'output' back to your original research question and know how to present this your report (or in cooking terms, should you serve your chocolate cake with cream or ice-cream, perhaps some berries and a sprinkle of icing sugar on top?).

In both cooking and data analysis, you can't just throw all your ingredients in together, shove it the oven (or IBM SPSS, as the case may be) and hope for the best. Hopefully this book will help yo understand the data analysis process a little better and give you the confdence and skills to be a bett 'cook'.

STRUCTURE OF THIS BOOK

This *SPSS Survival Manual* consists of 22 chapters, covering the research process from designing study through to the analysis of the data and presentation of the results. It is broken into fve ma parts. Part One (Getting started) covers the preliminaries: designing a study, preparing a codebook a becoming familiar with IBM SPSS. In Part Two (Preparing the data file) you will be shown how prepare a data file, enter your data and check for errors. Preliminary analyses are covered in Pa

Three, which includes chapters on the use of descriptive statistics and graphs; the manipulation data; and the procedures for checking the reliability of scales. You will also be guided, step by step through the sometimes difficult task of choosing which statistical technique is suitable for your data.

In Part Four the major statistical techniques that can be used to explore relationships are presented (e.g. correlation, partial correlation, multiple regression, logistic regression and factor analysis). These chapters summarise the purpose of each technique, the underlying assumptions, how to obtain results, how to interpret the output, and how to present these results in your thesis or report.

Part Five discusses the statistical techniques that can be used to compare groups. These include non-parametric techniques, t-tests, analysis of variance, multivariate analysis of variance and analysis of covariance.

USING THIS BOOK

To use this book effectively as a guide to IBM SPSS, you need some basic computer skills. In the instructions and examples provided throughout the text I assume that you are already familiar with using a personal computer, particularly the Windows functions. I have listed below some of the skills you will need. Seek help if you have difficulty with any of these operations. You will need to be able to:

- use the Windows drop-down menus
- use the left and right buttons on the mouse
- use the click and drag technique for highlighting text
- minimise and maximise windows
- start and exit programs from the Start menu or from Windows Explorer
- move between programs that are running simultaneously
- open, save, rename, move and close files
- work with more than one file at a time, and move between files that are open
- use Windows Explorer to copy files from a memory stick to the hard drive, and back again
- use Windows Explorer to create folders and to move files between folders.

This book is not designed to ‘stand alone'. It is assumed that you have been exposed to the fundamentals of statistics and have access to a statistics text. It is important that you understand some of what goes on ‘below the surface’ when using IBM SPSS. It is an enormously powerful data analysis package that can handle very complex statistical procedures. This manual does not attempt to cover all the different statistical techniques available in the program. Only the most commonly used statistics are covered. It is designed to get you started and to develop your confidence in using the program.

Depending on your research questions and your data, it may be necessary to tackle some of the more complex analyses available in IBM SPSS. There are many good books available covering the various statistical techniques in more detail. Read as widely as you can. Browse the shelves in your library, look for books that explain statistics in a language that you understand (well, at least some of it anyway!). Collect this material together to form a resource to be used throughout your statistics classes and your research project. It is also useful to collect examples of journal articles where statistical analyses are explained and results are presented. You can use these as models for your final write-up.

The *SPSS Survival Manual* is suitable for use as both an in-class text, where you have an instructor taking you through the various aspects of the research process, and as a self-instruction book for those conducting an individual research project. If you are teaching yourself, be sure to actually practise using IBM SPSS by analysing the data that is included on the website accompanying this book (see

viii for details). The best way to learn is by actually doing, rather than just reading. ‘Play’ with th data files from which the examples in the book are taken before you start using your own data fil This will improve your confdence and also allow you to check that you are performing the analys correctly.

Sometimes you may fnd that the output you obtain is different from that presented in the book. Th is likely to occur if you are using a different version of IBM SPSS from that used throughout this boo (IBM SPSS Statistics v21). IBM SPSS regularly updates its products, which is great in terms improving the program, but it can lead to confusion for students who fnd that what is on the scre differs from what is in the book. Usually the difference is not too dramatic, so stay calm and pla detective. The information may be there, but just in a different form. For information on changes the IBM SPSS products you may like to go to the IBM SPSS website (www.spss.com).

RESEARCH TIPS

If you are using this book to guide you through your own research project, there are a few addition tips I would like to recommend.

- **Plan your project carefully.** Draw on existing theories and research to guide the design your project. Know what you are trying to achieve and why.
- **Think ahead.** Anticipate potential problems and hiccups—every project has them! Kno what statistics you intend to employ and use this information to guide the formulation of da collection materials. Make sure that you will have the right sort of data to use when you are read to do your statistical analyses.
- **Get organised.** Keep careful notes of all relevant research, references etc. Work out a effective filing system for the mountain of journal articles you will acquire and, later on, th output from IBM SPSS. It is easy to become disorganised, overwhelmed and confused.
- **Keep good records.** When using IBM SPSS to conduct your analyses, keep careful records what you do. I recommend to all my students that they buy a spiral-bound exercise book to reco every session they spend on IBM SPSS. You should record the date, new variables you create, a analyses you perform and the names of the files where you have saved the output. If you have problem or something goes horribly wrong with your data file, this information can be used b your supervisor to help rescue you!
- **Stay calm!** If this is your frst exposure to IBM SPSS and data analysis, there may be tim when you feel yourself becoming overwhelmed. Take some deep breaths and use some positiv self-talk. Just take things step by step—give yourself permission to make mistakes and becom confused sometimes. If it all gets too much then stop, take a walk and clear your head before yo tackle it again. Most students fnd IBM SPSS quite easy to use, once they get the hang of it. Lik learning any new skill, you just need to get past that frst feeling of confusion and lack confdence.
- **Give yourself plenty of time.** The research process, particularly the data entry and da analysis stages, always takes longer than expected, so allow plenty of time for this.
- **Work with a friend.** Make use of other students for emotional and practical support durin the data analysis process. Social support is a great buffer against stress!

ADDITIONAL RESOURCES

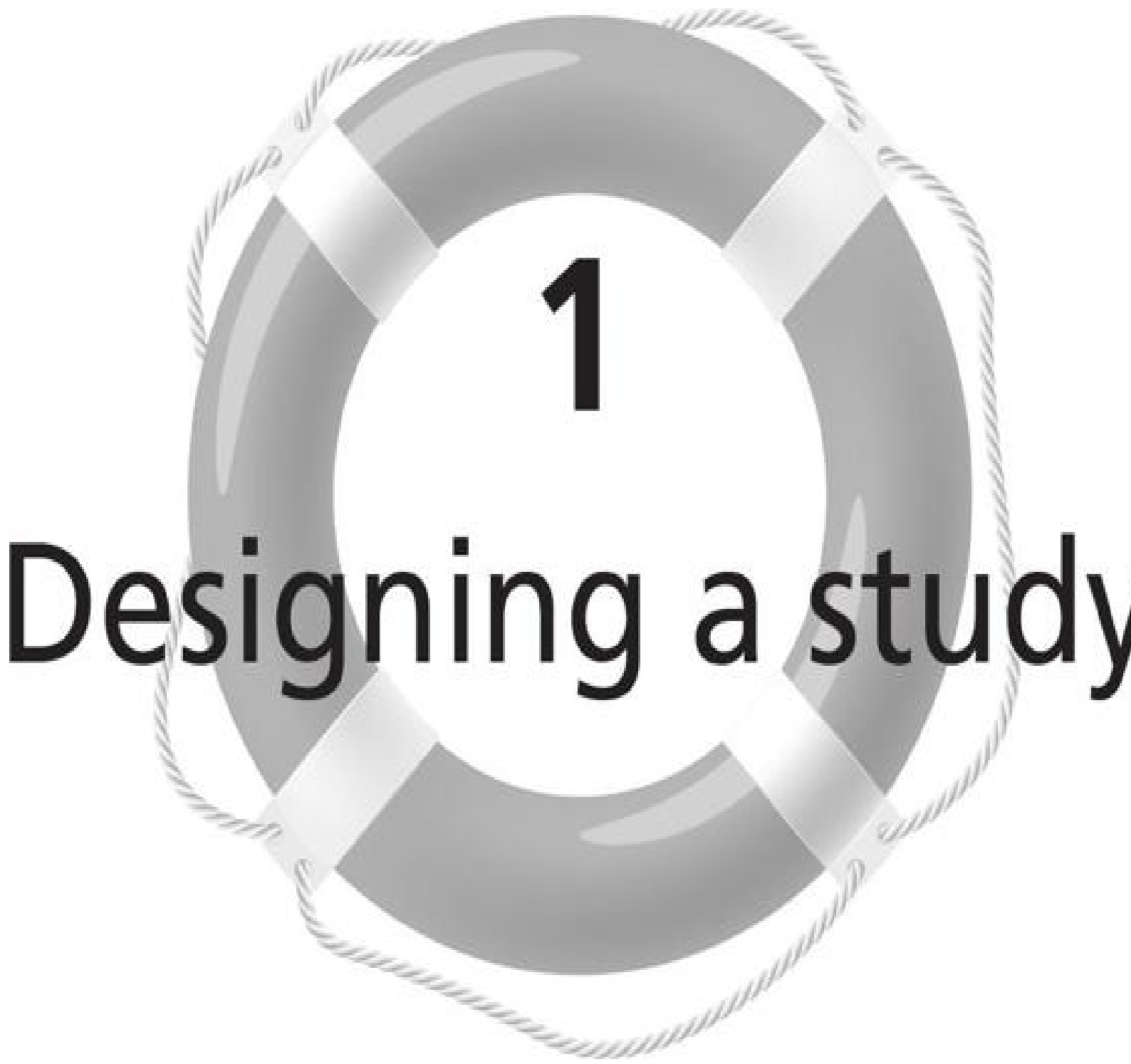
There are a number of different topic areas covered throughout this book, from the initial design of study, questionnaire construction, basic statistical techniques (t-tests, correlation), through advanced statistics (multivariate analysis of variance, factor analysis). Further reading and resour

material is recommended throughout the different chapters in the book. Yo u should try to read a broadly as you can, particularly if tackling some of the more complex statistical procedures.

Data analysis is only one part of the research process. Before you can use IBM SPSS to analyse yo
data, there are a number of things that need to happen. First, you have to design your study and choo
appropriate data collection instruments. Once you have conducted your study, the informatio
obtained must be prepared for entry into IBM SPSS (using something called a ‘codebook’). To ent
the data you must understand how IBM SPSS works and how to talk to it appropriately. Each of thes

steps is discussed in Part One.

Chapter 1 provides some tips and suggestions for designing a study, with the aim of obtaining good quality data. Chapter 2 covers the preparation of a codebook to translate the information obtained from your study into a format suitable for IBM SPSS. Chapter 3 takes you on a guided tour of the program, and some of the basic skills that you will need are discussed. If this is your first time using IBM SPSS, it is important that you read the material presented in Chapter 3 before attempting any of the analyses presented later in the book.



1 Designing a study

Although it might seem a bit strange to discuss research design in a book on IBM SPSS, it is a essential part of the research process that has implications for the quality of the data collected an analysed. The data you enter must come from somewhere—responses to a questionnaire, informatio collected from interviews, coded observations of actual behaviour, or objective measurements o output or performance. The data are only as good as the instrument that you used to collect them an the research framework that guided their collection.

In this chapter a number of aspects of the research process are discussed that have an impact on th potential quality of the data. First, the overall design of the study is considered; this is followed by discussion of some of the issues to consider when choosing scales and measures; and fnally, som guidelines for preparing a questionnaire are presented.

PLANNING THE STUDY

Good research depends on the careful planning and execution of the study. There are many excelle

books written on the topic of research design to help you with this process—from a review of th literature, formulation of hypotheses, choice of study design, selection and allocation of participant recording of observations and collection of data. Decisions made at each of these stages can affect th quality of the data you have to analyse and the way you address your research questions. In designin your own study I would recommend that you take your time working through the design process make it the best study that you can produce. Reading a variety of texts on the topic will help. A fe good, easy-to-follow titles are listed in the recommended reading section at the back of the book.
To get you started, consider these tips when designing your study:

- Consider what type of research design (e.g. experiment, survey, observation) is the best wa to address your research question. There are advantages and disadvantages to all types of researc approaches; choose the most appropriate approach for your particular research question. Have good understanding of the research that has already been conducted in your topic area.
- If you choose to use an experiment, decide whether a between-groups design (different cas in each experimental condition) or a repeated measures design (same cases tested under a conditions) is the more appropriate for your research question. There are advantages an disadvantages to each approach, so weigh up each approach carefully.
- In experimental studies, make sure you include enough levels in your independent variabl Using only two levels (or groups) means fewer participants are required, but it limits th conclusions that you can draw. Is a control group necessary or desirable? Will the lack of contro group limit the conclusions that you can draw?
- Always select more participants than you need, particularly if you are using a sample humans. People are notoriously unreliable—they don't turn up when they are supposed to, the get sick, drop out and don't fll out questionnaires properly! So plan accordingly. Err on the sid of pessimism rather than optimism.
- In experimental studies, check that you have enough participants in each of your groups (an try to keep them equal when possible). With small groups, it is diffcult to detect statistical signifcant differences between groups (an issue of power, discussed in the introduction to Pa Five). There are calculations you can perform to determine the sample size that you will nee See, for example, Stangor (2006), or consult other statistical texts under the heading ‘power’.
- Wherever possible, randomly assign participants to each of your experimental condition rather than using existing groups. This reduces the problem associated with non-equivale groups in between-groups designs. Also worth considering is taking additional measurements o the groups to ensure that they don't differ substantially from one another. You may be able t statistically control for differences that you identify (e.g. using analysis of covariance).
- Choose appropriate dependent variables that are valid and reliable (see discussion on th point later in this chapter). It is a good idea to include a number of different measures—som measures are more sensitive than others. Don't put all your eggs in one basket.
- Try to anticipate the possible infuence of extraneous or confounding variables. These ar variables that could provide an alternative explanation for your results. Sometimes they are ha to spot when you are immersed in designing the study yourself. Always have someone els (supervisor, fellow researcher) check over
- your design before conducting the study. Do whatever you can to control for these potenti confounding variables. Knowing your topic area well can also help you identify possib confounding variables. If there are additional variables that you cannot control, can you measu them? By measuring them, you may be able to control for them statistically (e.g. using analys of covariance).

- If you are distributing a survey, pilot-test it frst to ensure that the instructions, questions an scale items are clear. Wherever possible, pilot-test on the same type of people who will be use in the main study (e.g. adolescents, unemployed youth, prison inmates). You need to ensure tha your respondents can understand the survey or questionnaire items and respond appropriatel Pilot-testing should also pick up any questions or items that may offend potential respondents.
- If you are conducting an experiment, it is a good idea to have a full dress rehearsal and pilot-test both the experimental manipulation and the dependent measures you intend to use. you are using equipment, make sure it works properly. If you are using different experimenters interviewers, make sure they are properly trained and know what to do. If different observers a required to rate behaviours, make sure they know how to appropriately code what they see. Hav a practice run and check for inter-rater reliability (i.e. how consistent scores are from differe raters). Pilot-testing of the procedures and measures helps you identify anything that might g wrong on the day and any additional contaminating factors that might infuence the results. Som of these you may not be able to predict (e.g. workers doing noisy construction work just outsi the lab's window), but try to control those factors that you can.

CHOOSING APPROPRIATE SCALES AND MEASURES

There are many different ways of collecting ‘data’, depending on the nature of your research. Th might involve measuring output or performance on some objective criteria, or rating behavio according to a set of specifed criteria. It might also involve the use of scales that have been designe to ‘operationalise’ some underlying construct or attribute that is not directly measurable (e.g. sel esteem). There are many thousands of validated scales that can be used in research. Finding the rig one for your purpose is sometimes diffcult. A thorough review of the literature in your topic area the frst place to start. What measures have been used by other researchers in the area? Sometimes th actual items that make up the scales are included in the appendix to a journal article; otherwise yo may need to trace back to the original article describing the design and validation of the scale you a interested in. Some scales have been copyrighted, meaning that to use them you need to purcha ‘offcial’ copies from the publisher. Other scales, which have been published in their entirety in journ articles, are considered to be ‘in the public domain’, meaning that they can be used by researche without charge. It is very important, however, to properly acknowledge each of the scales you us giving full reference details.

In choosing appropriate scales there are two characteristics that you need to be aware of: reliabili and validity. Both of these factors can infuence the quality of the data you obtain. When reviewin possible scales to use, you should collect information on the reliability and validity of each of th scales. Yo u will need this information for the ‘Method’ section of your research report. No matte how good the reports are concerning the reliability and validity of your scales, it is important to pilo test them with your intended sample. Sometimes scales are reliable with some groups (e.g. adults wi an English-speaking background), but are totally unreliable when used with other groups (e.g. childr from non-English-speaking backgrounds).

Reliability

The reliability of a scale indicates how free it is from random error. Two frequently used indicators a scale's reliability are test-retest reliability (also referred to as ‘temporal stability’) and intern consistency. The test-retest reliability of a scale is assessed by administering it to the same people o two different occasions, and calculating the correlation between the two scores obtained. High tes retest correlations indicate a more reliable scale. Yo u need to take into account the nature of th construct that the scale is measuring when considering this type of reliability. A scale designed t

measure current mood states is not likely to remain stable over a period of a few weeks. The test-rete
reliability of a mood scale, therefore, is likely to be low. You would, however, hope that measures o
stable personality characteristics would stay much the same, showing quite high test-rete
correlations.

The second aspect of reliability that can be assessed is internal consistency. This is the degree
which the items that make up the scale are all measuring the same underlying attribute (i.e. the exte
to which the items 'hang together'). Internal consistency can be measured in a number of ways. Th
most commonly used statistic is Cronbach's coeffcient alpha (available using IBM SPSS, see Chapt
9). This statistic provides an indication of the average correlation among all of the items that make u
the scale. Values range from 0 to 1, with higher values indicating greater reliability.

While different levels of reliability are required, depending on the nature and purpose of the scal
Nunnally (1978) recommends a minimum level of .7. Cronbach alpha values are dependent on th
number of items in the scale. When there are a small number of items in the scale (fewer than 10
Cronbach alpha values can be quite small. In this situation it may be better to calculate and report th
mean inter-item correlation for the items. Optimal mean inter-item correlation values range from .2
.4 (as recommended by Briggs & Cheek 1986).

Validity

The validity of a scale refers to the degree to which it measures what it is supposed to measur
Unfortunately, there is no one clear-cut indicator of a scale's validity. The validation of a scal
involves the collection of empirical evidence concerning its use. The main types of validity you wi
see discussed are content validity, criterion validity and construct validity.

Content validity refers to the adequacy with which a measure or scale has sampled from th
intended universe or domain of content. Criterion validity concerns the relationship between sca
scores and some specifed, measurable criterion. Construct validity involves testing a scale not again
a single criterion but in terms of theoretically derived hypotheses concerning the nature of th
underlying variable or construct. The construct validity is explored by investigating its relationsh
with other constructs, both related (convergent validity) and unrelated (discriminant validity). A
easy-to-follow summary of the various types of validity is provided in Streiner and Norman (2008).

If you intend to use scales in your research, it would be a good idea to read further on this topic: se
Kline (2005) for information on psychological tests, and Streiner and Norman (2008) for heal
measurement scales. Bowling also has some great books on health and medical scales.

PREPARING A QUESTIONNAIRE

In many studies it is necessary to collect information from your participants or respondents. This ma
involve obtaining demographic information from participants prior to exposing them to som
experimental manipulation. Alternatively, it may involve the design of an extensive survey to b
distributed to a selected sample of the population. A poorly planned and designed questionnaire wi
not give good data with which to address your research questions. In preparing a questionnaire, yo
must consider how you intend to use the information; you must know what statistics you intend to us
Depending on the statistical technique you have in mind, you may need to ask the question in
particular way, or provide different response formats. Some of the factors you need to consider in th
design and construction of a questionnaire are outlined in the sections that follow.

This section only briefy skims the surface of questionnaire design, so I would suggest that you rea
further on the topic if you are designing your own study. A really great book for this purpose is D
Vaus (2002).

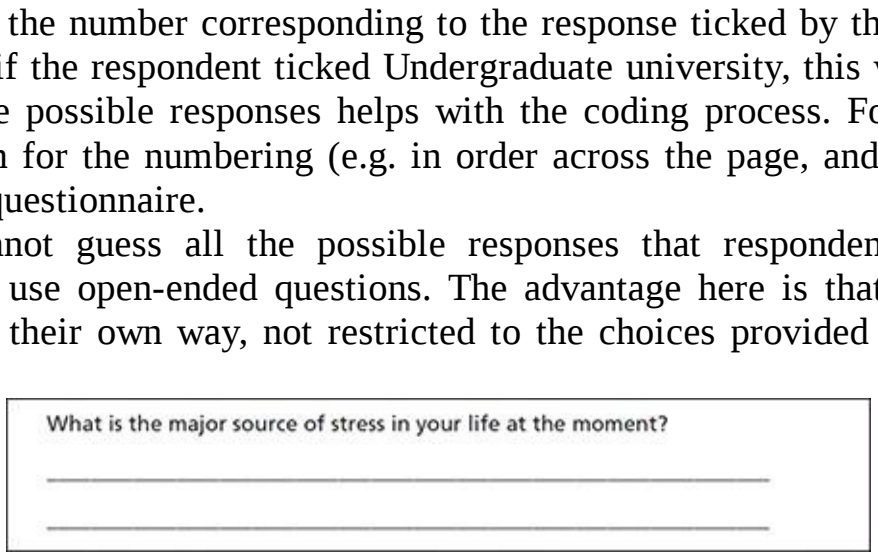
Question types

Most questions can be classifed into two groups: closed or open-ended. A closed question involve offering respondents a number of defned response choices. They are asked to mark their respon using a tick, cross, circle, etc. The choices may be a simple Yes/No, Male/Female, or may involve range of different choices. For example:

What is the highest level of education you have completed (please tick)?
❒ 1. Primary school
❒ 2. Some secondary school
❒ 3. Completed secondary school
❒ 4. Trade training
❒ 5. Undergraduate university
❒ 6. Postgraduate university

Closed questions are usually quite easy to convert to the numerical format required for IBM SPSS. F example, Yes can be coded as a 1, No can be coded as a 2; Males as 1, Females as 2. In the educatio question shown above, the number corresponding to the response ticked by the respondent would b entered. For example, if the respondent ticked Undergraduate university, this would be coded as a Numbering each of the possible responses helps with the coding process. For data entry purpose decide on a convention for the numbering (e.g. in order across the page, and then down), and stic with it throughout the questionnaire.

Sometimes you cannot guess all the possible responses that respondents might make—it therefore necessary to use open-ended questions. The advantage here is that respondents have th freedom to respond in their own way, not restricted to the choices provided by the researcher. Fo example:



Responses to open-ended questions can be summarised into a number of different categories for ent into IBM SPSS. These categories are usually identifed after looking through the range of respons actually received from the respondents. Some possibilities could also be raised from an understandi of previous research in the area. Each of these response categories is assigned a number (e.g. work= fnances=2, relationships=3), and this number is entered into IBM SPSS. More details on this a provided in the section on preparing a codebook in Chapter 2.

Sometimes a combination of both closed and open-ended questions works best. This involv providing respondents with a number of defned responses, and also an additional category (other) th they can tick if the response they wish to give is not listed. A line or two is provided so that they ca write the response they wish to give. This combination of closed and open-ended questions particularly useful in the early stages of research in an area, as it gives an indication of whether th defned response categories adequately cover all the responses that respondents wish to give.

Response format

In asking respondents a question, you also need to decide on a response format. The type of respon format you choose can have implications when you come to do your statistical analysis. Son analyses (e.g. correlation) require scores that are continuous, from low through to high, with a wi range of scores. If you had asked respondents to indicate their age by giving them a category to ti (e.g. less than 30, between 31 and 50 and over 50), these data would not be suitable to use in

correlational analysis. So, if you intend to explore the correlation between age and, say, self-esteem you will need to ensure that you ask respondents for their actual age in years. Be warned though, some people don't like giving their exact age (e.g. women over 30!).

Try to provide as wide a choice of responses to your questions as possible. You can always condense things later if you need to (see Chapter 8). Don't just ask respondents whether they agree or disagree with a statement—use a Likert-type scale, which can range from strongly disagree to strongly agree:

strongly disagree 1 2 3 4 5 6 strongly agree

This type of response scale gives you a wider range of possible scores, and increases the statistical analyses that are available to you. You will need to make a decision concerning the number of response steps (e.g. 1 to 6) that you use. DeVellis (2003) has a good discussion concerning the advantages and disadvantages of different response scales. Whatever type of response format you choose, you must provide clear instructions. Do you want your respondents to tick a box, circle a number, make a mark on a line? For some respondents, this may be the frst questionnaire that they have completed. Don't assume they know how to respond appropriately. Give clear instructions, provide an example if appropriate, and always pilot-test on the type of people that will make up your sample. Iron out any sources of confusion before distributing hundreds of your questionnaires. When designing your questions, always consider how a respondent might interpret the question and all the possible responses a person might want to make. For example, you may want to know whether people smoke or not. You might ask the question:

Do you smoke? (please tick) ❒ Yes ❒ No

In trialling this questionnaire, your respondent might ask whether you mean cigarettes, cigars or marijuana. Is knowing whether they smoke enough? Should you also fnd out how much they smoke (two or three cigarettes, versus two or three packs), and/or how often they smoke (every day or only on social occasions)? The message here is to consider each of your questions, what information they will give you and what information might be missing.

Wording the questions

There is a real art to designing clear, well-written questionnaire items. Although there are no clear-cut rules that can guide this process, there are some things you can do to improve the quality of your questions, and therefore your data. Try to avoid:

- long complex questions
- double negatives
- double-barrelled questions
- jargon or abbreviations
- culture-specifc terms
- words with double meanings
- leading questions
- emotionally loaded words.

When appropriate, you should consider including a response category for ‘Don't know’ or ‘Not applicable'. For further suggestions on writing questions, see De Vaus (2002) and Kline (2005).

2

Preparing a codebook

Before you can enter the information from your questionnaire, interviews or experiment into IB
SPSS, it is necessary to prepare a ‘codebook'. This is a summary of the instructions you will use
convert the information obtained from each subject or case into a format that IBM SPSS ca
understand. The steps involved will be demonstrated in this chapter using a data file that w
developed by a group of my graduate diploma students. A copy of the questionnaire, and the codeboo
that was developed for this questionnaire, can be found in the Appendix. The data file is provided o
the website that accompanies this book. The provision of this material allows you to see the who
process, from questionnaire development through to the creation of the fnal data file ready f
analysis. Although I have used a questionnaire to illustrate the steps involved in the development of
codebook, a similar process is also necessary in experimental studies, or when retrieving informatio
from existing records (e.g. hospital medical records).

Preparing the codebook involves deciding (and documenting) how you will go about:

- defning and labelling each of the variables

- assigning numbers to each of the possible responses.

All this information should be recorded in a book or computer file. Keep this somewhere safe; there nothing worse than coming back to a data file that you haven't used for a while and wondering wh the abbreviations and numbers refer to.

In your codebook you should list all of the variables in your questionnaire, the abbreviated variab names that you will use in IBM SPSS and the way in which you will code the responses. In th chapter simplifed examples are given to illustrate the various steps. In the frst column of Table 2 you have the name of the variable (in English, rather than in computer talk). In the second column

Table 2.1 Example of a codebook

Variable	SPSS variable name	Coding instructions
Identification number	ID	Number assigned to each survey
Sex	Sex	1 = Males
		2 = Females
Age	Age	Age in years
Marital status	Marital	1 = single
		2 = steady relationship
		3 = married for the first time
		4 = remarried
		5 = divorced/separated
		6 = widowed
Optimism Scale items 1 to 6	op1 to op6	Enter the number circled from 1 (strongly disagree) to 5 (strongly agree)

Example of a codebook you write the abbreviated name for that variable that will appear in IBM SPS (see conventions below), and in the third column you detail how you will code each of the respons obtained.

Variable names

Each question or item in your questionnaire must have a unique variable name. Some of these nam will clearly identify the information (e.g. sex, age). Other questions, such as the items that make up scale, may be identifed using an abbreviation (e.g. op1, op2, op3 is used to identify the items th make up the Optimism Scale).

There are a number of conventions you must follow in assigning names to your variables in IB SPSS. These are set out in the ‘Rules for naming of variables’ box. In earlier versions of IBM SPS (prior to Version 12), you could use only eight characters for your variable names. The later versio of the program allow you longer variable names, but very long names can make the output rather ha to read so keep them as concise as possible.

Rules for naming of variables

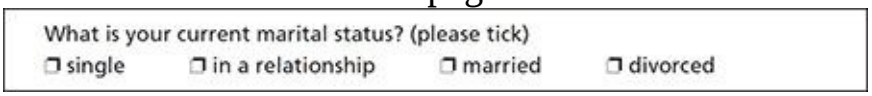
Variable names:

- must be unique (i.e. each variable in a data set must have a different name)
- must begin with a letter (not a number)
- cannot include full stops, spaces or symbols (! , ? * “)
- cannot include words used as commands by SPSS (all, ne, eq, to, le, lt, by, or, gt, and, not, g with)
- cannot exceed 64 characters.

The frst variable in any data set should be ID—that is, a unique number that identifes each cas
Before beginning the data entry process, go through and assign a number to each of the questionnair
or data records. Write the number clearly on the front cover. Later, if you fnd an error in the data se
having the questionnaires or data records numbered allows you to check back and fnd where the err
occurred.

CODING RESPONSES

Each response must be assigned a numerical code before it can be entered into IBM SPSS. Some
the information will already be in this format (e.g. age in years); other variables such as sex will nee
to be converted to numbers (e.g. 1=males, 2=females). If you have used numbers in your questions
label your responses (see, for example, the education question in Chapter 1), this is relative
straightforward. If not, decide on a convention and stick to it. For example, code the frst liste
response as 1, the second as 2 and so on across the page.



To code responses to the question above: if a person ticked single, they would be coded as 1; if in
relationship, they would be coded 2; if married, 3; and if divorced, 4.

CODING OPEN-ENDED QUESTIONS

For open-ended questions (where respondents can provide their own answers), coding is slightly mo
complicated. Take, for example, the question: What is the major source of stress in your life at th
moment? To code responses to this, you will need to scan through the questionnaires and look fo
common themes. You might notice a lot of respondents listing their source of stress as related t
work, fnances, relationships, health or lack of time. In your codebook you list these major groups
responses under the variable name stress, and assign a number to each (work=1, spouse/partner=2 an
so on). You also need to add another numerical code for responses that did not fall into these liste
categories (other=99). When entering the data for each respondent, you compare his/her response wi
those listed in the codebook and enter the appropriate number into the data set under the variab
stress.

Once you have drawn up your codebook, you are almost ready to enter your data. First you need
get to know IBM SPSS (Chapter 3), and then you need to set up a data file and enter your da
(Chapter 4).

Getting to know IBM SPSS

IBM SPSS operates using a number of different screens, or ‘windows', designed to do different thing
Before you can access these windows, you need to either open an existing data file or create one
your own. So, in this chapter we will cover how to open and close IBM SPSS; how to open and clo
existing data files; and how to create a data file from scratch. We will then go on to look at th
different windows IBM SPSS uses.

STARTING IBM SPSS

There are a number of different ways to start IBM SPSS:

- The simplest way is to look for an SPSS icon on your desktop. Place your cursor on the ico
and double-click.
- You can also start IBM SPSS by clicking on **Start**, move your cursor to **All Programs**, an
then across to the list of programs available. See if you have a folder labelled IBM SPS