OPEN EDUCATIONAL RESOURCE

Research Methodology: Definition, Types and Examples

Derek Jansen, MBA
Grad Coach
Reviewed by Kerryn Warren, PhD · November 2026

Abstract

Students meet the terms methodology, methods, research design and paradigm at the same time, and are expected to use them precisely in a proposal or methodology chapter. This article defines research methodology as the strategy that governs the choice and use of methods, together with the reasons for that strategy, and distinguishes it, following the methods literature, from methods, research design and research philosophy, noting where textbooks draw these lines differently. It then sets out the four decisions a methodology makes: what data to collect, from whom, how to collect them and how to analyze them. It describes the three main types of research methodology (qualitative, quantitative and mixed methods), the distinction between exploratory and confirmatory aims, probability and non-probability sampling, and common data collection and analysis methods. The article also describes in words where these decisions sit in the research onion of Saunders, Lewis and Thornhill. Two completed theses (a quantitative laboratory study and a largely qualitative sociology doctorate) show how the four decisions are made and justified in practice. The article is intended for students and early-career researchers writing a methodology, and for the educators who teach research methods.

Keywords: what is research methodology; types of research methodology; research methodology definition; difference between method and methodology; research design; mixed methods; sampling strategy; open educational resource

Suggested citation: Jansen, D. (2026). *Research methodology: Definition, types and examples*. Grad Coach. https://doi.org/10.5281/zenodo.24198549

About this article: This is the formal edition of an article first published at gradcoach.com/what-is-research-methodology/, where the figures can also be downloaded for reuse. Further open educational resources on research methods are listed at gradcoach.com/open-educational-resources/.

© 2026 Grad Coach. Free to share and adapt under CC BY 4.0 with credit to Grad Coach and a link to gradcoach.com/what-is-research-methodology/. Quoted thesis extracts remain their authors'; each thesis keeps its own license.

1. Introduction

Research methodology is often the first part of a research project in which students feel unsure of the vocabulary. Methodology, methods, research design, paradigm and sampling strategy appear together in textbooks and handbooks, and a proposal is expected to use each of them correctly. When the terms are confused, a reviewer or examiner may reasonably suspect that the thinking behind them is confused as well.

This article is written for students and researchers preparing a methodology and for those who teach research methods. Section 2 defines research methodology and distinguishes it from methods, research design and research philosophy. Section 3 sets out the four decisions a methodology makes and where they sit in the research onion. Section 4 describes the three main types of research methodology. Sections 5 to 7 cover sampling, data collection and data analysis; Sections 5 and 7 include extracts from completed theses. Section 8 compares the two theses decision by decision, and Section 9 explains how the decisions are justified in writing.

2. Defining Research Methodology

In this article, research methodology means the strategy that governs the choice and use of methods in a study (Crotty, 1998, as cited in Creswell, 2003, p. 5), together with the reasoning behind each part of it. In practice, it is the plan by which the study answers its research aims and questions: a set of decisions about which data will be collected, from whom, how and with what analysis, and why each choice suits the study. Almost every empirical study, whether a dissertation, a thesis or a journal article, contains a methodology chapter or section that reports these decisions. It is read mainly for that reasoning, not for the list of methods.

2.1 Methodology and methods

An influential distinction in the methods literature comes from Crotty (1998, as cited in Creswell, 2003, pp. 4–5). Crotty separates four levels of decision in designing research: the epistemology, or theory of knowledge; the theoretical perspective, or philosophical stance; the methodology; and the methods. In Creswell's summary of this framework, methodology is the "strategy or plan of action that links methods to outcomes" and governs the choice and use of methods. Methods are the techniques and procedures used to collect and analyze data, such as a questionnaire, an interview or a focus group (Creswell, 2003, p. 5).

Methods, in other words, are tools: an interview, a survey, a *t*-test, thematic analysis. Methodology is the strategy that selects the tools, puts them in order and explains why those tools were chosen and not others. One consequence follows directly. Two studies can use the same method, such as semi-structured interviews, and still have different methodologies, because they use the method for different purposes and combine it with different sampling and analysis.

2.2 Methodology and research design

Research design is the term most often confused with methodology, and textbooks do not draw the boundary in the same place. Bhattacherjee (2012) defines research design as "a comprehensive plan for data collection in an empirical research project," a "blueprint" (Chapter 5). In his ac-

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

count, this blueprint must specify at least how data will be collected, how instruments will be developed and how the sample will be drawn. Defined this way, design covers much of what this article calls methodology. In Crotty's framework, by contrast, experimental research, survey research and ethnography are examples of methodologies (as cited in Creswell, 2003, p. 5), although many textbooks would call them research designs.

A workable distinction, and the one used in this article, treats research design as the overall shape of a study: for example, whether it manipulates one variable while controlling others, follows the same people over time or examines a single case in depth. Methodology then refers to the full set of decisions about data and analysis, with their justification. Because the two overlap, a researcher should follow the usage of their program and of their methods textbook, and apply it consistently. In some fields the corresponding chapter is simply titled "Methods." What matters is that the chapter covers each decision and justifies it, whatever the chapter is called.

2.3 Methodology and research philosophy

Above methodology sits the research philosophy, or paradigm: the researcher's assumptions about the nature of reality and of knowledge. In Crotty's framework, the epistemology is embedded in the theoretical perspective, which in turn lies behind the methodology (as cited in Creswell, 2003, pp. 4–5). A philosophy makes some designs and methods more coherent than others, but it is better understood as a stance than as a rule that fixes the methods in advance. Nor are the approaches it informs sharply separated: Creswell (2003) observes that research practices now lie on a continuum between quantitative and qualitative, and that "the best that can be said is that studies tend to be more quantitative or qualitative in nature" (p. 4). Figure 1 shows how the four terms relate.

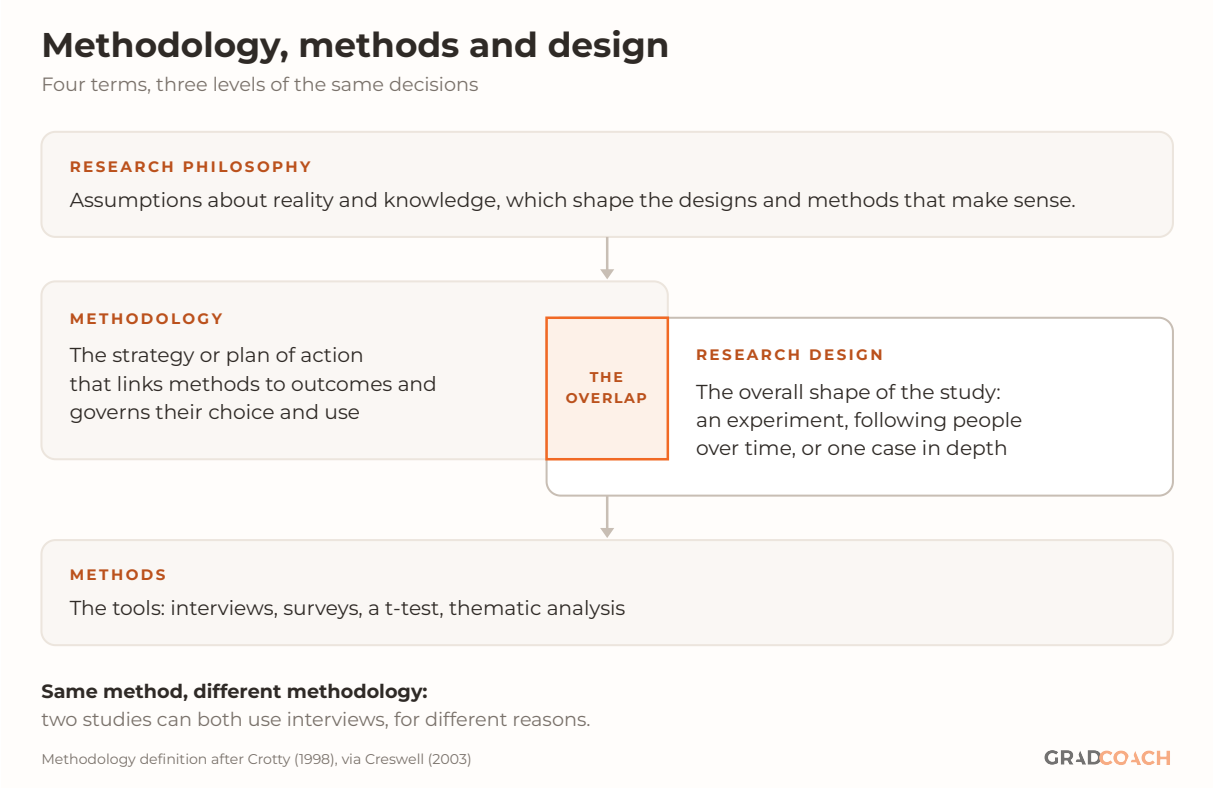

Figure 1. Research philosophy, methodology, research design and methods. Textbooks disagree about the overlap.

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

3. The Four Decisions of a Methodology

However the terms are drawn, a methodology for an empirical study has to settle four practical decisions:

1. **What data** to collect: words, numbers or both (Section 4).
2. **From whom** to collect them: the sampling strategy (Section 5).
3. **How to collect** them: the data collection methods (Section 6).
4. **How to analyze** them: the data analysis methods (Section 7).

The four are not independent. The research questions determine what kind of data are needed, and the kind of data determines who can provide them. Together, these narrow the ways in which the data can sensibly be collected and analyzed. A change to one decision usually requires changes to the others. Figure 2 shows the four decisions with the research aims and questions as their common starting point.

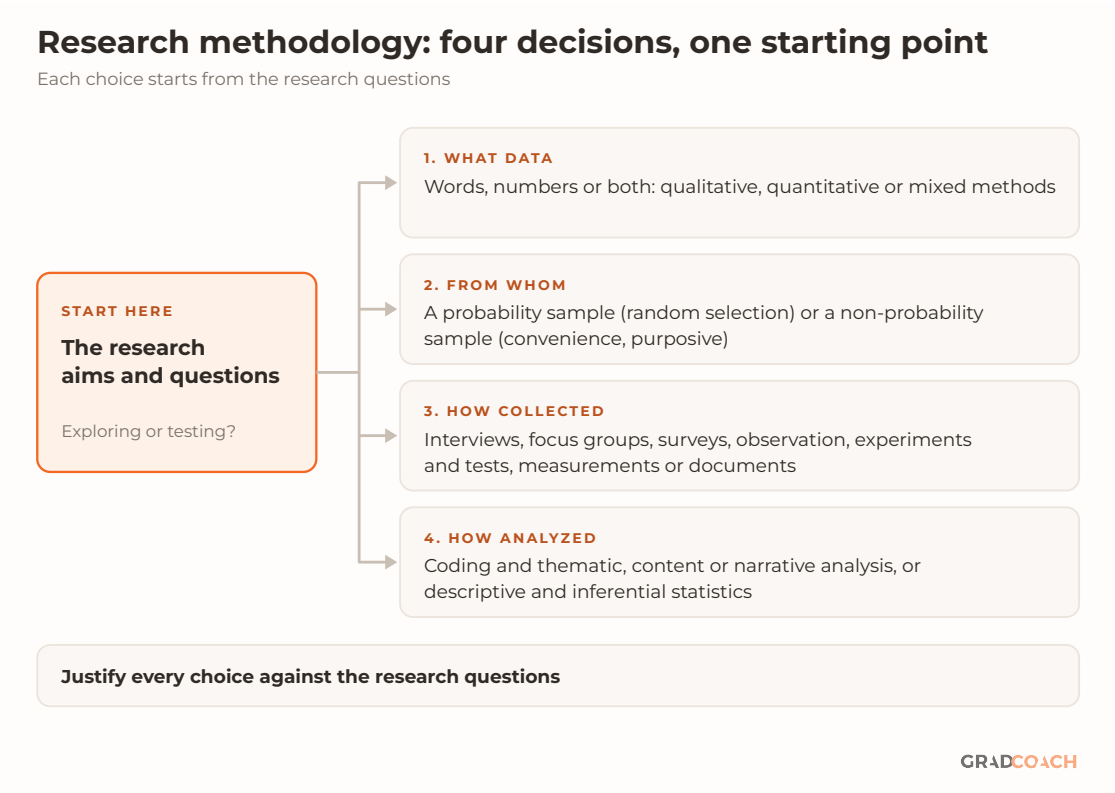

Figure 2. The four decisions of a research methodology, each starting from the research questions.

3.1 The decisions in the research onion

Many programs teach methodology through the research onion of Saunders, Lewis and Thornhill. The onion is a model from their textbook for business students, and it arranges the decisions of a research project as concentric layers. As Melnikovas (2018, pp. 33–34) summarizes the 2016 edition of the textbook, the onion has six layers, from the outside in:

1. Research philosophy, covering ontology (the nature of reality), epistemology (the nature and sources of knowledge) and axiology (the values, beliefs and ethics of the research)

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

2. The approach to theory development: deduction (starting from an existing theory and testing it), induction (starting from observation and data in order to form a theory) or abduction (moving between the two to find the most likely explanation)
3. The methodological choice: quantitative methods, qualitative methods or a mixture of both
4. The research strategy, such as an experiment, survey, archival research, case study, ethnography, action research, grounded theory or narrative inquiry
5. The time horizon: cross-sectional (data collected at one point in time) or longitudinal (data collected repeatedly over a long period)
6. At the core, the techniques and procedures for data collection and analysis, including the choice of sample, the content of a questionnaire and the preparation of interviews

The four decisions in this article sit in the onion's inner layers. In the onion's terms, the choice of qualitative, quantitative or mixed data is the methodological choice, and the sampling, collection and analysis decisions belong to the techniques and procedures at its core (Melnikovas, 2018, p. 34). The model is a useful checklist of what a methodology chapter has to address, but a chapter does not need to be organized around it.

4. Types of Research Methodology

The three main types of research methodology, which Creswell (2003) calls approaches to research, are qualitative, quantitative and mixed methods. Broadly, they are distinguished by whether a study works with words, with numbers or with both. Lists that name more types usually add research designs, such as experimental, descriptive or case study research, which describe a study's overall shape rather than its kind of data.

4.1 Qualitative and quantitative research

Qualitative research collects and analyzes words, written or spoken, and other non-numerical data such as images, video or observed behavior. Quantitative research collects and analyzes numerical data, to describe, measure or test. The two suit different kinds of questions. Writing about health services research, Fetters et al. (2013) note that quantitative methodologies address questions of causality, generalizability or the size of effects, while qualitative methodologies explore why or how a phenomenon occurs, develop theory or describe the nature of individual experience.

A qualitative methodology might therefore be used to understand how people perceived an event or how voters made sense of a political candidate. A quantitative methodology might be used to measure the relationship between two variables, such as sleep and exam performance, or to test a set of hypotheses.

4.2 Exploratory and confirmatory aims

A common teaching convention pairs exploratory aims with qualitative data and confirmatory aims with quantitative data. The pairing is a tendency, not a rule. Foster (2024) argues that the distinctions usually drawn between qualitative and quantitative research do not hold together. In his

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

view, the distinction between exploratory and (dis)confirmatory research matters far more in practice, and he offers a framework for making design choices that cross the qualitative-quantitative divide. A survey can be exploratory, and interviews can test whether an earlier finding holds in a new group. The practical order is therefore to ask first whether a study is exploring or testing, and then to choose the data that serve that purpose best.

4.3 Mixed methods

Mixed methods research combines qualitative and quantitative data in one study, so that each answers the part of the question it suits best. Its defining feature is integration: the two strands are connected rather than merely reported side by side. Fetters et al. (2013) describe three basic designs. In an exploratory sequential design, qualitative data are collected and analyzed first, and the findings inform the quantitative data collection. In an explanatory sequential design, the quantitative phase comes first, and its findings inform the qualitative phase. In a convergent design, both kinds of data are collected and analyzed in a similar period and then brought together for comparison.

Mixed methods can be powerful, but running two strands and joining them requires considerably more work. Fetters et al. (2013), drawing on earlier reviews, note that the integration actually achieved in mixed methods studies remains limited. A mixed methods design therefore needs a clear reason, such as a research question with both a measurable and an interpretive part, rather than a wish to cover all possibilities.

5. Sampling Strategy

Sampling concerns who, or where, data are collected from. It is rarely possible to collect data from every member of the group of interest (the population), so studies work with a smaller, accessible portion of it (the sample). How the sample is selected has a large effect on what the findings can claim. Sampling methods fall into two families.

In **probability sampling**, members are selected at random, so that every member of the population has a known, non-zero chance of selection. Random selection reduces the risk of selection bias (a systematic difference between the sample and the population) and allows results to be generalized statistically to the population. As Baker et al. (2013, p. 77) explain, a known, non-zero chance of selection is one of the assumptions behind many of the standard measures of survey quality. Non-probability samples violate them because the probability of selection cannot be computed or some members of the population have no chance of inclusion.

In **non-probability sampling**, selection is not random. In a convenience sample, the researcher recruits people who are easy to reach, such as colleagues or members of a group to which the researcher belongs. In a purposive sample, participants are chosen deliberately because they have the experience the research questions require. The rationale for this approach is a closer match between the sample and the aims and objectives of the research (Campbell et al., 2020). The trade-off is that results cannot be generalized statistically.

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

A doctoral thesis in development sociology at Cornell University studies conflicts over honey bee health and describes its 66 interviewees in a methods appendix. The sample is largely purposive, and the extract states plainly whom it does and does not represent:

> I interviewed 66 people: novice and experienced beekeepers, hobbyist and commercial beekeepers, educators, extension personnel, and apiculture research scientists. Informed consent was obtained from all participants, according to IRB guidelines for exempted research. Identifying information was not included in any of my writing, except for a small handful of public figures. My respondents are not representative of beekeepers more generally, as I sought out beekeepers with particular attributes for different parts of my research.
>
> Andrews (2020, p. 159)

The final sentence of the extract does two things. It states that the sample is not representative, and it explains why: the respondents were chosen for the attributes each part of the research needed. On the following two pages, Andrews lists selection bias among the limitations of the study and notes that recruitment through beekeeping clubs oversampled club members (Andrews, 2020, pp. 160–161). A sampling section should do both: state what kind of sample the study has and why it fits the questions, and then state what that sample cannot show.

6. Data Collection Methods

Data collection methods are the ways in which a study gathers its data. Common methods include:

- Interviews, which may be unstructured, semi-structured or structured
- Focus groups and other group interviews
- Surveys, administered online or on paper
- Observation, in which activities are watched and recorded
- Experiments and tests, such as a memory task in a laboratory
- Biophysical measurements, such as blood pressure or heart rate
- Documents and records, such as financial reports or court records

The choice depends first on the research questions and second on practical constraints such as time, access and funding. Interviews and focus groups often suit exploratory research. A survey or an experiment that produces numerical data usually suits research that measures specific variables or tests hypotheses, though, as Section 4.2 notes, the pairing is a tendency. The order of these two considerations matters. A method chosen because it seems quick or familiar, rather than because it fits the questions, is difficult to defend when a reviewer or examiner asks why it was chosen.

7. Data Analysis Methods

Data analysis methods are the techniques used to make sense of the data. They divide along the same line as the data: qualitative, for words and other non-numerical material, and quantitative, for numbers.

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

Widely used methods of qualitative analysis include qualitative content analysis, thematic analysis, discourse analysis, narrative analysis, framework analysis and the coding procedures of grounded theory. They differ in what they look for in the data and in what they build from it. A study may use more than one, depending on its research questions.

Quantitative analysis is usually divided into two groups. As Guetterman (2019) explains, descriptive statistics summarize the data by examining the typical values and spread of each variable. Inferential statistics make inferences about situations beyond the data set itself, such as a wider population. Means, medians and standard deviations are descriptive; correlation, regression and t-tests are commonly used for inference. Guetterman (2019) also lists beginning with descriptive statistics as one of the general steps of a statistical analysis.

As with data collection, the right analysis depends on the research aims and questions, the type of data and practical matters such as the software and skills available. A master's thesis in human development at Cornell University reports a two-session laboratory study of food nostalgia and memory. Near the start of its analysis section, it sets out both groups of methods and its software:

> The average values of relevant variables (e.g. confidence level) were examined using descriptive statistics. We ran multiple regression analyses using the lme4 package in R (Bates et al., 2015), with p values calculated using lmerTest (Kuznetsova et al., 2017).
>
> Zhou (2024, p. 17)

The two sentences report descriptive statistics first and inferential tests second. They also name and cite the tools used, which helps another researcher to repeat the analysis. The section then sets out each model in turn and the hypothesis it tested (Zhou, 2024, pp. 17–19). An analysis section is easiest to follow when it states which test answers which research question and why that test suits the data.

8. Two Studies Compared

Table 1 sets the two theses quoted above against the four decisions. One is a quantitative laboratory study. The other is a sociology doctorate that relies mostly on interviews and observation. Reading across each row shows how differently two completed studies answered the same four questions.

Table 1. The four methodology decisions in two completed theses.

Decision	Human development master's (Zhou, 2024)	Development sociology doctorate (Andrews, 2020)
What data	Numbers: ratings of food images and of recalled memories, memory confidence ratings, recognition accuracy and reaction times	Mostly words: interview transcripts or notes and observation of meetings, plus archival documents and a statewide survey
From whom	66 participants recruited, with exclusion criteria stated; data from 46 analyzed after invalid responses were filtered	66 interviewees chosen for particular attributes, from novice beekeepers to educators, mostly in New York State; 291 survey respondents
How collected	Two laboratory sessions a week apart: rating food images and recalling memories, then a recognition test	Participant observation (the author is a beekeeper and club officer), semi-structured interviews, observation of meetings of 22 organizations, archival research and a survey

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

Decision	Human development master's (Zhou, 2024)	Development sociology doctorate (Andrews, 2020)
How analyzed	Descriptive statistics, then mixed-effects regression models (lme4) in R, with ANOVAs	Transcripts or interview notes coded separately for each research aim

Sources: Zhou (2024, pp. 13–19); Andrews (2020, pp. 157–164).

Zhou recruited 66 participants and Andrews interviewed 66 people, but the resemblance ends there. Each column is internally consistent. Zhou's study asks whether food nostalgia predicts how confident and how accurate people's memories are, so every decision points to numbers and statistics. Andrews studies how beekeepers disagree over what responsible management of pests and disease looks like, so nearly every decision points to people's own accounts. Neither design is better than the other; each fits its own questions.

9. Justifying the Methodology

A methodology section is judged less on the methods it lists than on the reasons it gives for them. A clear section shows, for each of the four decisions, why the choice fits the research questions and why the main alternatives fit less well. This justification is also what makes the findings credible: if the data, sample and analysis do not fit the questions, the conclusions built on them will not hold. A clearly reported methodology also allows other researchers to judge the study and, in quantitative work, to repeat it.

The comparison in Section 8 also shows a common gap. Andrews's methods appendix says little about analysis, only that transcriptions or interview notes "were coded according to different research aims" (Andrews, 2020, p. 159). That may be sufficient in a theory-led ethnographic study, where the methods are reported in an appendix as supporting evidence for the argument. A methodology is nonetheless usually expected to name its analysis method and justify it. A student's program handbook and a few recent theses from the same department show what is expected.

10. Conclusion

Research methodology is the strategy that governs the choice and use of methods in a study, together with the reasons for it. Methods are the specific techniques for collecting and analyzing data. Research design describes the overall shape of a study and overlaps with methodology in ways that textbooks define differently. Research philosophy is the set of assumptions about reality and knowledge that makes some designs more coherent than others. In practice, a methodology settles four linked decisions: what data to collect, from whom, how to collect them and how to analyze them. The three main types of methodology (qualitative, quantitative and mixed methods) follow from the research questions. Asking whether a study explores or tests is a better first step than choosing between words and numbers. Whatever the decisions, each should be justified against the research questions.

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com

References

Andrews, E. S. (2020). *Beekeeping in the Anthropocene: Theorizing conflicts over honey bee health* [Doctoral dissertation, Cornell University]. eCommons. https://doi.org/10.7298/c6m0-8g35

Baker, R., Brick, J. M., Bates, N. A., Battaglia, M., Couper, M. P., Dever, J. A., Gile, K. J., & Tourangeau, R. (2013). *Report of the AAPOR task force on non-probability sampling*. American Association for Public Opinion Research. https://aapor.org/wp-content/uploads/2022/11/NPS_TF_Report_Final_7_revised_FNL_6_22_13-2.pdf

Bhattacherjee, A. (2012). *Social science research: Principles, methods, and practices* (2nd ed.). Global Text Project. https://digitalcommons.usf.edu/oa_textbooks/3/

Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing*, 25(8), 652–661. https://doi.org/10.1177/1744987120927206

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Sage.

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs—Principles and practices. *Health Services Research*, 48(6, Pt. 2), 2134–2156. https://doi.org/10.1111/1475-6773.12117

Foster, C. (2024). Methodological pragmatism in educational research: From qualitative-quantitative to exploratory-confirmatory distinctions. *International Journal of Research & Method in Education*, 47(1), 4–19. https://doi.org/10.1080/1743727X.2023.2210063

Guetterman, T. C. (2019). Basics of statistics for primary care research. *Family Medicine and Community Health*, 7(2), Article e000067. https://doi.org/10.1136/fmch-2018-000067

Melnikovas, A. (2018). Towards an explicit research methodology: Adapting research onion model for futures studies. *Journal of Futures Studies*, 23(2), 29–44. https://doi.org/10.6531/JFS.201812_23(2).0003

Zhou, S. (2024). *Effect of food nostalgia on memory accuracy and memory confidence* [Master's thesis, Cornell University]. eCommons. https://doi.org/10.7298/6hjp-m651

© 2026 Grad Coach · CC BY 4.0 · gradcoach.com