# The Application of Content Analysis in Nursing Science Research

Helvi Kyngäs Kristina Mikkonen Maria Kääriäinen *Editors* 



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### **About the Editors**



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Part I

**Content Analysis** 



1

# Qualitative Research and Content Analysis

Helvi Kyngäs

#### 1.1 Research Approaches in Nursing Science Research

Nursing science researchers require a broad range of research approaches because the focal phenomena are usually multi-faceted [1], covering diverse aspects of human beings, their environments, health and nursing practices. Furthermore, it does not address only phenomena that can be objectively measured, but also people's experiences, and seek to understand them in the settings in which they occur [2–4]. Research is a systematic process in which rigorous scientific methods are used to answer questions and solve problems. The common goal is to develop, refine and expand knowledge, which can then be used (in this field) to develop evidence-based nursing, evidence-based nursing education and nursing leadership practices, as well as to develop and test nursing theories.

Due to its wide scope, diverse methodologies are applied in nursing science research. Generally speaking, research can be divided into quantitative and qualitative methods, as well as mixed methods—which use both quantitative and qualitative methods. Furthermore, research can be divided into deductive or inductive research based on the starting point. Quantitative research is generally deductive while qualitative research tends to be inductive. These two research types have different philosophical foundations and are conducted in distinct ways.

Scientific research is commonly carried out to describe, explain or predict something. The aim in a descriptive study is to describe a certain phenomenon, for example, adherence to health regimens (Fig. 1.1). An exploratory study is an extension of descriptive research, with an additional aim of identifying

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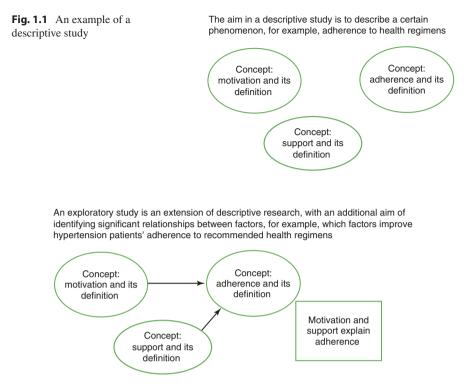


Fig. 1.2 An example of an exploratory study

A predictive study is conducted to identify predictors of a certain event, for example, predictors of good adherence to a health regimen

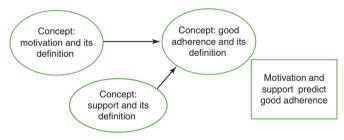


Fig. 1.3 An example of a predictive study

significant relationships between factors, for example, which factors improve hypertension patients' adherence to recommended health regimens (Fig. 1.2). A predictive study, on the other hand, is conducted to identify predictors of a certain event, for example, predictors of good adherence to a health regimen (Fig. 1.3).

#### 1.2 Comparison Between Quantitative and Qualitative Research

Philosophy underlies research. It is the foundation of research and determines studies' epistemology, ontology and methodology [5]. Quantitative methods are based on a positivist research philosophy whereas qualitative approaches are based on a naturalistic research philosophy. An assumption of positivist philosophy is that reality is fixed, directly measurable, and can be understood, i.e., there is just one truth and one reality. In contrast, naturalistic researchers assume that reality changes and can only be understood indirectly through the interpretation of people.

The different philosophical bases have also led to divergent ontological viewpoints, i.e., the way that reality is considered in a research approach. Quantitative research is characterised by objectivism while qualitative research is constructivist, with the inherent assumption that reality is the product of social processes. Epistemology describes how researchers know what they know (in terms of the possibilities, nature, sources and limitations of knowledge in the field of study). Methodology refers to the kinds of research instruments and frameworks that will be applied in a study. In research rooted in positivist philosophy, quantitative methods are used, i.e., methods capable of 'objectively' measuring variables and testing hypotheses. Thus, data collection techniques are applied that provide 'hard data': numbers that will be used to report results in quantitative form [6, 7]. In contrast, in qualitative research open data or descriptions of people's experiences and perspectives are analysed [8-10]. Qualitative methods can be applied to analyse all types of written material to provide answers to diverse types of research questions, which cannot be addressed simply by measuring physical phenomena (although such measurements may provide important complementary information).

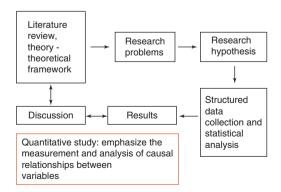
#### 1.3 Quantitative and Qualitative Research Processes

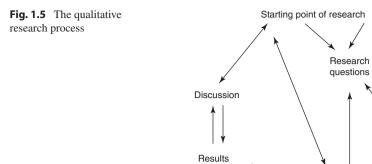
Qualitative and quantitative research have different characteristics because they are based on distinct philosophies. For example, a qualitative study (inductive research) is used when a researcher does not have knowledge-or has partial, unstructured and/or insufficient knowledge—about a certain phenomenon [4, 11, 12]. This type of research can also be used to study a certain concept, theory or practice from a new perspective. In contrast, quantitative research has a strong theoretical background and requires the researcher to set study questions and hypotheses. The purpose of qualitative research is to describe or explore human experiences and perspectives. It is important to note that the purpose will never be the explanation or prediction of a phenomenon, as qualitative research does not possess the tools necessary to make connections between concepts. Qualitative methods are used to create concepts, even if certain scholars have argued that the use of axial coding within the grounded theory approach can identify connections between concepts. This is a key difference between qualitative and quantitative research, as quantitative studies are undertaken to explain and/or predict events by analysing data with statistical methods. A further goal of qualitative research is to avoid generalising the findings,

and it is important to note that considering the transferability of research results (see Chap. 5) is not the same as generalisation. This is a clear distinction from quantitative research, as quantitative methods are used to produce knowledge that can be generalised.

Quantitative and qualitative studies also have distinct research processes (Figs. 1.4 and 1.5). Both types of studies have a starting point. When a researcher begins a quantitative study (see Fig. 1.4), they will consider earlier knowledge, i.e., previously published data or earlier theories. For this reason, every good quantitative study will include a comprehensive literature review, which is preceded by a careful and defined literature search. The starting point for qualitative research (see Fig. 1.5), on the other hand, can just be an idea that a scholar would like to study. The theoretical background can be very weak and there may not be any previous literature that supports the concept under study. It is important to emphasise that the open, or theoretically free, starting point requires an experienced researcher. In quantitative research (Fig. 1.4), the study questions and hypotheses are based on a theoretical framework while objective measurements are based on earlier knowledge. In contrast, the research questions in a qualitative study (Fig. 1.5) are based on the starting point of research but do not include a hypothesis. Furthermore, the data collection methods used in qualitative research are open or half-structured, but never structured. As such, they can span interviews, observations or any written material (diary entries, meeting minutes or other documents). The research questions in a qualitative study can also be changed during the research process. For example, one previous qualitative study was conducted to assess how the renovation of an intensive care unit environment-which took a lot of money and effortaffected people's perceptions of the environment. The researcher set the research question as: what are next of kind of experiences of the intensive care unit environment? However, when she started her data collection and open interviews, she realised that participants were unable to talk about the intensive care unit environment. They might answer "it is nice but my husband is seriously ill and I do not know whether he will survive." The researcher realised that the participants were unable to concentrate on the environment around them because they were more

**Fig. 1.4** The quantitative research process





concerned with their loved ones' health. After interviewing six participants, she realised that she was not getting answers to her research question, but rather answers to the question: what are your experiences when your relative/loved one is in the intensive care unit as a patient? As a result, she modified her research question. This approach is allowed in qualitative research and happens often when the study has an open starting point and open data collection method. As such, qualitative research guidelines advise researchers to analyse the data close to the time of data collection so they have the possibility to revise their research question(s). In a quantitative study, the researcher will make conclusions based on the results, just as in qualitative research. The researcher will strive to discuss the presented research in light of what has been previously published in both qualitative and quantitative studies; however, this is not always possible in qualitative research as there may not be a theoretical framework—or any previous knowledge—of the studied concept.

Results are also reported differently in quantitative and qualitative research. The nature of quantitative research means that the reports have a rigid structure, i.e., a detailed theoretical framework or literature review is followed by a methods section, the research results and a discussion of the results. The results, which are based on statistical analyses, are presented as numerical values. As mentioned before, qualitative studies sometimes only include a brief description of the theoretical framework or a limited literature review. Both types of research include a methods section, which explains, in specific terms, how the presented research was carried out. However, this is sometimes difficult in qualitative research as the analyses may have been partly based on intuition or the unconscious process of the researcher, both of which are difficult to describe using words (See Chap. 2). The results will also be presented using words, and the researcher can choose to supplement their writing with actual quotations from the research documents (see Chap. 5) [8, 13, 14]. In qualitative study reports, it is important that the researcher fully describes their preconceptions—in other words, what they knew about the studied phenomena before the research began-because these preconceptions can affect the data

Unstructured data collection

Data analyses

Many different types of qualitative research approaches are used in nursing science. The grounded theory approach is used to study meanings as well as create a substantive and formative theory for identifying core social processes. As such, this approach would be applicable to ethnography studies, which are used to address the question "What is the culture of a group of people?" On the other hand, phenomenological research—which is conducted to explore the "subjective reality" of an event and answer the question "What is it like to have a certain experience?"—requires a different research approach. In historical studies, qualitative methods are frequently employed to investigate where we come from, where we are, who we are now and where we are going. The main benefits of content analysis are that it is contentsensitive and flexible, i.e., can be applied to various research designs.

#### 1.4 Special Characteristics of Qualitative Research

In qualitative research, the theoretical framework or literature review provides the information necessary for a researcher to plan the data collection process, e.g., decide how open it will be and what kind of participants will be included. For this reason, researchers often ponder how open the starting point will be and what kind of literature review is needed. Neither issue has an explicit answer. For example, a researcher may want to perform quite a deep literature review to sufficiently understand the research subject, but in this case the researcher faces the risk of the study becoming more deductive in nature as the literature review may shape the data collection and analysis processes. Studies that include an open research plan but no literature review still require some preconceptions of the research topic as otherwise it will be almost impossible for the researcher to start their research.

The sample of a qualitative study is very important, but adequate sample size is not defined like in a quantitative study. The sample size is not specified before the researcher starts the data collection process, and data collection stops once saturation occurs. The term data saturation refers to a point when information from participants becomes repetitive and the researcher will not gain any new information from further data collection. For this reason, it is important for the researcher to analyse the data during the collection process so that they are aware of data saturation. Moreover, qualitative researchers should ensure that the chosen informants have the best possible knowledge of the research subject. For this reason, nonprobability sampling is used, and is a valid technique for qualitative studies because the goal of the research is not to generalise results. Researchers will often use a convenience sample, which is a set of people that are related to the research topic and easy to reach, e.g., nursing staff at the hospital under study. Furthermore, a researcher can set certain inclusion criteria to ensure that the informants will have knowledge and experience that is relevant to the research topic. The snowball method, or network sampling, in which earlier informants are asked to identify

other potential subjects that meet the eligibility criteria, is also commonly used. Studies that require research permission from a certain institute will break qualitative research principles, as they will need to provide a sample size so that the board (or person) responsible for providing research permission can know how many people will participate in the study. In cases in which data saturation is not reached with the initial sample size, the researcher will have to apply for research permission again. For example, if a researcher first obtained permission to interview 20 people, but did not reach data saturation, then they will have to think about how many more people they will include in the next research permission form.

The data used in qualitative research generally comprise interviews, observations, diary entries and/or written documents, among others. The written research material can be unstructured or half-structured (an example in the context of nursing science would be patient records), but never structured. The qualitative analysis process serves to reduce the data, group the data, form concepts/categories and finally describe the studied phenomena and answer the research questions (see Chap. 2).

#### 1.5 Qualitative Research and Content Analysis

Qualitative research is performed to study and understand phenomena in their natural contexts. As such, qualitative research focuses on—and respects—people's experiences and perspectives, neither of which can be described through objective measurements or numbers. Qualitative research is a process of understanding social or human issues and, when conducted properly, can provide a meaningful understanding of people's experiences and perspectives in the context of their personal life settings. The qualitative study process is inductive; for this reason, the data collection methods used in this type of research are unstructured and cannot provide numerical data that will be analysed through statistical techniques.

There is an ongoing debate about whether deductive qualitative research can fulfil the criteria of qualitative research. Unfortunately, there is no clear definition of the boundary that separates inductive and deductive research. This can be illustrated with a line where the ends represent the inductive and deductive approaches and the middle is marked with an "X" (Fig. 1.6).

It is easy to define both ends of the line. Inductive approaches, which are common in qualitative research, are employed when no prior research has covered a particular phenomenon, or if previous knowledge is fragmented. On the line above, an open starting point, which means that the research topic is only vaguely defined



Fig. 1.6 Line of the research starting point, with the inductive approach at the left end and the deductive approach at the right end

before the start of the research, would be situated close to the inductive approach end (Fig. 1.6). When the research topic is theoretically defined, or described in terms of previous research, the starting point will be situated closer to the deductive approach end of the line (Fig. 1.6). Problems in the definition of the research approach start to occur when the starting point moves closer to point "X" on the line (Fig. 1.6). The closer a point is to point "X", the more difficult is to determine whether the research requires an inductive or deductive approach, that is, whether the researchers should apply quantitative or qualitative methodologies. Figure 1.4 clearly shows that quantitative research is characterised by a deductive starting point (compare with Fig. 1.5), as the research questions are based on an established theoretical framework or comprehensive literature review.

This issue can be further described with several more examples. Figure 1.5 shows how the starting point for qualitative research is in stark contrast with that of quantitative research. This can be examined through an example research question: which factors support good adherence to health regimens? Even though this is an open starting point (inductive research), the research question proves that the researcher already knows that some factors will support adherence to health regimens based on earlier literature. The researcher can then collect data by asking participants about factors that support good adherence to health regimens. Participants will most probably describe many different types of factors (knowledge of the disease, income level and mental support from family members), and the researcher will then analyse the data inductively (see Chap. 2). However, if a researcher has a more complete knowledge base of the factors linked with regimen adherence, they can pose a more specific research question, for example, "how does family support adherence to health regimens?" Now the research starting point is no longer as open as it was in the first example. As the researcher's knowledge of the issue of regimen adherence grows, they can ask even more specific questions, such as "how does a mother support good adherence to health regimens?", "how does a father support good adherence to health regimens?" and "how do siblings support good adherence to health regimens?" These last examples demonstrate situations in which the researcher already has a lot of knowledge about the research topic, i.e., research questions are half-structured, but the data will still be analysed inductively. In terms of the line, these situations are moving closer to point "X" because a researcher's knowledge of a phenomenon has increased, which means that they are able to set specific research questions based on their theoretical knowledge.

#### 1.6 Conclusion

The field of nursing science employs diverse research methods due to the multifaceted subjects under study. Qualitative research is needed when a researcher does not have earlier knowledge of a certain issue, or if the existing knowledge is fragmented. The application of qualitative methods means that a researcher is interested in studying people's experiences and perspectives in a specific social context. Content analysis is a useful qualitative analysis method due to its content-sensitive nature and ability to analyse many kinds of open data sets. The next chapter will present how to conduct an inductive content analysis.

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# **Inductive Content Analysis**

Helvi Kyngäs

#### 2.1 Background of Content Analysis

There are many ways to analyse qualitative data. Content analysis, which was first used to analyse religious hymns, newspaper and magazine articles, advertisements and political speeches in the 19th century, is a method that is commonly used in qualitative research. Since 1990, when the first textbook of content analysis was published [1], content analysis has been applied to scientific data and its use is still gaining popularity. This research method allows researchers to systematically and objectively describe research phenomena at the theoretical level. Content analysis can be applied to various types of documents (interview transcripts, speeches, even images) and is used to create concepts, categories, and themes, which can be extended to create models, conceptual structures and conceptual maps that describe the subject under study [2]. It is important to note that the conceptual maps created based on content analysis results can describe a phenomenon, but not explain it, as content analysis does not include tools for connecting concepts. Researchers may feel that they understand how various studied concepts are related; however, this is based on their intuition (i.e. familiarity with the data) rather than the results of content analysis per se [3, 4].

Researchers generally use content analysis to describe human experiences and perspectives. Rather than yielding generalisable results, content analysis can provide meaningful descriptions of people's experiences and perspectives in the context of their personal life settings [2, 5, 6]. Data from a wide range of written documents (e.g. interview transcripts, observations and diary entries) can serve as the input for content analysis. In the context of nursing science, patient records, articles, meeting minutes and books are all suitable for content analysis; the only requirement is the data are unstructured or half-structured [2, 7].

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The research questions and starting point determine whether a researcher should choose inductive or deductive content analysis (see Chaps. 1 and 3). Inductive content analysis is performed to create concepts, categories and themes from data whereas deductive content analysis will apply either a structured or unstructured (unconstrained) matrix of analysis depending on the study aim.

#### 2.2 Inductive Content Analysis

Inductive content analysis is used when a qualitative study has an inductive starting point (see Chap. 1) or, in other words, when the data collection approach is open and follows loosely defined themes. This form of content analysis is suitable when the phenomenon under study has not been covered in previous studies or when prior knowledge is fragmented [2]. A basic inductive content analysis is performed according to the following phases: data reduction, data grouping and the formation of concepts that can be used to answer research questions. Hence, content analysis is used for data abstraction [2, 4]. Researchers may face problems when performing their first content analysis because there are no systematic, accurate rules for how to analyse qualitative data. Instead, content analysis can be considered a discussion between the researcher and their data. During the analytical process, the researcher will read, organise, integrate and form categories, concepts and themes by carefully comparing the similarities and differences between coded data. The ultimate aim is to produce abstracts of the raw data that summarise the main categories, concepts and themes, and provide indications of potential theoretical relationships.

#### 2.2.1 An Example of Inductive Content Analysis

This section will describe how to perform inductive content analysis by using a previous qualitative study as an example. Data were collected from 13 to 17 years adolescents with type1DM (n = 51) through open interviews. Data saturation (see Chap. 1) was achieved after 40 interviews, but—for ethical reasons—all of the participants were invited because invitations had been sent at the start of the study. It is considered ethically wrong to invite participants to take part in the research and then cancel their participation once data saturation is achieved. The selected study included three research questions: (1) What is the meaning of disease for adolescents who have type1DM? (2) How do you take care of yourself? and (3) Which factors affect how you take care of yourself? However, only one of the research questions (What is the meaning of disease for adolescents who have type1 DM?) is discussed in this section.

The interviews—which were taped—yielded 480 pages of transcribed text (which includes answers to all three of the research questions). A researcher should be very familiar with the collected data when starting the inductive content analysis process. Recommendations state that the researcher should have read through the data several times before starting the analysis. In the first step of the analytical

process, the researcher will select the unit of analysis, for example, one word, sentence, meaning or theme. During the next step, the researcher will usually analyse manifest content, i.e. the transcribed text. The latent content—anything else that has happened during the interviews, for example, silence, signs, posture or laughter can also be analysed. Researchers who want to analyse latent content will need to record any instances of non-verbal signals in the transcribed text.

An important part of the data abstraction process is analysing open codes to form sub-categories, which can be further grouped into categories and main categories. Some researchers will use the terms sub-themes/sub-concepts, themes/concepts and main themes/main concepts in place of sub-categories, categories and main categories. A researcher is responsible for ensuring that any terminology they choose is applied consistently throughout their research. The example used in this section applies the terms open codes, sub-concepts, concepts and main concepts.

The example presented in this section selected one sentence as the unit of analysis. When applying content analysis to transcribed text, the researcher is tasked with reading through the raw data sentence by sentence and determining whether each sentence is related to their research questions (in this example "What is the meaning of disease for adolescents who have type1DM?"). Any sentence that is related to the research question is classified as an open code (Fig. 2.1).

This process of reading through raw data sentence by sentence and marking instances of open codes is an example of data reduction (Fig. 2.2).

In the next step, the researcher compares the content similarities and differences between open codes to determine which codes can be grouped together. Various open codes that were identified from the transcribed text are shown in Fig. 2.2, for example, worries about the future, worries about health conditions, worries about future occupation, worries about starting a family, dependence on parents, dependence on nurses, and dependence on physicians. Hence, it is clear that the interviewed adolescents were often worried about something or concerned with being dependent on various individuals. However, before the researcher can group these open codes into sub-concepts (for example, worries and dependence), they must return to the raw data and check that the issues included in the identified open codes were discussed in the context of meaning of diabetes. Once this is confirmed, the researcher can group the open codes together and give the resulting sub-concept an

<b>Fig. 2.1</b> Example of data analysis to create open	Raw data (unit of analysis is sentence)	Open codes
codes	I am very worried about my future what kind of occupation I will get. I also worry what about my health in the future Will I get work which I would like to have It worries me a lot. I am also afraid of complications Will I have them on the future and will day complicate my life. It scares me. I feel guilt that I do not take care of myself better than I do	worries fears guilt

fears of complications
dependence on parents
pain
worries about future
worries about health conditions
lie to parents
health diet
conflicts with mother
my life depends on insulin treatment
worries about future occupation
worries about to get family

- blood glucose level varies a lot
- fears about to get blind
- threat of hypoglycaemia
- my life depends on nurses
- my life dependents on physicians
- · worry about have energy to take care of myself

Fig. 2.2 The list of identified open codes (data reduction)

**Fig. 2.3** Creation of sub-concepts through the combination of open codes (data abstraction)

Dependence

- dependence on parents
- dependence on insulin
- dependence on nurses
- · dependence on physicians
- dependence of regular daily life
- Worries
- worries about future
- · worries about health conditions
- worries about future occupation
- · worries about to get family
- · worries to have energy to take care of myself

appropriate name. In this example, the researcher grouped the open codes into two sub-concepts: dependence and worries. Hence, in light of the research question, adolescents feel that being afflicted by type 1DM translates into worries and dependence (Fig. 2.3).

After the data have been grouped into sub-concepts, the researcher must then determine whether the abstraction process can be continued by grouping sub-concepts together based on similarities in content (Fig. 2.4).

The data abstraction can continue if the concepts can be grouped into main concepts based on similarities in content. The presented example formed two main concepts—threat to life and healthy lifestyle—from the identified concepts (Fig. 2.5).

The data abstraction process can proceed one step further if the main concepts can be grouped together. This was not possible in the presented example because the contents of the two main concepts were not similar. In the presented example, the two main categories identified through inductive content analysis are the answers to

Answer to research question – the meaning of disease

ASK: what are similarities and differencies between the open codes



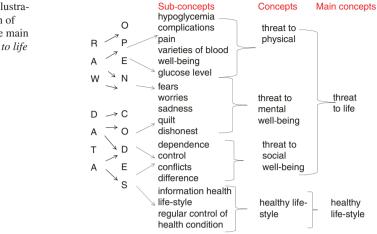
Fig. 2.5 Combination of concepts into main concepts

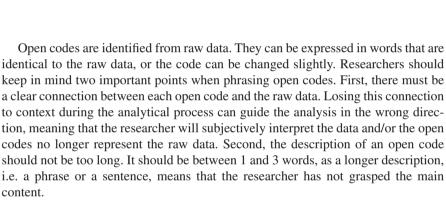
the research question "What is the meaning of disease for adolescents who have type1DM?" Hence, the participants felt that having type1DM represents either a threat to life or a healthy lifestyle. The path of analysis concerning the main concept *threat to life* is illustrated in Fig. 2.6. The path of analysis for the other main concept—*healthy lifestyle*—is not shown.

First, the figure illustrates how inductive content analysis can be applied to qualitative data to answer a research question (i.e. adolescents feel that having type1DM represents a threat to life). Second, the figure clearly outlines the abstraction process or, in other words, how researchers can move from raw collected data to theoretical concepts. Third, the illustrated abstraction process shows the structure of the main concept threat to life. Hence, it is clear that threat to life includes physical, mental and social factors.

#### 2.2.2 Frequently Asked Questions

Many researchers, especially those who have not extensively applied content analysis, frequently ask questions about the analytical process. The most common questions are: which kinds of open codes are satisfactory? how should I name open codes? what should I do with open codes that do not belong to any sub-concepts, -categories or -themes? what should I do when I find opposing or contradictory perspectives in the data? and how should I handle confusing data?





Content analysis scholars have emphasised that the process of generating open codes is highly sensitive as researchers can easily interpret the data subjectively. This can result in codes that are not strongly connected to the original data [2, 8]. Researchers need to be familiar with the data to maintain a good connection between open codes and the raw data. A helpful technique is adding certain notes to identified codes that will help the researchers when they return to the raw data. Several examples for the study presented above are: "worries about future (boy X or participant X)" and "worries about health condition (boy F)". This will help researchers when they have identified many cases of a similar open code, as they will need to check the contents of each code before grouping them into the same sub-concept. This means that they will need to return to the raw data for each identified open code. To generalise, a good open code is short, its content is closely related to the raw data, and it has some identifier that denotes the source in the raw data.

Another generally asked question concerns the names of sub-concepts, concepts and main concepts. First and foremost, researchers must keep in mind that the name should arise from the shared content of the group. For example, when thinking of a label for similar sub-concepts, the researcher should determine what content is included in each sub-concept. Researchers will rarely create totally new



concepts; in this way, descriptions of groups will come from a researcher's intellectual knowledge, theoretical understanding or expertise in the research field. As such, a researcher may think of a good label for a group based on previous research. However, it is important to note that any chosen label or description should reflect the shared content and the context that is under study.

Researchers are also commonly puzzled by what to do with open codes that do not belong to any of the generated sub-concepts (this is also evident in sub-concepts that do not fit into any of the created concepts). Most often, the reason is that data collection did not reach saturation. The researcher should mention this when reporting results, as well as list the open codes that did not fit into sub-concepts and describe the motivations for excluding these codes from the analytical process. The lack of saturation can also harm the data abstraction process, as researchers who did not reach data saturation may find that certain sub-concepts do not fit into any of the created concepts. Situations in which the participant group is highly heterogeneous may also cause researchers to generate open codes that do not fit into any sub-concepts. The fact that heterogeneous participant groups have such diverse perspectives and opinions may make it difficult for researchers to determine whether they achieved data saturation.

Another common concern is the identification of opposing perspectives or experiences. In most cases, the researcher will report both opposing perspectives as main concepts, for example, satisfaction with care and dissatisfaction with care. However, the researcher is also tasked with deciding whether to report these two main concepts or describe the research on the concept-level, i.e. present the contents included in the main concepts *satisfaction with care* and *dissatisfaction with care*.

Researchers often report feeling that they have rich but confusing data. The first step to tackling confusing data is getting familiar with the raw data, which can be achieved by reading through the data several times. After this, the researcher will be able to define a unit of analysis and start the analytical and data reduction processes. Even if a researcher is familiar with their data, they may still face challenges answering the research questions while analysing the data. To avoid this, a researcher may consider performing a pilot data collection to make sure that the collected data are relevant to the research question. Furthermore, as discussed in Chap. 1, the researcher should analyse the data during the data collection process and, if necessary, reformulate the research question. In qualitative research it is possible that participants may not focus on the interview question but rather provide information that is not related to the study question. In these instances, the researcher should be aware that it is logical that data which are not related to the subject of study will not provide any open codes.

#### 2.3 Reporting Results

Inductive content analysis results are sometimes challenging to report because the researcher can only describe part of analytical process exactly, and rely on their past insight or intuition to explain other parts of the analysis. When reporting inductive content analysis findings, researchers should strive to describe the

contents of the presented concepts through the identified sub-concepts and open codes. The researcher should also provide authentic citations that connect the results and raw data. This will improve the trustworthiness of the presented research. Scholars often ask about the proper number of authentic citations. There is no clear answer, but a good rule is that more authentic citations than text will make it hard for the reader to understand the results of the analysis. It is also important to select citations that will reflect different parts of the analytical process, for example, a citation for each of the presented sub-concepts and concepts. In addition, researchers can gain trustworthiness by including citations from a wide array of participants. Figures and tables are another way that researchers can clarify how they conducted the analytical process. An effective figure presents an example of part of the analysis and helps readers draw their own conclusion about whether or not the study is trustworthy.

It is critical that the reporting of results handles the findings as a product of inductive content analysis. Qualitative researchers occasionally use constructions such as "participants described..." or "participants said...", both of which should never be used because the researcher is stating what the participants said during interviews rather than what the content analysis revealed. Everyday expressions are sometimes used, and their presence often indicates that the researcher has trouble discussing their results on the theoretical level, which may also be reflected in the names of sub-concepts and concepts (i.e. they are almost identical to what was expressed in the raw data).

The information in Fig. 2.6 can be used to provide an example of how inductive content analysis results should be reported. In this case, the researcher should clearly explain the path of analysis from the open codes to the main concepts. For example:

The performed analysis demonstrated that adolescents perceive type1DM as a threat to their physical, social and mental well-being. The threat to social well-being encompassed dependence, control, conflicts and differences. Dependence included various aspects, e.g., dependence on parents, insulin, nurses and physicians. This can be exemplified through one adolescent's response: "of course it means that I am dependent on many things.... My parents, insulin treatment, nurses and physicians...... I am not free such like other adolescents are..... I have a strict schedule".

This could be followed by a figure or table, which is an effective way to present which open codes and sub-concepts belong in the concept of dependence. Including all of the open codes and sub-concepts within the text of a research report may hurt the narrative flow of the text and deter readers.

#### 2.4 Trustworthiness of Inductive Content Analysis

There are various criteria that can be used to evaluate the trustworthiness of qualitative research. These criteria, which are presented in more detail in Chap. 5, are also applicable to research that includes inductive content analysis.

#### 2.5 Conclusion

Inductive content analysis is a useful and commonly applied analytical method. Even though inductive content analysis follows a logical process, researchers sometimes find it difficult to explain how they identified certain concepts, categories or themes because the process involves a certain amount of intuition. Qualitative researchers who use inductive content analysis do not present any numerical results, but rather use the concepts identified during the analytical process to answer their research question(s). Researchers who have not used inductive content analysis before may experience uncertainty when applying this message, as certain rules for the analysis differ from case to case. Nevertheless, inductive content analysis is widely used among qualitative researchers and can provide meaningful insight to diverse research topics. On the other hand, deductive content analysis, which is presented in the following chapter, remains a less popular qualitative research method.

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# **Deductive Content Analysis**

#### Helvi Kyngäs and Pirjo Kaakinen

#### 3.1 Deductive Content Analysis

Deductive content analysis is an analytical method that aims to test existing categories, concepts, models, theories or hypotheses (all of which are referred to as theoretical structure in this chapter) in a new context, i.e. with new data [1–3]. It is important to note that the term testing—when used in this chapter—does not refer to statistical testing. Researchers usually apply deductive content analysis for two reasons. First, they may want to compare certain concepts in a different context. For example, a researcher may want to determine whether the concept *threat to mental well-being*—which was first identified in data collected from adolescents with asthma—can also be recognised in data collected from adolescents with diabetes. The second reason why researchers perform deductive content analysis is to study a specific theoretical structure in a new context.

In contrast to inductive content analysis, deductive content analysis requires a theoretical structure from which a researcher can build an analysis matrix. As outlined in Chap. 2, inductive content analysis does not require an analysis matrix as the collected data will guide how the analysis progresses (i.e. inductive approach). The analysis matrix can be either structured or unstructured depending on the purpose of the study. As the terminology suggests, an unstructured matrix is more open than a structured matrix—which includes a detailed description that will strongly influence the analytical process. However, the analysis does leave space for findings other than what is specifically mentioned in the matrix. Researchers commonly ask why deductive content analysis should be used when there is the alternative of designing a quantitative study that includes a questionnaire and statistical methods that will test the theoretical structure. A drawback of quantitative approaches is that

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they have a strict structure and will test only the issues that are outlined in the data collection design, for example, the questionnaire. Deductive content analysis, on the other hand, is applicable to qualitative research approaches—which aim to provide a broad view of the studied phenomenon. For this reason, deductive content analysis is relevant to studying a certain theoretical structure in another context. This type of approach can be used to test whether a theory of adherence to health regimes that was initially developed using data describing patients with diabetes also holds for patients with asthma. An example of how this research could be conducted is provided later in this chapter.

Even though qualitative approaches are commonly used in nursing research, deductive content analysis is rarely used. The paucity of studies employing deductive content analysis can be demonstrated through a literature search of previously published research. A search in the Scopus database using the keywords "content analysis", "deductive" and "nursing, nurse\*" in the title, abstract and keywords identified a total of 114 titles between 1990 and 2018. To ensure that the identified titles represented methodical articles, another search for the keyword "content analysis" in the title and the keyword "deductive" in the title, abstract or keywords was performed. The refined search yielded 33 articles, with 26 articles remaining after the removal of seven duplicate articles. These articles were published between 1983 and 2018 and represent a very small minority when compared to the number of nursing research papers that were published during the same time period. The rest of this section will provide examples of how deductive content analysis has been applied in nursing science research. Söderman et al. [4] used deductive content analysis to test a hypothesis. They developed a categorisation matrix from Halldórsdóttir's theory of caring and uncaring encounters and then tested the previously presented concepts in a new context. They first operationalised Halldórsdóttir's theory as a categorisation matrix and coded data that consisted of field notes. Next, each code was organised based on the operationalisation of caring and uncaring encounters in the categorisation matrix. In the final phase, the hypothesis was tested using the correspondence comparison method. In another study, Loft et al. [5] created a categorisation matrix based on Kirkevold's theory of therapeutic nursing roles (interpretive-, consoling-, integrative-, conserving function) and nurses' contributions to patient rehabilitation. The source documents were then read through several times, after which coded text was organised into appropriate categories based on the categorisation matrix. In a later analytical stage, all of the results in each category were synthesised into an integrated result.

#### 3.2 Research Process of Deductive Content Analysis

The research process underlying deductive content analysis is very similar to that of inductive content analysis. As mentioned before, the main difference between these two methods is that researchers should use deductive content analysis when the starting point of the research is earlier theoretical knowledge. For example, Chae

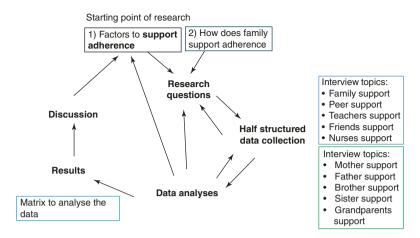


Fig. 3.1 The research process of deductive data analysis

and Park [6] assessed organisational cultural competence based on earlier theoretical knowledge of environmental factors [7]. When a researcher formulates their research question(s) based on earlier knowledge, they should structure their data collection method accordingly. An example is provided in Fig. 3.1. Chapter 2 stated that an inductive analysis is characterised by an open starting point. In other words, there is no theoretical structure underlying an inductive analysis. The example in Fig. 3.1 demonstrates that the researcher already knows that several factors will support adherence to health regimens and, as such, can set the research question according to this existing knowledge. In subsequent analyses, the research can explicitly ask interviewees how their family, teachers, nurse and peers, among others, support adherence to health regimens. A more specific example, also based on the information in Fig. 3.1, is that previous research has shown how family members support adherence to health regimens. Because the researcher is aware of this, they can ask interviewees how their mother, father, sister and brother, among others, support their adherence to health regimens. Both of these examples demonstrate how the research questions and data collection designs used in deductive analyses are based on prior knowledge. This knowledge can also be used to create the analysis matrix, which will guide the data analysis.

Research employing deductive content analysis relies on the same data collection methods and sources that are used in inductive content analysis, for example, interviews, observations, meeting documents, diary entries, historical documents and patient records. Any written material can serve as the input for deductive content analysis (see Chap. 1). As is also the case in inductive content analysis, the proper sample size for deductive content analysis is based on data saturation. Furthermore, the deductive content analysis process promotes returning to the research questions following data collection and analysis (Fig. 3.1). This is important for two reasons. First, it may be possible that the research questions and/or structure of analysis do not accurately reflect the theoretical structure. In this case, the researcher should revise their research question and/or structure of analysis to provide relevant results. A second issue is that the researcher may not have the correct data sources to answer their research questions. In this case, it is important that the researcher notices this immediately after initial data collection so that they can modify the data collection methodology. Researchers can lower the risk for both of these problems—and assure the trustworthiness of the study—by pre-testing the data collection tool and analysis matrix.

#### 3.2.1 Examples of How Deductive Content Analysis Has Been Applied in Nursing Research

A study of adolescents with diabetes found the meaning of disease to encompass the following concepts: threats to mental well-being; threats to social well-being and threats to physical well-being. If a researcher wants to study whether adolescents with asthma have the same experience, they will have to test a previous concept in a new context. This can be achieved in two ways. In one approach, the researcher could create a questionnaire that focuses on the meaning of disease, collect data, and analyse the collected data using statistical methods. This would provide knowledge on the issues that were included in the questionnaire. In contrast to this quantitative approach, a researcher could also choose to create interview questions based on earlier knowledge (i.e. meaning of disease for adolescents with diabetes), interview a group of adolescents and analyse the data using deductive content analysis. This approach may offer the researcher an opportunity to gain other important knowledge from adolescents with asthma because the interviewees are free to answer with their own words and explain how they are feeling. This is one advantage that deductive content analysis has over quantitative research approaches.

Prior knowledge that adolescents with diabetes describe the meaning of disease through the concepts threats to mental well-being, threats to social well-being and threats to physical well-being could be tested in a new context (adolescents with asthma) with the following research questions: (1) Do adolescents with asthma experience threats to their mental well-being?; (2) Do adolescents with asthma experience threats to their physical well-being; (3) Do adolescents with asthma experience threats to their social well-being? (Fig. 3.2). The interview questions should also be based on earlier knowledge. For example, the researcher could ask the interviewees questions like: does having asthma threaten your mental wellbeing?; what kind of threats to mental well-being have you experienced?; does having asthma threaten your social well-being?; what kind of threats to social well-being have you experienced?; does having asthma threaten your physical well-being?; what kind of threats to physical well-being have you experienced? These questions are quite open and would allow adolescents to freely express their feelings. However, these questions are not appropriate for an inductive approach because they are influenced by the theoretical structure and prior knowledge. As such, the starting point

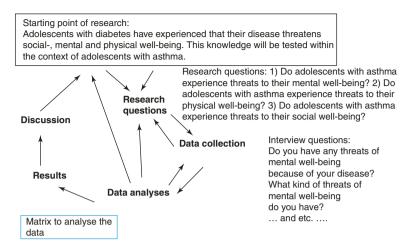


Fig. 3.2 The research process of a qualitative study which includes deductive content analysis

Table 3.1 A	n example	of an	unstructured	analysis	matrix
-------------	-----------	-------	--------------	----------	--------

adolescents with asthma have?	0		Physical well-being threats
-------------------------------	---	--	-----------------------------------

for this hypothetical research would move away from the inductive end of the line presented in Chap. 1 (Fig. 1.6) and approach the middle point (X).

The data collection phase also requires the building of an analysis matrix. The collected data will already be structured based on the interview questions. For example, the hypothetical study mentioned above will include data which describe threats to mental well-being. An appropriate analysis matrix for this study—which is based on the same theoretical knowledge that underlies the research starting point, research questions and data collection—is presented in Table 3.1.

The first step of data analysis is the selection of a unit of analysis. As discussed in Chap. 2, this can be one word, one sentence or meaning [7]. Inexperienced qualitative researchers may prefer to select a sentence as the unit of analysis because a sentence is easier to handle than a single word. The researcher will then go through the data to evaluate whether each sentence is related to the research question. All of the instances in which a sentence is related to the research question are recorded in the analysis matrix (see Table 3.2).

Once all of the open codes have been recorded into the analysis matrix, the researcher may still need to continue the analysis using inductive content analysis. For example, it may be possible to combine the concepts listed under the threat to mental well-being column in Table 3.2. These types of decisions are more common in inductive content analysis (see Chap. 2).

What kind of well-being threats does adolescents with asthma have?	Mental well-being threats	Social well-being threats	Physical well-being threats
	Conflicts between myself and guidelines of care Fear of asthma attacks Worries Sadness Dishonest	Difference Control Dependence Etc	Unable to breath Complications Disease getting worse Etc

Table 3.2 An example of deductive analysis that is guided by an unstructured matrix

A frequently asked question is what should be done with open codes that do not fit into the analysis matrix. However, this question does not have a simple answer. The research aim will specify if a researcher can only select open codes that are connected to the matrix. In certain instances, a researcher can create a new concept based on the information that does not fit into the analysis matrix, but they will need to use inductive content analysis to do so. A researcher risks losing important information if they do not create new concepts in the data analysis phase [7, 8].

#### 3.2.2 Example of Structured Deductive Content Analysis

A structured deductive content analysis has a more theoretically defined starting point than what was presented in the earlier example. Because the researcher has more knowledge of the research area, prior evidence will strongly influence every step of the research process, e.g. formulation of the research question, data collection design and the creation of the analysis matrix. For example, a researcher may already know that adolescents with diabetes perceive the disease as a threat to their mental well-being, which translates to dependence, worrying, sadness and guilt. The researcher may want to study whether adolescents with epilepsy perceive the same kinds of threats to mental well-being due to their disease. An appropriate research question could be: what kinds of threats to mental well-being do adolescents with epilepsy experience? When compared to the earlier example, this approach is more structured and deductive. The researcher could collect data by creating a questionnaire that measures these threats to mental well-being. For example, the researcher could ask adolescents whether they have worries as a result of having epilepsy. The interviewees can answer either yes or no to this type of question, and hence, the researcher will collect quantitative data. Another approach would be to ask adolescents what kinds of worries they experience, and allow them to answer freely in their own words. Even if a researcher applies a structured data collection method, they can nevertheless receive answers from interviewees that differ from the interview questions. For this reason, an analysis matrix is a crucial part of the research process. The example shown in Table 3.3 is more detailed and

Table 3.3	An example	e of a structured	data analysis	matrix

What kind of mental well-being threats do	Dependence	Worries	Sadness	Guilt
adolescents with epilepsy have?				

**Table 3.4** An example of how codes identified from the data can be organised according to a structured matrix

What kind of mental well-	Dependence	Worries
being threats do adolescents with epilepsy have?	<ul> <li>Dependence on parents</li> <li>Dependence on medication</li> <li>Dependence on nurses</li> <li>Dependence on physicians</li> <li>Dependence of regular daily life</li> </ul>	<ul> <li>Worries about future</li> <li>Worries about health conditions</li> <li>Worries about future occupation</li> <li>Worries about getting a family</li> <li>Worries about having the energy to take care of oneself</li> </ul>

structured than the previous analysis matrix because the researcher has more concrete knowledge of the topic under study. When considered in terms of the line presented in Chap. 2 (Fig. 2.6), this example is very close to point "X" between the inductive and deductive starting points.

As in the previous example, the researcher must choose an appropriate unit of analysis. Once again, one sentence may be useful and easy to handle for researchers who have limited experience in content analysis. This unit of analysis is then used when identifying open codes from the data and collecting them in the analysis matrix (Table 3.4).

The open codes should describe different threats to mental well-being experienced by adolescents with epilepsy. As was the case in the earlier example, open codes that do not fit into the analysis matrix can be analysed using inductive content analysis to create new concepts [7, 8]. The decision to combine inductive and deductive content analyses should be motivated by the research aims.

#### 3.3 Reporting of Results

When reporting results, the researcher should describe the various identified concepts/categories or themes. If the research aim was studying some theoretical structure in a new context, then the researcher should present the similarities and differences between the studied contexts. The researcher is also responsible for providing a detailed description of the analytical process. The results may not necessarily cover all of the categories which were included in the analysis matrix because it is possible that the data do not support some of the categories. This indicates that the theoretical structure does not fit the data. Tables and figures help to present the results to readers.

#### 3.4 Trustworthiness of Deductive Content Analysis

The trustworthiness of a study that employs deductive content analysis is evaluated using the same criteria that are applied to other qualitative research. These criteria—transferability, dependability, confirmability, authenticity—are explained in Chap. 5.

#### 3.5 Conclusion

Even though deductive content analysis is not commonly used in scientific research, it can be a useful method, especially when a researcher is interested in studying a pre-existing theoretical structure in a new context. A quantitative study design that involves statistical analysis can also be used to test theoretical structures, but will only allow the researcher to collect data that concern what was explicitly asked in the questionnaire. On the other hand, the deductive content analysis approach (which is applied in qualitative research) allows participants to freely share their perspectives. Hence, the main strength of deductive content analysis is that even issues that are not included in the analysis matrix can be taken into account when testing the theoretical structure. The following chapter will explain how researchers can mix qualitative and quantitative methods to employ the so-called mixed-methods approach.

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# Content Analysis in Mixed Methods Research

Kristina Mikkonen and Helvi Kyngäs

#### 4.1 Philosophical Background of Mixed Methods in Nursing Science

The philosophical foundation of nursing science emphasises questioning the truth and exploring the nature of being and reality. As such, nursing science researchers apply scientific theory and take into account the limits of knowledge when performing their research [1]. Two prevalent, and distinct, philosophical schools of thought are the received and perceived views of science. The philosophical principles underlying qualitative research methods are based on a perceived view of science. This view includes components of reality that are studied through subjective and inductive approaches. As such, qualitative research methods aim to describe and understand a phenomenon rather than predict and control the topic under study. Multiple truths can be unearthed during the research process. The discipline of nursing is described as a human science; hence, the field of nursing science focuses on humans as a whole and considers nurses as advocates to their patients [2]. Qualitative methods are used to study human phenomena so that researchers can understand relationships, values, experiences and issues, all of which are outside the scope of quantitative methods. On the other hand, the received view emphasises the empirical measurement of facts, with a possibility to implement, test and evaluate the outcomes. Empirical approaches, which were first developed in the nineteenth century, cannot be used to study human behaviour. Nursing science has combined these two schools of thought to provide the strongest possible interpretation of human behaviours. For example, researchers have built knowledge by translating inductive methodological approaches into deductive measurable entities, as well as provided scientifically proven models by developing and testing theoretical frameworks.

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The philosophy underlying nursing science includes three components: epistemology; ontology and methodology. Epistemology encompasses the study of knowledge whereas ontology examines the theory of being or, in other words, what exists or what is [3, 4]. Methodology is concerned with which tools should be used to obtain, organise and analyse knowledge. From the epistemological point of view, the nature, extent and justification of gained knowledge about participants' experiences are all important parts of research. Furthermore, epistemology places great significance on the identification of essential concepts from the collected data and the further examination of that knowledge, for example, the development of an instrument that can be used to examine the identified concepts with empirical methods. An ontological perspective stresses that qualitative methods are used to examine participants' experiences in their own context, how participants understand the reality of their own experiences and what relationships underlie how these experiences influence the participants. The methodology applied in qualitative studies is characterised by a humanistic philosophy, which considers personal meaning, understanding that meaning, subjectivity and the adoption of a holistic view of the human as valuable to the creation of knowledge [5]. However, interpretive approaches, subjectivity and inductive techniques include an inherent risk of bias [6]. Therefore, objectivity is essential when analysing research data and drawing conclusions. The inclusion of quantitative techniques is a beneficial way to increase the objectivity of a study.

Critical realism is the most common philosophical approach that combines qualitative (constructivist in that there is the underlying assumption of the existence of multiple realities) and quantitative (positivist in that there is the underlying assumption of a single objective reality) approaches [7, 8]. Mixed methods can be supported with a philosophical understanding of critical realism, which can be described by knowledge that is medicated by one's beliefs and perspectives [9]. Researchers who leverage this philosophy can gain a deeper understanding of topics that have attracted limited research attention by using inductive approaches to capture human experiences, and then translate these experiences into clearly defined concepts [10]. These concepts can be examined further to clarify their meaning and inter-relatedness, as well as develop theoretical models that can be tested and integrated into evidence-based practices.

Content analysis can be integrated into mixed methods approaches in at least three distinct ways. The following section provides some examples of how content analysis can be used in mixed methods research. The first example describes an instance in which qualitative and quantitative methods are used in the same study, while the subsequent example demonstrates how qualitative and quantitative methods can be separately applied in different stages of the research process.

#### 4.2 Examples of How Mixed Methods Are Used in Nursing Science

The application of mixed methods approaches in nursing science can facilitate rich data collection through clearly defined research questions, an intricately designed research design and rigorous data analysis [11]. However, a researcher needs to

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have experience and various competences to successfully conduct both research methods. Mixed methods approaches are used to gain a deeper understanding of measurable concepts, develop instruments, validate theoretical models, interpret the outcomes of quantitative research, combine different groups of participants in action research and examine the conclusions from a study's dissemination phase [11]. It is important for researchers to understand that the purpose of their research should guide study design and methodological choices. Mixed methods approaches can be used in nonparallel stages of research, for example, a researcher may begin a largescale research project by loosely formulating the study goals (quantitative approach), but then later carefully conduct a literature review to find prior evidence of the topic (qualitative approach). It is sometimes clearly evident that the topic under study has not received sufficient research attention and requires a deeper analysis. In a recent study by Wiens [12], the researcher interviewed 13- to 16-year-old girls living in Lapland, Finland, about their experiences of well-being. The research applied qualitative methods as participant experiences were described based on diary entries along with individual and focus-group interviews. The results of the long data collection process were used to develop a hypothetical model based on inductive content analysis, which is an example of a qualitative method. In the next step of the study, the researcher used the conceptual definitions of the hypothetical model to operationalise the definitions into empirically measurable units (items). The items can then be combined into a scale that quantitatively measures the studied phenomenon and can be psychometrically tested [13]. In this example of a nonparallel research approach, the researcher initially builds strong evidence and then leverages the versatility of different research methodologies at distinct research stages (see also Chap. 7). Another example of mixed methods is research that combines qualitative data collection and quantitative content analysis. Anguera et al. [14] provide researchers with comprehensive guidelines for how to apply quantitative methods to data that were collected using qualitative approaches. The objective of this type of research could be identifying behavioural patterns based on the conditional probabilities that were calculated for participants. This type of data analysis is commonly used in neuroscience and psychology, but seldom in nursing science.

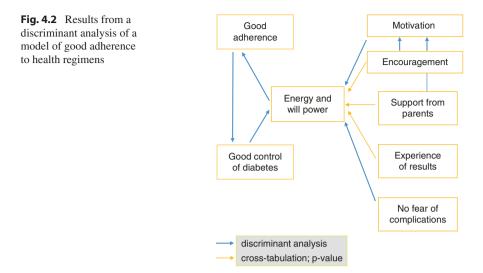
In another study, Kyngäs et al. [15] investigated how well adolescents with Type I Diabetes Mellitus (type1 DM) adhere to health regimens. The researchers performed an inductive content analysis with the objective of developing a hypothetical model (Chap. 2, Fig. 2.6 provides an illustration of the analysis path). The data collection phase encompassed open observations, interviews and drawings of adolescents' type1 DM experiences. A hypothetical model was developed based on the results. In the next step of qualitative data analysis, the researchers developed—and psychometrically validated—an instrument to test the hypothetical model. Once the Chronic Disease Compliance Instrument (CDCI)—which includes 72 items and 13 background questions—was validated, data were collected from 346 adolescents [15]. A linear structural relations (LISREL) analysis was performed to test the hypothetical model while a multiple indicators and multi causes (MIMC) approach was applied when building the model (see Chap. 7). LISREL—an example of structural equations modelling (SEM)—is a multivariate method that can be used to

conduct confirmatory factor analyses, multiple linear regression analyses and path analyses [16]. The MIMIC model is a structural equation that can be used to explain a single latent variable based on observed variables [17]. This method was applied to the research by Kyngäs et al. [15] to confirm that the structure and definitions of adherence concepts were in line with the factors measuring adolescents' adherence to health regimens. For example, the MIMIC model showed that Support and Encouragement did not explain adolescent adherence to health regimens. This disagrees with the initial quantitative findings, as the earlier analysis showed that adolescent participants often shared experiences of Support and Encouragement. The researcher continued the analytical process by returning back to the qualitative data and quantifying the sub-concepts identified in the content analysis (see Chap. 2, Figs. 2.3 and 2.6). There are two main approaches for the quantification of qualitative data. One approach is the calculation of the frequencies of defined concepts (for example, the Support of Parents toward adolescents) within participant experiences. In the study presented in this section, the support of parents was mentioned 51 times by the 51 interviewed adolescents (Fig. 4.1). As in the previous sentence, the results of the quantification can be reported in numerical format.

Another way that researchers can quantify the results of content analysis is to calculate the frequencies at which concepts are mentioned in all of the data, i.e., within the diverse sub-categories and categories. For example, in the study of adolescent adherence to health regimens, support from parents was mentioned over 300 times in the analysed data. Hence, various quantification methods can lead to noticeably different outcomes. For this reason, the purpose of quantification should be clearly defined to reach the required outcome of quantification. It is often the case that the sample used in the qualitative analysis is too small for any reliable statistical

**Fig. 4.1** The frequencies at which several participant experiences appeared in the results of a content analysis

- Conflicts (n = 47)
- Pain (n = 36)
- Guilt (n = 38)
- Dependence (n = 51)
- Control (n = 51)
- Support from parents (n = 51)
- Difference (n = 46)
- Fears (n = 51)
- Variations of blood glucose level (n = 25)
- Worries (n = 43)
- Hypoglycaemia (n = 38)
- Sadness (n = 28)
- Complications (n = 51)
- Encouragement from friends (n=51)
- Dishonest



analyses. However, the percentages and frequencies can be reported. The study presented in this section included 51 interviewees, which enabled the researcher to perform a discriminant analysis that included the calculation of *p*-values. These analyses supported the creation of a model that describes good adherence to health regimens among adolescents with type1 DM (Fig. 4.2). The model indicates that support from parents and the encouragement of health care providers and friends did not directly explain adherence, but explained the participants' motivation, energy and will power, all of which influenced adherence (see Chap. 7). A hypothetical model—which will be further discussed in Chap. 7—was created based on these outcomes.

An alternative approach for mixed methods studies is parallel data collection that combines qualitative and quantitative research methods. This approach can be used to gain a deeper understanding of quantitative data outcomes by considering how the collected qualitative data influence decision-making, and is commonly applied to interventional studies or action research in the field of nursing science. The example provided in this chapter is a Finnish study of doctoral students by Isohätälä et al. [18]. During the data collection phase, 1645 candidates from a university in northern Finland were invited to participate in a cross-sectional survey. A total of 375 doctoral candidates participated. The researchers aimed to explore and describe doctoral candidate perceptions of their doctoral degree and future career at the university. The survey included questions relating to doctoral study conditions, factors contributing to the progress of doctoral studies and perceptions of future career. These three areas of concern were measured using items that could be quantified statistically. For the factors contributing to the progress of doctoral studies area, candidates were given the additional option of sharing their personal experiences through an open question. These responses yielded qualitative data, which was

analysed with content analysis. During the analysis, prior to which one researcher had read through the data several times, the identified open codes (n = 300) were grouped under two tables: (1) presenting positive factors (298 answers); and (2) presenting negative factors (312 answers). The open codes were organised in Microsoft Excel, with each open code in a separate row. Table 4.1 presents an example of the data distribution. The most frequently mentioned factors were initially grouped under ten categories, and these categories could include both positive and negative factors. The ten categories were *Funding and position, Supervision, Community, Studies, Research and academic work, Practices, Infrastructure, Other work-related responsibilities, Motivation and one's own abilities* and *Personal life.* This phase included two researchers independently creating categories based on the collected data, after which the researchers organised the data into the identified categories. The data distribution among the ten categories is presented in Table 4.2.

Once both researchers had completed their categorisation of the raw data, the results were combined into one data set. All of the disagreements were marked in a different colour, after which the researchers discussed the reasons for their choices. In each of the disagreements, the researchers came to agreement based on the strongest theoretical support for categorisation. An example of the similarities and differences between the data analyses of the two researchers is presented in Table 4.3.

The frequencies at which each open code appeared among the ten categories were statistically calculated. Interrater reliability was assessed to strengthen the trustworthiness of the data analysis. Cohen's kappa, which measures inter-rater agreement in qualitative data analysis, was chosen for evaluating interrater reliability, and was calculated for each category [19]. Cohen's kappa can be calculated through several software programs, for example, SPSS, Microsoft Excel, and various online calculators, with a value >0.80 demonstrating sufficient reliability.

In the study presented in this section, six of the 10 categories demonstrated sufficient Cohen's kappa values. The four categories *Research and academic work*, *Other work-related responsibilities*, *Motivation and own abilities* and *Personal life* resulted in low Cohen's kappa values, varying from 0.10 to 0.60, which are insufficient for ensuring reliability. As a result, the researchers returned to the data

**Table 4.1** Raw data distribution of positive factors identified through content analysis, shown in a Microsoft Excel document

views

To be a member of research group. Supervision. That I had an opportunity to work full time for 1 year

Great supervisors and great infrastructure. Curriculum and structure of degree program is good Interesting topic, research community, support from friends in the same situation, encouraging supervisor

Research visit abroad

Research seminars and feedback there. Fellow PhD researchers and discussion with them. Conferences and conference paper presentations and feedback + connections made there

Support from my family

Freedom and independence, interesting industrial research projects

Negative factors			
Category	Funding	Supervision	Community
Lack of full-time funding	1		
Lack of knowledge in my field. Lack of cooperation with other researchers			1
Guidance of students, project management, project applications			1
Demotivated post-graduate students, who use doctoral studies for temporary employment			1

 Table 4.2
 Data distribution among the categories identified through content analysis

**Table 4.3** Similarities and differences in the content analysis results of two researchers who had worked independently

	Funding and position	Funding and position
Category	Researcher 1	Researcher 2
Lack of full-time funding	1.00	0.00
Lack of knowledge in my field		
Project management, project applications		
Demotivated post-graduate students, who use doctoral studies for temporary employment	1.00	1.00

analysis and examined the categories in which the most disagreements were observed. They noticed that a majority of the disagreements concerned whether an open code should be categorised under Research and academic work or Other work-related responsibilities, as well as under Motivation and own abilities or Personal life. A re-evaluation of these categories showed that there was a fair amount of overlap in the meanings and descriptions of the concepts defining these categories. For this reason, the *Research and academic work* and *Other work-related responsibilities* categories were merged into one category, while *Motivation and own abilities* and *Personal life* were merged into the *Personal factors* categories by both researchers, these two new categories showed Cohen's kappa values >0.80, and thus, reflected sufficient interrater reliability.

The frequencies at which open codes appeared in each category were calculated and presented as factors that either promote or hinder doctoral candidates' research and training (Figs. 4.3 and 4.4). These results were compared to the findings of the quantitative analysis to strengthen the reliability of the data analysis and the interpretation of results. The factors structure, recourses and supervision showed similar results in both the qualitative and quantitative analyses (Fig. 4.5). For example, the quantitative analysis showed that doctoral candidates in their twenties and thirties were 90% faster in their studies than older students. Among all of the participants, those employed by the university progressed 0.56 times faster than doctoral candidates who were employed outside the educational institution. Supervisory

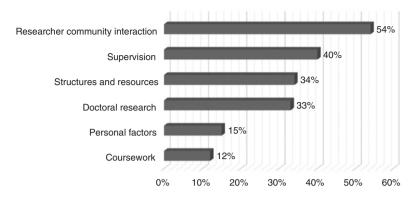


Fig. 4.3 The frequencies at which responses presented as promoting factors appeared in the data

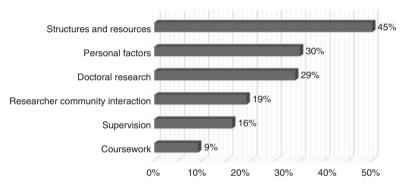


Fig. 4.4 The frequencies at which responses presented as hindering factors appeared in the data

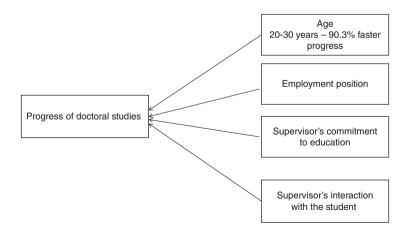


Fig. 4.5 Quantitative analysis results of which factors are linked to the progress of doctoral studies, quantitative study outcome

commitment to a candidate's education promoted their progress, as students who only had supervisory meetings a few times a year or less (10%) showed 25% slower progression than students who met with their supervisors more often. The qualitative data analysis offered new insights into how personal factors and coursework influence education progression that could not be unearthed by solely applying quantitative methods [18].

The results of the qualitative analysis were reported as the frequencies at which the most common open codes appeared in the collected data. The results section also included descriptions of each identified category, the frequency at which open codes appeared in each of the 10 categories and direct quotations from participants [18]. The quotations were presented to support the researchers' interpretations of the results and provide further confirmation for the trustworthiness of the research.

### 4.3 Conclusion

Nursing science that adopts the received view focuses on objective reality by gathering and analysing empirical evidence with the overarching goal of generalising results into evidence-based practice and education. On the other hand, nursing science that is based on the perceived view will investigate multiple realities which are not fixed to a single entity. Researchers use qualitative methods to understand human experiences based on the analysis of subjective and narrative data. The outcomes of qualitative data need to be further tested using larger samples so that the findings can be deemed reliable before they are applied as a solution.

Mixed methods approaches allow researchers to study phenomena with distinct approaches that are based on different philosophical backgrounds. Furthermore, mixed methods approaches enable researchers to better understand the topic under study by providing further evidence of the phenomenon and helping the researcher identify possible research gaps.

However, when incorrectly applied, mixed methods approaches can compromise the validity and reliability of the study. Researchers need to have competence and experience in using both of the research approaches. Furthermore, they must follow both the qualitative and quantitative research processes, as well as determine how the distinct methods can be combined in a way that benefits the research. This requires the research to be carefully planned, and it may sometimes be useful to include expert panels and/or collaborate with other groups of researchers. The study design needs to be transparently and meticulously described, including any potential limitations, so that readers and decision makers are able to evaluate the validity of the results.

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### Check for updates

## **The Trustworthiness of Content Analysis**

Helvi Kyngäs, Maria Kääriäinen, and Satu Elo

### 5.1 Trustworthiness in the Context of Qualitative Research

The terms reliability and validity were earlier used in both qualitative and quantitative studies. However, as qualitative methods became more popular, scholars began to debate which criteria were the most appropriate for determining trustworthiness. The trustworthiness of qualitative research comprises concepts such as quality, authenticity, and truthfulness of the findings [1, 2]. The discussion about trustworthiness criteria became active at the beginning of the 1990s. Altheide and Johnson [3] suggested that the terms plausibility, relevance, credibility, and importance of topic are the most relevant to trustworthiness, while Eisenhart and Howe [4] emphasised criteria such as completeness, appropriateness, comprehensiveness, credibility, and significance. Most qualitative researchers currently apply the criteria suggested by Whittemore et al. [5]—four primary and six secondary criteria—when assessing trustworthiness. The primary criteria apply to all qualitative research, whereas the secondary criteria provide supplementary benchmarks of validity that may not be relevant to every study. Therefore, the researcher must decide whether any of the secondary criteria are applicable to their study. The four primary criteria are credibility, authenticity, criticality, and integrity. Morse et al. [6] reminded researchers that while standards are useful for evaluating relevance and utility, they do not in themselves guarantee that the research will be relevant and useful. They claim that certain strategies, e.g., investigator responsiveness, methodological coherence, theoretical sampling, sampling adequacy, an active analytic attitude, data saturation, should be included in the qualitative research process if the researcher wants to ensure rigor [6]. The Oxford dictionary defines rigor as the quality of being extremely thorough and careful. Morse et al. [6] added to this definition

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by claiming that "without rigor, research is worthless, becomes fiction, and loses its utility" (p. 2). Lincoln and Guba [7] were the first to address rigor in their model of trustworthiness, which includes credibility, dependability, confirmability, authenticity, and transferability. In their framework, trustworthiness is the main parameter for appraising the rigor of qualitative research.

### 5.2 Trustworthiness: Credibility

Credibility is concerned with whether or not the research findings represent a credible, conceptual interpretation of the original data [7]. In other words, this criterion of trustworthiness examines if readers of the research believe what the authors are reporting. Credibility involves two aspects: carrying out the study in a way that ensures that readers will believe the presented findings and taking steps to demonstrate credibility in research reports.

A researcher's confidence that they are presenting truthful results has a large impact on credibility. This confidence is based on a carefully designed research process, detailed notes of how each phase of research was conducted, and a discussion of the strengths and limitations of the research in the final report. Whenever a researcher is considering the credibility of their research, they should be thinking about their experience, preconceptions of the studied phenomenon, and the context in which the study will be conducted. The main topic to consider is familiarity, and this includes two perspectives. First, a researcher who is very familiar with their research topic should understand that their experience and perceptions could influence the research results. This is because prior knowledge will inevitably affect the type of data a researcher collects, for example, criteria for participant selection or the choice of study documents, as well as how the researcher interprets the collected data. It is important to note that an extensive literature review will have the same effect. Hence, a researcher should carefully consider the objective of the literature review and what kind of literature review is most suitable based on the research topic and question(s). A reader will be able to judge how the researcher's preconceptions and earlier knowledge influenced the findings—as well as make sound conclusions about credibility—when the researcher can clearly explain their experiences, preconceptions, and/or reasons for conducting a literature review. Hence, researchers should discuss these issues in the research report and make their own conclusions about how each factor affected the research. On the other hand, a researcher who is not familiar with the researched phenomenon or the context in which it is studied may find it difficult to get rich and multi-sided data. Once again, the researcher should critically evaluate how these issues affect their findings. Initial knowledge is especially important for qualitative studies, as this knowledge will be pivotal to formulating research and planning data collection. An experienced researcher will be able to select the qualitative methods that are a correct match for their initial level of knowledge.

Credibility can be improved by making sure that the study participants are appropriate in terms of the research question and that data saturation is reached during data collection, i.e., that the sample size was correct. Researchers are expected to evaluate whether the sample size was appropriate or not when they report information about the sample.

Researchers can improve the credibility of their studies through several additional methods; however, each of these methods, if applied incorrectly, can also threaten the credibility of the research. First, it may be beneficial for the researcher to spend some time with the study participants before the data collection phase begins. This may allow the researcher to identify some of the realities experienced by the participant group and enable the participants to get comfortable interacting with the researcher(s). As a result, the researcher will get familiar with the participants and have a better understanding of which questions will elicit responses that are relevant to the research aim. Researchers who use open data collection should consider how they will handle diverse descriptions of experiences and prevent interviewer bias. An example of an open question is: "Could you please tell me, how do you take care of yourself?" In this situation, the researcher should be careful not to influence the participants' answers so that they obtain inductive data. Hence, the researcher has to make sure that they do not manipulate or lead the participant to answer in a certain way when asking broad questions. Researchers can mitigate the risk of hurting study credibility by pre-testing interviews to gain an understanding of what types of responses the questions will yield, and whether these responses are relevant to the research aim. It may be beneficial to record or/and transcribe the interview. When interpreting the results of a pre-test, the researcher should consider if they gave the participants enough time to answer, whether they in any way influenced the participant, and whether they were able to ask the participants further detailed questions. Researchers should remember that pre-testing their data collection instrument can be a useful learning experience that will demonstrate their research skills before the actual data.

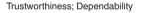
Researchers can also strengthen the credibility of their study by developing example interview questions for a 'critical reference group'. This means that the researcher will present potential interview questions to a group and then evaluate their responses to these questions. It is important to note that the members of this group need to be familiar with the research topic to serve as a useful reference group; in other words, this group should reflect the sample that will be used in the study. In addition, triangulation during data collection, i.e., gathering data from different sources such as interviews, observations, and documents, may increase credibility. It should be noted that this will not always be possible, and the researcher must decide whether this step is necessary, or even feasible. For the research to be credible, any interviews should be taped and transcribed.

The data analysis phase is another key factor to credible research. Hence, the researcher will need to choose an appropriate unit of analysis and present the analytical process in great detail (see Chaps. 2 and 3). The researcher must pay close attention to how the analysis matrix is developed whenever deductive analysis is

used. An approach that is highly structured may have a large influence on the study process and guide the researcher to the answers that they want. This will obviously impact the credibility of the study. As discussed earlier, the researcher must describe their research in a transparent manner so that the reader can make an informed decision about the credibility of the research.

### 5.3 Trustworthiness: Dependability

Dependability is defined as an assessment of the quality of the integrated processes of data collection, data analysis, and theory generation (for example, conceptual structures or theoretical models) [7]. It refers to the stability of data over time and varying conditions. Furthermore, dependability is concerned with consistency across the research starting point, data collection, and analysis (Fig. 5.1). For example, a study that has an open starting point—which means that the researcher does not have strong theoretical knowledge about the research phenomenon-should include an open, unstructured data collection method and an open analysis. A study shows high dependability if another researcher can readily follow the decision trail used by the initial researcher [7]. As such, the researcher should include tables, figures, and attachments that explain the categorisation process in the final report. These resources can help the reader evaluate the entire categorisation process, as well as recognise any overlap between the created categories. A qualitative study is sometimes impossible to conduct as it was planned. The researcher may, for example, notice that the open data collection does not work because the interviews do not provide rich information or there are difficulties in recruiting enough participants. As a result, they will need to modify the data collection method so that it is more



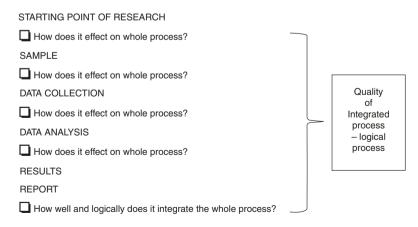


Fig. 5.1 A consistent research process supports dependability

structured. From the perspective of dependability, the researcher will now also have to adopt a more theoretical starting point and apply structured analytical methods that are relevant to the research question.

There are several ways through which a researcher can strengthen the dependability of their data analysis. These include independent coding-recoding, peer examination, dialogue among co-researchers, panel discussion, and face validity. A researcher can re-analyse their data (either the entire data set or a smaller part of it) to check the consistency of the data analysis technique. For example, a researcher can analyse their data twice and assess how the results answer the research question. However, this approach may not be effective as it is highly plausible that the researcher will remember how they conducted the analysis the first time.

Another alternative is peer examination, in which another researcher analyses the data and assesses how their results compare to the original findings. This includes a certain level of risk because both researchers will analyse the data from their own perspectives. Hence, the peer reviewer needs a detailed introduction that will cover the motivation for data analysis, along with the approaches that were used. If more than one person analyses the data, it may be beneficial to calculate the data agreement coefficient (ICR). A value >80% reflects a valid assessment by both researchers [8]. However, an ICR assessment cannot always be performed. Furthermore, an inductive content analysis is usually only performed by one researcher because it is time-consuming and tedious. A peer examination may not be relevant for inductive content analyses because this technique is used to identify concepts based on subjective interpretation of the data.

Dialogue among colleagues is also relevant to credibility, and researchers should ask colleagues who are familiar with the research subject to read through the findings and share their candid opinions about study credibility. In these situations, tables or pictures that depict the development process of each main category are useful. The results section should start with examples of identified open codes, for example, quotations from the collected data, and end with the main categories. Having another researcher read through the research report can be useful because another set of eyes may notice overlap between the identified categories that the primary researcher missed. When the steps of the data analysis are presented clearly, another researcher can notice flaws in the research, for example, incomplete data abstraction or the grouping of too many items under one category. Furthermore, research that presents a large array of main concepts may indicate that the researcher was not able to group the data under the correct categories. For this reason, the researcher should always specify the number of identified categories and/or concepts-preferably through clear tables or figures-when describing the analysis process.

In essence, the issue underlying the choice to test face validity or give the research to a peer for evaluation is a lack of confidence, and certain scholars argue that a researcher should not need someone else to analyse their data. A detailed description of the analytical process is a good starting point from which a researcher can build confidence about the trustworthiness of their research.

### 5.4 Trustworthiness: Confirmability

Confirmability is a measure of how well the study findings are supported by the collected data [7]. This aspect of trustworthiness is concerned with the connection between the data and the results. Hence, when considering confirmability, a researcher should evaluate whether their findings are solely shaped by the data collected from respondents, or do the results reflect some of the researcher's bias, motivation, or other interests [7]. The reader should be able to examine the data to confirm that the results or author interpretations reflect the data. A researcher can enhance confirmability by using 'audit trails', which means that the researcher will include written field notes, memos, or excerpts from a field diary to support the connection between the data and findings. However, this practice includes the same problems that were described earlier, i.e., written notes and diary entries are intended for the researcher rather than for outsiders. As such, researchers should understand that including 'audit trails' can also potentially harm the trustworthiness of their research. This criterion is closely related to the concept of authenticity, which is described in the next section and can also be used to gauge the connection between the data and results.

### 5.5 Trustworthiness: Authenticity

Authenticity describes the extent to which researchers fairly and faithfully show a range of realities [7]. Research that has sufficient authenticity will include various citations that clearly demonstrate the connection between the results and data. These citations should be used systematically throughout the text, for example, each identified category should include at least one relevant citation. Furthermore, it is important to include citations from different participants, as several previous studies have presented citations that reflect only one participant. In this situation, the reader may wonder whether this was the only participant who expressed something that was relevant to the research question. The researcher should also be able to demonstrate that the citation originates from the original data, for example, by using an 'identification' code. For example, the code 'BC35' could demonstrate that the participant is a woman (B), a teacher (C), and 35-years old. However, the researcher must ensure that the identification codes are in line with current data protection guidelines and cannot be used to identify the participant. There is also a risk of including too many authentic citations. To avoid this, the researcher should ensure that there are not more citations than text in the results section, as this may cause readers to question the researcher's ability to interpret the collected data. A researcher should always consider the value of including a certain citation. If the citation simply repeats what has been mentioned earlier, it might be boring for the reader and does not add any value.

### 5.6 Trustworthiness: Transferability

Transferability describes the degree to which research findings will be applicable to other fields and contexts [7]. Researchers who are concerned about transferability should question whether their results will hold in another setting or group of

participants. It is important to note that transferability is not the same as generalisation in quantitative research. It is important to note that transferability is not the same as generalisation in quantitative research because transferability is also concerned with how readers will extend the results to their own situations, whereas generalisation covers the extension of results from a sample to a broader population. Transferability is affected by every stage of research, including the choice of research context and topic. For example, the results from a study that focuses on the interactions between nurses and patients in an orthopaedic ward may not be transferable to the medical ward setting. This is because care and treatment in orthopaedic wards differs from that in internal medicine wards, so it can be assumed that the interactions between nurses and patients in these two settings focus on different issues. However, the results from the orthopaedic ward study may be transferable to another surgical ward because these wards have some similar elements, for example, patients are waiting for operations, which means that they may have some fears about their situation and/or they need assistance in basic daily activities. During the research planning phase, a researcher should consider transferability by clearly describing the sampling techniques, potential inclusion criteria, and participants' main characteristic so that other researcher can assess whether the results drawn from this sample are applicable to other contexts. Transparent reporting of the research process and results is critical to achieving sufficient transferability. Every researcher is responsible for providing enough information about their study so that the audience can evaluate whether the findings are applicable to other contexts. Hence, researchers who want to present transferable knowledge should consider the following question while writing their results and discussion: How, and to what extent, are these findings transferable to other settings?

### 5.7 Conclusion

A key element of trustworthiness is the sample. It must be appropriate and comprise participants and/or documents that are relevant to the research topic. Purposive sampling may be useful for building an appropriate sample, but data saturation is the most important measure of sampling adequacy because it provides the optimal sample size. Data saturation ensures that the gathered data can be organised into categories, concepts, and themes, which, in turn, verifies that the analysis is complete. Researchers who want to provide trustworthy analyses should consider performing a preliminary analysis after a few interviews or once they have collected some data from the study documents. Researchers should also keep in mind that the chosen unit of analysis will influence trustworthiness. A broad unit of analysis may be difficult to manage and can have various meanings, while a narrow unit of analysis may result in fragmentation. Both of these situations will negatively affect trustworthiness. Trustworthy research must be systematically reported and include clear indications of the connections between the data and results. The content and structure of concepts or narrative results should be clearly presented, and a researcher can provide figures to help the reader better understand the significance of the results. Failure to report the results in an appropriate way will threaten the trustworthiness of the study.

Elo et al. [9] published a checklist that researchers can use to improve the trustworthiness of studies that apply content analysis. This checklist is especially beneficial during the planning of a qualitative study, as it will ensure that the researcher pays attention to every issue that can affect trustworthiness. The checklist also provides valuable tips for the reporting of results, for example, researchers can use this guide to critically evaluate their research in terms of strengths and weaknesses to trustworthiness. Following the discussion of trustworthiness in this chapter, the next chapter will present ethical issues in the context of qualitative research and content analysis.

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# 6

# Qualitative Research: Ethical Considerations

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### 6.1 Introduction

Ethics is an integral part of research that extends throughout the entire research process, from the selection of a research topic, to data collection and analysis, and, finally, the dissemination of study results [1, 2]. In current research practice, researchers encounter increasingly multidimensional ethical questions on a daily basis [1]. In addition, ethical issues in qualitative research involving humans as study subjects are always relational, situational, and emerging [3]. Furthermore, totally new ethical questions arise when new questions are asked, new methods are used and new kind data is analysed [2].

Research ethics has two distinct foundations. One branch of research ethics consists of ethical principles that aim to protect the study participant. The second branch is focused on professional standards for ethical research and, as such, aims to ensure good scientific practice and publicly accountable research [1, 2, 4].

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Nursing research is held to the same ethical standards as all other research involving human participants [5]. Qualitative research involving human subjects should be conducted in accordance with ethical codes, laws, and institutional policies [1]. Any study that includes humans as research participants must strictly follow specific codes of ethics that define the standards for participant protection [6]. For example, the Declaration of Helsinki is a statement about ethical principles that was initially intended for medical research, but which also currently guides nursing research involving human subjects [5].

However, codes of ethics are not legally binding instruments [1]. They do not cover every situation, they may conflict, and they require situation-based interpretation [6, 7]. Thus, it is important that researchers and other relevant stakeholders have the skills necessary to interpret, assess, and apply various research rules in practice, as well as the ability to make the correct decision when facing an ethical dilemma [1, 2]. It is also important to understand the relationship between law and research ethics. The legislation can be considered to be a minimum level of ethics for clinical research, while research ethics defines its maximum level [4].

Research ethics is a general term that covers all of the ethical viewpoints and assessments related to science and research. On the other hand, the term research integrity emphasises the honesty and integrity that all researchers should apply to their research activities [8]. Every type of qualitative study is guided by the same ethical principles. This chapter will discuss how these principles apply to qualitative studies that employ content analysis.

### 6.2 The Role and Importance of Ethical Principles in Subject Protection

The four principles presented by Beauchamp and Childress—autonomy, nonmaleficence, beneficence, and justice—serve as a fundamental ethical guide for medical research [6]. However, this principle-based approach can also be used to ensure that qualitative research in the field of nursing science is conducted ethically [9].

**Autonomy** The principle of autonomy is central to research ethics. Autonomy refers to a study participant's right to self-governance, liberty, privacy, individual choice, and freedom of will [6]. The preconditions for autonomy are agency (capacity for intentional action) and liberty (freedom from controlling influences) [10]. The bases for these principles are that people should be free to make decisions and act on them, as well as retain control over their own lives without being controlled or coerced by external forces [6]. An autonomous individual is capable of self-regulation and is able to make judgements and take actions based on their values, preferences, and beliefs [11]. In contrast, diminished autonomy describes an individual who is controlled by others and/or incapable of deliberating or acting in line with their desires and plans. For example, children, patients with dementia or people with limited personal power, such as prisoners, exhibit diminished autonomy [6].

Vulnerable research subjects are individuals who, due to age, mental disability or illness, poverty, language barriers, or other cultural and/or social factors, have difficulty providing informed consent or protecting their own interests [1].

Informed consent promotes respect for the study subject's autonomous decision-making [1, 6]. The informed consent process respects a person's right to decide whether participating in the research will be compatible with his or her values, beliefs, and interests [6, 7]. Valid informed consent can only be obtained if the potential study participant is accurately informed about the research (e.g., the aim of the study, study methods, potential benefits and risk, data confidentiality, and voluntary nature of participation), has the capacity to understand the provided information, and is able to make a voluntary decision about participation [6]. The informed consent process typically culminates in the signing of a document that attests that the volunteer consents to participating in the research. However, the informed consent process does not end when the study subject has given their consent, but continues throughout the research process. Study participants always have the right to withdraw their consent at any time, and researchers must ensure that the participants are aware of this right [7]. Hence, informed consent has five main elements: information disclosure along with research participant competence, comprehension, voluntariness, and authorisation of the agreement [6]. If a study involves a participant that is unable to give their informed consent, perhaps because of their age or medical condition, a legally authorised representative of the individual may provide the informed consent on their behalf, as long as the decision is in line with the participant's values and interests. However, it is important to note that participants with diminished autonomy must also be afforded opportunity to express their opinions and concerns about participating in the research [7].

In practice, the quality of informed consent, the disclosure of information, and the understanding of given information have all raised concerns. The disclosure of information is vital to the informed consent process because study subjects who have not received complete information of the study have an inadequate basis for autonomous decision-making [6]. A successful informed consent process includes complete and adequate, but not overwhelming, verbal and written information that explains the planned study to participants in an understandable manner. Potential participant-specific needs, which may be related to age, educational level [7], or cultural factors, also need to be taken into account during the disclosure of information stage [12]. The disclosure of information is usually complicated by questions of what information, as well as in which form and at what level of detail, should be provided to ensure complete participant understanding of the planned research [13]. For example, information sheets are often described as not readily comprehensible and too verbose to be read in a reasonable time [14–17]. These findings may stem from the diverse array of factors (e.g., age, educational level, illness, and cultural background, among others) that influence study subjects' understanding of the provided information [18].

Previous literature indicates that potential study participants often have limited understanding of the information they were provided [14–17, 19, 20]. For example,

one literature review of clinical research showed that human subjects often had limited knowledge of the study aim, the possible risks and benefits, the nature of voluntariness, and their right to withdraw consent at any time [19]. In addition, Tam et al. investigated several components of informed consent and found that 75.8% of participants understood their freedom to withdraw from the study at any time, 74.7% of participants understood the nature of the study, 74.7% of the participants understood the voluntary nature of participation, and 66.2% of participants understood aspects related to the confidentiality of personal data [18]. Even though many researchers have attempted to find ways-e.g., multimedia presentations, video/ graphics, and extended discussions-to improve subjects' understanding of informed consent components, the effectiveness of these approaches remains unclear [21]. Prior research has demonstrated that face-to-face interaction between the researcher and subject during the informed consent process may optimise study subjects' understanding of relevant parts of the study. The authors of these studies suggest that reciprocal dialogue between the recruiter and prospective study subjects is instrumental to ensuring that the subjects have a complete understanding of the planned research as well as their rights as a participant. Other research has shown that both the timing and setting of recruitment significantly affect subject understanding [14, 17, 21, 22]. Hence, the combination of recruiter: study subject interaction and extended discussion seems to be one of the best ways to improve subject comprehension [21]. This suggests that researchers should create settings that are conducive to reciprocal dialogue and then proactively use verbal channels to disseminate information among prospective participants [23].

The privacy and confidentiality of personal data are critical aspects of current research practice that must be considered when planning and implementing research. Privacy-which is closely connected to the principle of autonomy-can be defined as a participant's right to be free from intrusion or interference [6]. Previous literature has identified several perspectives and dimensions of privacy [6, 24, 25]. For example, Beauchamp and Childress identified the following forms of privacy: informational privacy, physical privacy, decisional privacy, proprietary privacy, and associational privacy [6]. Leino-Kilpi et al. described privacy in terms of physical, psychological, social, and informational dimensions [24]. Informational privacy and an individual's right to control their personal information are particularly important in the context of qualitative research. The concept of confidentiality is closely related to privacy. When participants share their personal information for research purposes, they trust that their information will be kept confidential and that only predefined individuals will have access to their data. As such, confidentiality refers to a researcher's duty to protect the personal information that participants have shared with them. The protection of confidentiality is a continuous process, and various procedures have been specifically designed to ensure that participant information is kept confidential [26].

Open science is an increasingly important goal in scientific research [27, 28], and includes themes such as open data, open access publishing, and the sharing of research methodologies. Increased openness in research could enhance the

reliability, transparency, and social impact of research [28]. Along with these advantages, the promotion of open sciences raises ethical concerns, for example, how will researchers be able to ensure study subject privacy and the confidentiality of personal data. Thus, it clear that the protection of study subject privacy and personal data confidentiality will demand more collaboration between research stakeholders, detailed planning, clear documentation, and complete transparency [27]. Recent advances in European Union data protection regulation aim to reinforce participant data privacy and confidentiality in a digitalised, more open, and evolving environment. The General Data Protection Regulation (GDPR) entered into full effect in May 2018 and has significantly impacted scientific research [29, 30].

Beneficence and Non-maleficence The principle of beneficence refers to a researcher's ethical obligation to promote well-being and maximise the benefits for study subjects and society, whereas non-maleficence refers to a researcher's ethical obligation to minimise risk and avoid any harm to the study subject and society. Taken together, these principles describe how a researcher is responsible for maximising potential benefits and minimising detrimental effects [6]. Qualitative research methods do not physically harm participants, but may cause psychological, emotional, and social harm, e.g., fear, painful memories, shame, grief, or embarrassment. To avoid the exploitation of study participants, any harm to which participants may be exposed must be reasonable in relation to the anticipated benefits and expected social value of the study [7, 31]. Therefore, weighing the benefits and harms is an essential part of any qualitative study [7]. This is especially important for researchers who are planning to explore sensitive topics that can evoke strong memories or feelings in the study participant. Examples of sensitive topics include serious illness, grief, sexual abuse, violence and death and dying [32]. Additional factors that are important for protecting study participants from harm include planning the study in a scientifically valid and feasible way and ensuring that the researchers and relevant researchers are sufficiently trained to conduct ethical research [7]. In addition, researchers have an ongoing obligation to monitor and assess potential risks to participants during the research process [7, 31].

*Justice* The principle of justice states that all individuals should be treated fairly and equally [6]. In the context of nursing science, justice can be realised through the fair selection of subjects and distribution of benefits, burdens, and outcomes [6, 33, 34]. In his theory of justice, Rawls emphasises the fairness aspect, highlighting two fundamental principles: liberty and equality [35]. The latter refers to each individual having the same fundamental rights, while the principle of equality states that each person must be afforded the same chance for success irrespective of social status [35]. Fairness, when applied to subject selection, means that all members of the relevant population must be given an equitable opportunity to participate in the research and allowed to freely choose whether or not they wish to

participate [33]. Hence, factors such as race, socio-economic status, education, and culture do not justify differences in distribution unless the research objectives dictate otherwise [6].

### 6.3 Principles for the Responsible Conduct of Research

A researcher must ensure that the study subjects are protected throughout the entire research process. This responsible practice is based on a fundamental ethical standard, which guides research practices and ensures ethical and publicly accountable research.

An excellent starting point for the responsible conduct of research is the work by Shamoon and Resnik [1], in which they presented 14 ethical principles for research involving humans as the study subject [1]. These principles, presented in more detail in Table 6.1, are honesty, objectivity, carefulness, fair credit, openness, confidentiality, respect for colleagues, respect for intellectual property, freedom, protection of the research subjects, stewardship, respect for the law, professional responsibility, and social responsibility.

Shaw and Satalkar [36] found that researchers emphasise honesty and objectivity as the most important aspects of research integrity. Furthermore, they identified transparency as another key aspect of research integrity. The requirement of transparency is linked to many important objectives of ethical research, e.g., replicability, accountability, efficiency, the accumulation of evidence over time, and prevention of misconduct. The main tenet of transparency is that researchers must disclose all of the relevant aspects/steps of research, for example, the data collection process, rules used to analyse the data and research results, in an open and detailed way. Researchers can further increase the transparency of their research by making data publicly available whenever possible [36].

These principles also highlight that collaboration and trust are necessary for conducting ethical research [1]. Scientific research has become an increasingly collaborative process that involves multiple stakeholders, all of whom are responsible for the ethical conduct of research [2, 7, 37, 38]. For this reason, ethical standards have been created to guide anyone who is involved in the research process and promote values that are essential to collaborative research action, such as trust, fairness, and accountability [39], as well as mutual respect and equality, shared goals, and defined roles and responsibilities [37].

Trust is vital to promoting cooperation between stakeholders in areas such as collaborative work, publication, sharing data, and teaching and mentoring. Trust also facilitates interactions between researchers, funding sources, scientific journals, universities, research ethics committees, and the organisations that support and participate in the research process. Furthermore, trust is an important part of study subject protection [40]. For example, the development of researcher–study subject trust can positively affect study participant commitment to the research process

Honesty	• A researcher must be honest in the proposing, planning,
	<ul> <li>performing, and reporting of research</li> <li>A researcher must honestly describe the research contribution and disclose any potential conflicts of interest</li> <li>Fabrication, falsification, and misrepresentation are not allowed in scientific communication</li> </ul>
Objectivity	<ul> <li>The researcher needs to be free from external influences such as personal interest, value commitments, or community bias</li> <li>A researcher should strive for objectivity in research design, data analysis and interpretation and publication</li> <li>Science will never be completely free from political, social, cultural, or economic influences</li> </ul>
Carefulness	<ul> <li>Research should be conducted in a precise manner to avoid mistakes and errors</li> <li>Researchers should critically examine their own work as well as the research of peers</li> <li>Researchers must avoid self-deception, bias, and conflicts of interest</li> <li>All research activities, such as consent forms, data collection, and data analysis should be well documented.</li> </ul>
Fair credit	Researchers must ensure the fair allocation of research credit, for example, authorship credit in publications, patents and other materials
Openness	<ul> <li>Openness promotes the advancement of science and scientific knowledge</li> <li>Data, resources, and ideas should be shared among researchers</li> <li>Researchers should be urged to review and criticise each other's work</li> </ul>
Confidentiality	<ul> <li>Researchers must protect parts of the research project that should remain private (e.g., research plan, papers, personal records, and proprietary information)</li> <li>Researchers must protect study participants' personal information</li> </ul>
Respect for collegians	<ul> <li>Researchers must treat their peers, research staff, and students fairly and avoid causing them harm</li> <li>A researcher cannot discriminate against colleagues and students based on their sex, race, ethnicity, religion, or other characteristics, such as qualifications</li> <li>Researchers should help, educate, train, mentor, and advise their co-workers and students</li> </ul>
Respect for intellectual property	<ul> <li>Every researcher must respect intellectual property, for example, copyrights</li> <li><i>Researchers must respect the work of others</i>, i.e., they cannot use unpublished data or results without permission and must make sure to give credit to whom it belongs</li> <li>Researchers must avoid <i>plagiarism</i></li> </ul>
Freedom	<ul> <li>No organisation or institution should hinder a researcher's right to independently conduct research</li> <li>Nobody should interfere with a researcher's freedom of thought and inquiry</li> </ul>

 Table 6.1
 The principles for responsible conduct of research presented by Shamoon and Resnik [1]

Principle	Content
Protection of human research subjects	<ul> <li>Researchers are responsible for protecting the rights, dignity, and welfare of human subjects</li> <li>Researchers must protect research participants' autonomy and obtain valid informed consent</li> <li>Any researcher who is involved with study participants must protect study subject privacy and ensure the confidentiality of their personal data</li> <li>Researchers should strive to minimise research harms and risks and maximise benefits</li> <li>Researchers should pay special protection to subjects from vulnerable populations</li> <li>Researchers must fairly distribute the benefits and burdens of research</li> </ul>
Stewardship	<ul> <li>Researchers should make good and fair use of human, financial, and technological resources</li> <li>Every researcher is responsible for taking care of the research site as well as the research materials and tools</li> </ul>
Respect for the law	Researchers must conduct research according to relevant law and institutional policies
Professional responsibility	<ul> <li>Researchers should proactively improve their professional competence and expertise throughout their careers</li> <li>Researchers should promote scientific competence through mentoring, education, and leadership</li> <li>Researchers are responsible for reporting misconduct as well as any illegal or unethical activities that threaten the integrity of research</li> </ul>
Social responsibility	<ul> <li>Researchers are responsible not only for the people participating in the research, but also for anyone who may be affected by their research results</li> <li>Researchers should avoid causing harm and strive to conduct research that will benefit society</li> <li>Researchers should share research results in an ethical way, inform the public about the research results, and provide policymakers information that supports decision-making</li> </ul>

Table 6.1 (continued)

[37]. Finally, public trust can be pivotal to gaining public acceptance for the planned research [40]. Public trust also enhances the social value of research and can positively influence the dissemination and utilisation of research results. Researchers can build public trust by actively improving community awareness of the ethical aspects of their research [37].

Every institution in which research is conducted has an obligation to follow ethical principles and promote ethical conduct of research through leadership, education, training, support, and supervision [23, 37, 39]. Certain organisational factors, for example, organisational culture and research environment, have been suggested to promote the ethical and responsible conduct of research [23, 37]. An organisational culture that actively highlights the principles guiding ethical research conduct can help researchers recognise their role in protecting human subjects and, as such, ensure their commitment to ethical compliance. Research infrastructure, i.e., research administration along with clearly explained processes and practices, is key to supporting researchers' work in the complex research environment and maintaining organisation-wide research ethics [23].

### 6.4 Realisation of Ethical Principles in Content Analysis

Research is a process of thinking, planning, and the continuous processing of knowledge. In qualitative studies, the gathered data are analysed to create concepts of social phenomena. As such, the approaches used for data handling and processing directly reflect the initial study design.

A clear description of the data analysis procedure is important, but it may be difficult to provide clear and straightforward rules for certain analytical techniques. Data analysis begins with the definition of the research issues and the collection of data. However, the data analysis process must also consider ethical aspects, for example, researchers must recognise that content analysis also includes distinct ethical aspects. The ethical framework developed by Emanuel et al. is a valuable tool for improving the quality of a research design due to its structured nature and ability to serve as a guide for reviewing the ethical and scientific aspects of a research protocol [7, 41-43].

This specific framework was developed with the overarching goal of minimising the possibility of exploitation by ensuring that the research process respects study participants and simultaneously benefits society [7]. The framework comprises the following eight ethical requirements: collaborative partnership, social value, scientific validity, fair participant selection, favourable risk-benefit ratio, independent review, informed consent, and respect for the person. Additionally, it includes practical guidelines and specifications for how these requirements can be fulfilled in research practice [7, 41, 42].

Emanuel et al. combined traditional codes of ethics, ethics declarations, and relevant literature on research ethics when developing the model [7, 41, 42]. For example, the four ethical principles presented by Beauchamp and Childress—autonomy, non-maleficence, beneficence, and justice—are incorporated into the framework [6]. The presented requirements are addressed in a chronological order that follows the steps of a typical research process and provides a systematic, organised, and coherent framework that researchers and ethics reviewers can use to determine whether their research is ethical [7, 41–43]. It is important to note that these requirements are regarded as universal and applicable to all countries, settings, and context [43]. Even though ethical research must meet all of these requirements, certain requirements may have to be adapted to the circumstances of a specific research project (i.e., the health, economic, cultural, and/or technological conditions in which the research is conducted) [42].The ethical requirements presented in the framework are general statements of values; as such, they are applicable to all of the stakeholders that participate in the research process regardless of their professional background [7]. Therefore, it can be used to guide multi-professional discussion and decision-making concerning research ethics, and is also applicable to a wide range of qualitative research approaches.

The ethical framework, including the eight specific ethical requirements and their contents, is presented in Table 6.2. This table also provides brief descriptions of how each ethical requirement is relevant to qualitative research.

The study that serves as an example in Table 6.2 comprised two sub-studies [23, 37]. The first sub-study was a qualitative interview study conducted in two phases. The first part of the interview study focused on capturing nurse leaders' perceptions of what constitutes ethical recruitment in clinical research, whereas the second part aimed to detail the ethical aspects of clinical research from the administrative staff perspective (e.g., principal investigators, administrative managers, and elected officials). In both phases, the data were collected via semistructured, face-to-face individual interviews and analysed via inductive content analysis. The second sub-study was a secondary supra-analysis [44] of the interview data collected during sub-study I [23, 38]. This study focused on two ethical requirements-collaborative partnership and social value of clinical researchincluded in the ethical framework presented by Emanuel et al., and investigated these requirements based on the results from sub-study one. Data were analysed via deductive-inductive content analysis with assistance from NVivo software. The analysis matrix was formulated in line with the Ethical Framework presented by Emanuel et al. [7, 41, 42].

Ethics is always a situational and multidimensional issue and, as such, neither regulation nor a structured framework can cover all of the everyday situations that occur in research [1, 3, 9, 45, 46]. In addition, it has been argued that a set of rules may not leave room for authentic discussion about the ethical aspects of research [43] and that a structured framework can further complicate the identification of ethics issues [46].

According to Pollock [46], the best way to protect the participants of qualitative studies is to ensure that adequately skilled and experienced researchers conduct and supervise the research. In addition, better knowledge of ethics norms and their contents may be associated with better ethical reasoning [2, 47, 48]. Thus, a researcher's ethical sensitivity is a prerequisite for the analytical evaluation of ethical issues in research [1]. Since ethical sensitivity can be taught and learned [47], research and educational institutions should proactively offer ethics training and mentoring to strengthen the ethical sensitivity and reflection skills of researchers and relevant stakeholders [15]. Previous research has found courses that require active participation, case-based activities, a combination of individual and group approaches, and several instructional methods to be effective approaches for teaching ethical sensitivity [49]. Furthermore, participation in the actual research process during the early stages of one's career may improve a researcher's understanding of professional norms and values [47].

A commonly mentioned weakness is the lack of prioritisation in the requirements and benchmarks, which can be problematic when there are conflicts between requirements [43]. These types of conflicts are certain to occasionally

Requirement	Selected content	Examples from a qualitative study in the field o clinical research [27, 37, 38]
-	e partnership	
	<ul> <li>The community in which the research is conducted should participate in the research process (planning, conducting, and overseeing research as well as sharing the results)</li> <li>Collaboration among research stakeholders helps to ensure that the benefits of the research are fairly distributed and that community values, circumstances, culture, and social practices are respected</li> <li>The partners involved and their responsibilities in the research process should be clearly defined before the research is started</li> </ul>	<ul> <li>This study was part of a collaborative research ethics project</li> <li>The planning of the study included collaboration between representatives of the target hospital's administrative staff and scientific service centre. These stakeholders were especially involved in selecting the target population and designing the interview themes and structure</li> <li>The research process respected circumstances that were relevant to the organisational and study site circumstances. i.e., cultural and social practices. For example, the study participant recruitment process was planned carefully in collaboration with one representative of the organisation who knew the organisation and research sites well. The organisation is concerns about the timing of the study participant recruitment were taken into account in order to avoid staff excessive workload or stress</li> </ul>
Social value	<ul> <li>Research has social value if it generates scientific knowledge that can improve health or well-being (instrumental value)</li> <li>Research that does not produce social value exposes study subjects to risk and leads to the misuse of limited resources</li> <li>The potential social value, as well as potential beneficiaries, of research must always be defined</li> <li>Social value can only be realised if the results are effectively disseminated and implemented</li> <li>Researchers must investigate ways to increase the social value—and reduce the adverse impact—of research</li> </ul>	<ul> <li>This study provides new knowledge about nurse leaders' and administrative staff's roles in ensuring and maintaining the ethica conduct of clinical research in their hospital and describes their views of how ethical issues are covered in current clinical research practice.</li> <li>The results of this study can be utilised to improve the status and rights of clinical research subjects. In addition, this study increases the transparency of the clinical research process in university hospitals.</li> <li>The presented knowledge can be used for: <ul> <li>research management</li> <li>planning and conducting ethical research ethics</li> <li>enhancing multidisciplinary debates</li> <li>increasing the visibility of research ethics</li> </ul> </li> </ul>

**Table 6.2** The ethical framework presented by Emanuel et al. [41, 42], as well as examples of how it can be applied to a qualitative study

		Examples from a qualitative study in the field of		
Requirement	Selected content	clinical research [27, 37, 38]		
Scientific val	Scientific validity			
Fair particip	<ul> <li>The study must be planned and conducted in a way that uses accepted scientific principles and methods to produce reliable and valid data (appropriate design and methods)</li> <li>The study must be designed in a manner that is practically feasible for the social, political, and cultural environment in which it is to be conducted ant selection</li> </ul>	<ul> <li>The applied qualitative methods were chosen to provide a rich and comprehensive description of a phenomenon that had attracted limited research attention. The choice of a qualitative approach was appropriate because ethical aspects of clinical research are often complex, multidimensional, and conceptually oriented</li> <li>A secondary supra-analysis was employed to produce a broader and deeper conceptual understanding of the phenomenon under study. Data were analysed by deductive-inductive content analysis</li> </ul>		
	<ul> <li>Selecting the target population based on the research objectives will ensure valid research</li> <li>Participants must be selected in a way that minimises risks and maximises the social value of research</li> <li>Selection criteria should be transparent and consistently applied</li> <li>If certain study participants are identified as vulnerable, specific safeguards are needed to protect these individuals</li> </ul>	<ul> <li>The participants in this study were nurse leaders and administrative staff, including principal investigators, administrative managers, and elected officials. These study participants were selected as potential participants due to their professional responsibilities in enabling and managing clinical research in their hospitals</li> <li>The purposive sampling used to invite these participants had the following inclusion criteria: I) experience and knowledge in conducting clinical research; and II) willingness to participate in the study. The inclusion criteria were kept broad to minimise bias</li> </ul>		

Requirement Selected content	Examples from a qualitative study in the field o clinical research [27, 37, 38]
A favourable risk–benefit ratio	
<ul> <li>Researchers must identify and minimise the potential risks to study participants (including physical, psychological, social, and economic risks)</li> <li>Researchers must identify and maximise the potential benefits to study participants</li> <li>Researchers should also compare the potential risks and benefits of the planned study to create a risk- benefit ratio.</li> <li>The benefits to subjects should always reasonably exceed any risks to study subjects?</li> </ul>	<ul> <li>It is possible that this study did not directly benefit the study participants. However, it is possible that they enjoyed sharing their views, experiences, and recommendations, and felt that their participation was beneficial, for example, to their organisation and to society</li> <li>The potential harms of the study were related to time and financial resources. The limited resources could have prevented the participation was offered</li> <li>This study did not cause any psychosocial harm to study participants because the study topic was not sensitive. However, it is possible that some of the participants were concerned that their employers would know that they participants were offered the opportunity to choose the interview time an location. In addition, the processes related to them</li> </ul>
Independent review	
<ul> <li>Researchers must minimise the possibility of conflicts of interest and ensure public accountability</li> <li>Researchers are responsible for ensuring that the study is conducted in compliance with the law and research ethics regulations</li> <li>Every study must include an independent, transparent, and competent review process</li> </ul>	<ul> <li>This study did not involve sensitive research topics or participants who could be considered as belonging to a vulnerable group. Thus, according to Finnish research legislation, this type of research does not need approval from an official research ethics committee (Medical Research Act 488/1999)</li> <li>Organisational approval from both universit hospitals was obtained according to hospital protocols</li> <li>The study was conducted in accordance wit international and national ethical guidelines (Finnish Advisory Board on Research Integrity [8]; WMA [13]), and every phase of the study was in line with the national legislation (Medical Research Act 488/1999)</li> </ul>

		Examples from a qualitative study in the field of	
Requirement	selected content	clinical research [27, 37, 38]	
Informed consent			
	<ul> <li>The recruitment process must take into account the local context (cultural, political, and social factors)</li> <li>Researchers must provide potential participants with accurate, but not overwhelming, information about the research (aim, methods, risks and benefits, confidentiality, etc.) in culturally and linguistically appropriate formats</li> <li>Researchers should consider using a combination of verbal and written information</li> <li>Participants must make a voluntary and uncoerced decision about participation</li> <li>If subjects who are unable to give their informed consent (e.g., because of their age or clinical status) are to be enrolled, legally authorised representatives of these individuals may make the decision to participate in their behalf as long as it is in line with the individual's values and interests</li> <li>Researchers should ensure that study participants understand that they have the right to refuse or withdraw from participation.</li> </ul>	<ul> <li>Representatives of the organisations were informed about the research and recruitment before the recruitment process started</li> <li>During the recruitment and informed consent process, participants first received written information about the aim of the study, voluntary nature of participation, handling, storage and confidentiality of the data, and their right to withdraw participation at any time. Potential participants were also informed about the possibility to contact the researcher by phone or email with additional questions related to the research. An information letter was sent to potential participants by email. The participants had time to consider their participation and then expressed their willingness to participate by sending an email to the researcher or representative of the organisation</li> <li>Before each interview, the researcher and interviewee discussed the information letter and its contents. Written informed consent was obtained from each participant before the interview began</li> <li>Written information and joint discussions were used to ensure that each study participant understood the voluntary nature of participation. The joint discussions served as an opportunity for the researcher sto evaluate each participant's understanding of their rights</li> <li>Consent for the secondary use of interview data in another research participants during the informed consent process.</li> </ul>	

Requirement	Selected content	Examples from a qualitative study in the field of clinical research [27, 37, 38]
Respect for p		
	<ul> <li>Researchers must monitor the health and well-being of study participants</li> <li>Researchers must guarantee every study participant's right to privacy and protect their personal data</li> <li>Researchers must respect the study participant's right to withdraw from participation at any time without penalty and ensure voluntary participation through the study</li> <li>Researchers must be aware of their post-research obligations, such as informing research participants and the community about the research results</li> </ul>	<ul> <li>The interviews were conducted in a quiet and private place to ensure privacy and confidentiality of personal information</li> <li>The interviews were conducted by the same researchers, who also transcribed interviews verbatim. This further protected study subject privacy and personal data confidentiality</li> <li>The collected data were coded. Each participant was assigned a numerical code and any personal data that might identify participants were removed. Furthermore, the analyses were conducted without the possibility to identify any single individual</li> <li>Data were stored according to the legal requirements. As such, all the gathered data, tapes, and transcripts with no identification will be stored in a locked place with no access by anyone other than the researcher for 10 years. The results of the study were reported without any possibility of identifying individual participants</li> <li>The results of the study were reported as a scientific publication in peer-reviewed journal, as a publication in a professional journal and presented at national and international conferences. Copies of the dissertation and written scientific articles were given to the research organisations. Furthermore, the results of the study were presented at professional meetings</li> </ul>

occur, and polyphonic discussions that address the balance between these requirements are necessary to resolve these conflicts [50]. Additional weaknesses of this framework include that it does not require an evaluation of researchers' competency, does not specify that researchers should evaluate the feasibility of gaining sufficient research funding, and requires only research ethics committee members, and not researchers, to declare possible conflicts of interest in the review process [43].

### 6.5 Future Challenges for Content Analysis

*Fostering a Responsible Scientific Community* Ethical research requires a shared culture of responsibility within the research community. Researchers and research groups are responsible for the quality of their work. The starting point should always

be the protection of the subject. Ethics can be described as an attempt to understand what is good and how this can be achieved. Several changes in research practice have demonstrated how study subject privacy and personal data confidentiality have become increasingly important themes within the research community. Nevertheless, the protection of privacy is more challenging than ever in today's research environment [27].

Qualitative research methods, for example, in-depth interviews grant researchers the privilege of viewing study participants' lives and experiences in great detail. However, qualitative researchers face unique, and often ambiguous, ethical dilemmas in disseminating these rich data. One such dilemma involves finding the right balance between conveying detailed, accurate accounts of the social world, and protecting the identities of the individuals who live in that particular social world [51].

Recent research has identified six issues that will challenge research ethics in the coming years, namely, the evolving nature of health data in clinical research, the sharing of health data, the anonymisation of data, collaboration among stakeholders, complex regulation, and ethics-related tensions between social benefits and privacy [27]. Concerning the matter of privacy, a researcher should not solely rely on the participant to identify possible intrusions to privacy, but work to anticipate potential risks in advance. Confidentiality does not necessarily preclude intrusion, as anonymity by itself is not enough to protect a person's privacy or prevent the disclosure of personal issues. Investigators should refrain from soliciting private information that is not closely related to the research question [52].

*Qualitative Research Data: Anonymity and Confidentiality* Using research that involved in-depth interviews with family members of people in vegetative and minimally conscious states as an example, this section discusses the issues researchers face when trying to ensure participant anonymity and maintain data integrity. The anonymisation of data is a constant compromise: sometimes researchers have to sacrifice some of the data integrity to maximise anonymity while at other times researchers have risked compromising anonymity to maintain data integrity. This shows that despite a researcher's best efforts, anonymity cannot be completely guaranteed [53].

Conducting qualitative research in online settings also raises questions about confidentiality and whether researchers should be responsible for maintaining the privacy of participants who have shared personal narratives in publicly accessible online settings [54]. The increasing use of social media (both by research participants and researchers), popularity of open access publishing (a condition of certain funding sources), and growing public engagement efforts among researchers all pose relevant confidentiality problems [53].

It is also important to mention that qualitative research has the potential to harm study subjects through, for example, intrusion into personal privacy, embarrassment, arousal of distress, or breaches in confidentiality [46]. Furthermore, researchers should be aware that the increased use of information technology, as well as how it can be exploited to collect, analyse, and disseminate information on individuals, has brought about new kinds of privacy threats [55–57]. At the same time, technology now allows researchers to gather highly detailed medical information from any individual [58].

Sharing Personal Information: Potential Risks and Benefits Advances in information technology have also led to an increasing number of people sharing highly personal information online, which could jeopardise their control of personal data [59, 60]. This issue is compounded by the fact that some may not completely understand what personal information is [61], how personal data from various sources can be combined, and the risks and benefits of sharing health data on the Internet [59]. In addition, individuals are often poorly informed about how their health data may be used for secondary purposes [59, 62]. Studies have found that few people are fully aware of how their health data are handled and used [63, 64].

Previous studies have also found that individuals are willing to share their data for research purposes without displaying concern about privacy breaches. This is especially relevant if the research participant feels that the research will benefit the public and trusts the individual or organisation conducting the research [63]. Mulligan, Koopman, and Doty [65] have recognised changes in the nature of privacy based on evolving technological and social conditions. The authors concluded that the public should be adequately informed about how personal health data will be used and the related risks through educational and informational campaigns [63, 64].

However, as mentioned before, qualitative researchers face unique, and often ambiguous, ethical dilemmas when disseminating study results. For example, researchers are commonly challenged to convey detailed, accurate accounts of the social world while simultaneously protecting the identities of their study subjects [51]. Furthermore, ethical challenges, for example, anonymity, confidentiality, informed consent, and researchers influencing study subjects, are prevalent at every stage of research, from study design to the reporting of results. Hence, health care providers, educators, and clinicians must be well informed of all the responsibilities that accompany acting as a qualitative researcher [52].

*How Can Researchers Provide the Highest Quality Evidence for Practice*? Every researcher is expected to be able to achieve good scientific practice. Furthermore, it must be understood that one of the key parts of conducting research is protecting the subject. A researcher must remember that their research subjects are human beings, and grasp the importance of face-to-face encounters and nonverbal communication. When two people meet each other, ethics are always involved. Thus, it is important for researchers to consider how ethical principles are incorporated into the research process, from planning the study to disseminating research results. Heale and Shorten [5] highlight that understanding and

applying ethical principles is critical when planning and conducting research, and will ensure that the research produces the highest quality evidence for practice [5].

Scientists have a moral duty to promote good practices and to not harm others. Respect for autonomy is manifested by confidentiality, honesty, and a respect for others' privacy. Justice covers equal consideration of all individuals. Structured ethical frameworks can help researchers to practice and identify ethical principles in research, which will enable them to conduct research according to ethical standards.

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Part II

Integrating Content Analysis into Theory Development



# Theory Development from the Results of Content Analysis

Helvi Kyngäs

# 7.1 Theory Development in Nursing Science

Scientific research is carried out for various reasons, one of which is the development of theories. Nursing science is a broad field, and, as such, includes various types of theories. These theories are sometimes borrowed from other sciences, in which case the theories need to be tested to determine whether they are suitable in the context of nursing science [1]. Theories are based on scientific knowledge, but their reliability and validity should nevertheless be tested through established scientific and statistical methods.

# 7.1.1 The Definition of Theory

As theory is a broad concept, it can be expected to have a variety of definitions. A systematic explanation of theory would be a way to demonstrate the relationships between identified constructs and concepts, as well as provide several predictors. From the structure of theory perspective, it could be defined as a set of concepts, their descriptions and indications of how they are related to each other [1–6]. The next sentences provide an example of concepts, definitions and relationships in a theory of adherence among people with chronic disease [7–10]. The theory includes three concepts: adherence, support, and motivation. An example of a concept definition is: adherence is an active, intentional and responsible process of care in which the individual works to maintain his or her health in close collaboration with health care personnel.

Theory can also be defined based on the purpose of theory. In this case, theory encompasses a description of a phenomenon and explanations of how the studied

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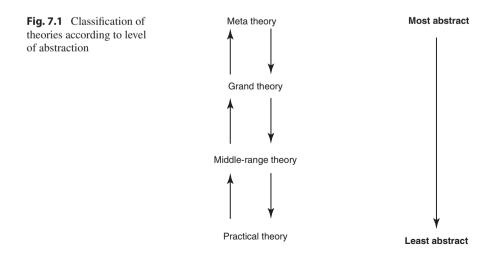
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phenomenon predicts or influences certain outcomes [1, 2, 4]. A descriptive theory is limited to naming and classifying characteristics of a phenomenon of interest; hence, its main purpose is to describe something, for example, coping among cancer patients (how they cope, what kind of coping strategies they use). This type of theory is also referred to as a factor-isolating theory. An explanatory theory works to clarify a certain observation or dynamic and, as such, will detail the connections between concepts. For example, an explanatory theory of coping among cancer patients could indicate that patients who receive support from family members have an easier time coping with disease. This type of theory is also referred to as a factorrelating theory because it provides indications of how the identified factors are connected to each other. Predictive theories will make estimates of an outcome based on scientific evidence, for example, cancer patients who do not have children have a five and a half times higher risk of poor coping relative to patients with children. This type of theory is also referred to as a situation-relating theory [1, 2, 4, 6, 11].

#### 7.1.2 Levels of Theory

A theory can be classified according to the scope, which refers to complexity and degree of abstraction. In other words, scope dictates the level of specificity and the concreteness of the identified concepts [2, 4, 5]. In one method of classification, theories are organised into metatheories, grand theories, middle-range theories and practical theories (Fig. 7.1). Metatheories are the most abstract and focus on the philosophical basis of science, for example, broad issues such as the process of generating knowledge and theory development. Hence, they will not be applicable to clinical practice. Grand theories—which describe comprehensive conceptual frameworks—can also be positioned at the theoretical level. In terms of nursing theories, grand theories are the most complex and are created to address the nature, mission and goals of nursing care. These theories are focused on nonspecific,



abstract concepts and cannot be operationalised. Furthermore, these theories are formulated to provide scholars with an ideal picture of nursing and caring. Middlerange theories describe frameworks that have a more specific focus than grand theories. Therefore, middle-range theories will include a limited number of concepts that are relatively concrete and operationally defined. For this reason, the concepts can be operationalised, and hence, empirically tested. A middle-range theory will present a limited view of nursing reality that is appropriate for empirical testing and directly applicable to nursing practice. Descriptive middle-range theories define several concepts while explanatory middle-range theories present how the included concepts are related to one another. Practice theory, which is often used instead of microtheory or situation-specific theory, is the least complex and most specific type of theory evident in nursing research. This type of theory includes the fewest concepts, is characterised by a narrow scope (i.e. a particular aspect of reality), describes strictly defined phenomena, and presents knowledge that is applicable to a specific part of nursing practice. Practice theory is relevant to clinical practice and provides detailed descriptions of the content of contemporary nursing practice [1].

#### 7.1.3 Theory Development Strategies

When theory development is discussed, the terms approach and strategy are commonly used instead of development. Figure 7.2 shows that theory development is a multi-phase process. It can begin with either an inductive or deductive approach (see Chaps. 1 and 2). Mixed methods can also be used to develop theory [2, 4–6] (see Chap. 4). An inductive strategy, described in Chaps. 1 and 2, is characterised by

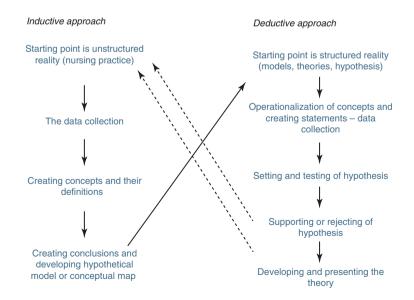


Fig. 7.2 Various theory development strategies

an unstructured starting point, which means that there is no, or very limited, earlier knowledge about the study topic, for example, unstructured reality in nursing practice (Fig. 7.2). Qualitative research approaches that include an inductive analysis, for example, content analysis, are used to create concepts. These concepts, when presented along with their respective definitions and relational statements, yield a hypothetical model, sometimes also referred to as a model or conceptual map [6]. These types of models are often called hypothetical models because the included concepts and their structures cannot be verified by statistical methods [6, 12] (see Chap. 9). This means that inductive strategy can be used to develop a hypothetical model rather than a theory. Deductive strategy is the starting point for structured reality. As seen in Fig. 7.2, these models can be hypothetical models or some theoretical structure, and are usually based on a systematic literature search or established, existing knowledge. Nevertheless, the concepts must be operationalised if they are to be measured and statistically verified. Statistical methods allow researchers to test hypotheses and present theory in terms of verified concepts, definitions and relationships.

A researcher must use a mixed methods approach whenever they begin the research process with an inductive approach and later test the hypothetical model with quantitative methods (see Chap. 4). As seen in Fig. 7.2, it is possible that the researcher will need to return back to the inductive strategy and/or data at some point during the theory development process. A relevant example will be presented later in this chapter.

#### 7.1.4 The Structure of Theory

Theory comprises concepts, their definitions and relational statements [2, 4–6]. Hence, a concept is the basic unit of theory. Concepts provide symbolic statements about the observed phenomenon, and are formulated in words that enable people to attach meaning to phenomena that can be directly or indirectly seen, heard, tasted, smelled or touched. In this context of theory, a concept may be a word (e.g. grief, power, pain), two words (e.g. job satisfaction, role strain), or a phrase (e.g. maternal role attachment, health-promoting behaviour). The concepts can be abstract (social support, personality) or concrete (e.g. chair, red colour) depending on the level of theory. However, if a researcher is interested in quantitatively measuring a concept, or verifying their structure, they need to operationalise the concepts so that they can be empirically tested (See Chap. 9).

The concepts presented in a theory must always be defined. However, different levels of definitions exist, for example, theoretical definitions, operational definitions, concrete definitions and empirical indicators. Examples of each type of definitions are presented below.

- Theoretical definition
  - Adherence is an active, intentional and responsible process in which patients work to maintain their health in collaboration with health care staff.

- Operational definition
  - Collaboration means working with health care providers such as physicians and nurses.
- Concrete definition
  - Collaboration means that a patient regularly comes to meet physicians. If the
    patient cannot come, he/she will book a new appointment. The patient and
    physician plan the care together during these appointments.
- Empirical indicators (which can, for example, be items in an instrument)
  - (1) I regularly visit my doctor or nurse; (2) My doctor works with me in planning a treatment that will suit my life; (3) My nurse works with me in planning a treatment that will suit my life.

Statements and hypotheses can indicate the connections between presented concepts. Statements provide suggestions of relationships on the general level, while a hypothesis is formulated to test the connections between concepts. The testing of a hypothesis can be extended to the testing of a theory (see Chap. 9). Theories are tested to study the reliability and validity of the theory, assess the usefulness of the theory, or further develop the theory [4, 6, 12].

## 7.2 The Creation of Concepts Through Content Analysis

As mentioned before, concepts are the basic element of theory. Inductive content analysis is a useful method for creating concepts that will be tested later or integrated into a theory. Chapter 2 described how content analysis can be applied to create concepts that will answer the research question, while this chapter will explain how these concepts can be used to create a hypothetical model.

## 7.2.1 The Theory Development Process: From Inductive to Deductive

This section provides a brief example of the theory development process. The first part of the section demonstrates how a hypothetical model can be created based on content analysis while the latter part of the section describes how quantitative methods can be used to create an instrument for testing the hypothetical theory, and how these results underlie the creation of theory. Theory testing is presented in more detail in Chap. 9. This example requires some understanding of inductive content analysis (see Chap. 2) as the concepts included in the presented model were identified through content analysis.

#### 7.2.1.1 Phase 1: Inductive Development of a Hypothetical Model

The hypothetical model was based on data comprising interviews of 13- to 17-yearold adolescents (n = 51) with type 1 diabetes mellitus (type 1 DM), observations of participant behaviour (n = 18) and analyses of participant drawings (n = 17). The

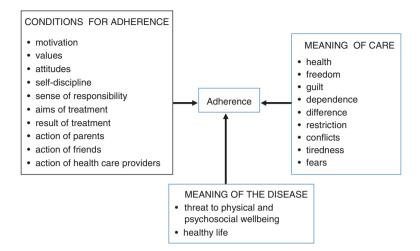


Fig. 7.3 Hypothetical model of adherence to health regimens among adolescents with type 1 diabetes

interview transcripts (480 pages) and drawings were analysed using inductive content analysis (see example of that in Chap. 2). The results were used to create a hypothetical model of adherence among adolescents with type 1 diabetes. This hypothetical model includes concepts (along with their definitions) that answer the three research questions (Fig. 7.3). Furthermore, the model includes line between conditions of adherence and adherence, meaning of disease and adherence and meaning of care and adherence, which indicates that researcher has hypothesised that these concepts are linked even though the analysis provided no evidence of relationships [13].

#### 7.2.1.2 Phase 2: Development of an Instrument to Test the Hypothetical Model

An instrument was then developed to test the hypothetical model. The items of the instrument were derived from the open codes (a product of content analysis) that were organised under the concepts included in the hypothetical model. The items in the questionnaire were formatted according to the original open codes. For example, one of the items was "diabetes causes me to worry about the future". The instrument was then tested with data collected from 12- to 17-year-old adolescents with type 1 diabetes (n = 91), after which factor analysis was performed and face validity, correlation coefficients as well as Cronbach's alpha were calculated to assess the validity and reliability of the instrument (see Chap. 8 for the instrument development process). A comparison of the adolescents' self-evaluated adherence to health regimens and long-term blood sugar test results served as another measure of validity. The results of these assessments showed that the instrument is valid and demonstrates high reliability [7, 14].

#### 7.2.1.3 Phase 3: Testing the Hypothetical Model

To test the model, data were collected from 346 adolescents with type 1 diabetes using the previously developed instrument. During this stage, a LISREL analysis— which is based on linear structural models—was used to create a MIMIC (multiple indicators multiple causes) model. A MIMIC model consists of two parts: a measurement model, which defines the relationships between a latent variable (here adherence) and its indicators; and a structural model, which specifies the relationships and causal effects between the latent variables and indicators. According to the MIMIC model, adherence was defined by self-care behaviour, responsibility for care, intention to perform self-care and collaboration with health care professionals. Furthermore, adherence to health regimens was shown to be strongly influenced by motivation, the results of care and having enough energy and willpower for care, while a sense of normality and the fear experienced by young diabetics exerted a weaker, yet positive, effect on adherence [15].

#### 7.2.1.4 Phases 4: Expansion of the Model

The theory development process may revert from a deductive approach to an inductive approach when a researcher returns to the original data (Fig. 7.2). This happened in the presented example, as the researcher was not content with the content of the MIMIC model. Analyses that use a MIMIC model rely on the statistical testing of a hypothetical model, and in this case, the researcher felt that certain factors which were not identified in the MIMIC model, for example, support from health care providers and parents, are nevertheless important to determining adherence to health regimens. For this reason, the researcher re-analysed the qualitative data and quantified concepts for statistical analysis (see Chap. 4). These quantified concepts were then used to construct a model of good adherence and the related factors. The connections between concepts were analysed by cross-tabulation and stepwise discriminant analysis, with the results showing that support from parents, friends and health care providers do not directly explain adherence, but explain motivation and energy and willpower to take care of oneself, both of which directly explain adherence [16]. This is why these factors do not exist in the MIMIC model, which only verifies direct connections between concepts [17].

#### 7.2.1.5 Phase 5: Construction of a Theoretical Model of Adherence

In the next step of the theoretical model development process, the MIMIC model (phase three) and the model of good adherence (phase four) were combined to create a theoretical model of adherence among adolescents with type 1 diabetes. The theoretical model was then tested. However, this required certain modifications to the validated instrument. The reason for this is that the validated instrument was based on the hypothetical model, which includes more concepts than the theoretical model.

#### 7.2.1.6 Phase 6: Development of an Instrument that Can Be Used to Test the Theoretical Model and Build Theory

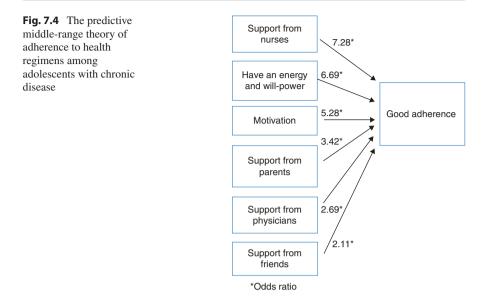
The hypothetical and theoretical models included different amounts of concepts because some of the concepts in the hypothetical model were not verified through statistical analyses. The items included in the modified instrument should only measure concepts which are in the theoretical model [14]. The data collected from adolescents with type 1 diabetes in phase three was used to test the instrument. The items included in the modified instrument were chosen based on a LISREL analysis, with the requirement that the covariance coefficient >0.40. For example, the initial instrument included five items that measure motivation, but the modified instrument would only include items that have a covariance coefficient >0.40. Following this process, the modified instrument included 32 items that measure the concepts presented in the theoretical model. An additional 12 background questions were also added. Content validity was assured by two diabetes nurses and five adolescents with type 1 diabetes. Based on this evaluation, nine more items (a total of 41 items) and one more background question (a total of 13 background questions) were added to better cover the content of the concepts presented in the theoretical model. The instrument was then tested with 13- to 17-year-old adolescents with type 1 diabetes (n = 30), with the data analysis demonstrating satisfactory correlation coefficients (>0.40). As the aim was to test the theoretical model using not only adolescents with diabetes, but also adolescents with arthritis, epilepsy and asthma, the self-care items were modified to be suitable to these other patient groups, after which content validity was tested with clinical experts as well as adolescents with asthma (n = 10), epilepsy (n = 10) and arthritis (n = 10). This resulted in an instrument that can be used to test a theoretical model of adherence among adolescents with type 1 diabetes, asthma, epilepsy and arthritis.

#### 7.2.1.7 Phase 7: Testing the Theoretical Model to Create Theory

The theoretical model was tested with the aim of creating theory about adherence among adolescents with chronic disease. Data were collected from 13- to 17-yearold adolescents with asthma, epilepsy, type 1 diabetes and arthritis. A total of 1200 individuals were selected from the Social Insurance Institution's register, with 1061 providing data (88% response rate). The data were analysed by logistic regression analysis (separately for each patient group and all patients together) to build knowledge of adherence among adolescents with chronic disease and identify which factors are associated with adherence (Fig. 7.4) [8, 15, 18–20]. After these analyses, the theory was tested in various patient groups representing both adolescents and adults. For example, the theory was applied to adults with hypertension, glaucoma, osteoporosis and COPD, as well as adults who are frequent users of health care services or have a risk of cardiovascular disease and coronary heart disease after percutaneous coronary intervention [9, 21–24].

#### 7.2.2 Reporting a Theory

When describing a theory, researchers should clearly indicate the scope of the theory as well as present the main concepts and their definitions. Researchers should also consider providing a visual representation of the scope of the theory and the main concepts so that readers can more readily understand the presented theory. Here is an example of theory reporting.



• The scope of the theory is good adherence to health regimens among adolescents with chronic disease. The main concepts included in the theory are motivation, energy and willpower, and support from parents, physicians and friends. The statistical analyses identified support from nurses as the most powerful predictor of adherence. Adolescents who received support from nurses were found to be 7.28-fold more likely to comply than adolescents who did not receive support from nurses. The second most powerful predictor of adherence was energy and willpower. Adolescents who have the energy and willpower to take care of themselves are 6.69-fold more likely to adhere to health regimens than adolescents who do not have the energy and willpower to take care of themselves. Furthermore, adolescents who have good motivation are 5.28 times more likely to comply than adolescents with poor motivation. Support from parents, physicians and friends is another predictor of good adherence to health regimens.

Here is an example of a concept definition and relational statement.

- Concept
  - Support from parents
- Definition
  - Parents accept the way(s) in which adolescents care for themselves and will support them. Moreover, parents are genuinely interested in the wellbeing of adolescents, and will remind them to carry out the treatment and motivate them to take care of themselves.
- Statement
  - Support from parents is a predictor of good adherence (odds ratio 3.42).

The theory was verified through various validity measures. For example, the value of the  $-2 \log$  likelihood was 433.764, the goodness of fit index was 1430.615, Nagelkerke's R<sup>2</sup> was 0.829, which indicates that the logistic regression model explains 82% of the variance, and the model correctly predicted 94% of the adolescents with good adherence. All of these values indicate that the logistic regression model matched the data well. Furthermore, the Cronbach's alpha values demonstrated that the instrument has high internal consistency. The Cronbach's alpha values for different patient groups were: 0.92 for adolescents with asthma; 0.94 for adolescents with epilepsy; 0.93 for adolescents with type 1 diabetes; and 0.94 for adolescents with arthritis. The presented theory can be classified as a middle-range theory because the concepts are defined on an operational level; hence, this theory is relevant to clinical practice.

# 7.3 Evaluation of Theory

The evaluation of theory can be defined as a process during which an external researcher systematically examines a theory. This process aims to describe the relevance of the theory for guiding practice, research, education and administration, provide further insight about the concepts and their relationships, identify the strengths and weaknesses of the theory, make suggestions for additional theory development or refinement, and provide a systematic, objective way of examining a theory. These diverse objectives have motivated researchers to develop criteria for theory evaluation [2, 4, 5]. For example, a theory can be evaluated based on accuracy, consistency, significance, simplicity, scope, acceptance and sociocultural utility.

Accuracy describes the extent to which a theory is focused on the study subject (in the context of this book nursing phenomena) and whether it fulfils the purpose and aim of theory development. An accurate theory will have a clear theoretical basis (assumption, statement) as well as a defined scope. The included concepts should also have concise definitions, and the theory development process must be valid. Consistency addresses whether the definitions of the key concepts remain constant throughout the theory. It is also concerned with the congruent use of terms, interpretations, principles and methods. Consistency is logically developed in that theories which follow the line of thought presented previous work will be consistent. In this way, consistency can be guaranteed by adhering to the process of theory development. Fruitfulness/significance evaluates how useful a theory will be to generating new knowledge and, in the context of this book, contributing to the development of nursing. Simplicity (or complexity) focuses on the number of concepts that are key components of a theory. Depending on the underlying context, either a simple or complex theory may be needed. It is important to remember that theory should be balanced and logical (e.g. number of concepts should be based on the scope of theory); moreover, the level of concepts and their definitions should match. Scope is concerned with the range of phenomena covered in a theory. Certain issues may require a broad scope while a limited scope may be beneficial in other contexts. Every theory must provide a clear description

of scope. Acceptance refers to how useful the theory is in practice, research, education or administration, whereas sociocultural utility describe how applicable the content of the theory is to the beliefs, values and expectations of different cultures. Every theory will not be suitable to all cultures because different cultures are based on distinct philosophical and theoretical bases. A general evaluation of theory can be performed at the end of the evaluation process. During this step, a researcher will assess how clearly and logically the theory was presented, as well as whether it was visualised well.

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# Instrument Development Based on Content Analysis

8

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# 8.1 Measurement in Nursing Science

Nursing practice can be assessed through direct observations, checklists based on evidence-based guidelines or nursing records, as well as self-reported, validated instruments that have been applied to measure the quality of counselling [1], patients' adherence to self-care [2], and mentor competence [3, 4], among others. This chapter focuses on the use of self-reported instruments to measure different phenomena in the field of nursing science. An instrument is a tool that can be used to measure important aspects of nursing science, for example, nurses' theoretical understanding of a certain topic. Instruments are widely used in nursing science because the phenomena studied in this field are often unobservable (for example, attitudes and perceptions), while constructs are abstract and may be composed of different components (for example, quality of counselling) that cannot be measured directly.

# 8.1.1 The Instrument Development Process

Instrument development and validation involves three phases: (1) construction of the conceptual framework and item generation; (2) judgement quantification;

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and (3) psychometric testing of instrument properties, for example, instrument reliability and validity.

#### 8.1.1.1 Phase I: Conceptual Framework Development and Item Generation

The conceptual framework can be developed through a deductive or inductive approach. The deductive approach focuses on using prior theory to conceptualise constructs. The inductive approach, on the other hand, is useful when the study topic has not been widely studied or the construct is multi-dimensional. The construct must be clearly conceptualised before progressing to item generation.

Construct conceptualisation [5] can be based on the results of a qualitative study (for example, a description of patient experiences) or a literature review that has identified the key constructs of a certain phenomenon (e.g., patient perspectives). The results of both concept and content analyses (see Chaps. 2 and 3) can be used in construct conceptualisation. Concept analysis is a method in which researchers identify the characteristics of concepts based on what has been presented in earlier researcher performed in the same field [6]. Concept analysis can be performed in various ways, for example, Wilson's method from the 1960s or Walker and Avant's more recent approach [7]. In content analysis, which can be applied to either qualitative research (see Chaps. 2 and 3) or systematic reviews (see Chap. 10), the original expressions are reduced and grouped into sub-categories, which are then further divided among categories and main categories according to similarities and differences in content.

The items of an instrument can be generated based on the results of a content analysis. From a theoretical perspective, it is important to specify the dimensionality of the construct. For example, the quality of counselling can be conceptualised based on a single variable or subscales that measure various dimensions of quality. Oikarinen et al. [1] applied a Quality of Counselling Instrument that included eight subscales. During the item generation phase, researchers should consider the reading level of the target population as well as determine whether the items cover a general or specific context. A general guideline is that items should be simple as well as avoid slang, abstract words, and ambiguous meanings. The preliminary version of the instrument should be designed to measure the key constructs identified for the phenomenon of interest. This means that the preliminary version of the instrument should contain more (for example, 3–4 times more) items than the final instrument.

When generating items from the results of a content analysis, the researcher can refer to the sub-categories and categories to create new items. In the beginning of instrument development, the item pool should be created with the aim of fully representing the theoretical framework of the measured phenomenon.

#### 8.1.1.2 Phase II: Judgement Quantification

The first step of the second phase (judgement quantification) is the recruitment of a convenience panel of experts that will examine the face and content validity of the instrument. Face validity describes an attribute or construct of the instrument that

measures what it is claims to measure [8, 9]. During a review meeting, the expert panellists verbally describe their assessment of the face validity of the instrument, their interpretations of the items, how suitable the instrument is for measuring the constructs of interest, and how logically the instrument appears to flow. Additionally, experts may evaluate the cultural appropriateness and grammar/syntax of the newly developed items. During the same review meeting, the experts will also assess the content validity of the instrument, i.e., the relevance of the items and their ability to serve as indicators of the constructs of interest [10, 11]. Content validity means that the instrument provides an adequate representation of the construct it was created to measure [8, 12]. Experts may use the Content Validity Index (CVI) method to enhance their evaluation. The CVI is formed from the evaluation of each item of the instrument by every expert panel member. The items are evaluated based on relevance and clarity (see Table 8.1). First, the expert panellists will evaluate each item using a four-point scale (from 1 = not relevant to 4 = very relevant) to determine whether to retain or reject the item. Each expert will then also independently rate each item's clarity (i.e., whether it was unambiguous or could be interpreted in multiple ways), relevance (i.e., the extent to which it was related to the phenomenon under study), representativeness (i.e., how completely it covers the associated aspect of phenomenon), as well as whether the instructions (clarity and format) are appropriate for the target population.

The aggregated ratings can then be expressed on the item- (I-CVI) and scalelevel (S-CVI). A good CVI score will indicate that the items are both understandable and cover the same content. The I-CVI is computed by dividing the number of experts who have scored the item as 3 (quite relevant) or 4 (highly relevant) by the total number of experts participating in the evaluation. For example, 11 (experts which scored an item 3–4)/12 (total number of experts) = 0.91666 = 0.92; this means that the I-CVI of the specific item is 0.92. The S-CVI is calculated by averaging the I-CVI values for all of the items included in the instrument. For example, if seven items have an I-CVI = 1.0 and three items have a I-CVI = 0.67, the S-CVI would be  $(1.0 \times 7 + 0.67 \times 3)/10$  items = 0.901 = 0.90.

Items are deleted or modified according to the I-CVI and S-CVI results [11, 12]. Experts are also afforded the possibility to leave open comments about each item, for example, suggestions for how to modify the phrasing. If inter-rater agreement and/or the S-CVI score is lower than 0.70, which means that certain items will have to be deleted or modified, another round of expert evaluation is required. Furthermore, researchers should always pre-test their instrument before large-scale data collection. The purpose of the pre-test is to evaluate the practicality, understandability, and interpretations of the items, as well as assess how easily the participants can answer the questions and progress through the survey [13]. In some cases, the participants may also be asked to assess readability, questionnaire length, item wording, and clarity, as well as how time consuming the questionnaire is to answer [14].

#### 8.1.1.3 Phase III: Psychometric Testing of the Instrument

After a developed instrument has been content validated, the instrument must also undergo a pilot test. The first version of the instrument should be pilot tested on a

Table 8.1An example matrix of content validity index by experts

	•		•	•					
Content validity		Not	Item need some	Relevant but need minor Very	Very	Not	Item need some	Clear but need	Very
index (CVI)		relevant	relevant revision r	revision	relevant	clear	revision		clear
Comment	ten	Relevancy				Clarity			
1.	Item								
Comment									
5.	Item								
Comment									

sample that was selected by random sampling and fit the inclusion criteria. Psychometric testing, during which various instrument properties such as reliability and validity are assessed, is performed to evaluate the quality of the instrument. Validity addresses the degree to which an instrument measures what it claims to measure [12, 15]. Construct validity can be assessed by analysing the pilot test data through exploratory factor analysis (EFA). The result of this analysis will indicate whether the instrument has good construct validity, i.e., the contents of all of the items correspond well to the concept that is being measured. Reliability, on the other hand, encompasses accuracy, consistency, and reproducibility, parameters which are measured by calculating Cronbach's alpha values, item-total correlations, and inter-item correlations [12, 15].

After the statistical tests, the content of items with low factor loadings, crossloading, and communalities is evaluated by a panel of experts, who provide feedback via a structured questionnaire. The expert panellists' evaluations are once more assessed by calculating CVI. Certain items will be deleted based on these evaluations and, if necessary, additional items will be added. In addition to the written evaluations, a convenience sample of experts will assess the deleted items and the instrument verbally. This assessment may lead to the addition of items to the instrument and/or modifications in the wording of items that resulted in high levels of non-responses during the pre-test.

These changes will result in a second version of the instrument, which must be again pilot tested on a sample of the total population selected using the same sampling procedures and inclusion criteria as in the preliminary pilot test. Returned questionnaires are rejected if they have an inadequate amount of answers (<50% of the questions answered).

The data acquired during the second pilot study is then tested for construct validity by factor analysis. This phase includes checking the returned surveys for missing data, confirming participant responses to negatively worded items, and deleting variables that show no apparent correlation to any other variable [16]. It is important to note that the preliminary analysis, which was performed to assess the quality of data, is essential to reaching higher construct validity. Data missing values need to be assessed based on missing completely at random (MCAR) or missing not at random (MNAR) outcomes [17]. It has previously been recommended that listwise deletion should be applied when missing values account for more than 5% of the data, while mean imputation is a better alternative when less than 5% of the data are missing values [18]. Furthermore, uni- and multi-variate outliers should be identified and removed once the normal distribution of data has been verified. Once the data quality has been improved, researchers can perform exploratory factor analysis with different rotation methods (orthogonal- varimax or oblique- promax rotation) depending on the amount of correlation allowed between factors. EFA results are reported based on a correlation matrix of between-variable associations. General recommendations state that the data and correlation matrix should meet certain criteria, for example, satisfactory Bartlett's test (p < 0.001) and Kaiser-Meyer-Olkin test (p > 0.60) results.

The factors identified through EFA are retained if they have eigenvalues >1.0, explain 5% of the variance in aspects of interest, or are important according to Cattell's scree test [18, 19]. Variables are accepted if they show loadings  $\geq$ 0.30 but <0.80 for at least one factor, or loadings between 0.20 and 0.30 loadings and communality  $\geq$ 0.30. Hence, variables with low communality or loading values will be excluded from further analyses. Items are removed and EFA is repeated until an optimal EFA model is achieved. It is important to note that EFA needs to be performed again every time items are deleted so that the analysis can provide accurate item loadings. This demonstrates that researchers must have a good theoretical understanding of EFA before applying it to validate an instrument.

The internal consistency of an instrument can be tested by calculating Cronbach's alpha coefficient, which is an indication of how well the items fit together conceptually. The functionality of the factors can be examined by calculating the item-total and inter-item correlations. The latter addresses the degree to which the items measure the same construct [20].

#### 8.2 Discussion

#### 8.2.1 Validity of the Instrument

Construct, face, and content validity all provide evidence of the overall validity of an instrument [14]. Lynn [10] recommends that content validity should be evaluated during several phases of instrument development [14] by panels comprising at least seven experts. Regarding the CVI values of items (I-CVI), several scholars have suggested that values  $\geq 0.78$  indicate excellent content validity [11, 12, 19]. The scale CVI (S-CVI), on the other hand, should exceed 0.90 to demonstrate excellent validity, while values between 0.70 and 0.80 demonstrate good content validity [11]. In cases where the expert panel includes five or fewer members, each item should have an I-CVI of 1.00 to ensure content validity. Moreover, the same experts should also unanimously agree that the instrument has good face validity, i.e., it is relevant for studying the phenomenon of interest.

The general recommendation is that the testing phase should involve more than five times the number of participants as there are items in the tested instrument. Furthermore, both the raw data and correlation matrix should meet the Bartlett and Kaiser-Meyer-Olkin criteria for factor analysis suitability (p < 0.001 and p > 0.60, respectively) [18, 21]. Researchers can also perform a scree test to avoid including non-significant factors. A factor analysis indicates good construct validity if the retained factors explain >5% of the total variance, their eigenvalues exceed 1.0, and their loadings and communalities are greater than 0.30.

The reliability of an instrument is typically assessed by testing it over two samples, during which researchers pay attention to the clarity of items as well as their logic [14, 19]. Cronbach's alpha coefficients are calculated for the responses of both sample populations, individual items and factors based on at least three items [9]. It is generally accepted that an instrument has good internal consistency if the

Cronbach's alpha values for both sets of empirical data exceed 0.70 [21, 22], although there is disagreement about the ideal values of these coefficients. When an instrument has been designed for clinical applications, some authors have suggested that the Cronbach's alpha values should ideally be at least 0.90 or 0.95 [9, 14]. However, DeVellis [21] suggests that Cronbach's alpha coefficient values over 0.90 are indicative of redundancies and suggest a need to shorten the instrument.

In certain cases researchers may feel that Cronbach's alpha coefficient has been artificially inflated by adding a large number of similar items to an instrument [21]. When this happens, it is beneficial to examine the correlation matrices of individual items as well as the item-total correlations [19, 22]. Items can then be deleted due to low (r < 0.30) inter-item correlations. In the cases in which all of these measures are examined, the item-total correlations, inter-item correlations, and alpha coefficients should all be high. Nevertheless, it should be noted that high values may potentially reflect unnecessary duplication of content across items and redundancy rather than homogeneity [22]. This is the reason that expert panels are commonly involved in instrument testing. Furthermore, alpha coefficients are sample-specific; hence, internal consistency results may substantially vary across samples.

#### 8.3 Limitations

Defining and operationalising concepts that are relevant to nursing science is the main challenge that researchers face during instrument development. Using content analysis to operationalise a concept will also identify key contents and provide ways to measure the studied concept. Not every definition is expected to cover all of the factors of a specific phenomenon, but an instrument must include a clear definition before it can measure some construct. Another risk of instrument development is that patients' and researchers' understandings of the content of items may differ. Therefore, researchers should encourage respondents to contact them if any item in the questionnaire is unclear. To further mitigate this risk, researchers could ask patients to evaluate the instrument's content at different stages of the instrument development process (e.g., pilot testing). However, it is important to keep in mind that researchers and patients have different theoretical perspectives of the studied phenomenon, which may further complicate the instrument development process.

Instrument development is also difficult in that there are no straightforward rules for how many items an instrument should include. Hence, the researcher must make some tough choices when deleting or adding items to the developed instrument. For example, retaining too many items may artificially inflate the Cronbach's alpha value, which—even though a positive result in terms of internal reliability—may signal that the instrument includes too many items. On the other hand, deleting numerous items may improve homogeneity as well as utility in clinical practice, but may increase the risk that the instrument does not sufficiently cover each factor of the studied phenomenon.

In addition, the suitability of the applied analytical methods will inevitably affect the reliability of the results; hence, ensuring that data and correlation matrices meet Bartlett's (p < 0.001) and Kaiser-Meyer-Olkin (p > 0.60) criteria is a good benchmark. However, it is important to note that the correlations between variables may increase when missing values are replaced with mean values. Furthermore, large sample sizes can sometimes contribute to part of the observed statistical significance and may lead to overestimates of the number of significant factors. For this reason, researchers may elect to use a scree test instead of eigenvalues to restrict the number of factors when the instrument is tested using a large sample.

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# **Statistical Testing of a Theory**

9

Maria Kääriäinen, Kristina Mikkonen, and Helvi Kyngäs

# 9.1 Theories of Nursing Science

Empirical testing is a significant stage of theory development. Theories that have been developed for nursing science generally include concepts, definitions and explanative correlations between the concepts of the nursing science phenomena [1]. Only theories that include hypotheses of how the presented concepts are related can be empirically tested. A definition of theory that is appropriate from the statistical testing point of view could be: a set of hypothetical links between theoretically defined variables [2]. Theories developed for the field of nursing science can be classified according to their type (descriptive, explanatory, predictive and guiding theories) and scope (meta theories, great theories, middle-range, or intermediate, theories and small-scale, or practical, theories) [2–6] (see more in Chap. 7). Meta theories often lack operationally defined concepts and include multiple complex concepts, with both of these characteristics serving as obstacles to empirical testing [4]. The intermediate and practical theories, which are more common in nursing science, are better suited for empirical testing; hence, researchers interested in the field of nursing science require a sound knowledge of theory testing [4, 5, 7]. Through systematic and empirical testing, a theory can be developed from a descriptive theory to an explanatory, predictive and directive theory [1, 5, 7].

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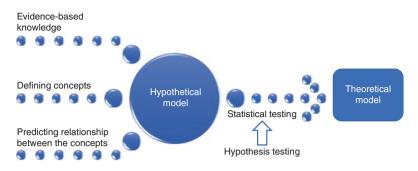


Fig. 9.1 The process of developing a hypothetical model for theory testing

# 9.2 Definition of Theory Testing

Theories are often hypothetical and presented as a preliminary version. Testability is considered a central characteristic of theory; hence, a theory is not a theory if it cannot be tested with empirical data. Theory testing is a systematic process in which the validity of theoretical statements is actually tested using statistical methods [1, 6, 8, 9]. It enables the theory to be verified, modified and further developed [3, 6, 7].

The traditional approach to theoretical testing in the field of nursing science is hypothetical-deductive. The hypotheses are formed on the statements of the theoretical structure and are empirically tested with statistical methods. However, it is important to note that theory can initially be developed with qualitative methods and later tested using quantitative methods [1, 7].

A theory comprises defined concepts and their relationships [3, 5]. The purpose of theory testing is reinforcing or suppressing the suggested relationships between concepts based on real world observations [10]. The testability of the theory requires empirical concepts of reality, theoretical and operational definitions of concepts, and statements about the theoretical structure [8] (Fig. 9.1). Theoretical concepts are often multidimensional, and they need to be defined through various forms of action. In addition to theoretical definitions, these concepts must also have operational definitions which indicate how concepts should be measured and link them with reality. The concept features of operational definitions are called empirical indicators. Evaluation criteria for the testing of the theory has provided by Acton et al. [11] (Table 9.1).

#### 9.3 The Process of Theory Testing

# 9.3.1 Aim

The purpose of theory testing is to verify the validity of a presented hypothesis about the theoretical structure of theory in empirical reality [3, 10]. A theory should be corrected or completely rejected if it does not receive support from the empirical

Concept	ual framework of the theory
1. The	theory is described precisely, including structure and concepts
2. The	research questions and hypotheses are logically derived from theory and evidence
	research questions and hypotheses are sufficiently detailed to enable assessments of ory validity
4. The	operational definitions of concepts are clearly derived from theory
The stud	y (data collection and analysis)
1. The	research design is appropriate for the type of theory
2. The	instrument/s is/are reliable and based on theory
3. The	theory guides participant selection
4. The	statistical methods used when testing the theory correspond with the type of theory
5. The theo	statistical analyses provide empirical evidence that supports, refutes, or modifies the
Results	
1. The theo	research report includes an analysis of the empirical results related to the tested
2. The	research report discusses the importance of the theory for nursing
3. The	theoretical conclusions are used to make recommendations for future research
4. The	ory testing is mentioned in the title, summary and keywords of the research report

**Table 9.1** Evaluation criteria for the statistical testing of the theory (Acton et al. [11])

data. A theory can be considered valid when the presented hypotheses gain empirical support. A theory should be tested on a continuous basis, and preferably with different target groups. A theory has a higher degree of validity as the hypotheses amass more empirical support [12, 13].

#### 9.3.2 Study Design

The research setting used to test a theory depends on the type of theory that is being tested. Descriptive theories are tested using a descriptive study design; explanatory theories are tested using a correlative study design; predictive theories are testing using an experimental study design; and guiding theories are tested using repeated measurements and interventions [7, 12]. Descriptive and correlative study designs define the relationships between the concepts described in theory, but they cannot be used to identify the causal relationships between concepts. For example, correlation coefficient between two variables does not describe the structure of the theoretical model, and thus, cannot be used for further theory development [12].

Explorative study designs examine the relationships between the concepts identified for a certain phenomenon, for example, by suggesting causal relationships. The experimental study design allows accurate descriptions (direct or indirect causal relationships) of the relationships between concepts [7] and shows how a change in one factor affects the factors included in the tested theory. It is important to determine which analytical methods will provide the best evidence of the verifying of a theory. A researcher can start the testing process with a descriptive study design and, once evidence for validity has been acquired, extend the testing to an experimental study design [3, 7, 9, 12].

#### 9.3.3 Data Collection

Data will be collected through either direct or indirect observations, such as surveys, interviews, observations and objective measurements. The target population should be representative of the group or context to which the theory is applicable. The sample size can be calculated by power analysis according what has been presented in previous studies that were conducted in the same or sufficiently similar context [12, 14–16]. Researchers will often develop an instrument that measures the concept(s) presented in the theory before the statistical testing of theory. The instrument will have to be pretested and psychometrically tested before the hypotheses are empirically examined [16]. Chapter 8 provides more detailed information about instrument development.

#### 9.4 Data Analysis

Statistical methods are commonly used to test explanatory, predictive and guiding theories to draw conclusions about the hypotheses being studied [12]. In particular, factor analysis and structural equation modeling (SEM) have used for testing theories [13, 14, 16]. SEM combines both factor and regression analyses. It allows the study of causal relationships between factors by using regression analysis [17, 18].

Explorative factor analysis (EFA) and confirmatory factor analysis (CFA) belong to the 'family of factor analyses'. EFA is used to determine exploratory factor model without an a priori assumption of associations between variables. No hypothesis of the factor structure of the data is needed to use it. Based on EFA researchers know how many factors the variables are intended to form which variables are loaded on which factors and whether the factors are interrelated. After EFA, CFA can be conducted to test nursing theory that has already been established. Researchers have to have an a priori hypothesis based on theoretical knowledge or empirical indications [18].

The theoretical basis of CFA relates to fundamentals of SEM. It describes the relationships between variables. The phases of CFA can be represented as preparation and model testing [18]. The preparation phase, which precedes the testing of a theoretical model, is concerned with the quality of the data. During this phase, the researcher will test their data for missing values, univariate and multivariate outliers and normality (for a description of data quality, see Chap. 8, testing an instrument's psychometric properties). Furthermore, instrument validity should be confirmed with exploratory factor analysis, and more preferably, with confirmatory factor analysis (CFA). Various statistical cut-off values for goodness of fit

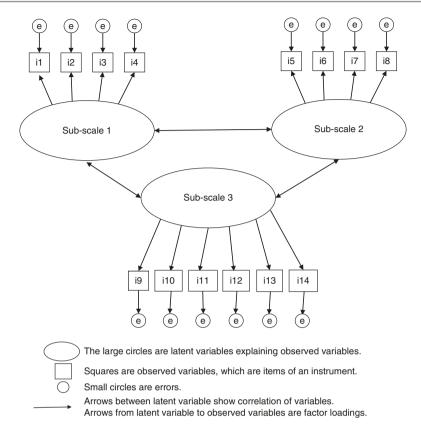
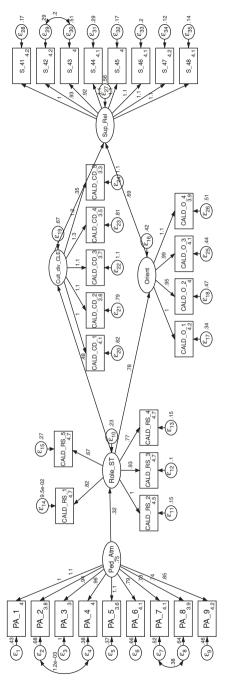


Fig. 9.2 Confirmatory factor analysis result during the psychometric testing of an instrument

can be used to evaluate whether a tested model is valid. Some of the most commonly used cut-off values for goodness of fit include: Root Mean Square Error of Approximation (RMSEA) <0.08; Standardised Root Mean Residual (SRMR) <0.08; Comparative Fit Index (CFI) >0.90; and Tucker-Lewis Index (TLI) >0.90. The CFA of an instrument will yield observed variables (which describe the items of an instrument) and latent variables (which describe factors that explain a minimum of three observed variables). An example of a CFA result for instrument validation is shown in Fig. 9.2.

An instrument that is deemed valid based on goodness of fit cut-off values can be further tested by building a SEM of the hypothetical theory model. The SEM process needs to be guided by hypothesis testing to provide relevant information about the connections between concepts. An example of the SEM process for theory model testing is presented in Fig. 9.3. A SEM defines the theoretical structure of a hypothetical model by demonstrating the relationships between latent, unobservable variables [18].





#### 9.5 Reporting Results

The results of theory testing can support the structure and validity of a theory and provide empirical support for the hypotheses derived from theory. Empirical results can be used to further modify a theory. Test results are often presented as a model that illustrates the theoretical structure [3, 5, 18] with standardized regression coefficients of the items related to the concepts, squared multiple correlations (R2) related to error terms and the model's goodness of fit indexes. The goodness of fit indexes may also be presented as a table. The relevant indices of different factor models and the changes after modification can be illustrated in table form [18].

#### 9.5.1 Generalisability and Usability of Results

Theory testing is concerned with generalisability and, as such, requires the theory to be tested using a variety of target groups, such as different customer and patient groups. The results of theory testing can be utilised in nursing practice if the results are consistent with previous findings and show that the theory is indeed generalisable. However, researchers should not expect that the testing of a theory will lead to practical implications, as the main value of theory testing is identifying parts of the theory that should be further developed [3, 6, 10, 12].

#### 9.5.2 Limitations of Theory Testing

There are several limitations associated with the statistical testing of theory. The concepts included in a specific theory may be so abstract that the operationalisation of these concepts is difficult. The relationships between concepts can also be problematic if they are not clearly stated as hypotheses that can be tested. Furthermore, in cases of complex theory, only parts of the theory should be tested [3, 9, 12, 19].

The theory testing requires an experienced researcher, as a variety of statistical models can be used to test a theory and, as such, numerous alternative models may provide empirical support for the tested hypotheses. In this case, the researcher must determine which methodology is the most relevant in terms of the scope and structure of the tested theory. Statistical testing may also produce a model that is not relevant in empirical reality [14, 18]. These problematic situations demonstrate how theory testing and development is an ongoing process [1, 12].

Theoretical structure and the causal relationships between concepts are often based on empirical findings. However, it is almost impossible to prove the validity of causal conclusions. It is important to state that theoretical structure may not be stable and consistent, for example, it may not hold across different target groups and different settings of nursing. Various factors, such as the characteristics of a certain nurse as well as cultural and environmental factors, may influence theoretical structure and a theory may change when it is applied to a different culture [16]. A researcher may also face challenges when deciding which statistical methods to apply. Data used in the analysis should be a random sample of the population [15]. The sample size must be large enough. For example, multivariate methods will require at least five for each of the variables tested. The variables have to have also normal distributions and there has to be variation in the data. Furthermore, measured variables should not be too similar because this can cause correlations of measurement errors [18].

In addition, the results of factor analyses and structural equation modeling of theoretical structure are data-specific; hence, researchers should use caution when generalising these types of results [16, 18]. In addition, statistical indicators are no longer reliable once a theory has been modified; for this reason, researchers will have to perform cross-validations with new data if they wish to report valid statistical indicators for the new theory [14]. Furthermore, theories should be modified with great care so that the changes are theoretically justified and meaningful to the context in which the theory will be applied [16, 18].

It is also good for a researcher to consider the relationship between the statistical significance of results and the clinical or practical significance of results. For example, large data sets can produce the statistically positive findings with small p-values, but they have very little meaning in clinical practice [14, 15]. In addition to the p-value, researchers should also pay attention in intervention studies to the effect size, which is independent of the sample size. Many scholars highlight that the p-value depends on the sample size and, as such, a difference that was insignificant in a group of 100 participants may suddenly be significant when tested with a group of 1000 participants. Thus, reporting the effect size in the results of a theory testing study is important, especially if the sample size is particularly small or large [12, 14].

## 9.6 Conclusion

The theory development process is incomplete without the systematic testing of theory [19]. The systematic statistical testing of theory is a long-term process during which a researcher continuously questions the theory under scrutiny. It provides information on the generalisability of the theory, i.e., whether the practical implications are applicable to different cultures and target populations. The information presented in this chapter highlights that multivariate methods, such as structural equation modeling, are relevant to the testing of diverse theories developed for nursing science.

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# **Content Analysis in Systematic Reviews**

# Kristina Mikkonen and Maria Kääriäinen

# 10.1 Systematic Reviews in Nursing Science

The systematic review describes a rigorous methodology that encompasses identifying and screening relevant original research, data synthesis, tabulation of chosen studies according to the research question(s) and interpretation of the findings in terms of evidence-based knowledge that is relevant to decision-making [1]. Systematic reviews are performed for several purposes, namely to critically evaluate a pre-defined research area, fill a knowledge gap [1], find evidence-based knowledge that will be relevant to clinical decision-making and/or help researchers define the key concepts—along with their relationships—in a chosen area of study [2, 3].

The systematic review process encompasses planning, implementation and reporting phases [1, 2, 4]. During the planning phase, the researcher will develop an understanding of which knowledge gaps exist in the area under study, define the main concepts and perform a preliminary review of the research area. The results of the preliminary review will help the researcher critically evaluate whether a systematic review is necessary and, if so, define the review objectives. A successful systematic review requires a detailed protocol that will define the background, concepts to be studied and applied methodology. The systematic review protocol can be published, so readers can refer to it when interpreting the review results. During the

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planning phase, the researcher may choose to use a guideline that will specify the systematic review methodology and synthesis. Examples of commonly used systematic review guidelines include the Joanna Briggs Institute Reviewers' Manual [4], Centre for Review and Dissemination [1], The Cochrane Handbook for Systematic Reviews of Interventions [5] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses [6].

The fact that the researcher must already clearly define the research question(s) during the planning phase demonstrates that the systematic review is a rigorous method [1, 2, 4]. The research question(s) will help the researcher choose which type of review (for example, systematic review of qualitative studies, systematic review of quantitative studies, integrative review, narrative literature review) will be used, plan the inclusion and exclusion criteria and select a relevant method of synthesis. A common problem in systematic reviews conducted in the context of nursing science is that researchers will identify and include original studies without following the rigid philosophical and methodological guidelines of mixed methods (see Chap. 4). For example, qualitative research studies relate to human experiences. Hence, the philosophical starting point for these studies in the context of nursing science is interpretive philosophy, which draws upon evidence from phenomenology (individual meaning), ethnography (social cultural meaning), grounded theory (develop theory grounded in real world, observation of the world induction), interviews, observations and field work [7]. Furthermore, the interpretive philosophical perspective accepts mutual recognition between the researcher and the participant. As described by Tong et al. [8], people perceive phenomena through their own eyes and in their own specific context; hence, interpretive philosophy assumes the existence of multiple realities [8]. Thus, the researcher must take into account the various perspectives underpinning the philosophical basis of the studied phenomenon when formulating the search strategy. This will ensure that all of the published research that may be relevant to the research topic is identified during the literature search.

A researcher should consider the criteria described in the PICOS (PICoS in the case of qualitative research) acronym when planning a systematic review and defining the research question(s). The criteria are relevant to both qualitative and quantitative research and should be mentioned in the systematic review protocol. In the scope of quantitative research, the PICOS acronym stands for P = population, I = interventions, C = comparators, O = outcomes and S = study type. It does not include participant experiences, which are described through qualitative research methods. In the scope of qualitative research, the PICoS acronym stands for P = participants, I = phenomenon of interest, Co = context and S = study type. In the case of a qualitative study, the research question(s) should be used to define the relevant characteristics of participants. The phenomena of interest must be related to the topic covered by the systematic review, for example participants' experiences and the meanings of these experiences. The context needs to include certain settings or locations that are related to the objective of the review (e.g. cultural factors, geographical locations or clinical environments). Following the PICOS or PICoS criteria will guide the researcher in planning inclusion and exclusion criteria for identified original studies, selecting the methods that will be used in the systematic review process and reporting the synthesis in a transparent and reliable way [1, 2, 9]. In cases in which a systematic review will include both quantitative and qualitative original studies, the planning phase must include separate research questions for the different types of studies, follow both PICOS & PICoS criteria and outline separate screening and data synthesis processes (an example of how a systematic review can combine two research methods is presented by Konttila et al. [10]). PICOS & PICoS criteria are additionally used to create the search terms and synonyms for the search strategy. A concise protocol will help the researcher choose the most relevant databases for the systematic review and will reduce the complexity of the screening process [11]. Furthermore, clearly defined search terms, along with relevant inclusion and exclusion criteria, will reduce the amount of identified studies that are later deemed to be irrelevant and strengthen the validity of the systematic review.

The implementation phase of the systematic review process includes the literature search, study selection, quality assessment, as well as data extraction and synthesis. The screening process usually involves two researchers who will independently assess search results by title, abstract and full text. After finishing their assessments, the two researchers will discuss their findings and work to reach a mutual agreement about which identified studies are relevant to the systematic review [1, 4]. This process can be illustrated through a flow chart that details how studies were assessed to be relevant to the systematic review. It is useful to include this flow chart in the systematic review protocol [1, 6]. Authors who have previously performed systematic reviews of qualitative studies noticed that several relevant studies were missed during the screening of qualitative study titles. This is because nursing science researchers sometimes use metaphors in study titles [12, 13]. This observation constitutes a major limitation for systematic reviews of nursing science research, as applying the PICoS criteria to the title may not necessarily identify each relevant original study. The screening process can be further enhanced by screening the reference lists of the original studies selected based on a screening of the full text.

The studies that are to be included in the systematic review need to undergo a quality appraisal prior to the synthesis of the results. This should be independently performed by two researchers, and both evaluations should be in agreement for the review process to continue. The researchers should consider the following issues when evaluating the identified studies: did the reported methods clearly describe the research process? Were the results reported truthfully and are the results valid? Was the study design relevant for the participants? and did the research follow ethical principles? Essentially, the evaluation process helps researchers decide whether or not a certain study should be included in the systematic review. The exclusion of lower-quality studies helps researchers avoid biases and errors in data synthesis [2, 14–16]. Several validated tools have been specifically designed for the critical appraisal of original studies. For example, the Johanna Briggs Institute has developed Critical Appraisal Tools [17], which is applicable to certain research methodologies, including qualitative studies.

# 10.2 Using Content Analysis in the Data Synthesis Phase of a Systematic Review

After the literature search and quality assessment have been performed, data should be extracted and synthesised [8]. Data extraction allows researchers to understand various aspects of the literature included in the review. For example, data extraction may include information about the authors, publication years, participants, research methods and key findings. The final stage of the implementation phase is the synthesis of the chosen studies. This part of the review process is guided by the research question, which will help researchers determine what types of results can be included in the final synthesis. The research question supports the researcher in collating, combining, interpreting and reporting the findings of each individual study [1]. The systematic use of data extraction and synthesis reduces bias in the results and enhances transparency. The method of synthesis should be chosen according to the research question, philosophical positioning and synthesis output. Tong et al. [8] provides clear descriptions of the synthesis methodologies that are most commonly used in qualitative health research, for example content analysis, critical interpretive synthesis, grounded theory synthesis, meta-ethnography, metastudy and thematic synthesis. Thematic synthesis matches the philosophical view of critical realism and, as such, is relevant for studies that have applied content analysis (see Chap. 4) [18].

Thematic synthesis follows a process similar to that of content analysis in that concepts are coded and hierarchically categorised based on the researcher's interpretation (see examples of thematic synthesis in publications of [12, 13]). Reliable results can be produced by closely following the instructions for data synthesis [19]. A qualitative synthesis can be performed by combining qualitative data with the appropriate theoretical assumptions and methods. The differences between thematic synthesis by Thomas and Harden [18] and content analysis by Elo and Kyngäs [20] stem from how themes or categories are defined and named. Thematic synthesis begins with line-by-line coding, which serves to define and name descriptive and analytical themes. On the other hand, content analysis begins when a researcher splits the data into meaningful units or open codes. The analytical process allows these codes to be phrases or even whole sentences, and the researcher will later use the open codes to define and name sub-categories, categories and main categories [20]. The analytical process does not further specify how these sub-categories, categories and main categories should be developed, but rather guides researchers to conduct an interpretational analysis with the overarching objective of reducing initially identified categories (i.e. sub-categories) into higher-order categories [20].

The decision to perform qualitative data synthesis should be supported by the research questions and objectives of a systematic review. Every method of synthesis will apply specific techniques and philosophical positioning to the studies that pass the appraisal process (see Chap. 4 for more information on mixed methods research). A synthesis will be strengthened when one researcher extracts data

and another researcher checks the accuracy of their work. Content analysis can be beneficial to summarising the key elements in the large amount of data identified during the review process. It is important to note that the theory underlying content analysis states that knowledge lies in participants' perspectives and experiences. Content analysis-when applied to a systematic review-will progress according to the steps described in Chap. 2, i.e. relevant data will be organised into sub-categories, categories and main categories. The data interpretation phase, however, will differ when content analysis is applied to original qualitative research and when it is used in a systematic review. Researchers who use content analysis in original research will determine how data collected with a detailed, consistent approach is related to their research question, while researchers who apply content analysis to a systematic review risk having to interpret data produced through diverse qualitative research methodologies with one specific question. Researchers who plan to use content analysis in a systematic review should have previously used the method in original qualitative research. They should have extensive experience with the analytical process because researchers who apply content analysis to a systematic review will have to interpret a large body of data-potentially produced through various qualitative approaches-and provide the reader with a comprehensible picture of how it relates to a single research question.

The data synthesis can be performed by collecting all of the results from the studies included in the review under one table. Whenever possible, researchers should employ software in the synthesis phase (for example, the Nvivo program from QSR) as these tools can organise results in a clear and logical manner. Additionally, the researcher should separately examine the abstract and discussion of each included study to ensure that no results which were not reported in results are missed. The chosen results should be clearly marked with references so that they can be correctly reported in the systematic review. Any identified results that are linked to the research question need to be coded. It is important to note that the coding process does not involve the researcher's interpretational definitions or combination of results. The researcher's own interpretation of the identified results only begins in the inductive stage of data synthesis (see Chap. 2), when the researcher must use his/her judgement to categorise the outcomes into sub-categories, categories and main categories. To be meaningful, the systematic review must offer interpretations of the identified evidence that go beyond the knowledge presented in the individual studies [8, 18]. The reporting of content analysis results differs slightly when this method is applied to original research and when it is used in a systematic review. The main difference is that researchers who employ content analysis in a systematic review must ensure that they adequately present the context of each study included in the review.

When presenting a systematic review, the researcher must report the way in which they performed the systematic review in great detail so that others can repeat the review process [21]. The findings should be presented in terms of their applications to current practices and how they may be significant in the future.

Furthermore, the researcher must clearly differentiate between previous knowledge and new evidence when presenting the findings of a systematic review. The researcher should also discuss the limitations of the researcher and how the findings can be further studied or implemented into clinical practice [22]. Researchers can choose to use validated checklists that have been specifically designed for the reporting of results to further enhance the validity of their review. Various instruments that have been developed and validated for this purpose can be found in the EQUATOR Network ([23], Enhancing the Quality and Transparency of Health Research).

# 10.2.1 An Example of a Systematic Review of Qualitative Studies That Employed Content Analysis During the Data Synthesis Stage

A previous systematic review of qualitative studies was conducted to investigate health science teachers' experiences of their competencies. The aim of the systematic review was to describe teachers' experiences of their competence in teaching health sciences. The search strategy included four databases. Following the PICoS protocol, participants were defined as health science teachers, the phenomenon of interest was defined as teachers' experience of their own teaching competence, the context was defined as higher education institutions and the study type included qualitative original studies published between 2007 and 2018 in English, Finnish and Swedish. The search yielded 1903 titles that were then screened by two researchers according to the title (1885 studies included), abstract (600 studies included) and full text (63 studies included). A total of 12 original studies underwent the appraisal process, with two studies being excluded due to poor quality. As a result, the qualitative synthesis included ten studies. The extracted data described the year of publication, study purpose, participants, data collection and analytical methods, and key findings. Content analysis was employed during the data synthesis stage [20], and the analytical process will be presented step-by-step, including practical examples, in the next paragraph.

The research question of the systematic review (which competence areas do health science teachers feel are important for their role as a teacher?) was used to guide the content analysis. The results of all ten chosen original studies were collected under one table, split into meaning units and eventually coded, i.e. the raw data were condensed into meaning units that are relevant for the research question (see Table 10.1). The meaning units were further simplified by creating 232 codes that answered the research question. The codes were read through several times by one researcher and later categorised into 88 sub-categories, 23 categories and seven main categories (see Tables 10.2 and 10.3). The seven main categories were professional capability, teachers' competence in teaching subject knowledge,

Their role was to increase awareness and appreciation of cultural differences They attempted to increase cultural awareness in varying ways She provided students with: "culturally relevant	<ol> <li>Increase awareness of cultural diversity</li> <li>Increase appreciation of cultural diversity</li> <li>Providing culturally</li> </ol>
of cultural differences They attempted to increase cultural awareness in varying ways She provided students with:	<ol> <li>Increase appreciation of cultural diversity</li> <li>Providing culturally</li> </ol>
They attempted to increase cultural awareness in varying ways She provided students with:	of cultural diversity 3. Providing culturally
cultural awareness in varying ways She provided students with:	3. Providing culturally
varying ways She provided students with:	
She provided students with:	
	and linguistically
" culturally relevant	diverse students with
culturally followallt	culturally relevant
material that incorporates	material
their culture and their	4. Incorporate culturally
practice and beliefs"	and linguistically
"I teach them about being	diverse students'
	culture, practice and
accepting of other people	beliefs in teaching
	5. Practising cultural
equally"	equality when
Some made biased	teaching culturally
comments that suggested	and linguistically
they viewed minorities as	diverse students
	6. Teaching culturally
-	and linguistically
	diverse students with
students	nonjudgemental
A few participants held	attitude
	7. Seeing culturally and
	linguistically diverse
	students as deficient
	8. Holding
	unconsciously biased
	perceptions of
	culturally and
	linguistically diverse
	students
	9. Seeing culturally and
	linguistically diverse
	students as highly
5	motivated
	10. Seeing culturally and
	linguistically diverse
	students as "just
	wanting to get by"
11	11. Teachers lack the
	skills to see culturall
	and linguistically
	diverse students as
	individuals
	practice and beliefs" "I teach them about being nonjudgmental to others, accepting of other people and that everyone is treated equally" Some made biased comments that suggested they viewed minorities as deficient, in spite of their desire to be receptive and nonjudgemental of diverse

 Table 10.1
 An example of content analysis process from raw text to coding

Sub-categories	Categories	Main categories
Lack of cultural competence in instruction	Cultural competence in the teaching of culturally and linguistically diverse students	Cultural competence of teachers
Cultural awareness in cultural diversity		
Cultural sensitivity in supportive instruction		
Cultural communication		
Cultural appreciation		
Judgemental attitude towards cultural diversity		
Not recognising cultural diversity in instruction	Cultural diversity in instruction of culturally and linguistically	
Cultural educational guidance in providing relevant materials and services	diverse students	
Integrating cultural diversity in educational guidance	-	
Student-centred guidance according to the needs of culturally and linguistically diverse students	_	
Role modelling of professional conduct		
Using evaluation criteria for culturally and linguistically diverse students' learning need assessments		
Cultural judgemental attitude in instruction		

Table 10.2 An example of content analysis process from sub-categories to main categories

pedagogical competence, facilitation of constructive evaluation, teachers' cultural competence, global partnership in an international context, and teachers' professional development and growth. When content analysis is applied to a systematic review, the reporting of the analysis findings needs to specify which knowledge has already been established—with appropriate citations—and which knowledge has been identified during the analytical process. For example, the main category *professional capability* was described by the requirements to practice as a teacher and professional recognition. In this case, the authors noted that the requirements to practice as a teacher are defined by institutional requirements, hospital policies, degree programmes [24] and job commitment [25]—all of which has been previously established. Other results, for example, evidence that teachers' knowledge and attitudes regarding leadership are important aspects to building competence, provided new insight into health science teacher competence and could be leveraged in subsequent instrument development studies.

Categories	Main categories	
Professional recognition	Professional capability	
Requirements to practice as a teacher		
Teachers' subject knowledge	Teachers' competence in teaching	
Evidence-based knowledge	subject knowledge	
Teachers' competence in socio-constructive teaching methods	Pedagogical competence	
Teachers' competence in digital technology		
Guiding students through the learning process and development of generic skills		
Needed recourses to support socio-constructive teaching methods		
Role modelling	_	
Teacher-facilitated reflection	Facilitation of constructive evaluation	
Benefits of learning in facilitation		
Educational tools for reflection	_	
Teachers' competence to facilitate reflection	_	
Providing versatile forms of feedback		
Cultural competence in the teaching of culturally and linguistically diverse students	Teachers' cultural competence	
Cultural diversity in instruction of culturally and linguistically diverse students		
Competence in building global partnerships	Global partnership in an international context	
Benefits for teachers' competence of global partnership		
Novice teachers' commitment and professional growth	Teachers' professional development	
Mentoring practices for novice teachers in supportive academic environment	and growth	
Dealing with challenging situations as a novice teacher		
Continuous education		
The connection between continuous education and working life	_	

Table 10.3 An example of final content analysis outcome

# 10.3 Conclusion

Researchers apply content analysis of qualitative studies to systematic reviews to summarise present evidence, offer new knowledge based on the synthesis of multiple original studies and describe how present understanding of the studied phenomenon should guide research, along with educator and clinical practitioner decision-making. One of the main points of this chapter was that the rigid methodology of a systematic review must be followed if a researcher wants to ensure the validity of the presented research. Thus, if certain steps of the systematic review process are compromised, the content analysis of the chosen studies is likely to produce results that include some degree of bias. The validity of a systematic review can be ensured by clearly defining a research aim and question, focusing on either qualitative or quantitative original research, applying the PICOS or PICoS inclusion–exclusion criteria

based on the type of research that will be examined, performing a comprehensive search and screening strategy, critically evaluating the scientific quality of each identified studies and choosing a synthesis method that is appropriate for the research aim. The limitations of the research also need to be critically assessed, and the researchers should openly declare any conflict of interest. The main limitation of using content analysis as the data synthesis approach is that the researcher will have to interpret how data produced through diverse methodologies relates to a specific study question. The original qualitative data cannot be retrieved when performing a systematic review; hence, a researcher must rely on their interpretation of preliminary reports. In terms of benefits, researchers commonly apply content analysis to a systematic review because evidence received from multiple sources can provide a wider picture of a certain phenomenon. Furthermore, content analysis findings can identify gaps in knowledge and applied methodology, prevent unnecessary future research and be pivotal in the development of new theoretical frameworks.

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