

Chapter 2

Managing Complex Psychoanalytic Research Projects Applying Mapping Techniques – Using the Example of the EDIG Study

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Abstract Science and research today are embedded in the development of a knowledge society, implying that scientifically based knowledge gains more and more importance in our society. As the demand for scientifically based knowledge and progress is continually growing, and science poses new risks for society and raises new questions, the need for regulating and controlling scientific activities has grown stronger. This development towards a stronger political and societal impact on research implies that scientists nowadays not only have to meet specific quality criteria, formulated by the scientific communities themselves, but also external criteria formulated by politicians, governments and other third-party funders. The EDIG study, funded by the European Commission, exemplifies this development towards increasingly complex research in a globalized context. In the EDIG project multiple research questions were investigated, applying a broad spectrum of research instruments and methodologies, while engaging in an interdisciplinary dialogue, in order to meet external and internal quality criteria. Graphical tools such as mind maps, flowcharts or concept maps may provide a useful instrument for researchers to meet the complexities and endeavours of current research projects. Such mapping techniques not only support the user in identifying and retrieving knowledge but they may also be used as an externalized memory. In constructing a map, the researcher is forced to reflect systematically on his/her knowledge, to elaborate on it and thereby identify possible knowledge gaps. By making the user's cognitions explicit, knowledge is more easily accessible to the researcher as well as his/her team members, thus enhancing communication processes as well as intersubjective transparency.

Keywords Knowledge management • Knowledge society • Mind map • Psychoanalytic research

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2.1 Challenges in Psychoanalytic Research

An EU research project like the EDIG study poses special challenges for the researchers, calling not only for expert knowledge, as well as methodological competences, but also for profound management skills. The EDIG study, with its broad methodological approach and taking into account interdisciplinary aspects and intercultural differences (cf. Chap. 3), illustrates the challenges that scientific projects have to face nowadays. As the Bielefeld research group around the sociologist Peter Weingart (Weingart et al. 2007) describe, science and research today are embedded in the development of a knowledge society, implying that scientifically based knowledge gains more and more importance in our society. Experts and expert knowledge are in great demand when it comes to the formulation of scientifically based recommendations for legal, societal and political frameworks for future policies. Whereas scientific knowledge increasingly replaces ‘naïve’ notions, and thereby contributes to the development of new insights in all domains of research activity, it also continuously creates new problems and raises new questions. As research is forced to explain increasingly complex phenomena in very different contexts, this leads to heightened insecurity in the predictive power and possible consequences of scientific results and developments (as shown in this volume; Weingart et al. 2007).

As the demand for scientifically based knowledge and progress is continually growing, and science poses new risks for society and raises new questions, the need for regulating and controlling scientific activities has grown stronger. This development towards a stronger political and societal impact on research implies that scientists nowadays not only have to meet specific quality criteria, formulated by the scientific communities themselves, but also external criteria formulated by politicians, governments and other third-party funders. Therefore, when evaluating research grants, not only the axiomatic relevance of a research endeavour is taken into account, but also its technological and societal impact (Carrier et al. 2007).

The Sigmund-Freud-Institute, a traditional institute for psychoanalytic research in Germany, is also affected by this development. The EDIG study, funded by the European Commission, exemplifies this development towards increasingly complex research in a globalized context. It took up a concern of the European Commission, formulated in one of their research work programmes “Science and Society”, located within the 6th EU Framework Programme for Research and Technological Development (FP6). One of their main focuses was to support a responsible use of scientific and technological progress, including research on ethics in relation to science. Hence, a crucial criterion for evaluating research grants was the extent to which “[...] the proposed project is likely to have an impact on reinforcing competitiveness or on solving societal problems.” (European Commission 2003, p. 32).

However, the European Commission not only considered the practical output of a prospective research project but also its innovative power. A highly innovative aspect

of the EDIG study was to connect the expert knowledge of different disciplines, such as psychoanalysis, ethics, medicine as well as social sciences. Prior to 2003, there had been no detailed analysis of the relation between ethical reflections in the decision-making processes around prenatal diagnosis (PND) and psychic strains on the individuals involved (Leuzinger-Bohleber et al. 2008).

By the conception of such a study the consortium of researchers also reacted to a desideratum of the European Commission, which sought to promote the emergence of structural connections, dialogues and networks within the European Research Area (European Commission 2003). This approach, of supporting cooperation between different disciplines, resulted from the perception that excellent research is characterized more and more by its complexity and its interdisciplinary nature (European Commission 2002).

Another specific characteristic of the EDIG study was its multinational approach with the participation of Italy, Sweden, Israel, Greece, England and Germany. According to the European Commission, the necessity to cooperate on a cross-national level, within Europe but also world wide, derives from the demands that arise in a globalized environment. The aim of the Sixth Framework Programme was thus to encourage the emergence of a European Research Area, promoting the establishment of common European policies (European Commission 2003). This demand was met by the efforts of the EDIG study to include a variety of countries, characterized by their diversity regarding law, policy and practice of prenatal testing.

Of course, the EDIG study also had to prove itself on a scientific-axiomatic level, showing its methodological soundness. Psychoanalytic research has to deal with the ideal of a 'unified' conceptualization of science and scientific methods and is critically observed by non-psychoanalytical scientists as well as psychoanalysts. Considering this background, the development of a study design, which adequately addresses unconscious processes and fantasies, proved to be a particular challenge. To meet these new challenges, Leuzinger-Bohleber, the coordinator of the EDIG study, in line with a view held by many German psychoanalysts, developed a specific approach to psychoanalytic research. This view is marked by its striving for intersubjectivity, trying to integrate and reflect different types of investigations, methodologies and instruments (cf. e.g. Leuzinger-Bohleber 2002, 2007; Leuzinger-Bohleber and Fischmann 2006).

2.2 Impact on the Research Process

As shall be shown in the following sections, these external and internal quality criteria and the specific approach to psychoanalytic research as outlined had a marked impact on the research process, increasing its complexity. The project's complexity resulted from an integration of several project objectives and research questions, the combination of different forms of research (clinical and extra-clinical; empirical and interdisciplinary) and the interplay of various methodological

approaches, including the application of psychoanalytic and non-psychoanalytic instruments, quantitative and qualitative data, bottom-up and top-down-processes as well as nomothetic, group-statistical and idiosyncratic analyses on a single case level. The specific research approach thus affected the research process, including the theoretical preparatory work, the performance of the study, data analysis and dissemination (Bortz and Döring 2006).

By referring to linear models depicting the research process in the life sciences, e.g. one developed by Bortz and Döring (2006), the problems arising due to the complexity of the research approach, will be shown. Such linear models are always restricted to extracts of an iterative scientific process and do not meet up with the dynamic character of research actions. However, choosing a schematic, phase-oriented approach offers the advantage of depicting the complex research process in all its facets.

Usually, a research project starts with the preparatory phase, followed by the actual study performance, then the data analysis and finally the dissemination of study results. The preparatory phase for a research project itself incorporates different steps. In many cases it starts with a comprehensive literature review, the specification of relevant research questions and the development of a sound study design – including the specification of the type of investigation, the operationalization of the relevant concepts and variables as well as the population to be investigated. This is followed by the conceptualization of the study performance as well as the anticipation of the data analysis (Bortz and Döring 2006). These different phases will now be described in detail.

2.2.1 Literature Review

Firstly, a research process should include a comprehensive literature review. In the sixties, de Solla Price, a historian of science and physicist, investigated the growth of natural sciences and concluded that the growth in the last two centuries resembles an exponential curve with a duplication period of only 10–15 years (de Solla Price 1974). Although criticized for his methodological approach, there is broad consensus that scientific activity, including the number of publications as an output-criterion, has decidedly grown in the last decades (cf. e. g. Kölbel 2004; Weingart 2005).

Looking at a research project like the EDIG study, with multiple objectives, intercultural comparisons and multidisciplinary research questions – and in a field of research that attracts high scientific interest – the complexity of a comprehensive literature review quickly becomes apparent. This is exacerbated by the fact that the scientific activity, including the number of publications, has grown enormously in the last decades. Processing this amount of knowledge can easily overload individuals' information processing capacities. Moreover, the interdisciplinary approach made it necessary to connect the expert knowledge of different disciplines.

2.2.2 Identification of Relevant Research Questions

Closely related to the question of literature research is the identification of relevant research questions. They might result from a research assignment, from practical/societal problems that elicit the need for scientific solutions or they might be based on a “purely” scientific interest (Friedrichs 1990). The EDIG project was confronted with the high standards of the European Commission and sought to address not only theoretical questions but also to contribute to the solution of societal problems. Thus it had to keep track of multiple research questions that split into further aspects. Moreover, all findings had to be highlighted from an intercultural and interdisciplinary perspective, increasing the number of relevant research questions further.

When looking at the research process, one realizes that it often shows dynamic characteristics and can be described in terms of oscillating processes, which imply the modification of theories, methods and data models. Overlaps, interferences, leaps, feedback and loops are regular processes (Hug 2001; Kromrey 2006). Therefore, the project planning has to be flexible enough to allow for changes and revision. Furthermore, interesting research questions sometimes do not emerge until the study has started (Diekmann 2006). Therefore, in the EDIG study, a heuristic part, consisting of interviews with pregnant women and their partners, was included to promote the development of preliminary hypotheses on the processing of ethical dilemmas in the context of prenatal testing. Considering the fact that each of these interrelated decisions is crucial with regard to the research design, Kromrey (2006) recommends a careful documentation of changes, amendments etc. in the research process to ensure intersubjective transparency.

2.2.3 Defining the Type of Investigation

After reviewing the current theoretical and empirical status, and having specified the relevant research questions, the researcher is asked to define the type of investigation which offers an adequate methodological approach to the research question. Bortz and Döring (2006) differentiate between descriptive studies, explorative studies and studies which test hypotheses. The EDIG study combined all aspects: first, the study aimed to describe the populations in the different participating countries that use the techniques of prenatal testing. Furthermore, it was characterized by its combination of bottom-up or inductive with top-down or deductive processes. On the one hand, hypotheses were formulated, based on psychoanalytic and psychological knowledge as well as existing empirical studies in the field, such as the investigation by Statham et al. (2002, 2003). On the other hand, the interviews conducted with couples undertaking PND, as well as psychoanalysts and their former patients, served as a heuristic basis for formulating the first tentative hypotheses. Moreover, group differences, correlations, changes over time, as well as single case studies, were incorporated within the study design. Thus, the combination of

these different types of investigations caused a complex interplay of descriptive, inductive and deductive research processes.

2.2.4 Definition of Concepts, Variables and Operationalization

After defining relevant research questions, as well as the type of investigation and study design, the central variables have to be set and operationalized. With the constant growth of our knowledge base, science continuously creates new scientific questions, forcing research to solve increasingly complex problems (Carrier et al. 2007). Authors like Rescher (1982) argue that efforts (methods, manpower, technologies) have to be continuously increased in order to achieve the same relevant results. The EDIG project tried to contribute to the standard of knowledge by choosing an interdisciplinary approach, bringing together disciplines that had not previously been involved in a multidisciplinary dialogue in the field of PND – namely psychoanalysis, cooperating with ethics and medicine. Moreover, up to that point longitudinal investigations of couples undergoing PND, from the time of waiting for the test results up to the expected date of birth and beyond, were clearly missing from previous literature.

These considerations resulted in the inclusion of a large number of variables within the study in order to meet the relevant research objectives and questions, e.g. to investigate the relation between a number of predictors and different dependent variables. Moreover, careful operationalization was required that would allow for the assessment of conscious as well as unconscious processes in a methodologically sound way. In the EDIG project standardized scales were used, as well as multiple choice questions with given answers, open questions and interviews, resulting in a large pool of quantitative and qualitative data.

2.2.5 Specification of Subjects

In the EDIG study, the population consisted of couples choosing prenatal testing (substudy A) as well as psychoanalysts, whose former patients reported retrospectively on their experience of PND (substudy B).

2.2.6 Conceptualization of Study Performance and Data Analysis

In this preparatory phase the performance of the study has to be anticipated as well as the analysis of data. This implies decisions about the processing of raw data

(e.g. of open questions) as well as choosing an adequate statistical procedure for data analysis. Of course, the high number of research questions and associated variables entail complex statistical analyses in order to investigate correlations, group differences or changes over time. Moreover, the question arises of how to relate the different data sources to each other, e.g. how material gained from open questions could be related to the standardized scales – a question which touches the aspect of methodological triangulation.

2.2.7 The Performance of the Study

After having defined the study design, the study has to begin. As can be imagined, the performance of such a research project requires high organizational efforts. Hence, special skills in the field of project management are required, as Bulmahn, the former federal minister for education and research in Germany put it (Bundesministerium für Bildung und Forschung 2002). Collaboration with colleagues, which is indispensable for the realization of studies of such scope, presupposes efficient communication.

2.2.8 Data Analysis

As soon as the data has been collected, the data analysis has to begin. It is a well-known fact that research interests often stimulate the formulation of manifold hypotheses that, due to limited capacities, cannot be processed simultaneously. In such cases, the research reality makes it necessary to determine strategies for data analysis, i.e. to fix priorities and proceed successively. In some cases, the “data flood” might lead to an overload, ending up in “data graveyard”.

2.2.9 Final Report/Dissemination

In line with the demand of the European Commission to heighten the acceptance of science and technology by fostering a dialogue between scientists and the public (cf. work programme “Science and Society”; European Commission 2003), the dissemination of the results was a crucial factor. By initiating a public debate on the topic of ethical dilemmas due to prenatal testing, the EDIG study consortium tried to meet one of the evaluation criteria of the work programme, namely the readiness to engage with actors beyond the research community and with the public as a whole (Council Regulations on the Rules for Participation, article 10; Europäisches Parlament und Rat der Europäischen Union 2002). However, the interdisciplinary and intercultural approach of the study made it difficult to spread

the results within very different scientific communities and diverse institutions, engaged in the field of prenatal testing, such as medical doctors, psychologists, psychoanalysts, ethicists and politicians.

2.2.10 Summary

Accordingly, the delineated research approach had particular consequences for the overall research process, influencing the conceptualization and preparatory work, the performance of the study, the data analysis and the dissemination of the results. The EDIG study had to face challenging tasks. The growing number of relevant publications had to be identified in order to determine relevant research questions. The complex study design (longitudinal study, large study population, methodological triangulation, high number of relevant concepts and variables, different research objectives and methodological approaches) entailed methodological and organisational challenges. Moreover, the knowledge of the various experts engaged in the interdisciplinary and cross-cultural dialogue had to be integrated.

Dealing with such complexities can be challenging. The production of knowledge, as realized in a research project like the EDIG study, calls for supporting tools to help manage these requirements. Nowadays, the quality and success of problem solving processes proves more than ever to be dependent upon the capacity to structure complex knowledge, to communicate and to keep it available for use.

Visualization strategies are seen as a key to the successful handling of information and knowledge. In the last 30 years, within psychology and educational sciences, a group of visualization tools have been developed which proved to be very supportive for knowledge management, namely mapping techniques (Jonassen et al. 1993; Mandl and Fischer 2000; Tergan 2004).

2.3 Mapping Techniques

Mapping tools allow for a structured, spatial-visual representation of knowledge units. Mind maps, originally developed by Tony Buzan (Buzan and Buzan 1999), represent one form of mapping technique. When constructing a mind map, the central theme, represented by a word, picture etc. is placed in the middle. The main topics of the subject radiate from the centre like branches, which are labelled using primary ideas. Topics of subordinate meaning are portrayed as branches, connected to higher order limbs. These are labelled with secondary or tertiary ideas, building a structure of connected nodal points (Haller 2002). The underlying assumption is that the accomplishment of cognitively challenging situations can be alleviated by making those cognitions that form the knowledge basis explicit through visualization techniques (Tergan 2004; Hillen et al. 2000; Hardy and Stadelhofer 2006; Hillen et al. 2000; Tergan 2004). A similar yet more complex mapping technique

was developed by Joseph D. Novak (Novak and Gowin 1984), called concept maps. Concept maps include concepts, usually represented within circles or boxes, and relationships between concepts, indicated by connecting lines between concepts. In contrast to mind maps, these lines are explicitly labelled, specifying the relationship between the two concepts.

Mapping techniques are useful tools to promote reflection by the user. They help to structure complex informational settings and to relate information units, where necessary (Thüring et al. 1995). Choosing a spatial-visual approach enables the user to take advantage of his/her abilities of spatial orientation and creation of cognitive maps in order to orient in “knowledge space”. The analogue modelling of structure helps to capture the overall structure immediately and thereby acquire a first framework, which serves to orient oneself in the presented contents. This kind of information editing is highly relevant for comprehensive topics, as the processing of complex data requires that many information units and their mutual connections are kept active in working memory. Since our memory capacities are limited, an external representation of information units discharges memory. The newly acquired resources can be used for elaboration and development of further considerations (Haller 2002).

Computer-based mapping techniques have proven to be of particular use when managing knowledge. They allow for a link-up with external knowledge databases such as thesauri, encyclopaedias, databases, internet files or private files. Such link-ups facilitate the individual organization of knowledge and information by setting up personal deposits (Haller 2002; Reinmann-Rothmeier and Mandl 2000; Tergan 2004).

2.3.1 Mapping in the EDIG Study

In the EDIG study different tools, supporting the process of knowledge management, were applied in the different parts of the research process. In the next section the research process, with its associated difficulties, and the instruments used to address these difficulties shall be denoted.

2.3.1.1 Literature Research

As mentioned above, the topic of prenatal testing and associated ethical dilemmas is well researched, resulting in a large number of publications, which easily overload one’s memory capacities. Moreover, the existing expert knowledge had to be connected (cf. Sect. 2.2.1).

To avoid memory overload and to ensure an exchange of expert knowledge, the knowledge had to be externalized and represented in some form. For that, we built up an electronic, online-literature database, comprising bibliographic information on publications relevant to the EDIG study. Moreover, in Frankfurt, a knowledge

management software was applied, called Citavi (www.citavi.com), supporting the user to organize and structure knowledge on one specific topic.

2.3.1.2 Identification of Relevant Research Questions

As described before, the researchers had to keep track of numerous research questions. In order to manage these we took advantage of the benefits of mapping techniques. In doing so, we followed a specific procedure. First, the various research questions were identified and listed, derived from the EU-application for the study and theoretical considerations and taking into account existing empirical studies, such as the “Cambridge-Study” by Statham, Solomou and Green (Statham et al. 2002; Statham et al. 2003) as well as other current publications on the subject of prenatal diagnosis. Moreover, experts in this field were consulted on recent empirical findings and publication activities in this research field. Major topics comprised:

- the description of the sample;
- the way prenatal testing was experienced and processed;
- the investigation of ethical dilemmas in the context of prenatal testing, taking up the interdisciplinary approach of the EDIG study;
- and finally, the aspect of counselling/crisis intervention, reflecting the aim of the EDIG study to contribute to quality standards for counselling in the field of PND.

Each major branch comprised more specific research questions: e.g., when looking at the way, PND was experienced and processed, the questions arose:

- What reasons were given for having PND?
- Which attitude towards PND proved to be characteristic for this population?

All these aspects were then visualized by using the mind mapping technique (cf. Fig. 2.1).

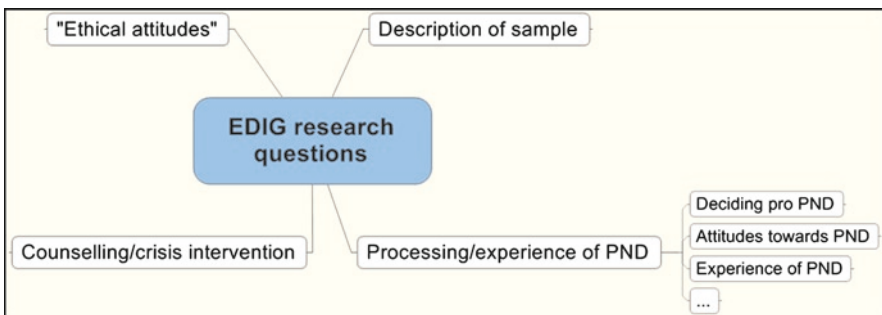


Fig. 2.1 Mind map (excerpt) of relevant research questions in the EDIG project

By explicitly formulating the research questions using a graphical tool for knowledge representation, an active process of reflection was initiated, enabling the user to identify and record the major aims of the study. Given the multitude of research questions that were relevant to the project, the visualizing technique was chosen as an adequate way to handle this complex information. Again, the formulation of research questions requires expertise in a scientific field in order to identify research demands. By representing information in the form of a mind map, the user’s cognitive processes were made explicit and therefore accessible to other experts in the field. By sharing the user’s knowledge structure with other experts, possible mistakes or missing research questions could be detected more easily. An example of this is that after constructing the first map, I sent it to Helen Statham, who is an experienced researcher in the field of prenatal testing and asked her to check that no relevant points were forgotten.

2.3.1.3 Defining Type of Investigation

As mentioned before, the EDIG study combined different types of investigation. Managing the complex interplay between bottom-up and top-down processes proved to be a particular challenge. For us, it was very interesting to relate newly derived hypotheses from the heuristic part of the study to other sources of data, e.g. to questionnaires. Therefore, the hypotheses, derived from the psychoanalytic interviews were rephrased as research questions and included in the map, marked as post-hoc-analyses. In this context, the mapping technique ought to support the researcher in organizing and monitoring the interplay of bottom-up and top-down-processes and thereby ensure transparency.

We also had to keep track of correlations, group differences etc. All these aspects were integrated into the map, formulating research questions that address, for example, group differences or time courses. The map suggested how to proceed with data analysis, for example, to first explore the data set, then look at group differences and then investigate correlations. Again, the mind map served the purpose to support the researcher and to structure a systematic approach to analysing the data (cf. Fig. 2.2).

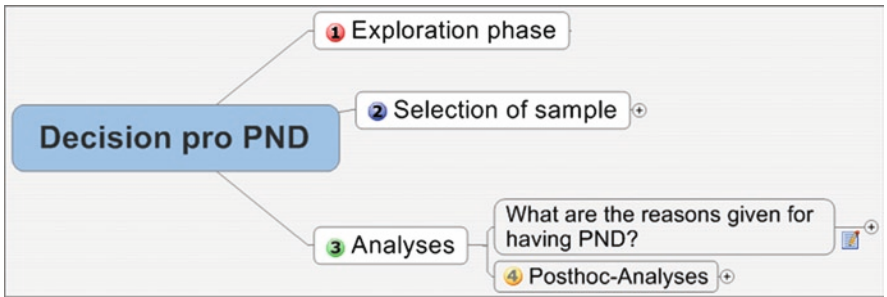


Fig. 2.2 Structure of mind map (excerpt) in the EDIG project

When talking about different types of investigation, one must not forget that the EDIG study not only looked at group statistics but also single cases. This brings up the question of how to combine these different approaches to ethical dilemmas – leading to the next point, the operationalization of concepts and data analysis.

2.3.1.4 Definition of Concepts, Variables and Operationalization

After having listed the research questions, the researcher has to be aware of the relevant variables and the specification of how these will be measured, i.e. operationalizing the variables and concepts. As described before, the research questions were assessed by a broad spectrum of variables and operational definitions, e.g. the attitude towards PND was investigated by using a self-constructed rating-scale, as well as open questions and interviews. This aspect alludes to the topic of data triangulation, which deals with the question of how to combine different sources of data, gained from different methodological approaches, namely quantitative and qualitative approaches. Authors with a constructionist background depict the utility of triangulation in terms of adding a sense of richness and complexity to an inquiry (Flick 1995; Kelle 2001).

The second step of the mapping procedure therefore included identifying the relevant sources of information and fixing them in the map. The possible operational definitions of each research question were listed using so-called annotations – notes, displayed in a separate window. The synopsis of different operationalizations should enable the researcher to highlight research questions from different perspectives for a more holistic and rich approach. Moreover, it should facilitate the reflection which source of information led to what kind of statement. And finally a more structured and organized approach to data analysis should be supported, which supports the researcher (cf. Fig. 2.3).

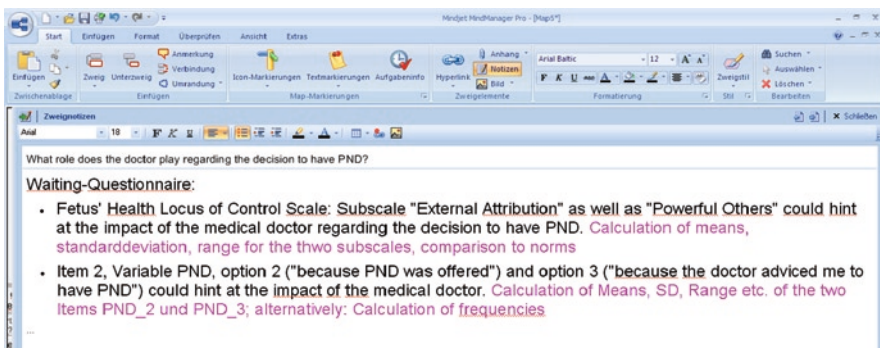


Fig. 2.3 Mind map annotation, listing the relevant operationalizations and statistical analyses with regard to the research question, "What role does the doctor play regarding the decision to have PND?"

2.3.1.5 Specification of Subjects

Having to deal with different subsamples increases the organizational requirements, which affects the performance of the study. Moreover, investigating group differences also increases the complexity of data analysis. The mind map with its organizational structure helped to monitor the different subpopulations and to account for their different analyses by calculation of group differences.

2.3.1.6 Conceptualization of Study Performance and Data Analysis

In a third and last step, suggestions for statistical procedures are included in the annotations, in order to prepare appropriate statistical analyses (e.g. t-tests, analyses of variance, etc.). This is the attempt to make the expert's operational knowledge explicit. Knowledge management should not only refer to explicit analytic knowledge on concepts but also to skills ("Können"), including heuristic strategies (Gruber et al. 2004). The mapping procedure, in this context, allows for the discussion of the user's operational knowledge, making it shareable and adding a group corrective. Moreover, it allows other, less experienced members of the research team to follow and reproduce the assigned steps. Finally, mapping programs like Mindjet allow for the organization of external knowledge resources, e.g. by setting links to Internet documents on complex statistical procedures or files stored on the personal computer, comprising files such as SPSS syntaxes.

2.3.1.7 The Performance of the Study

Of course, much effort is needed to organize, coordinate and perform such a study. Graphical tools may support the conduction of the study, e.g. flowcharts, which can be applied to coordinate the researcher's activity. A flowchart usually represents an algorithm or process, where the successive steps are depicted as boxes and their order by connecting arrows. They are usually applied to analyze, design, document or manage a process or program. By using such a graphical tool, the study's procedure can be made explicit and transparent to the research team, facilitating coordination of the activities of team members. This chart was applied in another study context and proved to be helpful in organizing the researchers' activities.

2.3.1.8 Data Analysis

Due to limited personnel and time it is not always possible to explore each research question simultaneously. The mind map may help the researcher to set priorities and coordinate the analysis of data. Even if limited capacity does not allow the analysis of all aspects at the same time, analyses may be continued at any point

when all relevant research questions, associated operationalizations and possible statistical analyses are listed. Moreover, the evolution of new research questions and the performance of post-hoc statistical analyses are carefully documented for intersubjective transparency.

2.3.1.9 Final Report/Dissemination

The dissemination of the EDIG study results proved to be particularly challenging, because very different disciplines, organizations, sections, institutions and persons are engaged in the field of prenatal testing – including medical doctors, ethicists, psychoanalysts, politicians, and support groups among others. Again, a graphical tool was applied to visualize the network between the existing institutions.

2.4 Summary

Graphical tools such as mind maps, flowcharts or concept maps may provide a useful instrument for researchers to meet the complexities and endeavours of current research projects. Such mapping techniques not only support the user in identifying and retrieving knowledge, they may also be used as an externalized memory. In constructing a map, the researcher is forced to reflect systematically on his/her knowledge, to elaborate on it and thereby identify possible knowledge gaps. By making the user's cognitions explicit, knowledge is more easily accessible to the researcher as well as his/her team members, thus enhancing communication processes as well as intersubjective transparency. Of course, such techniques only serve their purpose if the researcher defining the map is trained properly and the whole research team is committed to the underlying concept. However, – as I have tried to delineate in this article – if they are introduced carefully with regard to the needs and demands of the respective research objectives, they may constitute a major benefit for the whole research endeavour.

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