

A 15-step model for writing a research proposal

The word research is used in everyday speech to cover a broad spectrum of meaning. This makes it a confusing term for those who are new to the concept. On the whole, research is a systematic process which produces data to answer a specified question. Several methods may be followed, all of which have distinct characteristics. The choice of methodology selected by the researcher is dependent upon the style of the research question, with appropriateness of choice described as a 'horse for a course'. In other words, the researcher asks a question and selects an appropriate research methodology to answer it. Examples of research methodologies that may be selected include; randomized controlled trial (RCT) (Jadad and Enkin, 2007), grounded theory (Charmaz, 2006), phenomenology (Moustakas, 1994), ethnography (LeCompte and Schensul, 1999) or Survey (Alreck and Settle, 1995). All of these methods follow a generic framework of sequentially prescribed steps, which have customary language of understanding for researchers.

Before an attempt is made to start a research study, a proposal should be compiled. Constructing the proposal is the most challenging part in process. It is, nevertheless, the most critical part and should be given careful consideration since it provides logic and structure to the envisaged study. A research proposal follows a set of sequential steps that provide structure to the prospective study. It is a written submission which spells out the design of the intended research project. An example of a generic template for writing a research proposal is presented in *Table 1*.

The 15-step model to writing a research proposal

Step 1: give the research proposal a title

The title should accurately reflect the content and scope of the proposed study. It is important to present a consistent title throughout all of the regulatory documents; this includes the proposal itself, the ethics and grant application and all associated appendices, forms,

Abstract

On occasion midwives may be required to construct a research proposal. In the current climate of evidence-based practice. Such activity is considered an elemental skill for career progression in both education and service. Examples of where writing a research proposal may be required include: writing an assessment for under and post graduate research modules or designing a dissertation, MPhil, Prof Doc or PhD. Within clinical practice there are also audit and evaluation of practice responsibilities. With these factors at the forefront, this article provides a template specifically designed to direct midwives through the procedures of constructing a research proposal. The purpose of a research proposal is to produce a template of common understanding from which tasks are allocated, divided and discussed by researchers, clinical staff and in some cases participants. The finished product is then used to communicate intent to the ethics committees and grant funding bodies before authorization and money are awarded.

questionnaires etc. An example of a project title is provided to facilitate understanding of the first step in developing a research proposal: Physical activity in the first stage of labour and its effects upon specified maternal and neonatal outcomes: an observational analytical experimental study of childbearing women

Step 2: provide relevant personal and professional details

On the first page of the research proposal, it is imperative to state the names and titles of the principal researcher(s), supervisor(s), their professional qualifications, the intended study site(s) and contact information. In addition, the principle researcher should appendix a curriculum vitae which cites their publishing record.

Step 3: Provide a short abstract or summary of around 300 words

The purpose of the abstract is to present a clear summary of the intended project. It is normal to write this concise synopsis at the end of the proposal development, once the project has been methodically assembled and written. Since the writer is limited to 300 words, they must be brief in abridging the relevant sections.

A good abstract should present (*Box 1*):

- A brief background to the proposed study

Caroline J Hollins Martin is Senior Lecturer, Division of Community, Women and Children's Health, School of Health, Glasgow Caledonian University, UK

Valerie Fleming is Professor, Division of Community, Women and Children's Health, School of Health, Glasgow Caledonian University, UK

Table 1. 15-step model to writing a research proposal

Step 1	Give the research proposal a title.
Step 2	Provide relevant personal and professional details.
Step 3	Provide a short abstract or summary of around 300 words.
Step 4	Supply five keywords to describe the research proposal.
Step 5	Construct an introduction that contains a rationale and relevant literature review.
Step 6	State the aim, research question, sub-questions and hypotheses/null hypotheses of the proposed research study.
Step 7	Outline the research method.
Step 8	Select setting, participants, sampling method, inclusion/exclusion criteria and method of recruitment.
Step 9	Describe data collection instruments.
Step 10	Detail intended data processing and analysis.
Step 11	Declare any ethical considerations and outline data protection procedures.
Step 12	Produce a timetable and consider potential problems that may occur.
Step 13	Estimate resources that may be required.
Step 14	Append relevant additional material.
Step 15	Append key references

- The aim of the proposed study
- The research methodology (recipe) that will be used
- The study design i.e. declare measuring tools, variables (if quantitative)
- Describe data to be collected
- The setting of the research i.e. where the research will be conducted.
- Who the intended participants are i.e. population, sampling method, groups and numbers.
- Proposed data processing and analysis i.e. proposed descriptive and inferential statistics if numeric quantitative data are to be collected
- Thematic analysis and coding processes if qualitative data are to be collected
- Summarize the potential use of outcomes for developing professional practice.

Step 4: supply six keywords to describe the research proposal

Keywords are intended to facilitate the reader who wants to search databases and electronic journals for pertinent research studies cited in the literature review. Examples might be:

- Physical
- Activity
- Labour
- Childbearing
- Midwives.

Step 5: construct an introduction that contains a rationale and relevant literature review

Give the background and justification for the research study. This rationale provides information to the reader that will promote their understanding of the purpose of undertaking the study. This justification communicates the link between the research question and its relationship to advancing the literature and improving professional practice.

Present a literature review that summarizes and critically appraises previous research in the field, draws attention to gaps in current knowledge and cites key references. Relevant research papers are accessed from appropriate databases and electronic journals. These are analysed and the findings summarized and discussed in relation to the aim of the proposed research study. Where appropriate the research methodology used in previous studies should be reviewed, making comment on relative strengths and weaknesses.

Step 6: state the aim, research question, sub-questions and hypotheses/null hypotheses of the proposed research study

Research forms a circle; that is, it starts with a problem and ends with a solution to the problem. The researcher should think about what stimulated them to research the problem. Are there questions about the stated problem

to which answers have not been found? The research aim and questions should be stated in a way that leads to analytical thinking and potential concluding solutions to the stated problem.

Stating the aim, research questions, hypotheses and null hypotheses makes explicit the purpose of the proposed research study. That is, what the researcher hopes to achieve (hypotheses are only relevant in quantitative studies).

The introduction should provide some background that stands in support of the aim. The aim, research questions and hypotheses should be grammatically correct and avoid meaningless words. Demarcating the research study into manageable parts by dividing the main problem into sub-problems is of utmost importance. The following serves as an example.

The aim

A clear statement of the aim of the research study is crucial. This statement cannot be vague and should sum up the goal of the research study. In summary, it encapsulates what precisely the researcher intends to do. For example, 'the aim of this study is to measure the effects of activity in the first stage of labour upon specified maternal and neonatal outcomes'.

The research question

The research study is underpinned by a question, such as 'what is the cause of that?' 'What does it mean?' The research question is the first methodological step the investigator takes when designing the project. It precedes selection of an appropriate research methodology to answer the question. The question must be clearly articulated, since it underpins the entire project. An example might be, 'what are the effects of activity in the first stage of labour upon maternal and neonatal outcomes?'

The sub-questions

The research question may be divided into further manageable sub-questions. A simple primary question may require answering before the overarching principal research question can be attended to. Examples might be to assess the effects of physical activity during labour upon:

- Length of first stage
- Perinatal outcomes
- Pain experience
- Maternal birth satisfaction

Hypotheses/null hypotheses

If a quantitative numerical approach has been adopted, the attendant sub-questions are

further encapsulated in objective hypotheses. A hypothesis is a logical statement which the statistical results of the study either support or reject. Each hypothesis provides information that is pertinent to answering the sub-questions and, ultimately, the overarching research question (Box 2).

A hypothesis is stated in an explanatory form, because it indicates the expected reference of the difference between two variables. The research hypothesis may be stated in a directional or non-directional form. A directional hypothesis statement indicates the expected direction of results, while a non-directional one indicates no difference or no relationship. A hypothesis should be:

- Testable

Box 1. Example abstract

Background: a Cochrane collaboration review of 21 studies [Lawrence et al, 2009] concluded that the first stage of labour was around an hour shorter for women who labour upright instead of semi-recumbent. None of the 21 studies used physical activity monitors to record maternal activity or measured birth satisfaction and outcomes for babies.

Aim: to measure the effects of activity in the first stage of labour upon specified maternal and neonatal outcomes.

Method: an observational analytical experimental research methodology will be used.

Design: on beginning labour, an activity monitor (ActivPAL) will be taped to the consenting woman's right thigh. Quantitative scales will be used to measure:

- Length of first stage (partogram)
- Perinatal condition (Apgar scores)
- Pain (Wong-Baker scale)
- Maternal birth satisfaction (Birth Satisfaction Scale (Hollins Martin (in press))

Setting: maternity unit (specify).

Participants: a convenience sample of healthy childbearing women: primigravidas ($n=40$) and multiparous ($n=40$).

Data processing and analysis: participants will be assorted into one of four groups according to ActivPAL results: no activity (control); mild activity; moderate activity; and high activity. Means and standard deviations will be presented in tables and graphs. ANOVAs will produce *P* values for mean differences between groups.

Triangulation component: a phenomenological study will be conducted 6 weeks postpartum to explore women's experiences of being active in labour and their reports of birth satisfaction and pain ($n=10$). This qualitative component that will consist of women's opinions will enrich quantitative findings. Interviews scripts will be analysed using inductive thematic analysis.

Use of outcomes: results should facilitate midwives with providing evidence-based information to childbearing women about the advantages/disadvantages of being active during first stage of labour while birth planning.

Box 2. Hypotheses and null hypotheses

Hypothesis 1

Maternal activity shortens length of first stage of labour.

Null hypothesis 1

Maternal activity makes no difference to length of first stage of labour.

Hypothesis 2

Maternal activity in first stage of labour raises perinatal Apgar scores.

Null hypothesis 2

Maternal activity in first stage of labour makes no difference to perinatal Apgar scores.

Hypothesis 3

Maternal activity in first stage of labour reduces women's reports of pain experience.

Null hypothesis 3

Maternal activity in first stage of labour makes no difference to women's reports of pain experience.

Hypothesis 4

Maternal activity in first stage of labour improves women's reports of birth satisfaction.

Null hypothesis 4

Maternal activity in first stage of labour makes no difference to women's reports of birth satisfaction.

Box 3. Example research method and design

An experimental method will be used to answer the proposed research question. On beginning labour an activity monitor (ActivPAL) will be taped to the consenting woman's right thigh. The ActivPAL is intended to measure physical activity undertaken during first stage of labour. Post data collection, participants will be allocated to an appropriate group based on level of activity achieved during first stage of labour. The design will involve allocation of participants to one of four groups.

The information from the ActivPAL will be downloaded onto a computer and a graph of physical activity produced in terms of upright, walking, sitting etc. Scores are attached to no, mild, moderate and extensive activity undertaken during first stage of labour.

Groups:

- No physical activity during first stage of labour (control)
- Mild activity during first stage of labour
- Moderate activity during first stage of labour
- High activity during first stage of labour.

Quantitative scales will be used to measure:

- Length of first stage
- Perinatal Apgar scores
- Pain experience
- Birth satisfaction.

A quantitative method has been selected since numeric scores attached to the measuring tools will allow for statistical analysis. The results will provide absolute answers about the relationship of maternal physical activity during first stage of labour and the assessed maternal and neonatal outcomes. Significant /insignificant differences between groups will provide concrete 'yes' or 'no' answers to support or reject the hypotheses and answer the research question(s).

- A tentative answer to the stated problem
- Specific, logical and simplistic (not vague)
- Supported or rejected post statistical analysis.

Step 7: outline the research methodology

The research methodology provides practical details of the sequential processes involved in answering the research question. A well designed research proposal should be written in such a way that an unfamiliar person could pick up the proposal and repeat the study. Each research methodology (recipe) follows a recognizable template e.g. RCT, grounded theory, phenomenology, ethnography or survey, to name a few. The selected research methodology is declared and clearly outlined in the next step of writing the proposal (Box 3).

Selecting an appropriate research methodology

Research follows a carefully planned formula. That is, it follows a specific methodology and there are several methodologies to select from. The methodology chosen should be a suitable formula to answer the research question. The researcher outlines the steps of the selected research methodology. It is not enough to follow the research procedures without an intimate understanding that the research methodology directs the whole endeavour. The research methodology controls the study, dictates the acquisition of data and arranges it in logical relationships. The entire process is a unified effort, as well as an appreciation of its component parts.

There is a vast array of research methodologies to select from, with each following a universally prescribed process. An important factor to grasp is that the research methodology of choice is selected from one of two camps: it is either quantitative (deductive) or qualitative (inductive).

Quantitative research

In quantitative research the information collected takes the form of measurements or numbers that can be analysed statistically to determine whether or not a treatment has made a real difference. This type of research requires standardized procedures, specific methods and statistical analysis and so maximizes objectivity.

A deductive approach is taken by quantitative researchers. Deductive reasoning works from the more general to the more specific. This is sometimes informally called a top-down approach. The researcher begins by thinking up a theory about a topic of interest. This is again

narrowed down into more specific hypotheses that can be tested. This is narrowed down even further with observations collected to address the hypotheses. Ultimately, this process equips the researcher to test the hypotheses using specific data that provides confirmation (or not) of the original theory.

Characteristics of quantitative research:

- Experimental
- Manipulative
- Controlled
- Hypotheses are stated
- Empirically based
- Data collection precedes analysis.

Qualitative research

This type of research aims to understand the processes which lie behind patterns of behaviour, people's emotions or their responses to certain situations. It uses different ways of collecting data, for example, words and phrases people use in interviews are analysed non-mathematically.

Quantitative research takes an inductive approach. Inductive reasoning works the other way round from the quantitative approach, moving from specific observations to broader generalizations and theories. This is sometimes informally called the bottom-up approach, with the researcher attempting to detect patterns and regularities in the data that can be explored and end in the development of conclusions and/or theories.

Inductive reasoning, by its very nature, is more open-ended and exploratory. In comparison, deductive reasoning is more narrow in nature and is concerned with testing or confirming hypotheses.

Characteristics of qualitative research:

- Interpretive
- Reflective
- Inductive
- Data collection and analysis are often concurrent.

Examples of qualitative research methodologies include grounded theory, ethnography, phenomenology, discourse analysis.

At this point it is time to decide which research methodology to use. It may be helpful to retrieve a published research paper that has used the particular methodology of choice. From this paper, the generic pathway may be identified. Examples of research methods can be read about in the following books: Bowling, 2002; Cluett and Bluff, 2002; Cresswell, 2002; Davies, 2007; Polgar and Thomas, 2008; Silverman, 2005.

Box 4. Example measuring tools

- Length of first stage will be recorded on a partogram in numerical values of time (measured in minutes) and cervical dilatation (measured in centimetres 1–10)
- Neonatal condition immediately post birth will be measured using Apgar scores (0–10) at 5 minutes immediately post birth
- Pain will be measured using the Wong-Baker pain scale (scores 1–5)
- Birth satisfaction will be measured using the birth satisfaction scale

Example question:

Childbearing women respond on a 5-point scale based on level of agreement with the statement placed. Half of the items are reverse scored and the possible range of scores is 30–150, where a score of 30 represents least satisfied and 150 most. An example is provided:

(Q) The delivery room staff encouraged me to make decisions about how I wanted my labour to progress.

	Strongly agree	Agree or disagree	Neither agree nor disagree	Disagree	Strongly Disagree
Scores	5	4	3	2	1

Box 5. Example of proposed data processing and analysis

Data will be entered into a software package (SPSS) and appropriate statistical analysis carried out.

Descriptive statistics

Means and standard deviations will be calculated from numerical scores collected using the 4 data collection instruments:

- 1) Length of first stage on partogram in minutes
- 2) Apgar scores at 5 minutes postpartum
- 3) Pain scale scores
- 4) Birth satisfaction scale scores.

Participants will be assorted into one of four groups according to ActivPAL results quantified in mean group numeric scores:

- a) No activity (control)
- b) Mild activity
- c) Moderate activity
- d) High activity.

The data collected will be submitted to a significance test to assess the viability of each null hypothesis, with the *p*-value produced used to reject or accept. Tables and graphs of results will be produced.

Inferential statistics

- 1) Length of first stage on partogram: 2 (groups 1 & 2) x 4 (a, b, c, d) ANOVA will produce *p* values between groups
- 2) Apgar allocation at 5 minutes: 2 (groups 1 & 2) x 4 (a, b, c, d) ANOVA will produce *p* values between groups
- 3) Pain scale: 2 (groups 1 & 2) x 4 (a, b, c, d) ANOVA will produce *p* values between groups
- 4) Birth satisfaction scale: 2 (groups 1 & 2) x 4 (a, b, c, d) ANOVA will produce *p* values between groups.

Reliability and validity of birth satisfaction scale will be analysed using:

- Correlation coefficients
- Cronbach alpha
- Factor analysis.

Box 6. Example triangulation component

A qualitative study will be conducted simultaneously to explore women's experiences of being active in labour and their reports of birth satisfaction and pain. Data will be collected 6 weeks post delivery. A phenomenological method is appropriate since the 'lived in' experiences of labour as reported by the childbearing women are being explored. The qualitative component, consisting of women's opinions discussed during interview will enrich the quantitative findings. The questions asked in a semi-structured interview will include:

- What was it like being physically active during labour?
- What sort of physical activities did you undertake during the first stage of labour?
- How do you believe activity/inactivity altered your pain experience during labour?
- What impact did activity/inactivity have upon how satisfied you are with your birth experience?

The intention is to interview randomly selected consenting participants ($n=10$). The interviews will be carried out in a clinic side room at the maternity unit after the 6 week postnatal check. Interviews will be transcribed verbatim and imported into a QSR Nud*ist software program. The scripts will be analysed using inductive thematic analysis. Coding will be derived from the comments using an iterative process.

Table 2. Project timetable

Time period	Project tasks
July-Nov 2011	Develop research proposal
Dec-March 2011	Seek ethical approval and cooperation from maternity unit managers and staff.
April – ongoing 2012	Begin recruiting participants
June – ongoing 2013	Staggered data collection
June – Aug 2013	Data analysis
Sept – Dec 2013	Final report
Jan – Dec 2014	Write research papers
2015	Grade and enter papers for Research Excellence Framework

Step 8: select setting, participants, sampling method, inclusion/exclusion criteria and method of recruitment

Consider the setting, participants and numbers to be included. Alternatively, details of the data to be collected if no participants are being included. Choice of population, sampling method and inclusion/exclusion criteria should be considered (e.g. age, absence of disease, native English speaker etc). Method of recruitment should be declared and justified. In quantitative studies, data collected is submitted to a significance test to assess the viability of the null hypothesis, with the p -value produced

used to reject the null hypothesis. A power analysis conducted during the planning stage will estimate the number of participants necessary to yield an acceptable significant difference between groups. Generally, the larger the effect size wanted, the larger the sample size should be. The goal of a power analysis is to find an appropriate balance by taking into account the substantive goals of the study and the resources available to the researcher.

Step 9: describe data collection instruments

Provide details of the data collection instruments intended for use in the study, e.g. medical records review, questionnaire, interviews, observation, or apparatus being employed. Describe how they will be used and the items of data that will be collected, e.g. demographic data, medical conditions etc. Justification for choices should be provided. If existing validated data collection instruments are being used, these should be referenced as such. If new measuring tools are being specifically developed for the intended research study, information should be provided on how validity and reliability will be established. The design and methods should be described in sufficient detail to allow external people to cost the workload and estimate an achievable timetable.

Step 10: detail intended data processing and analysis

The next step is to consider the intended data processing and analysis. Specifically, what descriptive and inferential statistics are going to be produced? What comparisons might be made, if any, with the data, e.g. by age, sex, socio-economic status etc? The projected analyses should relate to the aim and the research questions cited. For qualitative research, describe the processes involved in analysis of the interview transcripts.

Once data has been collected, it will be organized into meaningful patterns that can be interpreted. The significance of findings depends on the way the human brain extracts meaning. No rules or formula lead the researcher to correct interpretation. Analysis is subjective and depends entirely on the logical mind, inductive reasoning skills and objectivity of the researcher. For advice on appropriate statistical analysis, it may be helpful to seek the advice of a statistician (Box 5).

Not all quantitative studies are subjected to significance testing. In descriptive studies, the aim is to summarize the data set quantitatively without employing probabilistic formulation,

for example, to produce measures of central tendency, dispersion or association.

Triangulation

Triangulation is the application and combination of several research methods in the same study. By combining multiple observers, theories, methods and/or empirical materials, researchers can hope to overcome the weakness or intrinsic biases and problems that arise from using one single research method. Triangulation combines research strategies for the purpose of achieving a multidimensional view of the phenomenon of interest.

Content analysis may be qualitative or quantitative in nature. First, in most basic terms, qualitative content analysis induces elements of text into labelled categories. In addition to this, during quantitative content analysis, the researcher further proceeds to allocate numeric codes to these labelled bundles of meaning (Box 6).

Step 11: declare any ethical considerations and outline data protection procedures

Detail any ethical considerations and how these will be dealt with. Provide practical particulars of the measures taken to ensure confidentiality for participants and in relation to the data collected. All research studies require approval from the appropriate ethics committees. Highlight these in the research proposal and complete the associated committee's application forms.

It is requisite to declare any conflicts of interest. For example, a researcher affiliated to a company closely related to the proposed area of research may stand to profit from steering the study in a specific direction. The general principle to consider is whether or not the circumstances could reasonably be perceived to affect the judgment or decision-making processes of the researcher during process. In attempts to remove potential conflicts of interest, transparency in procedures is required. This involves the researcher declaring any conflicts of interest in the research proposal for scrutiny by the relevant ethics committees. The researcher should report the offer and take advice over whether or not to accept the funding, gift or hospitality.

Step 12: produce a timetable and consider potential problems

Provide a summary of the planned programme of work, using a bar, Gantt chart or table which highlights significant phases of the project (Table 2). A Gantt chart is a type of bar chart that illustrates the

Table 3. Estimated project costs

Resources required	£
ActivPAL purchase x 6	800
Software	200
Travel	300
Research assistant	18 000
Transcribing	1000
Consumables	500
Stationery	500
Extras	500
Total cost	21 800

schedule for the research proposed. Gantt charts illustrate the beginning and completion dates of the procedures involved in the proposed research study. For example, timescales for expected ethics approval, literature review completion, recruit-



The methodology chosen should be a suitable formula to answer the research question

When determining the projected length of the study, it is important to incorporate interview and employment plans and the total time required to train relevant people.

ment of participants, completion of data collection, write up of study etc. Outline any potential organizational, practical or methodological problems that might occur and how you intend to surmount these. When determining the projected length of the study, it is important to incorporate interview and employment plans and the total time required to train relevant people. If new staff members are to be employed and trained, the procedures involved may add an additional 4 months to the project timetable.

Step 13: estimate resources that may be required

Provide a summary of the estimated costs and requirements for the project pending, for example, time, travel, consumables such as stationery, postage and equipment (Table 3).

Step 14: append relevant additional material

Appendix questionnaires, interview schedules, diagrams of equipment and any relevant information that will aid understanding of the intended project, such as the Wong-Baker pain scale, the birth satisfaction scale and interview schedule. Remember to reference these in text.

Key points

- All research methodologies follow a generic framework of sequentially prescribed steps, which have customary language of understanding for researchers.
- A research proposal is a written submission which spells out the design of an intended project.
- This 15-step model to writing a research proposal is a generic template designed to facilitate design and writing of a research proposal.

Step 15: append key references

The university/trust recommended referencing format should be used throughout.

Post data analysis, a discussion, conclusions and implications for practice are written in light of the study findings. Suggestions for future research may also be projected. Well-designed research proposals include a method of evaluating the success of the project post implementation, for example, development of an audit tool. Most sponsors request that a process of evaluation and outcome statement be part of the submitted research proposal.

Conclusion

The written template outlines the skeletal framework of the intended research project and is sent to appropriate ethics committee(s) before beginning data collection. If the researcher is seeking funding, the proposal will be scrutinized for value before money is awarded from the specified grant body. The validated research proposal will be the common understanding from which researchers, clinical staff and participants operate. It is the template from which tasks are allocated, divided and discussed.

Remember to be realistic when designing the study. Overly optimistic ideas of what the project can accomplish may detract from the chances of being approved. **BJM**

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