

Complementary research paradigms

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Research methodologies operate broadly within qualitative and/or quantitative paradigms. The simplest distinction between these two is that quantitative research methods involve enumeration, whereas qualitative research methods employ qualitative (non-numerical) judgements in exploration of the phenomena being studied.

Behind this simple distinction lie deep philosophical differences. Quantitative research paradigms are rooted in the positivist belief that there are simple universal truths which can be discovered with objective methods. Criteria such as validity, reliability and generalisability are used to assess the quality of the research. To a large extent quantitative research predominates in the physical world. In contrast, there are a range of qualitative research paradigms (e.g. interpretive, critical, feminist) that are grounded in different philosophical traditions (e.g. idealism, historical realism). In general, these traditions have identified a need to move beyond an objective view of the world so that the complex human world can be examined in context from the subjective perspectives and complex truths of different individuals. These qualitative approaches employ terms such as credibility, trustworthiness and transferability as quality criteria.

Despite their philosophical and methodological differences, research approaches across the paradigms can provide complementary ways of learning, particularly in areas such as health care which are concerned with both the physical and social worlds. In past decades much has been made of 'paradigm wars' which were divisive and unhelpful. In our view both qualitative and quantitative paradigms can generate valuable knowledge and there are many cases where the different approaches can be conducted in conjunction and harmony. In the following paragraphs we briefly outline what we see as being the primary roles and limitations of qualitative and quantitative research methodologies.

The role of quantitative research methods

Sometimes quantitative methods are necessary because the research question demands quantitative answers. Questions such as 'In young adults with primary shoulder dislocation, what is the probability of re-dislocating within one year?' or 'By how much can bone growth stimulators reduce healing time of tibial fractures?' can only be answered satisfactorily with quantitative methods.

More often questions are amenable to investigation with either qualitative or quantitative methods, but quantitative methods may be selected because they offer particular advantages. One strength (but also a weakness) of quantitative methods is that they provide a convenient way of describing complex data sets. For example, several hundred patients' responses to a series of questions about depression might be reduced to a mean depression score. This single number provides a simple and mathematically unambiguous summary of one dimension of the information in the whole data set. Most usefully, quantitative methods provide

convenient ways of describing simple parameters of relationships between variables.

Arguably the most interesting relationships between variables are causal relationships. A particular focus of much quantitative research is to differentiate causal relationships (e.g. rotator cuff weakness increases risk of dislocation, or exercise reduces disability associated with low back pain), from incidental (confounded) relationships. In observational studies, this is achieved by quantitatively 'adjusting for' confounding variables, and in experimental research quantitative methods provide a way of contrasting experimental and control conditions.

One further role of quantitative methods is that, theoretically at least, quantification enables statistical inference about populations based on observations from samples. In fact the process of making inferences about populations is not as solidly grounded in logic as it may first appear, because statistical inference is almost always based on the assumption that samples are drawn randomly from populations. Samples are almost never drawn randomly from the target population, so inferences must then be made about a hypothetical population from which the sample could be considered to have been drawn (Efron and Tibshirani 1993).

Limitations to quantitative research methods

The advantages of quantitative methods (simplification of description, and the ability to infer causation and make inferences about populations) come at a cost. Quantitative analysis necessitates reduction.

First, and perhaps most importantly, quantitative methods place very real limitations to the number of dimensions of the variables measured. The complexity of information that emerges from, for example, a conversation, cannot be represented numerically.

A second level of simplification occurs during analysis. Inferential statistical models implicitly ignore complexity. For example, potentially high levels of interactedness of data are almost always ignored. In the dominant frequentist statistical paradigms, exploration of data comes at the cost of certainty, so the number of hypotheses that can be explored must be constrained. In the words of Jacob Cohen, 'Less [investigation of phenomena] is more [confidence in one's conclusions]' (Cohen and Cohen 1983).

The roles of qualitative research methods

Qualitative research explores the social world. Different qualitative paradigms have different foci. For example the broad goals of the interpretive paradigm are to understand, interpret, seek meaning, describe, illuminate and theorise; the goals of the critical paradigm are to improve, reform, empower, change reality or situations; and the goals of the feminist paradigm are to improve, reform, empower, change realities or situations that involve/affect women and to

explore the uniquely feminine and allow women's voices to be heard. (For further reading see Denzin and Lincoln 2000, Higgs 1998, Holliday 2002.)

Examples of questions which can be addressed well through qualitative research include: 'What is it like to live with chronic back pain? How do parents of children with cerebral palsy experience the public hospital system? What is the place of professional artistry in physiotherapy practice? How can mental health services and support systems be improved (from the perspective of clients and their families)?'

Limitations of qualitative research approaches

In many cases the strengths of different research approaches can also be their limitations. In general, qualitative research focuses on aspects of the human or social world and its context, so it does not commonly seek to generalise the findings to whole populations or other contexts. It is the task of the researcher to describe the methods and findings in sufficient detail that others can assess the transferability of the findings to their context. In the critical paradigm high priority is placed on changing situations and reality; this clearly means that the phenomenon under investigation will change and people's understanding of it will change. Thus the notion of what is real as a fixed entity/situation is unrealistic and undesirable. Qualitative research approaches rarely look for the (one) truth, rather they seek a range of truths according to the people participating in the research. To some this is a limitation; to others it is liberating. From a practical perspective of implementing qualitative research some of the clearer rules (e.g. power calculations) that can guide quantitative research, are absent. Qualitative researchers look for saturation (no new findings) to determine adequacy of depth and scope of exploration. Frequently the search for depth results in the accumulation of masses of data which need careful and often complex analysis processes to achieve credible findings.

Conclusion

A variety of research paradigms and approaches is needed to explore the range and intersection of social and physical phenomena that concern health professionals. Quantitative methods are suitable when the aim is to generate simple descriptions of variables or relationships between variables, or to identify causal relationships, or to make inferences about populations. But deep exploration of social phenomena requires qualitative methods. Readers of physiotherapy research need to learn to understand and evaluate different approaches from within the rules of those paradigms rather than from rules that apply in other paradigms.

References

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