

# APPROACHES TO KNOWLEDGE DEVELOPMENT IN NURSING

Jacqueline Fawcett

Considerable progress in the development of nursing knowledge has been made in the past several years. Yet areas of confusion remain, especially with regard to our understanding of the relationships between conceptual models, theories and empirical indicators. This article starts with an overview of the components of conceptual-theoretical-empirical structures and continues with a description of three approaches to nursing knowledge development. The article concludes with a discussion of the advantages and disadvantages of each approach.

## Conceptual-Theoretical-Empirical Structures

The content of this article is based on three philosophic assumptions about nursing knowledge development. First, that knowledge development encompasses the articulation of conceptual models, the generation of middle-range theories and the testing of these theories. Secondly, that all empirical inquiry, that is, research, is directed toward the development of knowledge. The third assumption is that discernible levels of abstraction exist in the knowledge development enterprise and that these levels are conceptual models, middle-range theories and empirical indicators.

### *Conceptual models*

The three components of conceptual-theoretical-empirical structures are conceptual models, middle-range theories and empirical indicators (Fawcett & Downs, 1986). Conceptual models, which are also called conceptual frameworks, conceptual systems, paradigms and disciplinary matrices, are the most abstract component of a conceptual-theoretical-empirical structure.

The concepts of a conceptual model are highly abstract and general. Thus, they are not directly observed in the real world nor are they limited to any specific individual, group, situation or event. Client system stability is an example of a conceptual model concept (Neuman, 1989). It can refer to various types of systems that encounter all sorts of situations and events.

Jacqueline Fawcett, Ph.D., F.A.A.N. is Professor in the School of Nursing, at the University of Pennsylvania, in Philadelphia.

The propositions that describe or link conceptual model concepts are also very abstract and general. Therefore, they are not amenable to direct empirical observation or test. An example of a conceptual model proposition is: Changes in environmental stimuli are associated with changes in adaptation level (Roy & Andrews, 1991). Here, specific stimuli are not identified nor are dimensions of adaptation specified.

Examples of contemporary nursing knowledge that fit the description of a conceptual model include Dorothy Johnson's (1980) *Behavioral System Model*, Imogene King's (1981) *Interacting Systems Framework*, Myra Levine's (1973) *Conservation Model*, Betty Neuman's (1989) *Systems Model*, Dorothea Orem's (1991) *Self-Care Framework*, Martha Rogers's (1990) *Science of Unitary Human Beings* and Callista Roy's *Adaptation Model* (Roy & Anderson, 1984).

### ***Middle-range theories***

Middle-range theories are the intermediate component of conceptual-theoretical-empirical structures. Middle-range theories are less abstract than conceptual models, but more abstract than empirical indicators.

A middle-range theory addresses phenomena with much greater specificity than does a conceptual model. The specificity of a middle-range theory requires that its concepts be more specific and concrete than those of a conceptual model. The concepts of a middle-range theory, then, are tied more closely to particular individuals, groups, situations or events and are amenable to direct observation. Examples of such concepts are oxygen tension, Type A behaviour, social support and health-related hardiness.

The propositions of a middle-range theory also are more specific than those of a conceptual model and, therefore, can be empirically observed and tested. An example is: Depression is inversely related to family functioning (Mercer & Ferketich, 1990).

### ***Empirical indicators***

Empirical indicators are the most concrete component of conceptual-theoretical-empirical structures. Empirical indicators are the real world representatives of middle-range theory concepts. More specifically, they are the actual instruments, procedures or experimental conditions that are used to observe or measure the concepts of a middle-range theory. Empirical indicators are identified by the operational definitions of the concepts. For example, the *Health-Related Hardiness Scale* (Pollock & Duffy, 1990) is the empirical indicator for the concept of health-related hardiness in the theory of human responses to chronic illness (Pollock, 1986; Pollock & Duffy,

1990). Similarly, the Feetham Family Functioning Survey (Roberts & Feetham, 1982) is the empirical indicator for family functioning in the theory of the effects of antepartum stress (Mercer & Ferketich, 1990).

### ***Conceptual models, theories and empirical indicators***

In summary, a conceptual model, which is a set of abstract and general concepts and the propositions that integrate them into a meaningful configuration (Nye & Berardo, 1981), is the most abstract component of a conceptual-theoretical-empirical structure. A middle-range theory, which is a set of relatively specific and concrete concepts and propositions "that purports to account for or characterize some phenomenon" (Barnum, 1990, p. 1), is the intermediate component in the structure. Finally, an empirical indicator, which is the real-world referent for a concept, is the most concrete component of the structure.

### **Generating and Testing Theories from Explicit Conceptual Models**

With the preceding in mind, three approaches to the development of nursing knowledge will be described. These three approaches focus on the place of conceptual models of nursing in theory development. They are not meant to be exhaustive of all strategies for theory construction. In fact, Meleis (1991) and Walker and Avant (1988) have discussed several other particularly salient approaches.

### ***Explicit conceptual models and middle-range theory development***

The first approach to be discussed is the generation and testing of middle-range theories from explicit conceptual models. The use of an explicit conceptual model means that researchers "make overt the knowledge base [that] will guide each of their research decisions" (Batey, 1986, p. 543).

Each conceptual model is a separate school of thought about nursing that "guides and dictates how we see nursing and how we act in the world" (Meleis, 1991, p.185). Each model provides rules for research, including statements about what phenomena make up the domain of inquiry, as well as epistemic and methodological directives about how the domain is to be investigated, how theories are to be generated and tested, how data are to be collected, how those data are to be analyzed and how results are to be interpreted (Laudan, 1981).

The influence of a conceptual model on research has been addressed by Batey (1986). She pointed out that although two investigators may observe the same real world situation or event, "their notions of why it occurs, their conceptual organization about the problem, [and] the knowledge base they

select for studying that problem, may differ" (p. 543). In other words, each investigator views the world through a particular lens or frame of reference, which is capsulized by a conceptual model.

*Pragmatics of middle-range theory generation from an explicit conceptual model.* When a middle-range theory is generated from an explicit conceptual model, the conceptual model identifies the phenomena to be studied and helps the investigator to focus on particular problems. The methodological rules of the conceptual model facilitate selection of research methods for the discovery of new theories. Thus, theory generation proceeds from the conceptual model directly to the empirical indicators. The data obtained from the empirical indicators are then analyzed, again following the methodological rules of the conceptual model, and a new middle-range theory emerges.

Germain's (1984) study of residents of a shelter for abused women and children is an example of middle-range theory generation using an explicit conceptual model of nursing. The four adaptive modes of the Roy Adaptation Model (physiological, self-concept, role function and interdependence) guided Germain's observations and helped her to focus on problems that are amenable to nursing intervention. The end result of the study was a descriptive middle-range theory of common health situations experienced by shelter residents.

*Pragmatics of middle-range theory testing from an explicit conceptual model.* When middle-range theory-testing is based on an explicit conceptual model, the theory is derived from one or more concepts and propositions of the conceptual model. It then is empirically tested using a research design, subjects, setting, instruments and procedures that are in keeping with the methodological rules of the conceptual model. Thus, theory testing proceeds deductively from the conceptual model to the theory and then to the empirical indicators. The data obtained from the empirical indicators are analyzed, again following the methodological rules of the conceptual model, and the middle-range theory is supported or refuted. The results of theory-testing, in turn, are used to assess the credibility of the conceptual model (Fawcett, 1989a).

An example of theory testing from an explicit conceptual model is Fawcett's (1989b) program of research dealing with similarities in wives' and husbands' pregnancy-related experiences. An extension of Martha Rogers' (1970) Life Process Model was used to derive a theory of similarities in spouses' pregnancy-related experiences. The conceptual model concepts used for theory derivation were open family system, pattern and organization, and mutual and simultaneous interaction. Middle-range theory concepts representing the more abstract conceptual model concepts were pregnant and

postpartal women and their husbands; pregnancy-related experiences, including body image and physical and psychological symptoms; and strength of identification, respectively. The middle-range theory propositions were derived directly from propositions of the conceptual model and stated that wives and husbands have similar pregnancy-related experiences, and that the similarities in spouses' pregnancy-related experiences are positively related to the strength of their identification. Research designed to test the middle-range theory used measures of body image (Topographic Device, Figure Drawing Test, Body Attitude Scale) and of physical and psychological symptoms (Symptoms Checklist, Beck Depression Inventory) as the empirical indicators for pregnancy-related experiences. The *Identification Scale* was the empirical indicator used to measure spouses' strength of identification. Finally, married childbearing couples were the empirical indicators for pregnant and postpartal women and their husbands. A total of five studies tested the middle-range theory propositions. Taken together, the findings from the five studies provided minimal support for the theory and, therefore, raised serious questions about the credibility of the conceptual model.

### **Implicit Conceptual Models and Middle-range Theory Development**

The second approach to nursing knowledge development is middle-range theory generation and testing from implicit conceptual models. In this approach, the conceptual model upon which middle-range theory generation or testing was based is not identified. The conceptual model is implicit.

The use of the term implicit indicates that a conceptual model has been used for theory generation and testing, but that it has not been identified. Some conceptual model has, however, guided the middle-range theory development effort. Indeed, the label, theory development from an implicit conceptual model, reflects the philosophic premise that it is impossible to exist in this world without some guiding perspective. In fact, philosophers have pointed out that it is impossible to exist in the world at large without a frame of reference (Toulmin, cited in Cull-Wilby & Pepin, 1987). How, for example, could we look into the sky and understand the relationship of other planets and the stars to our own planet without a frame of reference? Researchers, too, have noted that theory development never proceeds without a guiding frame of reference, that is, a conceptual model. The concepts and propositions of a theory are, therefore, formulated within the context of some perspective (Babbie, 1989). As Johnson (1987) explained, "It is important to note that some kind of implicit framework is used by every . . . nurse, for we cannot observe, see or describe, nor can we prescribe anything for which we do not already have some kind of mental image or concept" (p. 195). Nurses may use their very own implicit, private images of nursing or they may use an explicit, fully articulated perspective, but each of us does use some conceptual model as a guide for our theory development efforts.

*Implicit conceptual models and middle-range theory generation.* When the conceptual model is implicit, theory generation proceeds directly from analysis of data obtained by the empirical indicators to the statement of the middle-range theory. The conceptual model is not identified.

An example of middle-range theory generation from an implicit conceptual model is Mishel and Murdaugh's (1987) study of family members' responses to heart transplantation. They used participant observation in support groups to obtain data from which they generated a middle-range theory called redesigning the dream. The theory is made up of three concepts, the dimensions of each concept and the definitional propositions for the concepts and their dimensions. The concepts are immersion, passage and negotiation. The three dimensions of immersion are freeing self, symbiosis and trading places. The three dimensions of passage are catharsis, vacillation and awareness. Finally, the four dimensions of negotiation are recognizing the risks versus second chance, back to normal versus recognizing the risk, smelling the roses versus life as it used to be, and life together versus time for self. No mention was ever made of an underlying conceptual model in Mishel and Murdaugh's research report.

*Implicit conceptual models and middle-range theory testing.* Similarly, when the conceptual model is implicit, middle-range theory-testing proceeds directly from the statement of the middle-range theory to selection and use of empirical indicators. Again, the conceptual model is not identified.

An example of middle-range theory-testing with an implicit conceptual model is the Metzger and Therrien (1990) report of their test of the theory of the effect of position on cardiovascular response during the Valsalva maneuver, which did not include a description of any conceptual model. The theory was made up of the concepts of body position; cardiovascular responses, including heart rate and systolic blood pressure; and Valsalva strain. The theory proposed that changes in body position are associated with changes in heart rate and systolic blood pressure during Valsalva strain. The empirical indicators for body position were lateral recumbent or sidelying, supine or flat, head elevated and up-in-chair. Cardiovascular responses were measured by cardiac monitor readings of heart beats per minute and sphygmomanometer values for systolic blood pressure. The empirical indicator for the Valsalva maneuver was intraoral strain pressure of 40 mm Hg, maintained for ten seconds, obtained by asking subjects to blow into a mouth-piece connected to a pressure-gauge manometer. The study findings provided conflicting evidence with regard to the validity of the theory, inasmuch as systolic blood pressure varied with body position (the most intense changes in systolic blood pressure occurred in the head elevated and chair positions), but heart rate was not affected by position.

## Inducing Conceptual Models from Middle-range Theories

The third approach to nursing knowledge development is induction of conceptual models from middle-range theories. This approach starts with an existing middle-range theory and proceeds to the induction of a parent conceptual model. In this case, the middle-range theory may or may not have been tested empirically at the time of model induction.

The North American Nursing Diagnosis Association (NANDA) taxonomy of nursing diagnoses is an example of a middle-range descriptive theory in search of its parent conceptual model. This theory identifies and describes problems experienced by health care consumers that are of particular interest to nursing. The conceptual model that guided this theory development effort has not yet been identified. To their credit, the NANDA members recognized the need for an umbrella conceptual model and charged a group of nurse theorists with inducing a conceptual model from the middle-range theory of nursing diagnoses (Kim & Moritz, 1982). Unfortunately, the resultant conceptual model of unitary man is *not* logically congruent with the theory of nursing diagnoses (Fawcett, 1986). What is needed, then, is a concerted effort to induce a logically congruent conceptual model from the middle-range theory of nursing diagnosis. The conceptual model could be induced from data obtained by surveying the NANDA membership, who may be considered experts in nursing diagnosis. The survey should be designed to determine these experts' views of the phenomena of interest to nursing, including the recipient of nursing care, the environment and health, as well as the social mission of nursing. The result would be a public articulation of the private images of nursing held by the nursing diagnosis experts. These images could then be examined to determine areas of agreement and disagreement. It is likely that differences in opinions about what phenomena should be included in the theory of nursing diagnoses could be traced to different perspectives of the phenomena of interest to nursing. Once the various perspectives, that is, the various conceptual models, of the experts are identified, the choices are to reach a consensus on a common conceptual model or to go separate ways. Regardless of the choice, the next step would be to examine the current nursing diagnoses and to determine which ones are logically connected with a given conceptual model and which ones do not fit with the model. Those that do not fit would have to be discarded or reformulated so that a logical connection is evident.

The strategy suggested for induction of a conceptual model from the theory of nursing diagnosis can be readily adapted to other situations. Thus, the investigators who are working with a particular theory could be interviewed to determine their perspectives, and a common conceptual model could be induced from their responses.

## **Advantages and Disadvantages of the Three Approaches to Theory Development**

There are both advantages and disadvantages of each of the three approaches to nursing knowledge development. Generation and testing of theories from explicit conceptual models has an advantage over the other two approaches in that the entire conceptual-theoretical-empirical is specified from the beginning of the knowledge development effort. Proponents of this approach maintain that the delineation of an explicit conceptual model is "the first and most crucial step in scientific theory-building" (Christensen, 1967, p. 622) that "introduce[s] an element of orderliness into the research process and findings" and, therefore, expedites "sound and accumulative development of theory" (Nye & Berardo, 1966, pp. 2, 6). The primary benefit of an explicit conceptual model, according to Suppe (1982), "is to sensitize the researcher to potentially important variables to include in one's ... middle-range testable theories" (p. 13). In short, the proponents of explicit conceptual models for theory generation and testing maintain that conceptual models are "necessary for good research and ... good research is, in turn, necessary for the development of valid theory" (Nye & Berardo, 1966, p. 6).

Another advantage of using an explicit conceptual model is that results of theory-testing may be used to determine the credibility of the model (Fawcett, 1989a). Credibility determination is necessary to avoid the danger of the use of a conceptual model as unquestioned ideology: this must be avoided if nursing is to continue its evolution as a respected discipline. Credibility of a conceptual model is determined by comparing the findings from tests of a middle-range theory with the propositions of the conceptual model that were used to deduce the theory propositions. If the findings conform to expectations established by the conceptual model, the model may be considered credible. If, however, the findings do not conform to those expectations, the credibility of the conceptual model must be questioned. Credibility determination, then, may not render a conceptual model free of ideology, but that ideology will have been scrutinized.

One disadvantage of use of explicit conceptual models is the effort required to comprehend fully the distinctive perspective and content of the conceptual model, as well as to identify and operationalize its rules for nursing research. Considerable time must be taken to study the original works by the author of the conceptual model, and to critique the questions asked and methods used by researchers who have already used the model to guide their studies. Considerable time also must be taken to learn how to prepare a narrative description of the conceptual-theoretical-empirical structure that can be comprehended by readers who are not familiar with the model. This is especially important if grant applications are to be funded and if research reports are to

be published with a description of the full conceptual-theoretical-empirical structure.

Another disadvantage is that a focus on conceptual models may actually hinder theory development "by encouraging sterile efforts to identify new conceptual [models] or to reconceptualize old ones" (Rodman, 1980, p. 439), rather than moving forward with middle-range theory generation and testing. Thus, the lack of an explicit conceptual model might speed theory development efforts by avoiding the risk of becoming distracted from theory generation or testing by the intricacies of the model. The disadvantages of an explicit conceptual model, then, become the advantages of an implicit conceptual model.

The use of implicit conceptual models has, however, created difficulties in categorizing nursing research in any theoretically meaningful way. Thus, the disadvantage of an implicit conceptual model is an advantage of an explicit model.

The advantages of the third approach to nursing knowledge development, that is, inducing a conceptual model from an existing theory, also are the advantages of using an explicit conceptual model, namely, the specification of all three components of the conceptual-theoretical-empirical structure and a clear understanding of the perspective that guided theory development. The disadvantages of this approach are the difficulties associated with identifying, contacting and interviewing all investigators working with a particular theory and the time required to induce the conceptual model.

## Conclusion

It is likely that proponents of qualitative methods, such as grounded theory and phenomenology, will not agree that a conceptual model guides their theory development efforts. These investigators, however, fail to take into account that the method they use, along with its underlying philosophical position, represent a frame of reference, that is, a conceptual model. For example, phenomenologists seek to identify the lived experiences of human beings and assert that this is accomplished through qualitative methods such as open-ended interviews. Grounded theorists also use open-ended interviews to identify basic social problems and basic social processes. In both instances, the phenomena of interest (lived experiences or basic social problems and processes) and the appropriate method (interviews) are specified prior to the empirical theory development endeavor, and constitute a frame of reference that fits the definition of a conceptual model. To deny that this is so is to refute the previously stated philosophical premise that it is impossible to exist without a guiding perspective.

Furthermore, although some readers may equate the approaches to knowledge development presented in this paper with logical positivism, the position taken here with regard to conceptual models as explicit or implicit guiding perspectives is in keeping with a postpositivist world view. More specifically, the claim that conceptual models always guide empirical research is consistent with the postpositivist claim that "all descriptions of 'reality' are recognized as inherently theory-laden" (Lavee & Dollahite, 1991, p. 361).

In conclusion, all three approaches to knowledge development are evident in the nursing literature. All of these efforts have done much to increase recognition of nursing as a professional discipline. Scholars are now urged to consider the advantages and disadvantages of each approach and to select the one they believe will advance nursing science and yield a systematic body of nursing knowledge.

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## RÉSUMÉ

### Méthodes d'étoffement des connaissances en sciences infirmières

Cet article offre un aperçu des éléments des structures empirico-théorico-conceptuelles et du rôle de chacun dans l'étoffement des connaissances en sciences infirmières. Trois méthodes y sont décrites, soit : 1) la formulation et la vérification de théories à partir de modèles conceptuels explicites; 2) la formulation et la vérification de théories à partir de modèles conceptuels implicites; 3) la déduction de modèles conceptuels à partir des théories. Les avantages et les inconvénients de chaque méthode sont analysés.