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Reductionism in the Pursuit of Nursing Science: (In)congruent with Nursing's Core Values?

Patricia Hawley, Susan Young, and Alberta Catherine Pasco

La philosophie et les perspectives prônées par la science ont fait l'objet d'une critique élaborée par certaines chercheuses en sciences infirmières. Suivant cette critique, les perspectives traditionnellement adoptées en sciences seraient contraires aux principes humanistes préconisés par la profession infirmière, le réductionnisme étant considéré comme une approche incompatible avec les valeurs fondamentales de la discipline. Par conséquent, plusieurs chercheuses en sciences infirmières ont avancé qu'il faut abandonner cette orientation, considérant que les efforts de recherche devraient être guidés par une perspective humaniste. Les auteures de cet article soutiennent qu'une telle position entraînera des conséquences graves pour le développement des connaissances en sciences infirmières, et qu'elle pourrait nuire à l'avancement de la profession et de la discipline dans son entier. Elles réfutent l'argument selon lequel le réductionnisme en sciences infirmières est incompatible avec les valeurs fondamentales de la discipline, vantent les mérites de cette approche et concluent que sans le développement d'une approche épistémologique globale, l'actualisation de ces valeurs risque d'être compromise.

Within nursing scholarship a critique has developed around the philosophy and approaches of traditional science. The central theme of this critique is that the approaches of traditional science are antithetical to nursing's commitment to a humanistic philosophy, as reflected in the premise that reductionism is incongruent with nursing's core values. Several nurse scholars, believing that nursing's humanistic philosophy should guide the research efforts of the discipline, have advocated abandonment of the reductionistic approaches of traditional science. The authors contend that adoption of such a position will have serious consequences for knowledge development in nursing and subsequently will be detrimental to the advancement of nursing practice and the discipline of nursing. They refute the premise that reductionism is incongruent with nursing's core values, argue for reductionism in nursing science, and conclude that without the pursuit of epistemological holism, the actualization of nursing's core values is in jeopardy.

The pursuit of nursing science is an endeavour fraught with commentary and debate, much of which has focused on the nature of nursing science and appropriate modes of inquiry for the development of

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Patricia Hawley, PhD(c), RN, Susan Young, MN, RN, and Alberta Catherine Pasco, MPA, RN, are doctoral students in the Faculty of Nursing, University of Alberta, Edmonton, Canada.

nursing knowledge (Schumacher & Gortner, 1992). While commentary and debate are to be applauded, we are nevertheless concerned about the critique that has developed around the philosophy and approaches of traditional science by critical social theorists and proponents of interpretive views of nursing science (Benner, 1985; Holmes, 1990; Leonard, 1989; Mitchell & Cody, 1992; Moccia, 1988; Munhall, 1982/1997, 1992; Newman, 1992; Sarter, 1987; Thompson, 1987). The central theme of their critique is that the approaches of traditional science are antithetical to nursing's commitment to a humanistic philosophy. This is reflected in their belief that reductionism, in the pursuit of nursing science, is incongruent with nursing's core values. In light of this viewpoint, several nurse scholars have advanced the "purist" position (Gortner, 1993) that the humanistic philosophy of nursing should guide and direct the research efforts of the discipline and have advocated abandonment of the reductionistic approaches of traditional science (Cody, 1995; Holmes; Mitchell & Cody; Moccia; Munhall, 1982/1997, 1992; Sarter).

We are convinced that adoption of this purist position will have dire consequences for the development of nursing knowledge and subsequently will be detrimental to the advancement of nursing practice and the discipline of nursing. Our purpose in this paper is to refute the premise that reductionism is incongruent with nursing's core values and to argue for the continued use of reductionistic approaches and hence the pursuit of "epistemological holism" (Thorne et al., 1998) in nursing science. Our argument is constructed in light of assumptions regarding the social mandate of nursing practice and the discipline of nursing. Before proceeding, we will define reductionism and briefly outline the origins of the critique around the philosophy and approaches of traditional science, as portrayed in the literature.

Reductionism

Reductionism is believed to be the cornerstone of scientific causal explanation of phenomena (e.g., states, behaviours, processes) (Slife & Williams, 1995). From the perspective of Slife and Williams, reductionism is a style of explaining — it explains the basic, fundamental, or principal cause of phenomena. To illustrate simply, they state that "at its most basic level, the notion of reductionism is that some complex phenomenon, X, when properly understood can be shown to really be (an instance of) a simpler phenomenon Y" (p. 128). Accordingly, they consider economy of explanation to be "good explanation" (p. 127). In suggesting that there is a fundamental or principal cause at the base of

many phenomena, they view reductionism as providing the basis for generalization.

Another similar, yet different, use of the term reductionism is evident in the definition offered by Drew (1988). She defines reductionism as a process whereby "complex phenomena can be broken down into causal chains or units from which the whole can be understood by reconstituting the parts" (p. 25). This definition suggests that multicausal explanations of phenomena are also achievable through reductionism. In the case of the phenomena of concern to nursing, scientific causal explanations are more apt to be complex, multifaceted, and possibly multidirectional (Poole & Jones, 1996; Schumacher & Gortner, 1992). Therefore, we hold that this latter view of reductionism is more applicable to nursing. In either case, reductionism leads to scientific causal explanations of phenomena and is the precursor to prediction and prescription (Gortner, 1990; Poole & Jones; Schumacher & Gortner; Wolfer, 1993).

Yet another perspective of reductionism is alluded to by Munhall (1982/1997). Given that many of the phenomena of interest to nursing are abstract and not directly measurable, the study of such phenomena requires that they be made operational — that is, defined and studied in terms of their observable/measurable attributes. According to Munhall, such phenomena are "reduced to the measurable and empirical" (p. 729), and thus this process constitutes another form of reductionism.

The Critique of Reductionism

Codes of ethics and statements of standards of practice reflect nursing's commitment to a host of core values such as health, patient autonomy, dignity and self-respect of human beings, confidentiality, fairness, accountability, ethical conduct (Canadian Nurses Association [CNA], 1997), holism (Gortner, 1990, 1993; Gortner & Schultz, 1988; Munhall, 1982/1997; Sarter, 1987), and human uniqueness (Munhall, 1982/1997). Yet the substance of the critique that has developed around the use of reductionistic approaches in nursing science focuses on their perceived incongruence with the values of human uniqueness, patient autonomy, and holism. For example, one position is that there is a lack of congruence in the discipline itself, in that while it calls itself holistic it studies parts (Munhall, 1982/1997; Nagle & Mitchell, 1991). If the human being can be understood only as an irreducible or unitary being in mutual process with the environment, as is believed by proponents of this view (Benner, 1985; Cody, 1995, 1996; Mitchell & Cody, 1992; Munhall,

1982/1997; Newman, 1992; Parse, 1992, 1994, 1996, 1998; Smith, 1991), then how can the whole human being possibly be understood through the study of discrete parts in isolation (Packard & Polifroni, 1991)? Furthermore, reductionism is often perceived as being translated directly into practice, which calls into question the ability to provide holistic care — care of the whole person, not just certain dimensions such as the disease (Parse, 1998).

Given that reductionistic approaches are used to generate knowledge that is not only prescriptive but also generalizable, their use has given way to criticism on two fronts, applicable to the two remaining core values under discussion, namely patient autonomy and human uniqueness. The first issue raised by some scholars (Cody, 1993; Gadow, 1980; Moccia, 1988; Munhall 1982/1997; Parse, 1998, 1999) is the appropriateness of the use of prescription to achieve an outcome desired by the nurse, implying control over patients when respect for patient autonomy is espoused. The second issue is whether the uniqueness of the individual can be respected when health-related outcomes are expected to fall within pre-established norms (Cody, 1993, 1995; Holmes, 1990; Munhall, 1982/1997; Parse, 1992, 1994, 1996, 1998) and the prescriptive knowledge, from which interventions are derived, is generalizable.

For example, in Parse's (1992, 1994, 1996, 1998, 1999) view, health is a process of becoming and a reflection of individual choice and value priorities. Rather than a human state, health is considered to be a lived experience, a potentiality co-created in mutual process with the universe and defined as quality of life from the person's perspective at a particular moment in time. From Parse's perspective, therefore, health cannot be objectively assessed nor delimited by norms or such qualifiers as good, bad, more, or less (Cody, 1993, 1995; Parse, 1998). Nor can norms be considered to provide sufficient reason for the performance of nursing acts or the nurse's use of prescriptive power, implying the power to impose the nurse's value system on a patient (Cody, 1993). According to Parse (1992, 1998, 1999), persons co-create health, know the way to health somewhere within the self, and therefore freely choose ways of becoming based on value priorities. Accordingly, nursing practice is "not offering professional advice and opinions stemming from the nurse's own lived value system" (Parse, 1992, p. 40), but, rather, true presence with the other to enhance quality of life.

This critique suggests that opposition to reductionism has surfaced because of perceived discrepancies between the practices and outcomes of traditional science and the values of the profession of nursing. More

specifically, the substance of the critique implies that the use of reductionism in nursing science potentially translates directly into nursing practice, creating conditions in which patients are treated unidimensionally, subjected to control, and depersonalized — conditions incongruent with the profession's core values of holism, patient autonomy, and respect for human uniqueness.

Our Argument for Retaining Reductionism

We begin our argument by claiming that the premise that reductionism, in the pursuit of nursing science, is incongruent with nursing's core values is faulty. We believe that the actual emergence of this premise primarily represents a failure to distinguish between the philosophy of nursing practice and the philosophy of nursing science (Gortner, 1990). Just as nursing practice and nursing science are distinct entities on the basis of their different goals (Batey, 1991), so too are their underlying philosophies. It is nursing's philosophy of practice, not its philosophy of science, that represents the value system of the profession (Gortner, 1990; Salsberry, 1994). Whereas the philosophy of nursing practice identifies the focus and aim of practice and delineates the values that guide both the practice and the practitioner (Salsberry), the philosophy of nursing science focuses on epistemology — that is, what can be known, how knowledge is structured, the basis upon which knowledge claims are made (Schultz & Meleis, 1988), and the appropriate methodologies/research approaches for the development of knowledge to guide nursing practice. Accordingly, it is through artful nursing practice, not through nursing's research approaches, that nursing's core values are actualized.

Furthermore, we contend that the criticisms that reductionism precludes the actualization of these core values in practice are also unfounded. We believe that respect for human uniqueness, through the delivery of individualized care, can be actualized in nursing practice irrespective of the fact that nursing's scientific knowledge of nursing interventions (i.e., prescriptive knowledge) is generalizable in nature. We concur with Johnson (1996) that prescriptive knowledge is meant to "guide" nursing practice and is in no way meant to be rigidly or blindly applied to the particular individual or patient. In artful nursing practice, nurses use this prescriptive knowledge, along with their personal insights regarding the individual and any contingent circumstances, to "choose wisely and well" in applying scientific principles in a particular situation (Johnson). Thus through the use of "artistic nursing prudence"

(Johnson, p. 47) nursing care can be individualized and the uniqueness of the individual recognized.

Regarding autonomy, we agree with Johnson (1996), who argues that nursing has a great deal to sort out about the proper place of patient autonomy in nursing practice. As a reflection of the current discourse, "which emphasizes patient autonomy and derides paternalism" (Woodward, 1998, p. 1046), some nurse scholars, like Parse (1998, 1999) and Moccia (1988), disapprove of prescription and advocate for decision-making based solely on patients' values, desires, or wishes. However, given nursing's social mandate to actively intervene (Thorne et al., 1998) to achieve health-related goals, we contend that prescriptive knowledge is essential to nursing practice and that nurses' involvement in health-related decision-making should occupy a legitimate place. As such, we argue for a more moderate view of patient autonomy, a view in which respect for patient autonomy is balanced with the nurse's beneficent guidance based on sound scientific knowledge and clinical expertise (Woodward). Given this view, we posit that respect for autonomy can be actualized if nurses consider patients' beliefs and values when applying prescriptive principles; respect for autonomy will be achieved in such a way that the moral integrity of both patient and nurse is protected (Woodward). Furthermore, we assert that in artful nursing practice nurses *do* respect patients' autonomous decisions about serious matters that affect their lives, once the nurses are assured that the decisions are informed. Is it not informed decisions that are truly autonomous?

Finally, we believe that the value of holism as it relates to the provision of holistic care can be actualized in artful nursing practice if all relevant knowledge is acquired and used in a balanced and proper way (Clarke, 1995). It is this point that remains relevant as we further develop our argument.

Let us now fuel our argument by stating that we are convinced that abandonment of reductionistic approaches, in the pursuit of nursing science, will preempt the actualization of several core values, specifically the core values of holism, health, and effective and safe nursing care. Our argument rests on the belief that actualization of these core values in nursing practice requires many kinds of knowledge, and that attempts to generate this knowledge require that the discipline embrace many methodologies (Allen & Jensen, 1996; Cull-Wilby & Pepin, 1987; Dzurek, 1989; Dzurek & Abraham, 1993; Ford-Gilboe, Campbell, & Berman, 1995; Letourneau & Allen, 1999; Lutz, Jones, &

Kendall, 1997; Monti & Tingen, 1999; Wolfer, 1993), not the least of which are those that are reductionistic in nature.

We contend that nursing is concerned with both the phenomenal world of lived human experiences of health and the biophysical/psychosocial world of humans as it relates to health, illness, and disease and therefore requires a holistic approach to knowledge development. To develop knowledge about the former world — the world of lived experience — nursing science must be directed towards seeking an understanding through the use of the interpretive approaches advocated by the humanistic sciences. We also acknowledge the link between health and oppression related to gender, race, and class. If nursing is to remain committed to achieving health-related goals, it must also recognize healing that can be achieved through emancipation. To develop knowledge for emancipation, nursing science must also be directed towards seeking an understanding of oppression through the use of emancipatory inquiries such as those advocated by the feminist and critical theorists (Campbell & Bunting, 1991; Gortner, 1993; Henderson, 1995; Thompson, 1987). To develop knowledge about the biophysical/psychosocial world, which has an objective component characterized by regularities and patterns, nursing science must also be directed towards the development of knowledge that is descriptive, explanative, predictive, and prescriptive (Donaldson, 1995; Donaldson & Crowley, 1978/1997; Gortner, 1990, 1993; Schumacher & Gortner, 1992) using the reductionistic approaches advocated by traditional science.

With regard to the biophysical/psychosocial world, there are still many relevant questions surrounding health, illness, and disease whose answers are dependent on inquiry that employs reductionistic approaches (Norbeck, 1987; Schumacher & Gortner, 1992; Weiss, 1995). As for the argument that it is towards causative states or processes that many preventive or therapeutic nursing interventions must be aimed (Schumacher & Gortner), reductionism leading to knowledge of causal explanations is not only relevant but essential for the practice-focused discipline of nursing (Schumacher & Gortner; Weiss). As such, we assert that if the discipline of nursing is dedicated to the achievement of excellence in care through the advancement of nursing knowledge, to reject reductionistic approaches for fear of dehumanization would be "epistemological error" (Shaw, 1993).

Consider the core value of health. Given that health is considered the proper goal or end in nursing (Johnson, 1996; Romyn, 1996; Thorne et al., 1998), it is not surprising to find that it is the first core value listed

in the Canadian Nurses Association *Code of Ethics for Registered Nurses* (CNA, 1997). We believe that health is multidimensional, a phenomenon that extends beyond subjective experience and one that is more than a personal matter (Thorne et al.). Some dimensions of health are universal in nature, capable of being assessed objectively and judged in relation to norms. Without reductionistic approaches to inquiry, the discipline of nursing will not be able to develop advanced knowledge to better assess the biophysical/psychosocial and socio-environmental factors that influence health. Without reductionist approaches, how will the discipline of nursing derive knowledge to better intervene to preserve and maintain the universal aspects of health of individuals, families, and communities?

Consider, too, that nursing's professional mandate will always include the care of the ill (Thorne et al., 1998). Without reductionism, how will the discipline of nursing develop knowledge to more fully understand illness/disease in all its dimensions and forms? How will the discipline of nursing be able to develop scientific knowledge of interventions to reduce or ameliorate the effects of illness? These are a few of the many questions that arise.

Consider next the value of holism, as reflected in the mandate to provide holistic nursing care — that is, nursing care of the whole person (Letourneau & Allen, 1999; Weiss, 1995). The provision of holistic nursing care requires that knowledge development be directed towards the whole of nursing knowledge. While we recognize that lived experience, for example, is an important dimension of the whole person, it is but one dimension. We believe that the body is an equally important one. While it has become increasingly apparent that nursing values the psychosocial and experiential aspects of care more than care of the body (Bjrrk, 1999; Drew, 1988), care of the body is critical to nursing's holistic mandate (Thorne et al., 1998). Although the emphasis on nursing care of the body may vary circumstantially, "care of the physical body remains an important part of nursing practice" (Dunlop, 1994, p. 33). If holistic nursing care is to be achieved, knowledge of care of the body cannot be ignored. Given that reductionistic approaches consider discrete properties as well as complex relationships between these properties, without reductionism the discipline of nursing will lack the knowledge to more fully understand the discrete nature of the body as a physical entity and its complex relationship with the other human dimensions that constitute the whole person. Without reductionism, how will the discipline of nursing be able to develop the knowledge to improve nursing care of the body? Without reductionism,

how will the discipline of nursing achieve the multidimensional understanding required for the provision of holistic care in nursing practice?

In seeking to attain health-related goals, nursing care must be not only holistic in nature, but also safe and effective. Accordingly, interventions must be based on prescriptive theory partially derived from sound scientific principles generated through the use of reductionistic approaches. As stated by Romyn (1996), "if nurses are bereft of the power of generalizability, nursing practitioners could not use the findings of research conducted with patients or clients other than their own and intervention in each practice situation would be the result of trial and error" (p. 144). If this is the case, then safe and effective practice is questionable and the actualization of this core value tenuous.

To support our argument for the continued use of reductionistic approaches, we cite Rising's (1993) study of the relationship of nursing activities to intracranial pressure (ICP) in brain-injured patients. This study explored the effects of selected nursing functions (i.e., bathing, repositioning, and suctioning) on ICP, a physiological and empirically measurable response. Based on the findings, it was recommended that the influence of intervening variables (e.g., age, level of consciousness, degree of agitation, vital signs, medications administered) be examined and that cerebral perfusion pressure (CPP), a measure indicative of brain perfusion and partially determined by ICP, be calculated. It is anticipated that, with further systematic study, nurses will eventually be provided with predictive knowledge about which patients, under what circumstances, are most at risk for fluctuations in CPP as a result of nursing care as well as prescriptive knowledge to ensure that the care of this type of patient will be provided in the least disruptive manner possible. It is also possible that eventually scientific knowledge of prescribed nursing interventions will include those that lower ICP, and therefore increase cerebral perfusion, enabling nurses to provide not only safer but more effective nursing care.

Does a position against reductionistic approaches to nursing science imply that research such as that described above is of no value to nursing practice? We believe it does. And in our opinion this line of thinking is of grave concern. Such research would provide generalizable knowledge invaluable to nurses who strive to provide safe and effective care to all patients at risk for increased ICP and decreased cerebral perfusion. Furthermore, it highlights knowledge development related to nursing care of the body, a dimension critical to the multidimensional understanding we believe is necessary if holistic care is to be achieved in practice (Thorne et al., 1998). Therefore, as the above

example illustrates, if reductionism is abandoned nurses will be without the scientific knowledge to ensure that the care they provide is indeed holistic, effective and safe, and results in the achievement of health-related goals.

Conclusion

We have argued that reductionism in the pursuit of nursing science does not preclude actualization of the core values of human uniqueness, patient autonomy, and holism in nursing practice, and thus have opposed the view of several nurse scholars that the discipline of nursing should adopt a purist position in the pursuit of nursing science. On the other hand, we claim that abandonment of reductionism in nursing science would place actualization of the core values of holism, health, and safe and effective nursing care in jeopardy. Our main concern is that without reductionism the practice-focused discipline of nursing will be without the predictive and prescriptive knowledge considered essential to guide nurses in practice. Without scientific principles to ground decision-making, nursing interventions will be based on trial and error, which will place the safety of patients at risk.

We have concluded that actualization of the core values of holism, health, and safe and effective nursing care requires many kinds of knowledge. Therefore, we have advanced the position that the discipline of nursing ought to pursue "epistemological holism" (Thorne et al., 1998), the development of the whole of nursing knowledge, and that such a pursuit requires that the discipline of nursing embrace multiple methodologies. We believe that if the discipline does not strive to develop the whole of nursing knowledge, it will fall short of fulfilling the social mandate that leads to its creation, the development of knowledge to guide practice (Donaldson, 1995). We also believe that nursing practice will be thwarted in its efforts to meet its social mandate as a result.

Advancement of the discipline of nursing, and ultimately nursing practice, depends on the success of the discipline in its efforts to develop the whole of nursing knowledge. We believe that only by employing a variety of methodologies can this be achieved. As stated by Omery, Kasper, and Page (1995), it takes more than one rope to climb a mountain. Equipped with a strong, relevant scientific knowledge base and a humanistic philosophy of nursing practice, nursing will be well supported on its journeys towards excellence.

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Correspondence may be sent to Patricia Hawley, 65 Tamara Drive, Antigonish, NS B2G 2T4 Canada.