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Complex Critical Realism
Tenets and Application in Nursing Research

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Aim: To outline the main tenets of critical realism (CR), its use, and future application in nursing. **Background:** Little work has been done to discuss how CR can be applied to nursing research. **Findings:** The tenets of CR include recognition of reality independent of human perceptions, a generative view of causation in open systems, and a focus on explanations and methodological eclecticism using a postdisciplinary approach. Critical realism is useful for (1) understanding complex outcomes, (2) optimizing interventions, and (3) researching biopsychosocial pathways. Such questions are central to evidence-based practice, chronic disease management, and population health. **Conclusions:** Critical realism is philosophically strong and potentially useful for nursing research. **Key words:** *framework*, *nursing research*, *ontology*, *philosophy*, *realism*, *realist*, *theory*

ALTHOUGH METHOD AND DESIGN are important, it is vital to reflect on the assumptions about reality that can and do underpin method. Failing to do so or relying on unsupported "common sense" arguments can result in work that lacks wider credibility, is inadequately justified, or even lacks internal coherence.[1]

Over the last decade, the metatheory known as critical or complex realism (CR) has emerged in Europe as a promising basis for theorizing in the human sciences, including nursing.[2–4] However, far less work has examined the theoretical application of CR in research studies. The aim of this article is to identify the types of research questions relevant to nursing to which CR has appropriate application. To do this, the article identifies the main tenets of CR, discusses previous work in nursing guided by CR, and considers the wider uses of CR for nursing research.

The origins of CR lie with philosopher Roy Bhaskar, whose early work addressed what reality must be like for science to be possible.[5] This work criticized positivist accounts of the natural sciences that emphasized the existence of universal law-like explanations for phenomena and a view that research was based only on what could be observed.[6] A number of influential academics, such as Wittgenstein, Popper, Kuhn, and Feyerabend, also attacked this positivistic approach to science.[5] Yet, the natural conclusions of these critiques were often problematic variations of relativism, a sense that not only knowledge development was a social process but also knowledge itself was relative to the perspective of the individual. As a consequence, arguments based on reason could not resolve competing claims to knowledge.[5] It was not clear who or what could determine what was

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true and, indeed, whether the very notion of truth itself was legitimate.

Currently, these initial arguments appear polarized and narrow. Bhaskar presented a direct critique of positivism as an epistemology that viewed the world as being overly uniform and "reduced to the ways in which we know it."[7(p254)] He argued that human perceptions of the world (epistemology) could not be synonymous with the world's objective state (ontology).[5] Proponents of relativism argued for the centrality and unacknowledged role of language in research and critiqued the claims of Western science to truth as being unjustifiably universalistic and dogmatic.[7] Other perspectives, such as idealism, sought some middle ground through claims that the objects to which science refers are not fully objective but are consensual models that are not determined by the mind of any one individual.[5]

The challenges of engaging with these arguments are evident in the health sciences.[8,9] Debate is mired in different labels and subtle variations. Positivism has been called objectivism, empiricism, or universalism and can be discussed generically or taken to be synonymous with a specific school, such as logical positivism. Similarly, relativism has been used interchangeably with terms such as *constructivism*, *perspectivism*, *intepretivism*, or *antifoundationalism*; it also has a number of variations, including cognitive or epistemic relativism (the claim that truth is relative to an individual or groups) and moral relativism (the claim that moral principles are relative to settings).

Debate in nursing has not sufficiently recognized some of these distinctions or has fallen too readily into polarized arguments framed by discredited forms of relativism[3] or stereotypical views of positivism.[9] However, although researchers are unlikely to claim positions that reflect more extreme versions of positivism and relativism,[10] these positions can be adopted implicitly. They are reflected not only in the positions researchers overtly claim to hold but also in what they do with, and the claims they make, for data. Positivist assumptions can be made when researchers overly generalize from data,[11] such as when extrapolating findings from data generated in a small region to a diverse country. Relativistic assumptions are reflected when researchers assign an objective truth value on human perspectives[8]; for example, when lay perceptions of a disease are viewed as being synonymous with the disease itself.

That said, there are merits of variations of positivism and relativism to nursing. Positivism points to the possibility of wider knowledge of the world that can be developed and built systematically through research. This resonates with nursing as a discipline that is informed by knowledge from the natural and human sciences.[3] Conversely, relativism points to the centrality of human experiences, social and cultural constructs, values, perspectives, and language. This connects with nursing as a discipline that focuses with sensitivity and respect on individual holism, patient advocacy, communities, and context.[3]

Complex realism emerged as a wider attempt to harness the strengths and address the weaknesses of positivism, idealism, and relativism. It acknowledges the possibility of science but recognizes the social dimensions of humans and science in a manner that does not fall into problematic versions of relativism or positivism. Taking the middle ground, it does not reduce the world to unknowable chaos or a positivistic universal order, nor does it place objective truth value on the perspectives of human beings or remove the influence and importance of human perspectives. These characteristics are evident in the following overview of its main tenets.

THE EXISTENCE OF INDEPENDENT SOCIAL AND PHYSICAL REALITY: RECONCILING THE OBJECTIVE AND SUBJECTIVE VALUES

Complex realism views physical and social entities as having an independent existence irrespective of human knowledge or understanding. Although social structures

and phenomena exist as a product of the existence of human beings (eg, class, culture, or discrimination), these entities are seen to be as independent of individual human beings as physical entities. Structures also exist and exercise power irrespective of whether this is known or recognized by individual humans. For example, gender-based discrimination may exist in an organization whether or not it is recognized by management or workers.

This stance can still incorporate human meaning and experiences (the hermeneutical dimension) and recognize that these can influence behavior and sometimes wider social structures.[12] However, human social processes and perceptions (including science), as with physical phenomena, are fallible and perspectival, that is, discourse around or perceptions of social phenomena and science are not synonymous with objective truth. Judgments regarding the accuracy of these accounts should be made with recourse to other arguments or available data.[12]

Consider, for example, a patient with colon cancer who sincerely believes he or she does not have cancer and acts accordingly.[8] In CR terms, the individual can be judged to be wrong on the basis of recourse to wider evidence, such as the results of pathology tests, professionals' opinions, and symptoms conventionally recognized to signal the disease.[8] It remains important, especially to nursing, that the patient's representation of his or her condition has intrinsic subjective value. This is likely, for example, to influence the patient's emotions and disease management. However, in epistemological terms, other evidence indicates that the patient is highly likely to be wrong. Hence, the perspectives of the patient, professionals, and those derived from other data make claims to truth, which like those from witnesses in a courtroom trial, have to be reconciled, weighed, and ultimately judged regarding their reliability and what they say about reality. Here, then, is an acknowledgment of the value of multiple data sources relating to the same phenomena as well as a recognition of the need to reconcile these perspectives and any claims made against each other.

A STRATIFIED EMERGENT GENERATIVE ONTOLOGY: UNDERSTANDING REALITY AND CAUSATION

Bhaskar[5] argued that for experiments to be possible, underlying structures, powers, and processes must act together under certain circumstances to influence observable events. These underlying phenomena are as real as the observable effects and outcomes they cause. Reality is divided or *stratified* into 3 domains: the actual (events and actions that are more likely to be observed), the real (underlying powers, tendencies, and structures whether exercised or not that cause events in the actual domain), and the empirical (fallible human perceptions and experiences, including science).

For example, a high school physics experiment involves the artificial creation of a vacuum around a ringing electronic bell. Upon creation of the vacuum, the "ringing" bell can be seen but no longer heard. This, the physics teacher would ensure, provides knowledge of the processes underlying the progression of sound and light through the earth's atmosphere. Hence, in the experiment described, the sound and the movement of the bell occur in the actual domain. The changes observed when the vacuum is created point to the underlying nature of the unseen structures and processes of the progression of sound and light through air in the real domain. Finally, human perceptions and interpretations of both of these realms are in the empirical domain.

Two further concepts are relevant here. *Transfactuality* refers to the frequent misalignment of the actual, real, and empirical domains. Human perceptions in the empirical domain are fallible representations of the real and actual domains that are prone to incompleteness and inaccuracy in perception and inference. Students' experiences and inferences from the bell jar experiment can

and may well differ. Similarly, scientists' ways of understanding and explaining phenomena such as the motions and forces guiding the earth's atmosphere have been and continue to be revised over centuries. Dimensions of the empirical domain should never be taken to be synonymous with those in the actual or the real domain. For example, sound and light traveled through the earth's atmosphere in the same ways before humans knew or devised experiments to explore this. Phenomena in the real domain may not be visible or exercise influence on the actual domain at any one point in time.[5] Yet, under the right circumstances, the power of these structures in the real domain can become active and influential.

Complex realism also offers an *emergent* ontology. *Emergence* is defined as "a relationship between two features or aspects such that one arises out of the other . . . [but] remains causally and taxonomically irreducible to it."[13(p63)] In practice, this means entities can be classified hierarchically into strata at macro and micro levels. Although CR acknowledges that humans are composed of huge numbers of subatomic particles acting in accordance with principles of physics, humans can also be understood at higher levels, for example, at the cellular, chemical, biological, psychological, and various social levels. Phenomena occurring at these higher levels are dependent on those at lower levels for existence; humans can function only at the social level because they exist as cellular matter. However, the notion of emergence comes from the sense that the social emerges from, but is also conceptually distinct from and more than, an individual's cells, biology, or psychology. This approach indicates the social is "emergent, distinctive and non-reducible . . . and thereby respects the autonomous logic of sociological theory."[14(p46)]

Phenomena within and between each of these levels can act together to create different phenomena that are irreducible to the underlying components. Water is composed of hydrogen and oxygen but is very different in nature from these 2 components in their isolated forms.[12] Yet, when these 2 elements come together in the right combination, a substance with very different properties emerges. Similarly, factors in the social realm can be causally influenced by a myriad of elements from the biological, geographical, and cultural factors but remain distinct from and irreducible to these other factors.

Finally, in CR terms, causation is not linear or successionist in the sense that event A must cause event B if A precedes B regularly[15]; that is, an approach that infers causation from regular sequences of events.[12,15] Rather, CR views events as being a product of many factors coming together in certain combinations and given the right circumstances or context to causally *generate* new events. Sayer summarizes the difference between these successionist and generative approaches as: "What causes something has nothing to do with the number of times we have observed it happening. Explanation depends instead on identifying causal mechanisms and how they work, and discovering if they have been activated and under what conditions."[12(p14)] To use another analogy, understanding of how a clock works is not based only on observation of the regular movement of its hands over time but necessitates a deeper examination to explore its underlying mechanics, the physics guiding these and possibly even the social meaning of the clock to different groups.[12] Hence, events in the actual domain are generated from complex interactions of factors in the real domain. To explain why phenomena occur, researchers therefore need to go beyond the surface of observable factors (the actual) to explore what is happening underneath (the real).

In the social realm, there is a high degree of flux within this generative model. Potentially small changes in underlying factors could have significant and large effects on the nature or the possibility of a certain event arising in the actual domain.[14] Hence, an event that appears to be straightforward and linear requires a distinct set of conducive circumstances and factors to align together in the right combination.

AN EXPLANATORY-FOCUSED OPEN-SYSTEMS VIEW: UNDERSTANDING DEEP CAUSATION IN A COMPLEX WORLD

Social phenomena occur in "open systems" rather than the artificially controlled "closed systems" of laboratory experiments. Complex realism wholeheartedly ascribes to the open nature of the social world in which numerous factors are present and interact in highly complex and variable ways over time and context.[12] Although humans can understand more about the world by trying to artificially control some of these factors in an experimental situations, this is not possible or desirable in social research owing to the difficulties of generalizing from closed to open systems.[15] Lawson,[16] writing on closed and open systems in economics, views markets as being the epitome of complex open systems. He argues that mathematical modeling in economics is based on a closed-systems view that has had very limited success in explaining and preventing major economic events in the real world (an open system). Although economists may know some of the main components of economies and have a reasonable knowledge of how economies function, it is a step further to be able to understand at a deeper level how these interact to cause outcomes.

Healthcare researchers often examine correlates and predictors or describe patterns in data. Similar to economics,[13] efforts are devoted to evaluating interventions or developing more accurate predictions via increasingly sophisticated mathematical techniques such as structured equation modeling or multiregression.[17] However, this often occurs in preference to attaining a sufficient understanding of causes and mechanisms.[18,19] Event regularities are rare outside laboratory experiments and prone to all manner of other influences in the real world,[13] be these social, physical, or psychological in nature.[15] To understand outcomes and patterns, researchers still need to examine regularities in the world but search for explanations *beneath* these patterns to account for why they did or did not occur.

This does not reduce the world to chaos; rather, the world is complex and somewhat patterned. This notion is captured in the CR term "demi-regularity,"[13] which is

> the occasional, but less than universal, actualization of a mechanism or tendency over a definite region of time-space. The patterning observed will not be strict if countervailing factors sometimes dominate (but) ... there is evidence of relatively enduring and identifiable tendencies in play.[13(p204)]

Such tendencies are familiar to nursing—found in fields such as health inequalities, cardiovascular risk, patient infections, and health improvement programs—in which enduring and consistent patterns are evident but not always predictable or persistent.

To recap, to identify causes researchers need to understand outcome *patterns* not identify outcome *regularities.*[20] These patterns are not the product of a small number of entities but of a larger number of factors coming together to *generate* an outcome of interest. Complex realism challenges nursing research to address generative causation over or before developing other types of knowledge. For example, Clark et al[21] identified that low usage of health services is often correlated with a lack of patient transport facilities. Researchers adopting a successionist view could conclude that the low uses of health services are caused by a lack of transport. However, CR-driven research that has sought to explore this pattern in people who both followed and deviated from it identified that at a deeper level, usage patterns are caused by patient conceptions of the self, other comparable patients, and general heart diseases. These generate a lack of perceived benefit that in the absence of sufficiently accessible transport fails to outweigh the perceived costs of participation. The mechanisms linking service usage to transport are therefore complicated and involves mechanisms associated with self-identity, disease conceptions, and views of other people.

RECOGNITION OF COMPLEX AGENCY AND STRUCTURE INTERACTIONS

Complex realism, somewhat obviously, views the world as being complex. It draws attention to the primacy of the world in leading both conceptualization and method.[12] The logic of this is that because the world exists independently of human beings, those attempting to discover knowledge of the world need to ensure their conceptions minimize distortion of the actual domain. These conceptualizations are problematic; for example, if they: "divide what is in practice indivisible, or if they conflate what are different and separable components. . . . So much depends on the modes of abstraction we use, the way of carving up and defining our objects of study."[12(p19)] This position may seem self-evident, but arguably the social sciences are beset with poor categorization and impoverished abstraction.[12]

Complex realism advocates that both agency and structural factors and mechanisms cause events. This reflects long debate in the social sciences of the relative importance of individual ("agency") factors (such as beliefs, attitudes, and personal meanings) and contextual ("structural") factors (such as social norms, culture, geography, and environment)[22], as well as the argument that this weight of research must be taken into account. The influence of both of these types of factors is recognized in nursing. This may be due to nursing's longstanding holistic focus or the strength of evidence that both individual and contextual factors affect health.[23] However, there has been far less historical recognition of the influence and interplay of these factors in economics[13] and social science[24] in which debates have overemphasized one over the other. Yet, even in modern healthcare, a wealth of discourse around health maintenance, patient self-care, and "compliance" presupposes high levels of personal agency to the neglect of structural determinants.[17] Complex realism urges nursing research to address the nature and complex interplay of agency and structural factors.

METHODOLOGICAL ECLECTICISM AND POSTDISCIPLINARY STUDY

All that is useful in explaining phenomena cannot be quantified.[13] The tenets of CR do not restrict researchers to adopt quantitative or qualitative approaches, or a particular method or disciplinary approach. Rather, researchers should acknowledge the complexity of the world and its open systems and let methodological choice be led by the nature of research question and the conceptualization of the phenomena under study.[12] That said, some researchers drawing on CR advocate a greater reliance on qualitative work,[12,13] whereas others argue for the contribution that mixed methods[25] or quantitative approaches can make,[26] for example, in cluster analysis[14] and regression analyses.[27]

Although this eclectic stance is now more accepted in nursing, this has not always been the case and mixed-method approaches are often argued for without resource to any underlying philosophical principles.[9]

Similarly, researchers from different disciplines seek to look beyond the conceptualizations and parameters of any one discipline[12] because approaches from a single discipline can lead to "disciplinary imperialism . . . reductionism, blinkered interpretations, and misattributions of causality."[12(p7)] This will ensure that conceptualizations are more responsive to the nature of the phenomena being examined rather than potentially narrow and loaded disciplinary perspectives and ideologies.[12] Although interdisciplinary research involving nursing is now well accepted politically and with funding bodies, CR offers a philosophical rationale for this approach. Moreover, via the notion of "postdisciplinary study,"[12] it challenges all researchers to focus on the phenomena being studied rather than disciplinary orientation.

USING CR TO INFORM RESEARCH: RESEARCH QUESTIONS

These tenets provide a basis for understanding reality and the world that has

implications for research. Complex realism is congruent with the purposes and values of practice-based disciplines that must, by nature, address issues in the complex other.[28] However, this does not tell researchers when and how they can and should use CR as an underling to guide their inquiries. Although CR has methodological and theoretical implications, it does not itself constitute a method.[29]

To convey how CR can be applied throughout the research process, we now outline 3 main types of research areas of relevance to nursing that CR is particularly suited to and discuss how it can inform method in these areas.

Health outcomes: Explaining events in contexts

Which policies lead countries to sustainable economic growth over the long term?[13]

Why are some crime prevention programs effective while others are not?[15]

How do health inequalities arise?[30]

Although these questions come from different disciplines and address different fields, at a more abstract level, they are similar and arise from the same criticisms.

For Lawson, economics has sought respectability via a reliance on mathematical modeling based on a successionist view of causation: "whenever x arises do y and event z will occur."[13(p5)] These models have tried to quantify all relevant factors, viewed these as operating in closed systems while giving scant attention to the assumptions about reality made in the models.[13] There has been a consistent lack of success of these models in predicting and identifying the causes of significant market events, such as stock market crashes.[13]

For Pawson and Tilley,[15] crime prevention programs have sought respectability via esteemed methods using closed-systems methods and successionist reasoning, such as the randomized controlled trial and quantitative meta-analysis. Reliance has been made on quantitative data, conceptualized in a simplistic manner, without attention to underlying assumptions about reality. Use of these methods has failed to yield generalizability of the benefits of effective programs in open systems and provided little insight into the complexities of what causes programs to be more or less effective.[15]

Epidemiological studies have historically been based principally on data collected on individuals and/or examined frequency and correlation rather than causation.[31] Attention has been drawn to the simplistic views of causation in health inequalities and epidemiological research.[32] More sophisticated epidemiological research has attempted to incorporate data on populations more overtly, most notably multilevel modeling. However, by a continued reliance on a relatively small number of quantified variables (albeit in large populations), the ability to discern what causes outcomes of interest (as opposed to correlates) and predict or change outcomes at the individual level is limited. Although some epidemiologists have now moved to examine causative mechanisms,[33] there is a continued pursuit of the identification of a small number of elusive pivotal explanations for data patterns,[14] underpinned with little theory[34] or sophisticated sense of causation.[14]

Hence, in each of these areas, to limited success, research has used an overly simplified and closed-systems view of reality that simultaneously relies heavily on quantification and avoids addressing the views of causation and reality that underpin inquiry. What are the lessons of this for nursing research? Although knowledge can be discovered of correlates and pattern regularities, this is of more limited practical utility than knowing what causes phenomena of interest and how to change these. Complex realism advocates that the complex causes of how and why changes in health or social factors occur need to be understood. This type of knowledge is prescriptively more useful. Understanding how, for example, dimensions of context (such as social and physical environments) and characteristics of the individual (including age, race, and sex) interact to influence health is an important step to designing interventions to improve health.

Complex realism–driven research has been applied in nursing care settings to understand the complex causes of racial discrimination[35] and practice change.[36,37] Briefly, this involves understanding how factors in the individual and the workplace setting interact to causally influence key behaviors, such as a nurse's practice. Tolson,[37] for example, drew on CR to inform a critical pathway for complex service evaluation and practice change in healthcare settings. Wilson and McCormack[36] used the approach to facilitate understanding of outcomes in local contexts and then to promote change. These studies use different data collection methods (ie, qualitative and quantitative data[37]) and data about different dimensions of the settings researched. For example, Wilson and McCormack[36] examined a nursing unit's culture via survey and participant observation before further clarifying questions and contradictions in the data with key informant interviews. However, both draw on CR to support the argument that the phenomenon they are researching is complex, is likely to be affected by the interplay of individual *and* contextual factors, and that understanding causes of variations in practice is key and should be prioritized over describing patterns of practice. In nursing research, these studies draw attention to the need to progress beyond measuring outcomes or examining correlates or superficial causes to identify the deeper and wider causes of outcomes (Table 1).

Complex realism has application to areas of nursing in which understanding the nature and effects of interactions between individuals, health systems, and settings is important (Table 2). These represent some of the most important issues facing nursing and society including knowledge translation in practice settings, chronic disease management, and promoting health in the community and home. Because of current patterns in healthcare, moving to a more sophisticated understanding of the factors affecting key phenomena in these areas will be vital in the coming decades.

Understanding and improving interventions

Why are cardiac rehabilitation programs so variable in effectiveness?[38]

Why do mandatory arrest policies for domestic violence increase violence?[39]

How can health be improved in areas of high social deprivation?[40]

Behavioral interventions and programs are important strategies to influence patterns of behavior. Neighborhood watch, mass-media health promotion campaigns, and cardiac rehabilitation programs are all examples of such initiatives. These are highly complex and multifaceted interventions that are very different from the tablets studied in pharmaceutical trials.[41] Yet, in terms of evaluation, behavioral interventions are often evaluated on the basis of using the same successionist/closed-systems views of causation and methods (frequently randomized controlled trial) as trials of medications.[17] As a result, findings do not examine the influence of context,[28] often lack replicability of effect,[15] and cannot explain why any variability occurs.[38] As an alternate approach, CR-driven research directs researchers to understand "what works for whom, when and why"[15] and explore the complex ways in which

Table 1. Critical realist approach to deeper causation levels

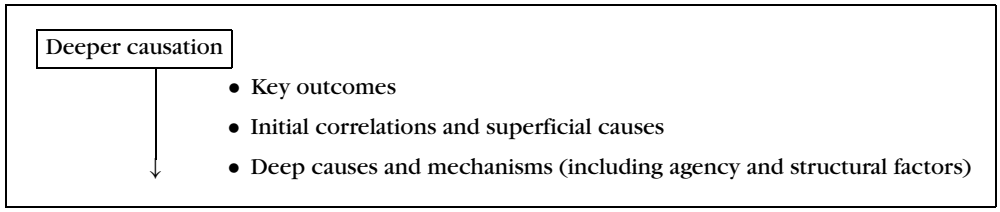

Table 2. Possible areas of complex realism–driven research in healthcare

Area	Nursing issue	Desired outcome	Phenomena of interest
Knowledge translation	Consistently low rates of evidence-based practice	Practice in accordance with best evidence/ clinical guidelines	Disciplines (S) Organizational characteristics (S) Local experts (S, HS) Clinical settings (S) Individual personality type, attitudes, beliefs, and knowledge (I)
Chronic disease management	Low compliance and ineffective self-management	Effectiveness of chronic disease management	Social capital, values, and norms (S) Health system characteristics (HS) Health services (HS) Professional interactions (S, I) Social support (S, I, HS) Caregivers (S, I, HS) Patient values, knowledge, embodiment, and attitudes (I)
Public health	Declining population health	Improved health-promoting and decreased health-harming opportunities and behaviors	Social capital, values, and norms (S) Places and communities (S) Health and social services (HS) Public attitudes, values, knowledge (I)

Abbreviations: HS: health system; I: individual; S: setting.

interventions interact with people, professionals, and settings to cause different outcomes.

Complex realism–driven approaches around the evaluation of interventions have been used to examine nursing practice settings,[36,37] health behaviors,[38] and area-based health promotion.[42] This work draws mostly on the work of Pawson and Tilley[15] (Table 3), whose approach is to examine the effectiveness of interventions in a manner that is context acknowledging, focused on deep complex causation, and is prescriptively useful. The primary unit of study is likely to be a particular change-focused entity, such as a program, an intervention, or a policy. Although evaluations of these programs in the health sphere often measure "hard outcomes" such as mortality or morbidity, CR-driven approaches are appropriate when the outcome(s) of interest are determined by or are themselves behavioral. This grounds the program in open systems.

Pawson and Tilley[15] conceive behaviors in such systems as complex outcomes, produced from the ways in which programs come together with people to generate new choices and capacities. The power of the program is therefore not inherent in the program, people, or places, but in the ways the program works (mechanisms) for people in different contexts.

How then to do this empirically? Although conceptually examining these mechanisms would seem appropriate, doing so is challenging. Mechanisms can be inactive under some circumstances and have a large effect on an outcome with only a correspondingly small

Table 3. Understanding interventions in context

1. Identify program/intervention/policy of interest
2. Specify key outcome and mediating behaviors
3. Explore and/or measure key outcomes and behaviors
4. Explore how program/intervention/policy of interest is causally linked to key outcomes and behaviors (ie, *mechanisms of effect*)
5. Explore how contextual factors affect mechanisms of effect
6. Identify key mechanism-context synergies linked to different outcomes and behaviors

Adapted from Pawson and Tilley.[15]

change in the mechanism. Moreover, mechanisms and contexts are likely to be in a degree of constant flux. It is easier to capture and measure outcomes because underlying mechanisms are difficult to conceptualize, identify, and explore.

Some argue that it is best to examine mechanisms using qualitative research[15,38]; others argue that "clues" to the nature and effects of mechanisms are accessible through analytical statistics.[26] Irrespective of competing claims, either or both can be used legitimately as long as the intention is to examine clues regarding complex causation.[12] However, relying solely on qualitative accounts (particularly of those directly involved in a program) runs the risk of ascribing primacy to subjective accounts. Conversely, relying on quantification may lead to important nonquantifiable or unexpected mechanisms to be missed.

The utility of CR arises from its constructive perspective regarding success and failure. Irrespective of whether programs have the desired effect, learning can occur on how the intervention works (or fails to) that can be used to improve effectiveness.

A small number of studies have examined nursing issues that use CR in this way. Bauld and Judge[42] and Bonner[43]describe the benefits of using a CR-driven evaluation approach to the evaluation of health action zones in the United Kingdom. These zones refer to community-wide projects in which local stakeholders work particularly closely together to address the health of local populations. A critique is therefore made of traditional experimental approaches to evaluation that fail to capture the complex dynamics of programs, populations, and settings—the understanding of which is essential to explaining program effects.[42]

Clark et al[38] examined variations in outcomes after cardiac rehabilitation, identifying that the mechanisms of effect of these programs were principally social and body related rather than related to program content or didactic information. Programs did not work through the information they provided about risk factor reduction but through patients' social experiences of the program and other participating patients and by affecting their embodied experiences of exercising. Programs generated considerable camaraderie among participants and this increased motivation and self-efficacy around exercise, particularly when patients experienced pushing their body to extremes they had not envisaged would be possible even prior to their cardiac event. However, exercise changes were not maintained if patients who experienced positive changes after rehabilitation (ie, these mechanisms were activated) did not then identify a context in which they could continue to exercise safely.

More recently, variations of this CR-driven approach to evaluation have been used to guide systematic reviews.[44] In this usage, it is the nature of key mechanisms that is seen to be more important in determining program effectiveness than the content or supposed objective characteristics of the intervention. Complex realist–driven systematic review examines family-based interventions across different fields, using

the same key mechanisms.[44] Hence, name-and-shame policies in the disparate areas of pedophilia, property tax nonpayment, and television license evasion share a similar underlying mechanism that can be meaningfully analyzed, although the outcome behavior in each area is clearly different.[20]

With regard to future applications in nursing research, the mainstream evaluation of interventions remains dominated by randomized control trials and other variations of experimental methods. Yet, there is an emerging recognition that behavioral interventions related to health promotion or disease management require approaches that produce more than a dichotomous answer to the question of "does this work?" to examine the effects of context, implementation, and user perceptions and reactions in different sites. Efficacy is no longer viewed as being determined by a small number of dimensions of programs but by the complex interactions between people, places, and programs.

Areas of contemporary nursing research amenable to this approach relate to chronic disease management programs (eg, in relation to diabetes and heart disease), health services access, and promoting health improvement in vulnerable populations. In each of these areas, although knowledge exists about what actions should be employed in leading to effective management or better health, current approaches yield disappointingly inconsistent results while there is little understanding or generation of evidence as to how current approaches could be improved.

Toward integrative programs of nursing research: Understanding biopsychosocial pathways

What are the links among experiences of the body, biology, and behavior?[45]

Based on an emergent ontology, CR views biological matter as being necessary to the existence of psychosocial entities and structural phenomena. Emergent ontology suggests that causally important phenomena arise out of a combination of factors within and between different domains. Hence, biological factors (genetics, production of neurological chemicals, environment exposure) can combine to cause changes in the psychological domain (depression, anxiety, hostility). The influence of these factors coming together can also be modified by social circumstances (isolated spatial environment, lack of family network, partner support). The effects of this can be social (apathy, reduced social networks, aggression) or physical (reduced physical activity, violence to partner). Separate to all of this are people's experiences of both external (other people, services, places) and internal (such as views and experiences of the body) phenomena. In terms of complexity, this reflects the so-called "butterfly effect" in which small changes in one factor could cause a much larger effect in a different domain.[14] In and between these systems, there is neither chaos nor order but complexity.[46]

This simplified account conveys the interdependency and complexity of these different systems that are familiar to practicing nurses but are very challenging to research. Many approaches to nursing have advocated that the discipline be based on philosophies that recognize the biological, social, and psychological dimensions of health, illness, and healing,[47] dimensions of human experience such as embodiment, the multiple determinants of health,[23] and the need to examine causal interactions between the individual and his or her environment. However, examining links in research among biological, social, and psychological factors is challenging. Few researchers are expert across these domains and measurement difficulties abound. Complex realism, however, offers a common approach through which researchers from different disciplines can work together with common language and approach to understand biopsychosocial phenomena. Consequently, although this area of CR inquiry is in its early stages, it offers great potential to nursing. First, biologists are comfortable with a vocabulary that makes references to mechanisms, outcomes, and environmental effects.

With advances in gene mapping and increasingly large data sets and causally focused data-mining techniques, it is conceivable that researchers will be able to explore the sophisticated pathways that causally link genetics, biology, behavior, and psychosocial variables. As yet, there have been few attempts based on CR to address these multiple levels. To show the potential of research in this area, we discuss a recently funded CR project in the area of women's health.

Although it has been postulated that postpartum depression is linked to hormonal changes, no hormonal causes have been established.[48] Psychosocial predictors of postpartum depression have been identified including life stress, lack of social support, and socioeconomic disadvantage.[49] However, in CR terms, these may not be the actual causes of depression. Although depression before pregnancy predicts postpartum depression in around 50% of cases, even taking these other factors into account, it is unclear why some women with previous depression do not experience postpartum depression, whereas others do. Postpartum depression, therefore, appears to be the result of a complex and reciprocal interplay of underlying biological, psychological, and social causal factors that produce vulnerability to depression with specific contextual processes/circumstances and expressions of the clinical syndrome varying from woman to woman by context.[50] By examining causes of depression in women stratified by the presence or the absence of depression (ie, by varied outcomes), it is possible to explore how dimensions of context and mediating psychological mechanisms appear to influence mental health. Using semistructured interviews, clues regarding the possible mechanisms linking contextual and personal factors to the depression can be illuminated and investigated using future quantitative and qualitative studies.

Concluding comments

Understanding complex patterns should be a priority for nursing because it addresses key present and future healthcare challenges. The presence of a sound and articulated ontology is an important element of nursing research. Critical or complex realism offers a stated and unified approach that confronts complexity, acknowledges the importance of both agency and structural factors, and enables nurse researchers to work collaboratively across disciplines and methods. Complex realism is particularly useful for informing research into priority areas related to understanding complexity, improving interventions, and explicating biopsychosocial pathways.

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