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Organizational interventions

Facing the limits of the natural science paradigm

by Amanda Griffiths, PhD¹

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This paper reviews current challenges in the conceptualization, design, and evaluation of organizational interventions to improve occupational health. It argues that attempts to confirm cause-and-effect relationships and allow prediction (maximize internal validity) are often made at the expense of generalizability (external validity). The current, dominant experimental paradigm in the occupational health research establishment, with its emphasis on identifying causal connections, focuses attention on outcome at the expense of process. Interventions should be examined in terms of (i) conceptualization, design and implementation (macroprocesses) and (ii) the theoretical mediating mechanisms involved (microprocesses). These processes are likely to be more generalizable than outcomes. Their examination may require the use of both qualitative and quantitative methodologies. It is suggested that such an approach holds unexplored promise for the healthier design, management, and organization of future work.

Key terms evaluation, occupational health, philosophy of science, qualitative research, quantitative research, work design.

As the 21st century begins, work in industrialized and postindustrialized societies is physically less strenuous and dangerous than before. However, other less tangible factors, largely concerning the design, management, and organization of work, now represent common threats to workers' physical, social, and psychological health (1, 2). Although the latter is usually conceptualized along dimensions such as job satisfaction, stress, anxiety, and depression, it might also include morale, self-esteem, aspirations, and autonomy (3). It is widely recognized that improving the design, management, and organization of work (often referred to as the "psychosocial" work environment) may be an important step in improving employee health and organizational productivity (4). In the United States, the National Occupational Research Agenda Organization of Work Team has usefully conceptualized changes affecting the design, management, and organization of work at the following 3 levels: (i) socioeconomic, political, technological, and demographic forces at national and international levels (eg, trade policies, information technology), (ii) macrolevel changes at the industry or company level (eg, downsizing, outsourcing), and (iii) microlevel changes in the workplace (eg, work load, participation, support) (5). This paper focuses

largely on factors at the 3rd level. But questions about how to monitor such developments at all levels, how to examine their effects on both individual and organizational health, and how, when necessary, to intervene loom large in the horizons of researchers, practitioners, and policy makers. Some of the answers lie in developing better ways of identifying trends and analyzing problems, particularly in a climate of constant change. But part of the solution lies in the careful design and thorough evaluation of interventions.

This paper reviews current challenges in the conceptualization, design, and evaluation of organizational interventions and makes suggestions for future research. It argues that the current favorite criticisms of organizational interventions — that they do not have good control groups (and that therefore we cannot safely ascribe cause-and-effect) and that they are not generalizable — may in many cases be unwarranted. Focusing exclusively on these 2 issues may be misguided and conceal other important questions. In any case, attempts to confirm cause-and-effect relationships and allow prediction (maximize internal validity) are often done at the expense of generalizability (external validity). The current, dominant experimental paradigm in the research establishment, with

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its emphasis on identifying causal connections, focuses attention on *outcome* at the expense of *process*. Interventions can be evaluated as "experiments", but they should be examined in terms of conceptualization, design, and implementation (macroprocesses) and be explored via the *detail* of the nature of change (microprocesses). These microprocesses, or theoretical mediating mechanisms, are less context-specific and hence more generalizable than outcomes. They currently hold unexplored promise for understanding organizational interventions. They also offer possibilities for the healthier design, management, and organization of future work. These 3 dimensions of interventions — outcomes, macroprocesses, and microprocesses — are considered in this paper.

Interventions as experiments

Organizational interventions to improve occupational health are usually regarded as "experiments". Experiments are designed to discover whether or not desired changes occur as a result of the manipulation of some important variable or the introduction of a particular treatment. In other words, they were conceptualized as tests of cause-and-effect hypotheses. This method originated largely as a laboratory-based exercise in the natural sciences, where temporal priority, control over important variables, and random allocation of subjects to treatment or control groups (the minimum necessary requirements for establishing causal connections) are generally feasible.

Yet in organizations we are dealing with *social* experiments, in which these conditions rarely apply. Researchers are guests, not autocrats. Causal relationships are not simple; they are embedded within complex contexts. Although temporal issues may be documented (eg, that treatment preceded change), interventions can rarely manipulate only one variable. And, when one works within the operational constraints that characterize organizations, random allocation of subjects to groups is virtually impossible.

Even with the random allocation of subjects to groups, some alternative explanations for intervention outcomes exist (ie, other than that the intended manipulation was responsible). But without random allocation, many alternative explanations remain. For example, control (or comparison) groups can themselves represent threats to causal inference in organizational interventions. It may be that people's reaction to being in a control group influences the apparent outcome of an intervention, rather than any intended manipulation of the treatment group. Cook & Campbell (6) list 4 such threats that may affect any subsequent difference between intervention and control groups (and hence cause-and-

effect interpretations), without necessarily affecting the actual intervention being tested. First, control groups may resent the fact that other groups are receiving apparently more desirable treatment than they are, and this resentment may lead to increased dissatisfaction and decreased performance (*resentful demoralization*). Second, control groups may respond by trying harder (*compensatory rivalry*). Both such effects would make subsequent intervention-control group differences hard to interpret. Third, if employees or managers in control groups learn about and become impressed with the types of intervention being provided elsewhere, they may either deliberately or unintentionally implement them themselves (*treatment diffusion*). And, fourth, intervention providers may become unwilling to tolerate what they perceive to be inequalities between the intervention and control groups and, therefore, may try to overcome these inequalities by whatever means at their disposal (*compensatory equalization*). These 4 threats have all been observed in social experiments (7).

In their influential book on research designs, Campbell & Stanley (8) described various other threats to causal inference. They include the effects of history, maturation, selection, testing, instrumentation, regression to the mean, and mortality. They argued that many of these threats to internal validity can be ruled out by careful research strategies. Various ingenious designs, commonly referred to as quasi-experiments, have been suggested, each of which deals with a different set of threats to causal inference. These designs may require, for example, a series of preintervention and postintervention measurements, the sequential introduction of intervention, some groups having no preintervention measurements, some having no postintervention measurements, some groups having no intervention at all, and various combinations of these situations. But in time it has become clear that quasi-experiments are rarely used (7). While possible in many fields of social science (community health promotion, for example), within functioning organizations they are extremely challenging.

Highlighting the difficulties and limitations of thoroughly evaluated "outcome" research is not an argument for its abandonment, particularly since research has shown that the more rigorous the design, the more modest the documented results of the intervention (9, 10). But, rather, the acknowledgment of these challenges represents a plea to researchers, journal editors, practitioners, and policy makers alike for more realistic expectations, more appropriate criticism, more in-depth interpretations, and a greater awareness of alternative (but complementary) approaches. Researchers should frankly acknowledge the unavoidable constraints of their designs against ideal "experimental" principles and attempt to explore some of the challenges in interpreting outcomes (the remaining threats to internal validity) by other

means, such as demographic or attitudinal data (9), or by qualitative approaches. I shall return to this point, and the related issue of generalization, in the sections on "paradigms and methodologies" and "external validity".

Implementation evaluation — macroprocesses

Clearly, examining the effects of organizational interventions solely within experimental and even quasi-experimental paradigms is probably unrealistic and is unlikely to provide optimal understanding. However, an exploration of the *process* of organizational change may enrich our understanding further. Researchers working in different countries over recent years (notably in Finland, the United States, the United Kingdom, and The Netherlands) have independently discovered that whatever the content of the intervention, the necessary implementation issues are similar, all resting heavily on the participation of employees and other key stakeholders (eg, 11—16).

Careful documentation of the process of implementing interventions in both intervention and nonintervention groups is crucial. Without it, the interpretation of intervention outcomes is difficult. Exactly to what, for example, can "no-difference" findings be attributed? Was the analysis of the original problem wrong? Was the design of the intervention inappropriate? Was the implementation deficient? In the absence of documentation about the integrity of the intervention, even positive results do not make clear what role the *intended processes* played in bringing about the outcome (7). Detailed questions should be asked about how the intervention was implemented. Did it reach the intended number of people? Did people comply with what they were supposed to do? What appeared to be the barriers to compliance? If the intervention involved a planned increase in the number of consultative meetings, did the meetings increase in number? How many people attended? When an intervention was aimed at increasing support for employees, partly via training for their supervisors, was such training mandatory? If not, was there anything different about the attendees and nonattendees? Did the training appear to make a difference to supervisors' knowledge or attitudes or behavior? Did employees notice? If the objective was to enhance communication via a weekly newsletter from the departmental manager, how many people actually received it? How many read it? Did it communicate anything considered useful? How many people in the comparison group (without such a newsletter) actually got hold of it and read it? More generally, what were the views of key stakeholders about the implementation of the intervention? What were their models of intervention? How did they conceptualize improvement? What did it mean for them? And, importantly, what were the unin-

tended spin-offs? Much of the useful information about these issues, and many others, can be revealed by qualitative methodologies. Such information facilitates judgments about why an intervention may or may not have had any impact; in other words, it informs the evaluation of outcome. It may also provide some indication of the nature of the underlying processes and mechanisms involved.

Mediating mechanisms — microprocesses

Literature reviews point to many aspects of work design and organization that are associated with health-related outcomes (17—21). Basic research, much of it epidemiologic, provides a strong indication as to the *broad* type of intervention that would seem to have the most potential for improving employee well-being (22). However, identifying these broad dimensions is one matter; identifying them in a local context, in one particular organization, at one particular moment in time, and designing an intervention to improve things is quite another.

Let us take "control" as an example. There is now much agreement across many studies from various countries that people reporting low levels of control at work are at greater risk of coronary heart disease. It is also known that people in low employment grades have a higher incidence of coronary heart disease, and report less control, than higher status workers. These differences in the perception of control alone may explain a substantial amount of the socioeconomic gradient in coronary heart disease (ie, in addition to differences in traditional risk factors and the effects of early environments). It has been suggested that control may play a role in the generation and maintenance of social inequalities in health (23). Most investigations into work control have come from research-based, epidemiologic perspectives, and they have used broad-brush, standardized measures that can be applied to many different types of job situation. These measures are robust enough to reveal broad associations between work conditions (eg, low control) and worker health (eg, coronary heart disease, musculoskeletal disorders, and minor psychiatric disorders). The trouble is merely knowing that an employee is experiencing low levels of "control", that such a thing is "bad" and predicts various ill-health outcomes, does not necessarily help us change things. While there are clear advantages for researchers to keep the model simple, this important factor has thus far had little practical impact in the workplace. The concentration of effort to establish (and re-establish) causal connections, and hence to enhance general prediction, seems to be at the expense of both an exploration of mechanisms and, ultimately, the effective translation of research into practice. So, what does "control" really look like?

Control has been widely used in the occupational health and organizational psychology literature to represent a collection of overlapping constructs such as participation in decision making, decision latitude, skill discretion (the breadth of skills a worker can use on the job), decision authority, autonomy, influence, challenge, empowerment, ownership, self-determination, or workplace democracy. Control can concern workers' ability to make decisions about tasks or conduct during the workday (eg, influence in the planning of work activities, encouragement to take own initiative or ability to choose rest breaks) or wider organizational participation (influence in setting goals, making other decisions that affect their jobs or involvement in organizational strategy and policy). Control may be operationable at many levels; for example, control over the task itself, control over the work environment, control over the organization and management of work, control over the planning and achievement of career goals, or control over others. Control has served as a convenient name covering several dimensions of work. Even the original proposers of the job control-job demands model admit that "it is difficult to be precise" about which aspects of control (or demands) are important (24). Perceived lack of control (or any other undesirable aspect of work design and management) is likely to be a result of factors unique to each organization at any one moment: it is context-specific. We should ask what exactly does it *mean* when people report they have little control at work in terms of their feelings, decisions, and behavior? And, exactly how does this translate into psychological and physical health outcomes? This level of analysis is currently rare and our lack of knowledge hampers attempts at intervention. Some of the answers may already be appearing in distinct literature. For example, studies concerning the health effects of participation in decision making at work are rarely mentioned in the literature on organizational development, or in the literature on distributive and procedural justice. Distributive justice refers to the outcome of decisions; procedural justice concerns the procedures which led to that outcome. Procedural justice, often the actual or perceived possibility to influence decision making, is seen as more important than distributive justice in determining people's overall judgments about work. People have fewer negative reactions to unfavorable outcomes when procedures are fair (25, 26). Various theories have been proposed to account for the psychological phenomena which might underlie such results (27, 28). This approach to the study of behavior at work may have much to offer research which attempts to understand the micoprocesses underlying the relation between control and health.

Another important broad dimension in "healthy work" appears to be support, particularly from line managers or supervisors. But there is little in the literature

exploring the nature and origins of such support at work (29). There is even less exploring the precise function of such support. Outside the work context, it has long been established that social support can reduce ill health and psychological disturbance, but, for this relationship too, there is a lack of studies which serve to examine the possible intervening mechanisms (30). We do not understand exactly how social support influences well-being. Furthermore, it would appear that the positive effects of social support may depend on the nature of the measures used and that social support is not always positive; there should be a match between support and individual coping requirements (31). Instead of simply trying to establish *whether* increasing the perceived level of support "helps", we could examine precisely *how* increasing support affects people.

Attention to these principles, these presumed micro-processes underlying interventions, these theoretical mediating mechanisms, is a crucial next step in our understanding of organizational interventions. It is these principles that will be generalizable, probably much more so than the outcome of any particular intervention. And it is this knowledge which may ultimately help us to design more effective types of intervention. This step is particularly important in the world of work, where change is a constant feature. Rather than observing the impact of new ways of working as they emerge, we may be able to predict their health effects at the design stage. Cook & Shadish (7) use a neat illustration. "The presumption is that once such knowledge has been gained, the crucial causal processes can be transferred to novel contexts of application. Cook & Campbell (1979 [6]) use the example of a light switch to illustrate this. Knowledge that flicking the light switch results in light is the type of descriptive knowledge about manipulanda that experiments promote; more explanatory knowledge requires knowing about switch mechanisms, wiring, and circuitry, the nature of electricity, and how all these elements can be combined to produce light. Knowing so much increases the chances of creating light in circumstances where there are no light switches, providing one can reproduce the causal explanatory processes that make light in whatever ways local resources allow" [p 574].

Paradigms and methodologies

Clearly, carrying out experiments in organizations is probably impossible. In many situations even quasi-experiments may be too much to ask for. Establishing the extent to which the intervention is the *only* systematic difference among the groups under study (ie, providing internal validity) is fraught with difficulty. Really, it is unrealistic to expect the natural science paradigm to explain highly complex, constantly

changing systems such as organizations and to predict the specific effects on individual behavior and health. This quantitative paradigm is really better suited for the natural world, for physics and for single-cell activity. It is highly unlikely that the often-quoted "messiness" of human life can be fully understood in such terms. As Edgar Schein (32) has described (as quoted in reference 33), the "traditional research paradigm . . . has not worked very well . . . [it] has produced very reliable results about very unimportant things In that process, we have lost touch with some of the important phenomena that go on in organizations, or have ignored them simply because they were too difficult to study by the traditional methods available" [p 2].

Questions about the limitations of the natural science approach and its dominant methods of inquiry, and about the futility of "physics envy", have been noted by many distinguished academics from several disciplines in the social sciences. Many do not agree with the sociobiologist Edward Wilson (34), who predicted that the social sciences would one day be made as rigorous as physics by grounding them in evolutionary theory, genetics, and neuroscience. In fact more recently even Wilson himself does not appear to take such an extreme view (35, p 148). The anthropologist Clifford Geertz (36), describing the development of ideas over the last 2 decades among his fellow social scientists at the Institute for Advanced Study in Princeton, New Jersey, noted, "We are hardly of one mind on everything and we have different interests and different problems before us; but we are all suspicious of casting the social sciences in the image of the natural sciences, and of general schemes which explain too much Human beings, gifted with language and living in history are, for better or worse, possessed of intentions, visions, memories, hopes, and moods, as well as of passions and judgements, and these have more than a little to do with what they do and why they do it. An attempt to understand their social and cultural life in terms of objectivized variables set in systems of closed causality, seems unlikely of success" [p 127]. Similarly, the linguist Noam Chomsky (37) proposed that our verbal creativity may prove more fruitful than scientific skills for investigating human behavior: "It is quite possible — overwhelmingly probable, one might guess — that we will always learn more about human life and human personality from novels than from scientific psychology. The science-forming capacity is only one facet of our mental endowment. We use it when we can but are not restricted to it, fortunately" [p 159].

There are many types of knowledge, and while scientific "truths" may be better than others, there are those that have little to do with science but which nonetheless remain useful: historical facts, for example, as well as literature and that knowledge which we all rely on to get through everyday life, known as "common sense". These

more qualitative types of knowledge are indeed "good enough" truths, and in our attempts to understand people's reactions to changes in the world of work, should not be dismissed. Even methodologists as highly respected in the established (quantitative) research community as Cronbach (38) propose that the qualitative methods of historians, ethnographers, or journalists may be useful to generate and explore hypotheses about the micro-mediating processes involved in interventions. Nonetheless, as Cook & Shadish (7), equally respected, point out, "Although we personally have a lot of sympathy for this qualitative approach, it is likely to fall on deaf ears in the social science community at large" [p 575].

While the strengths of quantitative methods have been appreciated by many in occupational health disciplines for some time, the advantages of qualitative methods have been appreciated by few, and only relatively recently. Barbara Israel and her colleagues (39—41), after having been engaged for many years in public health intervention, have emphasized the importance of acknowledging that knowledge is socially constructed, rather than a static, objective body that is separate from the knower. (This latter "positivist" paradigm has dominated public health, just as it dominates occupational health and psychology.) These authors describe how a "constructivist" approach, acknowledging the social, cultural, and historical contexts, requires specific research methods that are determined among other things by theoretical perspectives (including "local" theory), the purpose of the study, the context, the involvement of participants themselves, and how the information is to be used. Under such conditions, both quantitative and qualitative methods can be used (41). In their review of the health-related outcomes of multicomponent worksite health promotion programs, Heaney & Goetzel (10) also recommend that such qualitative evaluation methods could confer certain advantages. Clearly the same argument is pertinent for organizational interventions: by definition, an organizational intervention cannot take place outside the participation and experience of the subjects under study.

Qualitative methodologies, based on people's verbal utterances or written reports, are interpretative in nature, use a smaller number of participants, and seek to identify the meaning of events in the social world. They ask "What is it like?" rather than "How much of there is it?" They are poorly understood and little used by most researchers interested in the implications of work organization for employee well-being and performance. But they may provide a useful adjunct to traditional quantitative approaches for at least 3 reasons. First, they are useful as a stand-alone technique to examine the richness and significance of people's (context-dependent) experience; quantitative methods fail to capture the richness of the meaning of organizational interventions. Second, grounded in rich data, they are helpful in the

generation of *new* theories; quantitative methods have been criticized for their overemphasis on testing existing theories (42). Organizational interventions, as examples of action research, are ideal for generating and testing new knowledge (43). And, third, they are useful in the early stages of problem analysis and project design. There is now a growing recognition of the need for these methods in psychology (44–47). However, this burgeoning interest in qualitative intervention evaluation may have arisen largely from a recognition of the limitations of quantitative approaches. It seems unlikely that it has arisen because of any prominent successes of qualitative evaluations; they are hard to find and seem to be confined to local efforts and to improving ongoing programs rather than to determining any larger impact (48).

There is considerable reluctance in the academic community to use qualitative methods in organizational interventions to improve occupational health. Just like the behavior we study in organizations, science too is embedded in social context (49). It is not carried out by people in isolation. Funding agencies play a major role in shaping scientific knowledge, as do the editorial policies of journals. Qualitative methods are often not as highly valued by the current, natural-science-dominated research establishment as are quantitative approaches, even when the latter come close to mindless empiricism. For example, the proliferating number of publications and conference presentations about the psychometric properties of various new self-report measures of the work environment (without actually *using* them in any way to provide external data) seems unlikely to advance the field very much (50). Qualitative research is often assessed against the traditional criteria used for quantitative methods. This procedure is not always appropriate. Certain criticisms, for example, that analysis is an interpretative process and hence the output is not reliable or valid, are addressed by qualitative researchers (47). For the reasons already described, and others, methodologically diverse intervention studies take a long time and are difficult to publish. They are not good for the careers of researchers in academic communities where performance is judged simply on the number of publications.

So, having considered how the zealous evaluation of organizational interventions, in terms of the natural science paradigm, can present a barrier to progress, how do we respond to the criticism that we cannot extrapolate the results of most organizational interventions, however obtained, to unstudied populations? This problem brings me to consider the question, or the “myth” of external validity.

External validity

A common knee-jerk reaction to organizational interventions, and hence a pronouncement of their acceptability

and potential usefulness, is along the lines of “but they are not generalizable”. External validity can be defined as the extent to which experimental findings make us better able to predict real-world behavior (51, p 25). Notwithstanding the difficulties of carrying out experiments in organizations and the fact that all such endeavors are highly context-specific, there is still much confusion over the *need* for research to be generalizable (externally valid). External validity is only important if we intend to make a decision on the basis of the outcome of the study in question. In other words, if prediction is our aim. But research is not always about predicting behavior. Its purpose can be to help us understand the world in a different way. Then, external validity is often irrelevant.

To take an example, Mook (51) describes Johansson’s classic study (52), in which participants observed movies or still frames of people walking in a dark room with small light bulbs attached to their major joints. Those who watched the movies saw people walking, whereas those who looked at still frames saw meaningless patterns of dots. “Could we find a more blatant case of external invalidity? Does your representative *Homo sapiens* walk around in the dark with light bulbs on his knees? Does he watch other people doing so? Are we going to generalize these findings and attempt to predict how a population will react to ambulant Christmas trees? I do not think so” [p 29]. The purpose of this investigation was an exploration of principles. And often “the generality of the principle rests on the diversity — not the representativeness — of subjects and settings in which instances arise. The external validity of individual studies, or the lack thereof, plays no part in this inductive process” [p 26]. Purposive sampling strategies to increase heterogeneity (to show that a particular type of intervention is robust in many different situations) or to select representative instances (to examine situations similar to the settings to which generalization is sought) can help determine how broadly a principle or causal relationship can be generalized (53). But, as pointed out earlier, it is the micromediating processes underlying interventions that can be the most usefully generalizable.

Concluding remarks

There are 3 types of scientific endeavor relevant to our interest in the effects of work design and organization on health. The 1st aims to identify broad patterns in the relationship between work and health: the pioneering studies of Töres Theorell, Robert Karasek, and Jeffrey Johnson are fine examples (54). A 2nd strand of research aims to explain the underlying structures, mechanisms, and mediating processes. And a 3rd aims to apply this knowledge, once gained, to predict, diagnose problems, and improve the quality of work for both employees and

their organizations. A major task ahead in organizational intervention research is to further our understanding of the mediating processes involved in people's reactions to their work environment: for example, in modeling important general concepts such as control and support and exploring how they might serve as protective factors. Organizational interventions will play an important role in these more theoretical and practical endeavors. But "if our aim is to explain behavior as it occurs in ordinary life there is no escaping the ordinary description of behavior and experience. Certainly causal mechanisms and structures discovered by experimental psychology or other sciences apply to such behavior, but by themselves they do not provide sufficient explanation, and they certainly do not enable us to dispense with ordinary language and to substitute a pure language of behavior" [55, p 410].

Partly as a result of pressures from the natural science establishment, those of us engaged in organizational intervention research may have sometimes put the cart before the horse — methods before problems and prediction before understanding. While the scientific method is necessary for many endeavors towards understanding people's thoughts, feelings, and behavior at work and, in turn, their ramifications for health, it is not sufficient. This realization, although not new, has had limited impact on the scientific community. In 1959, reviewing the contribution of psychology, Sigmund Koch (56) wrote "From the earliest days of the experimental pioneers, man's stipulation that psychology be adequate to science outweighed his commitment that it be adequate to man" [p 783]. I suggest, 40 years later, that this criticism still holds true. In the real world, we cannot expect to achieve complete closure; we deal in patterns, probabilities, and, of course, uncertainty. Understanding open systems demands more than experimental science can provide. It requires knowledge and acceptance of additional contexts and a variety of methods. Once employed, these new approaches may enable us to understand far more about how the design, management, and organization of work affects the health of both employees and their organizations.

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