National Cancer Institute
Division of Cancer Control and Population Sciences
Behavioral Research Program

Toward Better Theories of Health Behavior
Theories Projects Workshop 2002

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Meeting Summary

Welcome and Introduction
Drs. Neil Weinstein, Barbara Rimer, and Robert Croyle

Dr. Neil Weinstein, Workshop Chair and Professor in the Department of Human Ecology at Rutgers University, welcomed participants and introduced members of the Workshop Steering Committee (comprised of himself and Drs. Barbara Rimer, Robert Croyle, Meg Gerrard, William Rakowski, and Alexander Rothman). He explained that the workshop was sponsored by the Behavioral Research Program in the National Cancer Institute's (NCI) Division of Cancer Control and Population Sciences (DCCPS).

Dr. Barbara Rimer, Director of the DCCPS, participated in the workshop via conference call. She noted that the topic of health behavior theories has not yet been given the appropriate emphasis, and credited workshop participants as being among the individuals who can move the field forward. She asked participants to think broadly throughout the workshop and noted that there are significant gaps between health communication and health behavior theory that need to be bridged. Dr. Rimer concluded her introductory remarks by thanking participants for their attendance and the Steering Committee for their efforts.

Dr. Robert Croyle, Associate Director for Behavioral Research in the DCCPS, explained that the workshop was an outgrowth of broader activity at the NCI and National Institutes of Health (NIH) that is focused on accelerating progress in the testing, validation, development, and revision of health behavior theories. The workshop brought together experienced contributors on this topic from a variety of perspectives such as public health, health psychology, behavioral medicine, and epidemiology, as well as experts who work across different domains and risk behaviors, not solely in the areas of cancer prevention and control. Dr. Croyle noted that it is rare at the senior professional level to have a group such as this meet and spend a significant amount of time discussing theory and theory development in depth.

Dr. Croyle explained that one of the workshop's goals was to determine how to serve the field and science at large by finding ways to engage intellectual efforts in theory testing and building the interaction between evidence and theory revision. The NCI is committed to following up on the results of this workshop, which also is intended to initiate an ongoing series of large and small activities on this theme.

Dr. Weinstein stated that all current theories of health behavior have significant limitations. Furthermore, progress in improving theories that explain or encourage healthy behavior has been slow. The scientific process, in which theories are tested, weaknesses exposed, inadequate theories rejected, and better theories arise to take their place, has not been taking place. He asked participants to offer suggestions on how the NCI and other funders can improve this process. Thus, the purpose of the meeting was to find ways to encourage theory development and testing, not to develop a theory during the workshop or to choose among existing theories.

SESSION 1: Theory or Theories? Different Theories for Different Groups?

Presenter: Dr. Robin Mermelstein

Dr. Mermelstein, Associate Professor and Deputy Chair of the University of Illinois at Chicago's Health Research and Policy Centers, presented an overview of the challenges in developing theories that are generalizable to diverse populations and offered suggestions for ways that researchers may become more sensitive to population differences. Dr. Mermelstein noted that researchers often seek universal, generalizable laws and theories, but phenomena need to be understood within their unique cultural contexts. "Scientific" research designs and methodologies are not necessarily "bias free" and applicable to different populations. Values and cultural orientation dictate to some extent which hypotheses are formulated, which variables are considered extraneous, how variables are controlled, and which theories are built on.

Ethnicity and culture are different terms. It is important to differentiate between an "ethnic identity" one assumes in context and an "ethnic label" that is imposed. Dr. Mermelstein explained that ethnic identity may be claimed or distanced in particular contexts, it is not static. Ethnic identity is based on shared meanings that emerge from collective experiences, while ethnic label is a static designation. She noted that ethnic labeling groups people together who may have as many differences as similarities. Dr. Mermelstein defined culture as an enduring set of social norms and institutions that may organize the lives of members of particular ethnic groups (e.g., a set of "mental blueprints" for an ethnic group).

Discussions about ethnicity and culture are important for health behavior research because of mounting criticism about the way race/ethnicity has been used in public health research as a set of "black holes." This approach focuses on individual and group traits, rather than on the contexts in which people live. Dr. Mermelstein explained that a more relevant issue may be whether health behavior in particular social and economic contexts is influenced by cultural norms and processes, and if so, how these influences manifest themselves. It is important to recognize that a great deal of research and theory has a strong Eurocentric paradigm—research instruments that are widely employed for a white and generally middle-class group—and this

group frequently and inappropriately serves as a normative population from which to judge other populations.

Dr. Mermelstein explained that choice of constructs matters because some constructs are more relevant to certain cultural groups than others (e.g., the concept of ethnic identity among adolescents may have dramatically different meanings for white, middle-class youth whose families have been in the United States compared with adolescents in families of recent immigrants).

When selecting measures and establishing crosscultural equivalency, researchers need to consider: (1) translation or language equivalence, (2) cultural and socioeconomic equivalence, (3) conceptual equivalence, and (4) metric equivalence. She noted that the range of behaviors relevant to a particular construct may vary across different cultural populations, and the same behavior in different cultural contexts may result in very different outcomes. Furthermore, definitions of constructs may vary across cultures (e.g., body image in white versus African-American females). An understanding of relevant concepts and theoretical frameworks across diverse cultures can be established through the use of culturally anchored perspectives and qualitative research to discover a system of meanings for a group. In attempting to understand the meaning of group differences, researchers should investigate the pattern of relationships among variables and explore how cultural context variables moderate the relationships between predictor and criterion variables.

Dr. Mermelstein concluded her remarks by making the following recommendations:

- Bring multiple stakeholders to the table in formulating the question of interest and salient constructs (have participants and investigators from different disciplines)
- Define cultural groups with meaningful variables (multiple indicators versus single proxy)
- Search for underlying processes and mechanisms rather than solely tallying or describing outcomes
- Develop novel methods and analytic techniques
- Encourage training in issues of diversity and lifespan development (sponsor workshops at key national meetings, incorporate ethnic and gender issues into most courses)
- Introduce researchers to a broad array of research designs and methods from different disciplines (use of ethnography, other qualitative methods)
- Encourage journals to "require" authors to examine gender and ethnic differences as moderators
- Facilitate opportunities for crossinstitutional collaborations to increase access to a more diverse sample
- Recruit a critical mass of ethnic minority students, faculty, and staff into health behavior research.

Reactor: Dr. Karen Glanz

Dr. Glanz, Professor and Program Director of the Social and Behavioral Sciences Program at the Cancer Research Center of Hawaii, presented on basic assumptions about ethnicity and other diversity-related issues such as socioeconomic status, gender, life stages, sexual orientation, and

geography. Dr. Glanz noted that there are so many ways to identify and differentiate special populations that it raises a number of challenges. One of these challenges is that there is much more heterogeneity within groups than between them. Dr. Glanz provided the following examples: (1) there are more than 550 American Indian tribes, (2) there are many Asian-American ethnic subgroups, (3) adolescents in two-parent households versus runaways and those in foster care, and (4) healthy elders versus those who are physically disabled.

Assumptions, therefore, are very complicated and generalizations and stereotypes are seldom useful, but they often are hard to resist because researchers want to make general statements that apply to a wide range of groups. Society changes over time, leading to misperceptions and changing stereotypes. For example, many still believe that large body size for women is attractive in the Polynesian culture, but that is no longer the case.

Dr. Glanz explained that generality is basic to the definition of theory. Operationalizing a theoretical construct requires understanding the audience (e.g., what the research questions mean to them, what language they can understand), and theories only become concrete when they are applied. The relationships uncovered through theory testing may vary across different groups. If a model does not work as well in one population as it does in another, that is an empirical finding—it does not mean that the theory is not applicable any more than if it does not work as well for one topic area or one health problem area as it does for another.

Dr. Glanz described a debate that has surfaced in the diabetes literature. One group of researchers working with American Indian and Native Hawaiian populations found that Social Cognitive Theory and the Stages of Change Model were very useful for developing participatory community-based programs and applying the constructs. This work was published in the journal *Diabetes*. In the same issue of that journal, another group of researchers found that none of the health behavior models were effective in a population of elderly Hispanic women. Culture impacts theory. Many cultures believe that disease is caused by fate, by angering the gods, or by talking about illness. These cultures understand risk and risky behaviors, but do not necessarily feel they can be controlled. A related question is: when is a new theory needed? Theories proliferate for many reasons other than the fact that they might actually be needed.

Dr. Glanz said there has no empirical evidence she is aware of to indicate that a particular theory works more or less effectively in selected ethnically different groups than it does in the majority of racial groups. She recommended that researchers be encouraged, supported, and rewarded for developing solid relationships with the populations they study. This work is difficult and the rewards currently are low. She also recommended that social scientists apply the principles of developing good interventions in their work (i.e., start where the people are; stepwise intervention design; and pretest, pilot test, and obtain feedback).

Discussion

In discussion, participants were asked what theories are and how they are different from hypotheses, axioms, and models. One participant responded that, in general, theories are systematic ways of putting together constructs that are believed to explain or predict some phenomenon. The definition of theory is vague, however, and does not provide much guidance. One challenge to defining theory may be identifying boundary conditions (e.g., life cycles,

geography, age, gender, time) of theories and then determining whether the theory is applicable in different groups. Pushing the limits of theories or setting boundary conditions is perhaps one of the best ways of refining existing theories. It is not clear whether new theories are needed; but there is a clear need to better understand the increasing number of social, environmental, and contextual factors and conditions.

One participant asked what it would take to modernize theories. It was noted that current theories represent a previous historical view of human nature. It may be that the view of human nature has changed, but human nature itself also may have changed. The knowledge base has expanded greatly. There is some debate as to whether models can be modified and culturally sensitive so that they are appropriate in any given population. Almost any theory can be tested on any audience if it is operationalized properly. However, the theory may not be useful in developing predictions or ways to improve conditions or situations.

Participants discussed between-group versus in-group variability. Are the group differences more or less important than the individual differences? How much variability is there that is predicted by group status versus individual status? The answer depends on researchers' beliefs about how to approach interventions. From a public health perspective, group differences are likely to be thought of as most important. From a clinical psychological perspective, individual differences are most important.

In studying the socioeconomic gradients found in health disparities, it is clear that how these social or economic conditions translate into biological differences is not well understood, and they continue to be studied on a group basis. There is tremendous individual variation within those groups, and there are individuals within those groups who fall outside of the norm. If the research community could determine how that occurs, it might help in understanding some of the underlying mechanisms that lead to these differences. Participants were asked what the null hypothesis should be regarding group differences. There was discussion on distinguishing between explanatory theory and theories of change.

Communalism—rather than individualism—may be an important variable. Another could be the effect of peer influences versus parental influences. It may important in cases where there is an interaction with a group or a moderating condition, perhaps even a crossover interaction, to look for a specific, falsifiable condition. Theory builders need to have the necessary constructs to explain a phenomenon. If there is another population that acts in a different way from other populations, the theory must be able to produce an estimate of the probable data weight to explain the difference. Existing theories have sets of constructs, and each of the constructs has variance with different subgroups. However, no existing theory is able to make predictions about the kind of moderator effects that researchers are encountering with different subgroups. One of the alarming weaknesses of many models is that they do not have a construct for this and so cannot make predictions about those moderator-effect interactions that keep occurring.

SESSION 2: Theory Interests and Theory Skills in Health Researchers

Presenter: Dr. Barbara Curbow

Dr. Curbow, Associate Professor in the Department of Health Policy and Management at the Johns Hopkins University School of Hygiene and Public Health, explained that applied health researchers are always using social and behavioral science theories in their work. These theories usually are required as part of grant applications or publications and are broadly accepted as a way to organize research questions. However, even though theories are used in public health, there is not always an understanding of the intellectual background of the concept. Furthermore, theories are not typically used critically or with the goals of theory testing or development.

According to Dr. Curbow, public health students often are taught a small number of theories that are routinely used and often "made to fit." Often, not all theory components are used, and components of different theories are combined. There also are low expectations of the role public health professionals have in developing theories. Dr. Curbow discussed the following barriers to the emphasis of theory testing and development in the public health arena:

- Theory testing and development is not essential to the mission of public health, which is a very applied discipline. Although behavioral science is seen as one of five core disciplines of public health (the others being biostatistics, epidemiology, environmental health sciences, and health services administration), it is not defined as a theory-based discipline, but rather as a methods-based discipline. Dr. Curbow offered the following definition of behavioral scientists: "These specialists use specific methods, skills, and program strategies to help people choose healthier lifestyles, to make efficient use of health services, to adopt self-care practices, and to participate actively in the design and implementation of programs that affect health." Public health in general also is methods oriented and driven by epidemiologists.

- Faculty training—there are many pathways to becoming a professor in a school of public health, and as a result the professionals in this field have many different views of the world. Most of the faculty Dr. Curbow comes into contact with are graduates in the social and behavioral sciences and tend to have more breadth than depth in their training, with no way to gain that depth. She also works with many faculty members who graduated with another professional degree (e.g., lawyers, physicians, nurses), and some who graduated with a discipline-based degree (e.g., social psychologists, sociologists). Many come from government, a foundation, or another applied setting.

- What is taught at schools of public health needs to be relevant to the field's mission. Most of what is taught to public health students needs to cover the skills students will have to use when they go out to practice public health. There is even greater focus on this today because of the increased emphasis placed on public health in the wake of the September 11 tragedies.

- Public health students represent a diverse group, with individuals from many different backgrounds. The M.P.H. is the focal degree and the majority of M.P.H. students are physicians, but there also are nurses and other health professionals. Public health

students range from undergraduates to long-time practicing physicians. Resources at schools of public health are directed toward introductory courses, and many schools are not able to offer advanced behavioral science courses.

- The community/medical populations require that special ethical concerns be placed on the nature of the research in terms of designs, timing, and necessity of the studies. There also are special concerns on maintaining community relationships, but not on theory development and testing.

- Funding needs—faculty at schools of public health work on soft money. Many funding opportunities are practice oriented, and there are very few calls for theory-based work.

Dr. Curbow noted that public health needs to address the issue of theory testing and development not being essential to its mission from the top down. She noted that this group of workshop participants could create some impetus for schools of public health to make theory a priority. The other barriers she described may require bringing together faculty from different organizations who have different styles of research and different resources for conducting their work.

Reactor: Dr. Karen Emmons

Dr. Emmons, Associate Professor in the Center for Community-Based Research at the Dana-Farber Cancer Institute, explained that the priority placed on theory in schools of public health can be determined based on: (1) the number of courses that are available, (2) whether they are required or elective, and (3) the status of behavioral science overall in the departments of schools of public health. Many schools of public health are run by epidemiologists, and the "theories" put forth by epidemiology are closer to frameworks than theories. Until schools of public health begin to recognize the importance of social factors and how they might be brought into theory or theories framed in terms of these social factors, it will always be an uphill battle to place priority on theory.

Dr. Emmons has taught individually oriented theory from the perspective of some social factors and has brought in social epidemiology faculty to address these factors from their perspective in the context of individually oriented theories. This approach shows students that these are not polar opposites; rather they are complementary perspectives. One challenge, however, is that epidemiologists tend to think that these issues are fairly easy and transparent. There is a need to move beyond simply identifying problems related theory development, testing, and use.

Students typically enter schools of public health with a pragmatic mindset, looking for a specific focus or theory. It is important that students make theory a part of their research trajectory, with the realization that different theories are needed to address different problems. Dr. Emmons noted that the students who have taken to theory the most generally are those who have work experience. Engaging these individuals and introducing new theories to interventions they have developed may be a way to get them to become more active in theory development and testing.

Dr. Emmons noted that it is very hard to include the measures required to test theories in public health applications of research. In some cases, the theories and constructs are very similar, and care must be taken to avoid redundancy. Redundancy of constructs is a major issue, especially when working with low-literacy populations. As public health moves more to multiple risk factor interventions, there is a need to address the impact of these factors on theories. Additionally, more and more interventions are tackling more than one problem at a time, and theories need to address this.

Dr. Emmons explained that one of the most effective approaches to addressing these issues in public health from a top-down perspective is to consider partners with which to collaborate. She described a project involving the Association of Schools of Public Health and the Legacy Foundation focused on grantwriting related to tobacco control. Part of that collaboration was focused on encouraging the development of curriculum. The NCI and schools of public health could develop a similar working relationship that would require, or at least encourage, the development of curriculum around theory and make it more of a priority for schools of public health. Another role for the NCI could be creating a repository of information, syllabi, materials, and resources for courses on theory that public health professors and others could access.

Discussion

There is a need to have strong intellectual theorists from different perspectives sit down and determine in what ways their various perspectives are similar and in what ways they are different. One way to bring different disciplines together is through an interdisciplinary research center in which, for example, behavioral scientists work closely with epidemiologists. Contributions from social and cognitive psychologists are needed in the health arena. It was noted that creating crossdisciplinary collaborations is a challenge for all schools of public health, particularly those with rigid departmental structures. Public health professionals tend to see themselves more as users of theory than as theorists. They generally try to use theories to solve a health problem, as opposed to using a health problem to test a theory.

Medicine in general is an applied discipline and may have a better appreciation for research and a more innate appreciation for randomized clinical trials than health behavior research. One reason for this may be that medical training includes more basic science. It may be helpful to provide training in cognition, psychoanalysis, and other courses at schools of public health and psychology to provide future researchers with a basic understanding of human behavior and human cognition to establish a better foundation for developing and using theories.

Public health training needs to be across and within disciplines, addressing both breadth and depth. The norms and culture within traditional psychology departments are changing, and these changes are being driven by funding. It was noted that the tensions between theory and practice are not unique to schools of public health (e.g., they are present in schools of journalism, law, and social work). One way to address these tensions may be to include more coursework from different disciplines and have teachers from other departments teach some of the theory-based public health courses.

SESSION 3: Attention to Theory in the Publication Process

Presenter: Dr. Arthur Stone

Dr. Stone, Professor and Vice Chair of the Department of Psychiatry at Stony Brook University, noted that the same kind of tensions present in schools of public health are present in behavioral theory journals. Dr. Stone, Editor-in-Chief of the journal *Health Psychology,* compared top-tier medical journals with psychology journals in terms of how they address theory. In terms of the level of theory, top-tier medical journals typically include one or two paragraphs, if any, that address theory. The articles themselves generally are atheoretical. That contrasts with psychology journals, particularly social psychology journals, which tend to include a great deal of theory. These journals want their papers to be of the same quality as the top-tier medical journals, which have the best articles, a large audience, and a great deal of publicity.

Health Psychology and other behavioral medicine journals tend to emulate the top-tier medical journals, but have shorter papers that lean toward the applied area. Dr. Stone reviewed the last few years of *Health Psychology* to assess how theory was represented. Of the 74 papers reviewed, 57 percent did not explicitly mention any theory. In looking at the introductions and the discussions of each paper, Dr. Stone noted what theories were mentioned. Some papers contributed no theories, other papers contributed more than one theory. He found that there were 20–25 different theories mentioned, but there was no single theory that dominated throughout the papers. The Social Cognitive Theory was mentioned six times in six different papers; other theories included the Self-Efficacy Theory, the Theory of Planned Action, the Health Belief Model, and the Theory of Reasoned Action. Theory is there, Dr. Stone explained, but it is explicitly stated less than one-half of the time.

What are the implications of minimal theory in behavioral medicine/health psychology journals? They come across in many ways. For example, not having a theoretical approach does not enhance the value of a paper. Dr. Stone noted that papers submitted with pure description in their introductions often are rejected. A strong theory can work in even a brief introduction, he added. Furthermore, the discussion of a paper's results is strengthened by the inclusion of a theoretical framework. Nevertheless, there can be significant papers that make a contribution to the literature that have little or no mention of theory.

Reviewing theoretical papers poses a number of challenges. For instance, who are the theory reviewers? It is difficult to find them and convince them to review papers. Dr. Stone also explained that there are individuals who are associated with particular theories, and fairness issues surface. Should a paper be sent to advocates of the theory that is presented for review, to an opponent, or to an atheoretical reviewer?

Dr. Stone presented the following possibilities to consider in highlighting the role of theory in the publication process:

- Make the decisionmakers (e.g., editors, authors, reviewers) more aware of theory
- Emphasize theory in the manuscript preparation guidelines
- Emphasize theory in the reviewer rating sheets
- Include and encourage position papers and pro versus con articles

- Provide a theoretical commentary on empirical issues
- Have special sections or special issues of journals that focus on theory.

Reactor: Dr. Russell Glasgow

Dr. Glasgow, Senior Scientist in the Behavioral and Community Studies Center at AMC Cancer Research Center, explained that theories can be advanced and refined, and knowledge about the generalizability of different theories can be improved, by focusing on the review criteria, encouraging authors, and specifying both mediating variables and mechanisms of change and moderating variables. A difficult challenge facing professionals in the behavioral medicine field is to be theoretical and conduct good science, yet still be applied and produce important results. Dr. Glasgow noted that it is rare to find a contribution that is strong in both of these areas, and being aware of this challenge is a contextual factor. Dr. Glasgow offered six specific suggestions for closing the gap between research and practice in terms of theory:

- Create a much greater focus on mediating variables, particularly for intervention studies. Some key issues include falsifiable hypotheses and making point predictions rather than directional hypotheses.

- Examine the robustness of theories, particularly in terms of external validity issues, which are as important and can help advance theory arguably as much as internal validity. The examination of moderating variables needs to apply not only to population groups but also to settings, intervention agents, and behaviors.

- Conduct comparisons of different theories. It is extremely difficult to conduct adversarial collaborations well and fairly. Dr. Glasgow instead suggested testing an explicitly theory-based intervention versus a more common-sense intervention. Examining a specific theoretical contribution or construct to see if it can incrementally improve the result of an otherwise basic packaged cognitive behavioral model that is a standard in the field may be another approach. Comparing different theoretical approaches to tailoring also may be an approach.

- Specify the expectations of theory to authors before they submit papers. Authors could and perhaps should be required to focus on both mediating and moderating variables of theory.

- Implement reviewer rating sheets. The consort criteria used by many medical journals focus on 23 criteria—almost all of which are exclusively focused on internal validity and randomization. The criteria include nothing on external validity or theory. The Society for Behavioral Medicine's (SBM) Evidence-Based Behavioral Medicine Committee is generating guidelines for papers in behavioral medicine and may be open to suggestions on incorporating theories into these guidelines.

- Conduct meta-analyses. If there is enough specification of theory-specific hypotheses and the mediating and moderating variables in particular, then meta-analyses could be conducted to advance the theory field.

Discussion

Participants were asked about how much literature there has to be and what criteria the existing literature should meet to conduct a meta-analysis. A concern voiced by some participants was that many researchers are tacking theories onto their grant applications almost as an afterthought. Researchers applying for grants should be asked what their study does to advance theory or test theory, rather than simply being asked to cite specific theories.

In studies there often are two groups, a comprehensive treatment group and a control group. The comprehensive treatment group often fares better than the comparison group for an intervention, leading many researchers to conclude that the theory bears out the effectiveness of the intervention. However, many comparison groups are needed before it can be stated that the theory bears out the effectiveness of the intervention. One barrier to theory development and testing is that the NCI and other funders may not be willing to fund or support the necessary experimental designs to isolate these variables because of the cost associated with running a number of comparison groups.

Unlike many other subspecialties, health psychology/behavioral medicine does not have a journal that focuses on theory, which is an indicator of the lack of importance given to theory at present. Limiting the page length of papers in journals versus providing an adequate amount of information to be communicated to readers that includes theory description is another challenge. Manuscript reviewers ask for papers to be short, and theory can be presented very briefly; physicists and chemists have shown that this is possible. It also was noted that the special issues or sections of journals may not be effective because they often are not very popular or widely read (e.g., papers that appear in them rarely are cited).

There are lessons that can be learned from the consort criteria for publishing in medical journals. It was suggested that recommendations on including theory be submitted to SBM's Evidence Based Behavioral Medicine Committee. It also was recommended that greater value be placed on smaller laboratory studies conducting basic behavioral research that include methods framing but not large outcomes.

Most of the scientific models in use are derived from physics. A challenge facing investigators is when to use one theory over another theory (e.g., can theory A explain as much as theory B does of certain groups of phenomena, plus also explain phenomena that theory B does not explain?). Most theories in psychology are directional, but the theories in more advanced sciences make use of point predictions, which allows for theories to build on each other. The research community could be doing a more effective job of taking hypotheses and putting them into a framework where there are, for example, dose-response relationships, which would help confirm the objectives of the theory.

SESSION 4: Usefulness of Current Theories for Designing Interventions

Presenter: Dr. Guy Parcel

Dr. Parcel, Professor and Director of the Center for Health Promotion and Prevention Research at the University of Texas Health Science Center at Houston, noted that current theories are useful in designing interventions; there are some deficiencies and gaps, however. One major deficiency is that many of the behavioral science theories address the explanation of behavior but fail to centralize methods for changing behavior. Even if interventionists think that they are using a particular theory, when they try to use that theory to identify their variables, they almost invariably have to use another theory to find methods to help guide them with the intervention.

Another major weakness in the application of theory in intervention development is that, frequently, the available theories are not appropriately applied (e.g., not taking the specific methodology and applying it using the underlying assumptions that are outlined for those interventions). Theories that address change at higher ecological levels and the interface between these levels are lacking. Most theories focus on change at the individual level. The greatest potential for change can be maximized, however, when the focus is on individual change as well as changing environmental and social conditions that are influencing potential determinants of behavior.

Dr. Parcel described the ecological approach in health promotion programs according to six levels: (1) supranation, (2) society, (3) community, (4) organization, (5) interpersonal, and (6) individual. As one gets closer to the supranation level, the types of theories that are available become fewer and less well developed. In working up these levels to design interventions, researchers often have to move into nontheoretical areas to develop intervention methods because the theory is not there to help guide them. Theories are needed to help fully understand how interactions might take place between these levels to help design interventions that enable one level to influence another level.

Dr. Parcel provided examples of theories arrayed by level of problem and intervention (e.g., individual level: Theory of Planned Behavior; interpersonal level: Social Cognitive Theory). His group has been conducting intervention-mapping exercises so they can be more explicit on how to approach using theory and its application in interventions. Researchers often fail to make explicit how they make decisions about the application of theory and what process they go through to do so. Dr. Parcel's group is attempting to make more explicit some of the steps they follow through intervention mapping, which helps create mechanisms for linking decisions back to theory. He presented a causal model for trying to examine the relationship between behavior and health problems.

Dr. Parcel's group also tried to more carefully define what purpose theory might be used for in designing interventions. He provided examples of when to use theory in intervention planning to: (1) describe and select target groups and subpopulations, (2) define the target behaviors, (3) define the target environmental conditions, (4) understand and select determinants of behaviors and environmental conditions, and (5) choose methods to promote change and translate the theoretical methods into practical strategies. Also through the intervention mapping project, Dr. Parcel and colleagues created a matrix of proximal program objectives whereby

theory is used to identify the determinants of either behavior or environmental conditions and then theory is linked with performance objectives. This helps link theory to the determinants more directly with the desired outcomes.

Dr. Parcel described core processes for methods, noting that the same process used for identifying determinants of behavior or environmental conditions also can be applied to identifying methods for interventions. He suggested that, in some cases, researchers do not single out a single theory and apply it, rather they try to identify which theories might help to understand influences on a change in behavior as well as which theories might provide a method linked to changing those particular determinants. The field of intervention development needs causal models that can be tested. If researchers are more explicit in causal models, they can go back and test assumptions made at each juncture. Furthermore, if researchers examine mediators and moderators and not just the overall intervention effect, it may help them understand why interventions do or do not work.

Reactor: Dr. Robert Jeffery

Dr. Jeffery, Professor in the Division of Epidemiology at the University of Minnesota, described how interventions challenge theories. Interventions are always conducted in a real-world context that has a great deal of applied constraint, unlike theory, which can be developed in a vacuum. Furthermore, interventions must take place in real time in real settings, and there is little control over the individual histories of the people in the study, so there is a lot of uncontrolled individual variability. The environmental contingencies that support behaviors health behavior researchers try to change often are ones over which they have little influence.

Dr. Jeffery explained that one of the difficulties in applying current health behavior theories to applied situations, whether they be individual interventions or community interventions, is the constraints that are imposed on investigators' ability to control the variables of interest. There are some significant strengths, however, to current theories of intervention, especially to the extent that there are consistencies across theories. The need to consider audience variables in the context of population subgroups is an example of a consistency across theories.

Dr. Jeffery described some of the significant weaknesses in current health behavior interventions. There are too many theories, and there is no hierarchical basis for deciding which theories are important and which are not. Many of the health behavior theories are too complicated to be of much practical utility. Often, too many variables are included in intervention studies, and the complexity of interventions poses problems to the extent that it is important that people who are the subjects of the intervention understand the guiding theory. He noted that interventions that rely on subtly nuanced differences between variables are not useful in applied settings.

Prevailing health behavior interventions tend to be descriptive. They describe states of affairs, attitudes, and beliefs, whereas interventionists generally try to find how to move from point A to point B, and theory cannot explain this. Dr. Jeffery stated that there also is a need to have some way to conceptualize environmental exposures.

Dr. Jeffery concluded his remarks by presenting some problems in intervention research:

- There is too much research that is justified on need rather than on improving the understanding of how to help people. It is easy to generate statistics for population groups at highest risk for certain conditions, and replication is a good thing, but there is redundancy. Not every research project that is directed at behavior change needs to be held to the standard of being generalizable to everyone in the population or to be practically adaptable and immediately deliverable to a wide audience. Researchers do not need to prove that every intervention is maximally generalizable "out of the box."

- Individuals conducting intervention research focused on new concepts need to be encouraged to actually test the concepts they are focusing on. In other words, the research designs should test the concepts being put forward as guiding concepts. Three examples include tailoring, the teachable moment, and "kitchen sink" interventions.

- It is discouraging when reading descriptions of interventions in grant proposals to see that the methods description bears little or no resemblance to the guiding theory that is claimed to be used in the intervention. Some studies have theories that are not being tested.

Discussion

Theories are subtle, and it is desirable for interventions to have a "big bang" effect. Yet, to test an intervention based on a very subtle finding is not a good idea. Part of the problem is determining how to get a "big bang" out of a theory so that there is enough variance accounted for. There is a disconnect between theories of health behavior and theories of health behavior change. What should be the control or the comparison group in interventions? Should intervention testing be built against the current state-of-the-art or the standard of care?

One participant suggested encouraging health behavior researchers to return to single-subject study designs. The notion of theory intervention testing could start by building a case based on single-subject design and a time series analysis before moving to full-scale effectiveness testing. This approach would be easier to fund at the outset.

One place to look for the "big bang" effect is in interaction effects, particularly between different ecological levels. It was noted that there is very little reporting in the literature related to external validity from population participants to settings to intervention agents. External validity does not need to be studied *ad infinitum*—through some careful, purposeful sampling, the limits can be tested in ways that do not require a large number of studies. Theories should not be criticized for being too complex. They should be criticized for not telling researchers how important the variables are and how much they can be changed.

The research community should consider to what extent it uses theories simply as a list of variables versus tools that have directions and weights. Theories typically do not come packaged telling researchers the weights of variables, and there is no resource for investigators to determine variable weights with confidence. There also are not many behaviors for which there

are enough studies to conduct a meta-analysis. One participant noted that most theories are incomplete—on the whole, research on theory is incomplete—and there is no body of empirical literature from which to derive the weights that would guide a precise intervention.

The NIH could fund intermediate outcome studies in which a smaller piece of the intervention is examined, with the knowledge that the outcome will be something more cognitive or "intentional," and that type of research currently is more acceptable. Conducting a "kitchen sink" intervention may help move theory further; so might a mechanism for conducting dismantling studies. These studies would need to be well funded to attract investigators.

One method of getting more specific about variables and eventually being able to determine which variables are more important than others and make point predictions could be moving free parameters to fixed parameters. The research community needs to be more accepting and forgiving of investigators who, through solid studies, inadvertently choose inappropriate variables/parameters, because a culture of not being accepting of these "misses" has led to researchers being too conservative. Participants underscored the importance of having theory that could directly inform intervention and noted that the findings of that intervention need to be crafted in such a way that they can be fed back into the theory. There is some concern that the current interventions do not produce output that can make a determination on how much weight to give a variable. Researchers continue to focus most of their energy on the most proximal variables, while very little research looks at the distal variables. Larger measures of change may be possible if the research community can develop ways to change these distal variables.

SESSION 5: Recruiting Theoretically Oriented Social Scientists to Health Behavior Research

Presenter: Dr. Jerry Suls

Dr. Suls, Professor in the Department of Psychology at the University of Iowa, discussed how social psychologists view health behavior research, how they can be encouraged to apply theory-building skills to health behavior, and approaches to having social psychology researchers and others to collaborate. He noted that for the most part, health psychology as a field has been a success story, so much so that the American Psychological Association has made health psychology its major agenda.

Dr. Suls explained that social psychologists view health behavior with a neutral-to-negative attitude; many of them brand this as applied research and there are groups of social psychologists who have a negative view of applied research. As a result, in departments of psychology, most social psychologists working on health behavior theory feel they are in a neutral-to-negative environment, which may affect what work they are attracted to and what their graduate students are attracted to.

There is a status hierarchy—at least in some psychology departments—that also creates problems, particularly for graduate students and younger faculty members. Although administrators and department chairs may want to have health behavior research conducted in

their departments because there are extramural funding opportunities, certain other parts of the department may not, and that puts younger faculty members into conflicting situations that should not exist.

There are social psychologists who successfully transitioned either completely or partially into health psychology. However, many prominent scientists (including a number of pioneers in the field of health psychology) who have done so have "deserted" the social psychology community. These individuals were trained as social psychologists but are not interested in thinking about how their current work helps to change theories that are prevalent in academic departments. One reason for this may be that these researchers are more interested in the medical community; another explanation is that they know where the money is and know that research in the medical community is a popular area that can more quickly lead to fame and fortune. Dr. Suls noted that it is unfortunate that some of the best minds trained in social psychology have not tried to relate their findings to the theories they learned in graduate school; their priorities are such that they are not as interested in doing so.

Another barrier to the development and testing of theory in social psychology is getting the right curriculum so that students learn physiology, anatomy, and other disciplines that are not traditionally taught in conventional psychology, which means that departments have to offer such courses. There also is the issue of making inroads into the medical community, which requires establishing relationships with physicians, other health professionals, and medical centers. This takes time, political and intellectual energy, and luck.

Dr. Suls ended his remarks by presenting suggestions on how to improve theory in social psychology:

- Increase funding for theory-related activities. Increased funding is one of the reasons that health psychology has assumed considerable prestige and has made tremendous advances.

- Encourage more programs in psychology departments that train health psychologists and are based in theory. These programs currently are lacking.

- Suggest that certain types of grants require a theoretical component in which a theoretically based investigator contributes in a major way (more than as a consultant) to the study. One possibility would be to include a line item with a known theoretically based experimental psychologist. Dr. Suls noted that there are many attitude and persuasion researchers in experimental and social psychology, and those fields are some of the most active and interesting in terms of theory and the research they are conducting. If a structure was established for particular grant proposals to emphasize more theoretical development, it would be interesting to see if the money could make increased theory development and testing happen.

- Form adversarial collaborations that include an organizer/mediator, apply reasonable tests to opposing theories, and publish the results. This would be a difficult exercise, but it might encourage existing theory makers to pit theories against each other.

Reactor: Dr. Meg Gerrard

Dr. Gerrard, Professor in the Department of Psychology at Iowa State University, noted that the stigma of conducting applied research—specifically applied health research—in traditional psychology departments is a major barrier to overcome if more social psychologists are to enter into health research. Another barrier is the assumption on the part of graduate students and young faculty members that health research requires collaboration with physicians, biomedical researchers, and working with patients. This assumption is not true; a great deal of successful health research does not require these activities. However, graduate students and young faculty members believe these to be requirements, and they appear as large obstacles to overcome at a point in their careers when they do not have the time to develop these collaborations.

Dr. Gerrard explained that there also is an assumption that good health research requires either very large samples or longitudinal studies. Again, to the graduate students and young faculty members who do not already have exposure to health research, this assumption represents an almost insurmountable barrier because graduate students and young faculty do not have the time early in their careers to design and conduct these studies. They need to put their time into work that offers an immediate payoff to improve their chances of getting tenure.

Another barrier is the lack of role models. Social psychology as a field in general has been a success story. There are many social psychologists conducting good health-related research. Those individuals who have made that transition completely have done a "disservice" in that they are no longer role models for individuals who might make that transition, because they epitomize the kinds of barriers related to perceptions about health research and are no longer continuing research activities that are possible at early points in a social psychologist's research career. These individuals are no longer connected with basic theoretical research; they have moved, frequently entirely, into health research and are conducting 10-year longitudinal studies with diverse populations. Most young investigators do not realize that these individuals did not start their careers this way.

Dr. Gerrard made the following suggestions for rectifying some of these problems:

- In traditional psychology departments, relay the message to graduate students and younger faculty that health-related problems present unlimited opportunities for testing the basic theories in which they are interested.

- To bring investigators from more basic fields into health research, convince graduate students that they can conduct health-related research that will not be laughed at by the rest of the department as long as they are testing basic theoretical hypotheses. These students should be told that they may even solve some problems they are interested in through conducting this research. More opportunities are needed for postdoctoral researchers who were raised in the traditional social psychology milieu with the stigma of conducting health-related research to work with people who have expanded their research and are conducting health psychology research.

- There also is a need to educate more basic social psychologists at a higher level, possibly at the midcareer point when they are seeking funding and see health psychologists getting funded. Efforts should also focus on getting established researchers more involved in applied research; not just new students.

Discussion

One participant noted that the pharmaceutical model works so well because scientists work until they develop something that may have a reasonably large effect size, and then it is tested through a variety of methods. While they work inductively, discussions at this workshop have been more deductively focused—starting with a theory and working from there. Perhaps it would be more effective and would generate more innovative concepts if researchers were encouraged to come to the NIH or NCI with great ideas rather than great theories. Ideas are different than theories—although they may be related—and good ideas may inductively lead to theories. An alternative approach is that the NIH support small-scale work in which researchers can develop interventions that have a large effect. A second level of funding could be used to further develop the ideas and determine whether the intervention applies across populations. A third level of funding then could be used to conduct parametric investigations of the intervention and theoretical investigations of the mechanisms. Although this is a very different approach than the current process, it keeps the system fresh and focuses on ideas rather than well-developed theories.

The conflicts between social psychologists and psychology departments, particularly in terms of theory, are troubling. Compounding the problem is the fact that the theoreticians on both sides tend not to disseminate their research. This issue is easier to recognize than it is to solve. It was noted that the focus of discussions during this session have been on social psychologists, and that sociologists, anthropologists, economists, and social workers also contribute to health behavior research.

One idea to stimulate innovation would be to have the NIH or NCI establish special review groups that make funding recommendations based on innovativeness rather than on probability of success. Currently, it is very difficult to get intervention studies funded unless the researchers are using methods that are well established and they can document that their intervention has a high probability of success. It was noted that the R21 grant mechanism is available and intended for funding innovative research.

Postdoctoral training programs have been a great success for the most part. In these programs, postdoctoral students and graduates in psychology and other discipline-based programs receive interdisciplinary training and are exposed to working with other disciplines and their various approaches to some of the more complex issues related to health. It was suggested that these programs be expanded with an even stronger emphasis on interdisciplinary training. One way to attract researchers to collaborative projects with other disciplines could be summer institute-type programs, which offer researchers who have 9- or 10-month appointments during the school year to take a few months for intensive work on theory development and testing. Because change has to come from the higher levels of institutional leadership, it also was suggested that the NCI partner with the National Science Foundation to bring together researchers from various disciplines.

Many of the basic behavioral organizations feel that they need to become more applied. Conversely, a number of applied organizations are trying to determine how they can become more theoretical and more evidence based. The NCI has been putting a lot of money into interdisciplinary and transdisciplinary research. Institutional incentives at universities tend to go against interdisciplinary work, and one role of the NIH is to encourage interdisciplinary efforts by creating incentives for universities and dedicating funds.

SESSION 6: How Funding and Perceptions of Funding Affect Research Choices

Presenter: Dr. Robert Croyle

Dr. Croyle explained that when he began working at the NCI, he was greatly concerned that the majority of NCI grants were atheoretical. The perception of the funding process was that the NCI only was interested in funding large intervention studies. In reality, however, study sections generally prefer studies that are more conceptual and theoretically based and that represent new ideas. Dr. Croyle noted that he is concerned not so much about what is currently funded or what is in the NIH portfolio, but that there remains a large proportion of research grants coming into the system that are atheoretical. One explanation could be that there has been a spillover of the atheoretical epidemiologic approach to the world for many social behavioral science researchers who work in public health, epidemiology, or cancer settings.

It would be an incredible accomplishment to get the general field up to a minimal standard, *a priori* hypotheses in grant proposals and in manuscripts, for example. If researchers stated *a priori* hypotheses at the outset and later had to stick to them when they published, it would be a great improvement and would have incredible theoretical value. In many cases, there is a significant gap in the publications of grantees between what they report they were studying in manuscripts versus what they proposed to study in their grant applications. This is due primarily to researchers reframing their manuscripts based on their results instead of on what was written in their grant. The reason the end product does not seem to test the theory in many cases is that, when investigators start to test their theory and find null or negative results, they quit that objective and move to other findings that will still be attractive for publication. As a result, the writeup of the data is reframed around these other findings. Dr. Croyle explained that this process greatly contributes to diminishing the possibility of the research making a contribution to and advancing theory.

Attempts are being made to counter the perception that applicants and, perhaps, some reviewers have that bigger studies and interventions are better. Many researchers perceive that a sign of being senior in the field is conducting a large intervention. Those who know the field best are spending 90 percent of their time on large interventions. As a result, the investigators working on smaller-scale work are newer and at the junior level. The smaller-scale efforts do generate new ideas and hypotheses, but the senior researchers are spending very little intellectual time on the small-scale generative tasks, in part because they need the large sums of grant money to support their staff.

Dr. Croyle described what he called the "tyranny of statistical power." Grant reviewers are generally effective at examining issues of feasibility, generalizability, and statistical power. But the issue of statistical power has blocked a lot of developmental work because many studies cannot reach a high enough statistical power due to funding and/or recruitment constraints. One way to change the culture may be to examine intermediate endpoints.

Dr. Croyle noted that the different roles of theory often are confused. A theory that explains or provides understanding may not be a theory that helps for an intervention. Dictating that every theory should explain, understand, predict, and instruct how to carry out an intervention is unrealistic. A good theory that explains and predicts behavior may identify variables that account for the variance in the predicted behavior, but an effective intervention can be designed that uses none of those variables or constructs because, in the real world, they may not influence people's behavior. Introducing these variables or constructs to the real world, however, may result in a significant change in behavior.

Health researchers often find that psychologists are able to introduce a variable into a system that does not currently exist and therefore will never appear in developmental work, yet has a larger effect on behavior change than anything in the explanatory theoretical model. This does not mean that the health researcher's model is wrong. It may be formative in terms of generating a completely new variable that could be a determinant of behavior change.

Reactor: Dr. Ken Resnicow

Dr. Resnicow, Professor in the Department of Behavioral Sciences and Health Education at Emory University's Rollins School of Public Health, opened his presentation by posing two questions: (1) To what extent do current theories improve the ability to understand and change behavior? and (2) Where else in "nature" can we look for guidance?

Dr. Resnicow reviewed currently funded grants in the Computer Retrieval of Information on Scientific Projects Database and found that the most commonly mentioned theories in these grants were as follows: Social Cognitive Theory (58 grants), Transtheoretical Model (56 grants), Social Learning Theory (27 grants), Theory of Reasoned Action (25 grants), and Health Belief Model (21 grants). He presented a juxtaposition of health behavior-related theories (e.g., Social Cognitive Theory, Health Belief Model, Theory of Reasoned Action) to some of the most interesting and important far-reaching theories (e.g., Theory of Relativity, Big Bang Theory, Evolution, God, etc.). Theories such as the Theory of Relativity and the Big Bang Theory tend to be parsimonious and tend to have very simple explanations for complex phenomena. Health behavior-related theories are the opposite: they have complex explanations for simple phenomena. The far-reaching theories also tend to be universal, unifying, conceptually distinct, and provable/falsifiable (in theory), in contrast to health behavior theories.

Dr. Resnicow cited examples of theory, including: (1) efficacy (not performance efficacy, but efficacy when it is manipulated), (2) behavioral choice, (3) message framing research on fear and gain versus loss, (4) tailored interventions (assuming an appropriate comparison group), and (5) harm reduction messages/responsible use versus education. He stated that health behavior interventions work, but we are often unable to understand why. (Mediators often explain only a small percent of the variance. One problem is that the wrong denominator is being used. Many

of the reasons individuals change their health behavior are due to random events. The premise that we should be able to account for 100% of the variance in human health behavior is flawed.)

Two models that have been virtually ignored but that researchers should start to consider are the Random-Walk and Chaos Theories. Dr. Resnicow explained the Random-Walk Theory, drawing a parallel between health behaviors and the stock market. When any stock is graphed, patterns develop. These patterns can be mathematically modeled, but no one can reasonably predict long-term patterns in the stock market even though these patterns make mathematical sense. The peaks and valleys of the graph have no meaning for future prediction. He explained that one can see that stock prices (health behaviors) tend to follow a random walk. That is, the best forecast of tomorrow's price (behavior) is today's price (behavior) plus a random component. Prices (health behaviors) move at random and adjust to new information (cues, norms, environmental and intrapsychic factors) as it becomes available. The adjustment to this new information is so fast that it is impossible to profit from (predict) it. Furthermore, news and events (cues, norms, environmental and intrapsychic factors) also are random, and trying to predict them is futile.

Dr. Resnicow also noted that health behavior is dominated by chaos. Chaos does not mean unpredictability. Chaotic systems also can be mathematically modeled but are almost impossible to predict. The presence of chaotic systems limits the ability to predict motion and system patterns (e.g., behavior change). For example, health behaviors can change based on a family member dying, advertising, and other random events that cannot be modeled. The classic case of chaos theory is the weather (people try—unsuccessfully—to model long-term changes in the weather).

Health behavior change is an example of a chaotic system. Dr. Resnicow explained that to predict behavior change, it would be necessary to take an infinite number of measurements. Because human behavior is chaotic, tiny uncertainties eventually would overwhelm any calculations and defeat the accuracy of the "forecast." There are many examples of why health behavior changes in an unpredictable, random, and chaotic way. Current models only in a broad sense try to increase the likelihood that one intervention element hits one of those random points at the right time. In other words, the combination of measurement error and innate unpredictability within a system makes accurate long-term forecasting almost impossible.

Dr. Resnicow concluded his remarks by making the following suggestions: (1) rethink what is meant by the predictability of behavior change; (2) develop new theories (and explanatory models) that incorporate other systems of behavior, human and otherwise; (3) acknowledge limitations of prediction and intervention; (4) start thinking "outside the box" and bring in disciplines that have thought about randomness; and (5) incorporate the random component of behavior not only as a nuisance or error term.

Discussion

It was noted that many reviewers do not know what happens with the grants they review. It would be helpful if the NIH could inform reviewers on publication rates and other information. One participant noted that, although individual behavior is unpredictable, aggregate behavior is predictable and averages are predictable in a way that individual responses are not. One problem is that researchers whose grants have null or negative intervention findings might not

get published. However, a study with null or negative findings is more likely to be accepted for publication if it is well designed and well prepared. It is an uphill battle, because null or negative findings lead to questions about what was not measured or what was not measured well enough.

In the context of theory, there are issues of how researchers are analyzing and reporting their data, being honest about what they are trying to do, being honest about secondary and tertiary findings, and being honest in presenting them that way. Journal editors have no way of knowing what an original study was supposed to be doing versus what the study that they are reading does. It would be helpful if granting agencies had some way to enforce "honesty" on grantees when they prepare papers for publication. Reviewers do pay attention to grantees' publication records, and they are affected by applicants who have received a lot of funding in the past but have very few published articles on what they stated they were being funded for.

The grant-publication disconnect is not just an NCI phenomena. It would be revolutionary, however, if the NIH could implement the progress reports in some way because grantees often will explain in their progress reports that they have changed what they are doing or what they are looking at. The NIH is developing a program evaluation methodology to evaluate the scientific impact of initiatives, and one part of that project is a coding system to be used for grant progress reports combined with bibliometric analysis and a software tool that relates publications and progress reports to grant proposals.

Breakout Groups

Workshop participants were assigned to one of three breakout groups (training, incentives, and reviews) and were asked to answer a set of questions and use the information presented earlier in the workshop to develop ideas for potential NCI initiatives. Among the ideas generated were the following:

- Make the presentations at the Santa Fe Workshop accessible to other researchers and practitioners.

- Produce a "key constructs" guide that would assist both researchers and students to use and measure important variables properly.

- Commission review papers on:

    (1) Theoretical constructs and their use and utility across health behaviors (e.g., smoking, UV exposure, physical activity, nutrition).

    (2) Specific health behaviors (e.g., in physical activity we might describe theories and constructs that have been useful in predicting childhood and adult inactivity, those that are common to efficacious interventions that promote and maintain activity; etc.).

- Organize different types of advanced training institutes on theories of health behavior for graduate/professional students, postdoctoral fellows, and young/mid-career professionals.

- Create a primer or "selected readings" book on the use of theory in applied research, or theory testing in applied research.

- Sponsor an annual conference on Advances in Theories of Health Behaviors.

- Commission state-of-the-art papers on antecedents, prevention, screening, and maintenance in specific health arenas.

- Create guidelines for authors and reviewers to improve handling of theory issues in publication and grant-review processes (to be published by funding agencies, journals, professional associations).

- Establish a supplementary grant mechanism for currently funded projects to encourage the addition of theory development, theory testing, comparing alternative theories, and theory refinement to already-funded projects that lack such components.

- Create periodic theory institutes. These theory institutes would be comprised of four groups: (1) successful grantees with demonstrated grantsmanship and publication skills around theory-based work; (2) prospective applicants who would be likely to submit grant applications; (3) reviewers from standing committees; and (4) prospective reviewers who are not currently on a committee but who might be available from a reviewer pool.

- Develop a "matchmaking" process, via a "broker," for linking clinical/community researchers with researchers interested in theory development.

Closing Remarks

Dr. Croyle thanked attendees for their participation and noted that the Workshop Steering Committee would be meeting after the workshop to discuss next steps. A theories projects Web site may be established to keep participants and others updated. Dr. Croyle asked participants to submit any ideas or comments on the workshop and any of the information discussed during the workshop to Dr. Weinstein and/or himself. Dr. Weinstein thanked attendees and the Workshop Steering Committee for their participation, and adjourned the workshop.

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