

Executive Summary

Nutrition and Behavior Research Grantee's Meeting

National Institutes of Health

National Cancer Institute

Health Promotion Research Branch/Behavioral Research Program

From September 27–28, 1999, the National Cancer Institute's (NCI) Health Promotion Research Branch (HPRB) and the Behavioral Research Program (BRP) sponsored a meeting for *Nutrition and Behavior Research Grantees* to discuss current issues and future priorities in nutrition behavior research. This meeting, which was the first in a series, brought together nutrition behavior research experts currently receiving grants from NCI, other behavioral scientists, and NCI staff working in the area of human behavior research. Twenty-one nutrition behavior researchers presented brief synopses of their ongoing research projects. Discussion sessions on both days allowed for an exchange of discuss issues, feedback to NCI staff, and guidance on research issues from two experts in health behavior research.

Brief information on cited participants is provided at the beginning of each section of this report. Contact information for cited participants is provided in the **Cited Participant Information** section.

Welcome and opening remarks were given by:

Linda Nebeling, Ph.D., M.P.H., R.D., Acting Chief, HPRB, NCI, National Institutes of Health (NIH)

Robert T. Croyle, Ph.D., Associate Director, BRP, Division of Cancer Control and Population Sciences (DCCPS), NCI, NIH

Dr. Nebeling welcomed the participants, provided an orientation to the next two days, and discussed the purpose of the meeting. She described the main purpose of the meeting as an opportunity to encourage exchange of information, discuss issues and problems among nutrition behavior researchers, and provide feedback to NCI staff about current issues and future developments in nutrition behavior research.

Dr. Croyle provided an update of the new behavioral research program, which was established in October 1997 and expanded in October 1998, to include six new branches focusing on tobacco control, applied sociocultural research, health communication, health promotion, cancer screening, and basic biobehavioral research. Dr. Croyle discussed the basic themes and new initiatives in behavioral research and described the NCI's extraordinary opportunities for Fiscal Year 2001. For the first time, two of the top three priorities are in behavioral research: tobacco

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use and cancer communication. To increase communication and collaboration among scientists performing related research in behavioral and biobehavioral science, NCI will sponsor more investigator meetings in the future.

Dr. Croyle presented the following goals for the nutrition behavior research meeting:

- Increase communication among investigators about current research projects
- Review current NCI-funded research projects for gaps, problems, and methodological issues
- Identify common themes and gaps
- Discover scientific opportunities for future research
- Establish ongoing collaboration for methods development, concept development, and data synthesis

Summary of Research Project Presentations

Co-moderators: Drs. Croyle and Nebeling

The Human Nutrition Research Projects were presented by twenty-one investigators and/or co-investigators using slides, overheads, and videotapes. They presented the major content of their research, identified problems and issues, and suggested future research needs. One person discussed three projects that were being developed by other researchers. After each presentation, time was allowed for questions and comments from the participants. Abstracts of each program were available.

The projects used a multiplicity of theories, designs, methods, materials, evaluation tools, and sites. Subjects were adults and children, with an emphasis on grade school children and women. Six projects targeted African Americans, and two projects targeted Hispanic families. Schools, homes, churches, and health and community programs comprised the settings. Sample sizes ranged from 70 to 3,878 subjects. Duration of exposure ranged from 5 weeks to 24 months. Followup evaluations were scheduled at 6-month, 1-year, and 2-year intervals, depending on the project. The projects' durations varied with complexity, type of setting, phase of intervention, and the inclusion of a pilot project.

Goals for most of the programs were to increase fruit, vegetable, and fiber consumption, decrease fat intake, increase knowledge, and improve attitudes and behaviors related to eating healthy foods. A few projects measured biochemical markers and blood cholesterol levels to assess the validity of reported changes.

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Smoking cessation or control was included as a goal of three projects. Increased physical activity and weight control or reduction were stated goals in only a few projects. In some cases, the goals were to test strategies, such as the use of peer educators, a computer program, training of pastors, and improvement in availability and accessibility.

Theoretical models or constructs included transtheoretical stages of change, cognitive social learning, self-efficacy, social support, health communication, life skills, health promotion, lifespan development, motivation, reasoned action, parent-child modeling, and the PRECEDE/PROCEED community model. In general, comparison groups or randomization were used for treatment and control groups. Pre- and post-testing was standard with followup one year or more after exposure.

Involvement of the community, and school and church leaders was evident in most projects. Parents, teachers, church leaders, and food service personnel were trained and educated to provide or facilitate the cognitive, behavioral, and environmental changes. A school nutrition advisory committee was

providing a platform for community involvement in school nutrition programs. The committee members were trained and educated to provide or facilitate the cognitive, behavioral, and environmental changes. A school nutrition advisory committee was

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Food frequency questionnaires, food diaries, 24-hour recall, cafeteria sales and observations, psychological instruments, phone surveys of parents, card-sorting of foods liked and consumed, computerized interactive sessions, the NCI 7-item test, and the Eating Patterns Study Instrument were some of the methods used to measure food behaviors. Other instruments used to assess various psychosocial and behavioral aspects included: stages of change assessment tools; surveys of community food pricing, accessibility and availability; the MOOS organizational climate scale; religiosity scale; health habits history; self-reported instruments; and surveys of children, teens, parents, teachers, and church and community leaders.

Results were not available for the majority of projects because they were still in process or under development. For those that did have preliminary results, the changes observed were small—about a one-half to one serving increase of fruits and vegetables per day. Some projects also reported less consumption of fatty foods, less weight gain, decreases in body mass, and increases in smoking abstinence among experimental subjects compared to control group subjects. Process and pilot study data were helpful in designing the second phases of certain projects.

Some of the findings presented follow:

- In the *SISTERTALK* program, statistically significant changes were found in body mass indices after 12 weeks.
- In the *PEP/HMO* study, followup was better among white, older, and 5c -r.

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as, “make food look good,” “give us choices,” “use competitive methods,” and “improve the school cafeteria environment.”

- In the *TEENS* program, eating habits were low on the list of parent’s concerns and the topics they discussed with their children compared to schoolwork, chores, and family relationships.

One of the most dramatic dietary changes was reported in the *Cuisine for Cancer Prevention* study that tested biochemical markers after a strictly controlled 2-week diet with 10–14 servings of fruits and vegetables. There was a 12 percent reduction in the levels of 8-OhdG (8-hydroxydeoxyguanosine) in lymphocytes and a 36 percent reduction in 8-EPG (8-isoprostane F-2a) in urine, which was significant. Compliance with the diet was 98 percent, and the average fruit and vegetable consumption increased from 5.8 to 12 servings during the intervention. Four repeated studies showed significant changes in measures of oxidative cell damage.

In the studies that targeted black churches, some of the findings presented were:

- Those who participated in a motivational interview in the *Eat for Life* program increased their fruit and vegetable intake by 1.3 servings.
- The intervention group in the *Black Churches United for Better Health* project consumed 0.85 more servings of fruits and vegetables than the delayed intervention group at the 2-year followup. The largest increases in servings were observed among those aged 66 and older (1.0), those with education beyond high school (0.96), and those attending church more frequently (1.3).

In the youth projects, the *Goals for Health* pilot project achieved positive changes in fat consumption, sweet and snack consumption, and relevant knowledge and attitudes. In the Virginia site, the biggest changes in fat consumption were among those high school students trained as leaders. The *High 5 School-Based Intervention* targeted fourth graders and achieved a higher consumption of fruits and vegetables for intervention children, compared to controls at Followup 1 of 2.28 total servings and at Followup 2 of 2.21 total servings. Mean daily consumption of fruits and vegetables was higher for intervention parents at Followup 1 (3.94), compared to controls, but not at Followup 2.

Discussion and Feedback to NCI

Co-moderators: Drs. Croyle and Nebeling

Discussants cited:

Len Epstein, Ph.D., Professor, Department of Pediatrics, Social and Preventive Medicine and Psychology, State University of New York (SUNY) at Buffalo

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Drs. Nebeling and Croyle asked the group to provide constructive feedback to NCI on the grant process and other issues.

Participant Feedback and NCI Response

The most important issue expressed by investigators involved recent changes in the grant review committees' membership, recruitment, structure, and processes.

Concern—Participants perceived a relative lack of reviewers experienced in nutrition behavior research and community-based cancer prevention.

NCI Response—Dr. Croyle agreed that there was a problem for the new SNEM-1 study section reviews. He reported the following NCI actions:

- Names of experienced nutrition and cancer researchers have been submitted to Dr. Mary Sue Krause, Scientific Review Administrator (SRA) for SNEM-1.
- The methods of referral to the review committees are being studied and Dr. Croyle will be briefing new SRA members on NCI's priorities.

Concern

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Suggestions for Potential Grant Writers—Drs. Epstein and Croyle

Dr. Epstein suggested that grant applicants:

- Request the most appropriate CSR or Institutional Review group (IRG)
- Include quotes from the program announcement in their applications

Dr. Croyle recommended that grant applicants:

- Access the NCI CSR website to determine who was on the roster for each new social and behavioral science study sections
- Obtain a list of ad hoc reviewers from the SRA
- Indicate responsiveness to the program announcement

NCI Concerns About Reviewer Recruitment and Participant Response

Drs. Epstein and Croyle voiced concerns about recruitment of reviewers to the study sections.

In response to their concerns, participants suggested the following:

- Provide more reward for serving by increasing the funds, expanding reviewers' research funds, or providing a small grant for service
- Reduce the number of times served from three to one per year
- Avoid asking people who are submitting a grant to be on a study section during the same time period
- Inform reviewers of the value of learning how to improve their grant-writing skills
- Reduce the number of grants reviewed by each reviewer
- Develop teams or a pair of one experienced and one new researcher to reviews grants jointly

Discussion on Best Mechanisms for Dissemination

A discussion ensued about the best mechanisms for disseminating information and materials from successful intervention trials. Participants stated that research is needed on the best way to transfer information; that information transfer is needed

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on multiple risk-based intervention programs; and that combining programs should be done on a step-wise basis.

Dr. Croyle indicated that an interim step of research integration and synthesis of the common elements was needed between the individual prevention trials and the dissemination of findings. NCI supports dissemination research as part of the tobacco control budget; uses a support contractor for distribution of materials on tobacco control and the “5 A Day” nutrition program; and will use the NCI’s website for ordering print materials and CD ROMs.

NCI Division of Cancer Control and Population Sciences Update

Presentation by: Robert Hiatt, M.D., Ph.D., Deputy Director, DCCPS, NCI

Dr. Hiatt presented the context of the participants’ work and discussed the changes that have occurred in the division over the past few years:

- The definition of cancer control now emphasizes population science and determinants of human behavior.
- “Quality of life” has been added to the “mortality and morbidity” clause in the standard definition, due to the increasing number of survivors and length of life.
- The new foci in the DCCPS include links to epidemiology and behavioral science, informatics and communication research, and outcomes research.

Looking Toward the Future

Dr. Hiatt emphasized that DCCPS will need a more systematic approach to intervention research and knowledge synthesis. Surveillance research can be used to:

- Explain causes by linking interventions with outcomes
- Link behavior changes in tobacco and nutrition behavior with health outcomes
- Learn more about quality of care and treatment approaches

DCCPS is developing a National Cancer Surveillance Plan to look at U.S. incidence, minority coverage, and surveillance partners. Dr. Hiatt spoke of extraordinary opportunities for progress in tobacco control, cancer communication, and genes and the environment. Behavioral approaches need to incorporate basic

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biomedical research, and nutrition behavior researchers need to link with other disciplines to test programs.

Common Themes and Issues in Nutrition and Behavior Research

Chairman: Dr. Croyle

Cited discussants:

Len Epstein, Ph.D., Professor, Department of Pediatrics, Social and Preventive Medicine and Psychology, SUNY at Buffalo

Arthur Stone, Ph.D., Professor and Vice-Chair, Psychiatry, Department SUNY at Stony Brook, and Consultant to DCCPS

Dr. Croyle invited Drs. Stone and Epstein, experts in the field of health behavior research, to respond to the presentations and discussions. Drs. Stone and Epstein posed questions, problems, and issues for future nutrition behavior research.

Focus on Methodological Issues (Dr. Stone)

Dr. Stone opened with the comment that the work of the participants is important and that he understands the difficulty of changing behaviors in nutrition. His major concerns related to:

- Use of focus groups
- Whether researchers know what works to change behavior
- Use of a multiplicity of approaches
- Small effect sizes
- Maintenance of effects over time
- Development and modification of instruments
- Bias of self-reported data
- Use of comparison groups

Dr. Stone posed the following questions to the participants:

- Where are your research ideas coming from? Are they from focus groups?

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- Are you studying people who naturally eat better, as well as those who do not?
- Have you studied the effects of the natural environment?
- Have you done post-focus groups to find out what subjects like?

To improve methodology in this area, Dr. Stone suggested the following:

- Large research programs should be deconstructed to study single factors to learn what is effective. Some single causes of change might be duration of exposure, concerns for self or others, food accessibility, family interaction, materials, and education. If research shows that one part works better, then researchers need to make that part more powerful. NCI should ask for component research so researchers can focus on particular interventions.
- Researchers should state the public health benefits related to the small size of the effects shown in their studies. Addressing the long-term health benefits of small dietary behavior changes is an essential step for nutrition behavior researchers before going to the next steps. Dr. Stone was concerned about moving from efficacy research to effectiveness research and then to dissemination research at this time, because the effect sizes to date had been so small, and these effects will decrease when moving from one type of research to another.
- Researchers should be cautious about developing new instruments and modifying older instruments. Merely changing the order of the questions can change response rates. To overcome the problem of 24-hour recall reliability, Dr. Stone suggested sampling behavior over longer periods of time and then aggregating the data to achieve reliable results.

Dr. Stone's suggestions for further research included:

- Use of single component interventions in a double-blinded study
- Study measures of positive affect, because effects are greater than for negative affect
- Developing basic research on the validity of recall data
- Utilizing process research to learn what causes change

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- Studying the long-term maintenance of effects

Nutrition Research Funding, Use of Theory, and Policy Implications (Dr. Epstein)

To increase research funds, Dr. Epstein recommended that nutrition behavioral scientists:

- Propose more basic scientific research
- Generate more enthusiasm about nutrition research projects and the scientific questions they address
- Indicate more immediate payoffs of research findings
- Develop a common behavioral scientific language
- Incorporate the tremendous changes that have taken place in related areas of science such as drugs for nutrition and tobacco control into their research

Dr. Epstein recommended that basic science address the following:

- Do we know what happens to people when they go from high fat foods to low fat foods? Do people feel deprived?
- What does changing from high fat to low fat foods do to the eating cycle? Does it create a need to eat more? Will people on low fat diets find other unhealthy foods or drink as substitutes?
- Is it possible to implement behavior change programs with parents and not enroll the children?

Dr. Epstein noted:

- In obesity programs, better results were achieved by working only with the parents. This approach minimizes the school access problem.
- If habits are to endure, the subjects need to think the choice of foods was their choice, not something that was imposed by teachers, parents, or researchers. Choice is critical and this is difficult in public health programs.
- To generate new knowledge, it is necessary to be specific and concentrated in the use of theory. It may be better to start with one

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approach and then add another and keep adding them incrementally until there are no more effects. Behavioral research models could use negative feedback instead of always using linear models.

- Reinforcement theory could be tested by using healthy foods as reinforcers. However, behavioral scientists should limit the use of older psychological theories and focus on developing and testing new ideas.

He also stated that dissemination of knowledge should take place when researchers know what works, what information to disseminate, and what level of dissemination is appropriate. However, knowledge dissemination is complex so the following should be recognized:

- If a program works in a small, controlled area and does not work later in the community, then it may be due to less expertise at the lower level.
- It is not necessary to disseminate research findings to all levels.
- Some knowledge may need to be kept in the hands of professionals where there is more control of program content and greater effectiveness.

Open Discussion of Common Issues, Problems, and Future Directions

Cited discussants:

Tom Baranowski, Ph.D., Professor of Behavioral Nutrition, University of Texas-MD Anderson Cancer Center (as of October 1, 1999, at Baylor College of Medicine)

Deborah Bowen, Ph.D., Fred Hutchinson Cancer Research Center

Marci Campbell, Ph.D., R.D., M.P.H., Department of Nutrition, School of Public Health, University of North Carolina

Karen Glanz, Ph.D., Professor, Cancer Research Center for Hawaii, University of Hawaii

Jerianne Heimendinger, Sc.D, M.P.H., R.D., American Medical Cancer Research Center

Teresa K. King, Ph.D., Clinical Assistant Professor, The Miriam Hospital, Center for Behavioral and Preventive Medicine, Brown University School of Medicine

Tom Lasater, Ph.D., Professor of Community Health, Brown University Memorial Hospital

Leslie Lytle, Ph.D., R.D., Associate Professor, Division of Epidemiology, University of Minnesota

Sherry Mills, M.D., M.P.H., Chief, Applied Sociocultural Research, NCI

Ken Resnicow, Ph.D., Professor, Rollins School of Public Health, Emory University

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Andrea Romero, Ph.D., Project Director, Stanford Center for Research in Disease Prevention

Beti Thompson, Ph.D., Professor, Fred Hutchinson Cancer Research Center

Common issues and problems discussed by researchers, scientific advisors, and NCI staff included the impact on health of small dietary changes, the use of single versus multiple interventions, theory development, process evaluation, policy advocacy, research on high risk groups, and the recruitment of minority researchers.

Impact of Dietary Changes on Health

In response to Dr. Stone's query about the public health benefits of small effect sizes in nutrition behavior change, members responded that nutrition behavior researchers are moving towards generating statistical models based on certain assumptions of risk, but cannot scientifically answer that question now. Researchers in The Netherlands have stated that a one-half serving increase in consumption of fruits and vegetables would translate into approximately a 14 percent reduction in overall cancer risk. In some clinical studies, effect sizes of 12 percent were found in nutrition behavior change. No one present was able to say whether this was sufficient to impact public health.

One investigator speculated that none of the estimates of risk reduction may be valid. For example, one could say that diet is related to the PSA level and that this is related to prostate cancer, but it is difficult to predict an exact number. A recent RFA supporting contracts for modeling trends and the impact of interventions on breast and prostate cancer incidence may provide some of the answers.

Investigators mentioned other barriers to estimating health effects; specifically that:

- Multiple factors are involved
- School personnel are interested in whether teachers and students like the program and the materials and that the intervention was effective in changing behaviors, rather than the magnitude of the change and its overall health benefits
- Worksites and managed care programs want the program to save health care costs and are as not concerned about long-term health benefits
- Research grantors are not the ones who benefit from cost savings

Dr. Thompson said there are effectiveness trials that look at changes in subgroups, not only at individual change. Researchers know the kind of effect size to expect in a controlled group of individuals, and also in a population. She thought that even if the population effect size is lower than the effect size for individual change, some improvement could be expected in public health.

Dr. Croyle acknowledged that it is harder in the cancer domain than for cardiovascular disease, where the mechanisms are well known. He reported that The National Heart, Lung, and Blood Institute (NHLBI) has a risk factor intervention trial system that incorporates behavioral science, etiological studies, multiple risk factors and different target groups into one system. He also noted that in cancer control, the clinical trial evidence for dietary intervention related to cancer disease prevention is not available.

Single Versus Multiple Strategies

Many participants reacted negatively to Dr. Stone's suggestion that nutrition behavior research should study one component at a time. They indicated the following concerns:

- Studying single components would require tremendous sample sizes due to small effect sizes and the need for several comparison groups; for example, using schools as a unit in a nested design with cluster randomization would require hundreds of schools.
- Breaking programs into components might necessitate using many strategies.
- Testing all approaches is important if you can't randomize.
- Using multiple strategies is helpful for learning measures that work and what effects are possible.
- Avoiding Type I errors is a real problem in small studies.
- Funding small studies might use up scarce resources.

Dr. Resnicow posed two questions related to multiple component research: "What if the reason people change behavior is due to many factors?" and "How can this be predicted with precision?" He thought the field may have to accept a certain amount of imprecision and multiplicity of behaviors and approaches.

Dr. Epstein responded that if the effect size was larger, smaller entities could be tested, and more research on high-risk groups might enhance the effect size. For science to advance, research on smaller components is needed. Dr. Stone argued that the “kitchen sink” approach is more expensive than smaller interventions that seem to have better effects. For example, in a Kaiser study of why people were going to physicians too often, a booklet was used to tell people when to go to the doctor. This singular and simple intervention had a very large effect size.

Theory Development

Dr. Epstein discussed the use of theory and said that Dr. Resnicow’s use of theory in the project, “The Eat for Life Trial,” was a good example of theory that worked. It is important to test theory by using interventions and measures based on the theory. If researchers don’t test theories, then they won’t know what works. Researchers need to try new and different models, rather than the same models with incremental shifts.

Dr. Thompson stated that the theories used in the COMMIT study were not only linear; multiple approaches were used and the components were synergistic and very exciting.

Dr. Campbell agreed with Dr. Epstein’s previous discussion about the importance of choice for promoting behavior change. She said that a limitation of using the stages of change transtheoretical model is that it addressed readiness to change each behavior separately. However, people may need to change several unhealthy behaviors but cannot do so all at once. In her theory-based project, “Health Works for Women,” when women choose the behavior they wanted to focus on, the change was greater. These changes were not always congruent with the stages of change model.

Dr. Glanz thought that different models are needed for children than for adults. Most models are based on choice and children don’t always have choices. Starting with descriptive models and then adapting them directly for intervention models may also be a problem, because recent analysis has shown that it is not so much the amount of change in the mediators that matters, but where people are at the end of the time period. If people start in maintenance and end in maintenance, they could still have significant change.

Dr. Bowen proposed that one way to improve research is by starting with the theoretical idea, testing the components of each model, and then only including the parts of the model that have proved predictive in the next intervention. Many interventions say they use the health belief model, but very few report on what specific components are used, how they are used, and

which ones proved useful. In structural programs, the goal is to merge basic science with practice science. Therefore, testing and refining theory should be a part of large intervention programs.

Dr. Baranowski suggested using a mediating variable model to link interventions to mediator variables, such as self-efficacy, and through them to behaviors. He contended that research should be done in phases. In the first phase of research, researchers need to show that the model predicts behavior at some significant effect size (R^2 of 0.3). In the second phase, researchers should show which interventions impact the mediators. If the interventions don't impact the mediator variables, then researchers should not study their impact on risk factors. Dr. Croyle noted that the reason for NCI's new R21 research grants program announcement is to fund that kind of exploratory research.

Process Evaluation

Several persons agreed with the need for more and better process evaluation. Dr. Glanz noted that process evaluation goes beyond studying what people like, to obtaining information on what people use and how it is received. Process evaluation should include tracking and debriefing about what does and does not work. For example, available evidence suggests that it matters little if nutrition programs use group counseling or individual counseling. This information would be helpful to HMOs and other groups that are concerned about health care costs. In the "5 A Day" program, process approaches were used; but these ideas can't contribute to the body of knowledge if the results are not made available in published form.

Policy Advocacy

Dr. Resnicow posed a question to the group: "Has the nutrition field used policy changes to effect change in behavior similar to what has been done in the tobacco control area?" Dr. Epstein said three States have used policy to change dietary behavior by taxing candies and fast foods, and all the taxes had an effect on food intake. Several other researchers agreed that trying to influence nutrition behavior change through policy change was an important idea.

Dr. Lytle thought that policy changes to influence food choices could work in schools to create a healthier school food environment. Dr. Glanz felt that not enough has been done on the organizational level and at the policy level. She suggested NIH could set an example by serving food at meetings that meets the Dietary Guidelines. Other institutions, schools, churches, and worksites could also incorporate healthy catering policies.

Dr. Stone cautioned that the food industry and advertisers would fight tax advocacy policies. Dr. Lasater reminded the group that nutrition behavior change was not an area where coercion could be used.

High-Risk Subgroups and Minorities

Drs. Glanz and Thompson agreed on the importance of studying high-risk groups and developing creative ways to reach high-risk sub-groups. Dr. Glanz said that by aiming programs at the general population, a large amount of time and money is spent on people who are already eating a healthy diet.

Dr. Thompson thought that more attention should be paid to structural factors that affect behavior. For example, low-income people are working on survival issues and are not too interested in changing their diets. She also stated that more funds are needed for public education to compete with advertisers who use television and other media to influence children.

Dr. Baranowski observed that there were no African American researchers at this meeting and only one Hispanic researcher. He asked if NCI could be more proactive in recruiting minorities and encouraging high school and college students to get involved in the field? Dr. Mills responded that new minority researchers were needed in the system. In the basic biological sciences, there are parallel activities for minority investigators, but this is not true for the behavioral sciences. Dr. Mills suggested that investigators include associate researchers from minority groups in their studies. NCI and researchers need to be in partnership to encourage this involvement and help minority people develop careers in this field.

Dr. Romero, the sole participant member from a minority group, stated that there is a lack of knowledge among minority subgroups about the system. To enhance the inclusion of minorities, Dr. Romero recommended the following:

- Sponsor more mentoring and outreach programs through NIH
- Meet the challenges of changing demographics and cultural pluralism
- Look at how cultural theory can inform intervention models
- Consider cultural differences when disseminating findings
- Increase minority research and recruitment of minorities into the system

One participant informed the group that the National Institute on Drug Abuse (NIDA) used several approaches to encourage junior minority investigators and help them obtain NIDA grant funds. NCI could learn from their efforts and try something similar. Dr. Lasater suggested using the NCI website to more effectively match minority faculty to research opportunities such as Minority Supplements.

Future Directions in Nutrition Behavior Research and Education

Drs. Epstein and King both stated that a paradigm shift was needed. New ideas, models, and theories should be developed and tested. The following suggestions were made for the future direction in nutrition behavior research and education:

- Fund research on food labels and the effectiveness of governmental materials such as the *Dietary Guidelines* and the *Food Pyramid*
- Use new scientific findings in molecular biology
- Emphasize biobehavioral prevention
- Study the cost of interventions, using cost-effectiveness studies
- Fund new researchers who want to test new ideas and approaches
- Use more phased-in research to find the intervention effects on mediating variables

Dr. Heimendinger summarized some of the remarks made by others and added some new ideas as follows:

- Empirically test how models work with nutrition
- Test one model at a time
- Develop policy-driven models
- Develop new research on ethnographic factors
- Study the context of how people actually eat and make decisions
- Use more qualitative methods and study what people are doing at home
- Conduct more followup research on the permanence of changes

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- Provide for longer intervention exposure times
- Find a way to educate children outside of the classroom
- Spend more time on intervention than measurement

Finally, Dr. Heimendinger stated that nutrition behavior interventions are not like pharmacological interventions. Nutritionists are trying to get people to change habitual behaviors in a negative environment. People have different ways of learning, so multiple approaches are justified. She also stated that nonlinear models, like negative feedback, could be used.

Summary and Focus of the Next Meeting—Drs. Croyle and Nebeling

Researchers agreed that many items were accomplished at the meeting and that Drs. Stone and Epstein provided them with direction for the future. For the next meeting, researchers suggested that the next meeting:

- Provide more time for discussing how to improve nutrition behavior research
- Focus on completed research
- Allow time for participants to attend sessions related to their areas of research and other sessions of interest to them
- Discuss suggestions made by Drs. Stone and Epstein
- Include minority supplement grantees
- Involve a representative of an effective minority mentoring program

Dr. Croyle responded that NCI would follow up on this project-focused, information-sharing meeting with a more issue-oriented meeting. The meeting was adjourned at approximately 3:30 p.m.