

Formative Research in School and Community-Based Health Programs and Studies: “State of the Art” and the TAAG Approach

Joel Gittelsohn, PhD
Allan Steckler DrPH
Carolyn Johnson, PhD
Charlotte Pratt, PhD, RD
Mira Grieser, MHS
Julie Pickrel, MPH
Elaine Stone, PhD
Terry Conway, PhD
Derek Coombs, MPH
Lisa K. Staten, PhD

Formative research uses qualitative and quantitative methods to provide information for researchers to plan intervention programs. Gaps in the formative research literature include how to define goals, implementation plans, and research questions; select methods; analyze data; and develop interventions. The National Heart, Lung, and Blood Institute funded the Trial of Activity for Adolescent Girls (TAAG), a randomized, multicenter field trial, to reduce the decline in physical activity in adolescent girls. The goals of the TAAG formative research are to (a) describe study communities and schools, (b) help design the trial’s interventions, (c) develop effective recruitment and retention strategies, and (d) design evaluation instruments. To meet these goals, a variety of methods, including telephone interviews, surveys and checklists, semistructured interviews, and focus group discussions, are employed. The purpose, method of development, and analyses are explained for each method.

Keywords: *formative research; physical activity; girls; qualitative; intervention*

The National Heart, Lung, and Blood Institute sponsored the Trial of Activity for Adolescent Girls (TAAG), which is a multicenter, randomized field trial of 36 middle schools

Joel Gittelsohn, Johns Hopkins University. Allan Steckler, University of North Carolina. Carolyn Johnson, Tulane University School of Public Health & Tropical Medicine. Charlotte Pratt, National Heart Lung & Blood Institute. Mira Grieser, University of Maryland. Julie Pickrel, San Diego State University. Elaine Stone, University of New Mexico. Terry Conway, San Diego State University. Derek Coombs, University of North Carolina at Chapel Hill. Lisa K. Staten, University of Arizona.

Address reprint requests to Joel Gittelsohn, PhD, Center for Human Nutrition, Bloomberg School of Public Health, Johns Hopkins University, 615 North Wolfe St, Baltimore, MD 21205-2179; phone: (410) 955-3927; fax: (410) 955-0196; e-mail: jgittels@jhsph.edu

Authors’ Note: This research was supported by the National Heart, Lung and Blood Institute Grants U01HL66858, U01HL66857, U01HL66845, U01HL66856, U01HL66855, U01HL66853, and U01HL66852.

Health Education & Behavior; Vol. 33 (1): 1-15 (February 2006)
DOI: 10.1177/1090198105282412
© 2006 by SOPHE

with the goal of reducing the decline in physical activity in adolescent girls. It is a collaborative study involving six field centers (University of Arizona, San Diego State University, Tulane University, University of Maryland, University of Minnesota, and University of South Carolina) and a coordinating center (University of North Carolina at Chapel Hill). The National Heart, Lung, and Blood Institute also participated in the study. Building on insights gained in school-based interventions (Caballero et al., 2003), TAAG is implementing a 2-year coordinated school- and community-linked intervention and will evaluate its effects on moderate to vigorous physical activity in middle school girls.

Although there is ample evidence that school-based interventions can be effective, there is a general lack of experience in using school- and community-linked approaches to assist in reducing the decline in physical activity in adolescent girls. Thus, TAAG included extensive formative research activities to determine the best approaches to physical activity interventions using a school-community linked model.

This article reviews the use of formative research as a key component of health-behavior intervention trials, with a focus on theory, method, and the use of such information. It provides an overview of TAAG formative research, including data collection methods and analyses. The other articles in this special issue present a detailed account of the TAAG formative research results, discuss how these were applied to the development of the intervention, and consider future directions and needs in formative research.

Formative Research: Background

Formative research is gathering data useful for the development and implementation of intervention programs. One of the major themes of formative research is appropriateness. Formative research can be used to make intervention programs both culturally and geographically appropriate. It has its roots in applied anthropology, sociology, social marketing, and educational psychology.

Formative research involves a variety of qualitative and quantitative methods to help inform recruitment and retention of study participants, determine measurement procedures and acceptability, and aid in intervention design and implementation. It is the process by which researchers define and assess attributes of the community or target audiences that are relevant to the specific public health issue of interest (Higgins et al., 1996). This process is conducted before an intervention is developed or implemented to obtain detailed information about the people for whom, and the context in which, interventions will be designed (Gittelsohn et al., 1999). Formative research can also help facilitate relationships between researchers and target populations (Gittelsohn et al., 1998; Gittelsohn et al., 1999; Kumanyika et al., 2003). It can be applied at all levels of behavioral interventions, whether clinic based (one on one and group interventions), school based, community based, or population based (Gittelsohn et al., 1999; Higgins et al., 1996; Kraft, Beeker, Stokes, & Peterson, 2000; Middlestadt, Bhattacharyya, Rosenbaum, Fishbein, & Sheperd, 1996).

Health-related behaviors have proven extremely difficult to change and are motivated by a variety of personal, cognitive, economic, social, cultural, and structural factors. Understanding such factors and the processes that can be employed to develop meaningful and effective interventions at multiple levels (e.g., individual, interpersonal, organizational, environmental) is a primary purpose of formative research.

Although the number and variety of articles that report results of formative research has increased in recent years, key gaps in the literature on formative research still exist. These gaps include (a) limited information on how to develop formative research goals,

objectives, and implementation plans; (b) most appropriate data analysis procedures; and (c) the process of using formative research findings to inform subsequent interventions. An approach to answering key questions, such as how much formative research should be done, what the most important questions should be, how to combine and weigh information provided by expert informants versus that of regular community members, and what research methods to use (qualitative vs. quantitative emphasis), has not been developed in a systematic way. Also, it is not always clear how to insure that formative research findings are used appropriately in intervention design.

Table 1 summarizes studies that have been published on both the results of a health behavior change intervention trial and separately on the formative work that led to the intervention. Although far more formative research has been done than is reported in the table, it is not frequently published separately from the results of the intervention trial and so does not permit a complete assessment of questions addressed, methods, and uses of the information.

The primary methods used in the formative research studies shown in Table 1 include direct observation, in-depth interviews, focus groups, structured and semistructured surveys, and pile sorts. Use of multiple methods in formative research is seen as having several advantages, including informational convergence (data triangulation; Ayala et al., 2001), development of an intervention framework or matrix, guides to intervention planning, and understanding of the cultural and ethnic diversity of the targeted audience (Kumanyika et al., 2003).

Formative research ranges from just a few focus groups (Meade, Calvo, & Cuthbertson, 2002) to year-long efforts with multiple methods and several stages (Gittelsohn et al., 1998). Programs with intervention approaches and materials developed for diverse audiences (i.e., several ethnic groups, multiple locations) generally have greater resources dedicated to the formative research phase. It is clear that many formative research studies have successfully employed multiple complementary methods. For example, Pathways, a school-based obesity-prevention trial, used both unstructured and structured interviews, focus groups, and direct observations to address key questions, such as which teaching methods and approaches were most effective in communicating with American Indian schoolchildren (Gittelsohn et al., 1998).

A key concern in the formative research literature is the issue of standardization in multicenter trials. Just as a "one size fits all" approach is not appropriate for intervention programs being developed for diverse populations and settings, the level of standardization of the formative research in multicenter trials has been debated. Should formative research be conducted in a standard way across sites to permit easy comparison, or should it be adapted to the situation in specific sites? A related concern is that once specific important subaudiences (i.e., segments) have been identified, should formative research be used to explore each segment? These issues are addressed in the articles by Young et al. (2006) and Staten, Birnbaum, Jobe, and Elder (2006).

Theories for Conducting Formative Research

Several investigators have used specific theoretical frameworks to develop formative research approaches and questions. Newes-Adeyi, Helitzer, Caulfield, and Bronner (2000) based their formative research on the ecological model (McLeroy, Bibeau, Steckler, & Glanz, 1988) and focused their information gathering at specific levels of the model that they thought were more amenable to intervention. Gittelsohn et al. (1998, 1999) used Social Cognitive Theory (Bandura, 1986) for formative research in Pathways.

4 Table 1. Selected Health-Related Studies That Use Formative Research

Principal Author	Topic	Theory Used	Methods	Uses of Formative Research	Results of Formative Research
Higgins et al., 1996	AIDS Community Demonstration Projects	Unspecified "theories of health promotion and behavior"	In-depth interviews, focus groups, direct observation. "Systematic integration" of information	Refine target groups, develop "role model" stories, contribute to questionnaire development	Not reported
Gittelsohn et al., 1996; Saksvig et al. (in press)	Sandy Lake Health and Diabetes Project	Social cognitive theory, stages of change	In-depth interviews, free lists, pile sorts, and direct observation of behavior	Identify priority behaviors, foods and approaches for home visit, school and store programs	School program showed improvements in dietary behavior and cognitive variables
Gittelsohn et al., 1998; Gittelsohn et al., 1999	School obesity prevention program for American Indians (Pathways)	Social learning theory	Paired child interviews, child food sorting interviews, focus groups and interview with caregivers, focus groups with teachers, interviews with teachers and food service workers, direct observation	Identify a set of priority behaviors that became the focus of the intervention strategy; identified appropriate foods for intervention and educational approaches	Program demonstrated positive changes in dietary behavior and cognitive variables.
Newes-Adeyi et al., 2000	Growth monitoring in WIC centers	Ecological model	In-depth interviews with WIC providers and clients, observation of counseling and site layout	Develop training programs, including gaps in counseling skills of WIC providers, and identify organizational issues	Not reported

Cortes et al., 2001; Gittelsohn, Haberle, Vastine, Dyckman, & Palafox, 2003	Overnutrition and undernutrition pre- vention program	Social cognitive theory	In-depth interviews, free lists, pile sorts, and structured surveys	Identify priority behav- iors, foods, and ap- proaches for home visit and store inter- vention programs	Intervention trials led to more purchasing and consumption of pro- moted foods and im- proved psychosocial variables
Ayala et al., 2001	Nutrition intervention for Latinas	Tailored health commu- nication, social learn- ing theory	Focus groups, in-depth interviews, partici- pant observation	Develop a nutrition and lifestyle intervention for Latinas and their families; information used to target and segment intervention	Not reported
Meade et al., 2002	Developing cancer information	Unspecified	Six focus groups with Hispanic women	Develop, pretest, pilot, and evaluate videotape	Improved knowledge of need for screening but not comfort
Kumanyika et al., 2003	Collaborative planning for formative re- search and cultural appropriateness in Girls Health Enrich- ment Multisite Studies	Social cognitive theory	Focus groups with mothers and children, interviews with camp directors, child and parent questions, card sorts with girls, assessment of neigh- borhoods and com- munities, interviews with girls and leaders	Develop matrix of pro- grammatic, child, family, and contex- tual issues related to ethnicity, socioeco- nomic status, food, physical activity	Led to site-specific interventions

NOTE: WIC = Women, Infants, and Children Program.

This approach led to an intervention focusing on individual behaviors for modification as well as on environmental and personal factors. Kumanyika et al. (2003) also based their formative research in the Girls Health Enrichment Multisite Studies on Social Cognitive Theory and developed a matrix that explained the levels and types of cultural influences on weight status. One of the most widely used frameworks for formative research has been social marketing, where an emphasis on audience segmentation, channel identification, and development of appropriate messages has been used on such diverse research topics as malaria prevention (Minja et al., 2001) and nutrition education (Andreason, 1995; Ayala et al., 2001). The use of theory provides direction in the overall formative research process.

Uses of Formative Research

The majority of the literature on formative research shows its use primarily for developing intervention strategies and materials and instruments. The literature has many examples of the uses of formative research for intervention development. These include identification of salient themes and social norms for message development (Ayala et al., 2001; Meade et al., 2002), identification of key behaviors for intervention (Gittelsohn et al., 1998; Gittelsohn et al., 1999), assessment of the level of knowledge or gaps in knowledge about a specific educational area (Meade et al., 2002), determination of appropriate channels for communication (Cortes et al., 2001), and understanding local health and illness concepts as a means of rapport building and as a means of targeting, segmenting, and testing messages and approaches (Ayala et al., 2001; Cortes et al., 2001; Gittelsohn et al., 1996). This diversity of potential uses demonstrates how formative research can be an important strategy for developing effective health interventions.

Another less frequently reported use of formative research is for instrument development. An example is a recent article by Nichter, Thompson, Shiffman, and Moscicki (2002) that described a seven-stage formative research process for developing an adolescent nicotine dependence survey. This process, which included in-depth interviews and focus groups at different stages, was used to modify or eliminate existing questions and develop new questions. Cognitive interviewing approaches (Carbone, Campbell, & Honess-Morreale, 2002), where respondents complete and review a survey and discuss their thoughts and feelings about it and suggest alternative wording is another approach. In addition, formative research has been used to develop a bibliography of core cultural issues (Kumanyika et al., 2003) useful for the development of surveys appropriate to the intended audience.

TAAG Formative Research

The aim of TAAG is to determine if a multicomponent intervention, which includes linking schools with community organizations, reduces the age-related decline in moderate to vigorous physical activity in middle school girls. TAAG will implement a standardized intervention in six field sites in Arizona, Louisiana, Maryland, Minnesota, California, and South Carolina. Each field center will be working with schools and communities with differences in geography and ethnic/racial and cultural backgrounds. Given these complexities, TAAG formative research was developed to provide information to maximize the trial's feasibility (i.e., acceptability to the schools, parents, students and community organizations, operability) and to enhance potential for sustainability.

The TAAG intervention and evaluation is primarily drawn from social ecology theory (McLeroy et al., 1988) but is also informed by social cognitive and social marketing theories. Ecological models acknowledge the role of interpersonal factors but place their emphasis on the pervasive influences of social-environmental and physical-environmental factors (McLeroy et al., 1988; Stokols, 1992). The TAAG formative research accommodated this framework by examining the perspectives of multiple players (teachers, girls, parents, and community agencies—interpersonal factors), documenting the availability of institutions and local resources for inclusion in the intervention strategy (organizational factors, community factors), and assessed policy factors, which may be linked to the promotion of physical activity in young people. In addition, the TAAG formative research used key principles and strategies from social marketing, such as audience segmentation, to guide data collection.

TAAG formative research goals were to (a) provide a description of study communities and schools, (b) select and design the trial's interventions to increase physical activity among adolescent girls, (c) identify potentially effective recruitment and retention strategies, and (d) design appropriate evaluation instruments. To meet these goals, a variety of formative research techniques, including telephone interviews, surveys and checklists, semistructured interviews, and focus group discussions, were used. The following section contains an overview of the formative research approaches, instruments, and methods implemented. Other articles in this issue provide more detailed descriptions of the data and results of each formative research method.

DATA COLLECTION AND ANALYSIS METHOD

Design and Sampling

The TAAG Formative Assessment Working Group, which comprised representatives from field sites, the coordinating center, and the National Heart, Lung, and Blood Institute, developed instruments and procedures for their administration in several phases. TAAG subcommittees and working groups were invited to present their information requests to the formative research working group in the early stages of the project. Later, as initial results were presented to these groups, additional questions were generated that were addressed by the group. All instruments and protocols were pretested at field sites and then modified prior to national training. Representatives from each site were trained and certified to collect formative research data. Each field site's institutional review board (IRB) approved the instruments prior to data collection. For the interviews with school principals, physical education (PE) instructors, and parents and for the mailed surveys with community agencies (described below), informed consent was obtained per IRB guidelines at each field site. For the individual interviews with girls, checklists of girls' activities, focus groups with boys, and focus groups with girls (described below), both signed parental consent and adolescent assent forms were obtained.

An overview of the TAAG formative research instruments is presented in Table 2. Information was gathered from schools that were located in the TAAG catchment area (i.e., within the same area as potential TAAG schools) and were demographically similar to TAAG schools at each of the six field sites. Information was also gathered from community agencies located in proximity to potential TAAG schools, parents, and students. Parents and adolescent girls and boys were recruited from schools not participating in the TAAG main trial because data collected from these individuals could potentially influ-

∞ Table 2. TAAG Formative Research Data Collection Methods

Instrument	Purpose	Participants	Sample Size	Formative Research Goal Addressed			
				Intervention development	Recruitment and Retention	Instrument Development	Community and School Description
School survey	Determine physical education requisites, physical activity facilities, health education requisites, after-school programs, transportation, Internet resources	Principals (or designees) in potential TAAG schools	64	X		X	X
Community agency survey	Community agency resources, facilities, communication strategies, role of staff, Internet access	Community agencies near potential TAAG schools	139	X		X	X
Parent survey	Determine parent, girls' physical activity participation, access to resources, physical activity barriers, preferred methods of learning about programs	Parents of seventh and eighth grade girls	87	X	X		X
Girls' activity checklist	Determine prevalent and favorite physical activities	Sixth and eighth grade girls	130	X		X	
Girls' in-depth interviews	Determine favorite activities, barriers to being active, social and environmental contexts, attitudes about physical education	Seventh and eighth grade girls	80	X	X	X	X
Boys' focus groups	Perceptions of girls being active, barriers to girls activity and participation	Seventh and eighth grade boys	12	X		X	X
Girls' focus groups	Determine segments, channels within segments, preferred messages, acceptability of strategies	Seventh and eighth grade girls	13	X		X	X
PE instructor interviews	Determine PE environment, current PE teaching methods, requirements of TAAG schools	PE department heads at TAAG study school	36	X		X	X

NOTE: TAAG = Trial of Activity for Adolescent Girls.

ence attitudes or behaviors and therefore could contaminate trial results. PE instructors and principals were recruited from each potential TAAG study school.

The TAAG formative research used purposive sampling to select participants for all data collection instruments. This was particularly important for the in-depth interviews and focus groups to vary participant ethnicity and physical activity levels. Through this process, the final data sets included 64 school surveys, 138 community agency surveys, 87 parent surveys, 130 girls' physical activity checklists, 80 individual interviews with girls, 11 focus groups with boys ($n = 77$), 13 focus groups with girls ($n = 100$), and 36 interviews with PE instructors.

The formative research data were collected in two separate phases. The components of the Phase 1 formative research were designed to generate preliminary information that could be used to improve and enhance intervention development and facilitate implementation, particularly to be used by the TAAG intervention team for general planning purposes. The data collection methods used for the Phase 1 formative research included (a) a school survey, (b) a telephone survey of parents, (c) a community agency survey, (d) in-depth interviews with girls, (e) a girls' activity checklist, and (f) boys' focus groups.

The objectives of the Phase 2 formative research were to refine the development of intervention materials, define meaningful segments of girls for tailoring intervention messages, explore potential channels for delivering intervention messages, understand the resources and constraints of TAAG school PE departments, and determine specific barriers for girls wearing the Actigraph accelerometers (small monitoring devices worn on the waist that detect motion) during structured physical activity programs. Phase 2 was conducted after each site had selected the six TAAG schools for the main trial. The data collection methods used for Phase 2 formative research included (a) girls' focus groups and (b) a PE instructor interview.

Data Collection

School Surveys. A total of 64 quantitative surveys (ranging from 7 to 16 schools per field site) were conducted from June 2001 to August 2001 with middle school principals, assistant principals, or guidance counselors from a pool of potential local TAAG schools at each site. The surveys were conducted in a minimum of six schools per site. An in-person interview was preferred; however, in some cases, scheduling constraints or long distances to schools made phone interviews expedient. The one-time assessment contained 35 questions and covered topics including the school's daily structure, PE requirements, how PE is taught, physical activity facilities available at the school, availability and delivery of health education curricula at the school, types of after-school programs offered, transportation availability and needs, Internet access, relationships with community organizations, methods for communicating with parents, and general questions about the school. Each survey took approximately 30 to 40 min to complete.

Community Agency Surveys. A total of 139 quantitative mailed questionnaires were completed by directors, coordinators, supervisors, or managers of community agencies in proximity to potential TAAG schools or students at each field site. The number of community agencies surveyed per site ranged from 17 to 33. At least two community agencies (e.g., YMCA, Boys' and Girls' Club, City and Regional Parks and Recreation) were identified for each of the potential TAAG schools.

One person per local community agency completed the mailed questionnaire, containing 23 questions. The community agency survey covered topics including agency offer-

ings, hours of operations, available facilities for physical activity, transportation availability, methods of marketing and communication, staff demographics, Internet access, physical activity programs for girls ages 11 to 14, physical activity programs sponsored by the agency at middle schools, and community partnerships. Each questionnaire required approximately 30 to 40 min to complete.

Parent Interviews. A total of 87 quantitative interviews (ranging from 6 to 17 parents per field site) were conducted with parents who had a daughter entering the seventh or eighth grade in the 2001 fall semester. Because of IRB and school constraints, parents at most sites were first sent a letter explaining the study. In most sites, parents were requested to return a postcard or call the study site to participate. One parent per family was interviewed. In households with more than one daughter of middle-school age, the youngest daughter was referenced in the interview. This one-time telephone interview contained 29 questions and covered topics such as types of physical activities and associated family participation; daughter's physical activity levels at home, school, and off-school grounds; methods of communication with the schools; transportation to and from the school; daughter's access to computers; and general demographic information about the daughters and parents. Each interview required approximately 15 to 20 min to complete.

Girls' Physical Activity Checklist. A total of 130 quantitative group-administered checklists (ranging from 14 to 31 girls per field site) were conducted with middle school girls in the sixth and eighth grades. The physical activity checklists were completed by an equal percentage of sixth and eighth grade girls. Each site conducted the checklist with a minimum of five girls each in sixth and eighth grades at each of one to two middle schools that were demographically similar to TAAG schools. Girls were selected from classes that were representative of the student body. This one-time checklist contained 70 questions and covered topics including girls' participation levels in types of physical activities and work activities and frequency (number of days per week) of participation in physical activities when school is in and out of session. Checklists were administered in a classroom setting at school and required approximately 15 to 20 min to complete.

Girls' Semistructured Interviews. A total of 80 semistructured interviews (ranging from 8 to 21 girls per field site) were conducted from September 2001 to January 2002 with middle school girls, half in the seventh and half in the eighth grades. When possible, girls were selected from two different schools at each site. Within the schools, teachers were asked to select girls from various racial and ethnic backgrounds and physical activity levels from classes representative of the student body (excluding advanced or remedial classes).

This one-time individual interview contained 35 open-ended questions and covered topics such as how they spend their free time, meanings of physical activity, favorite physical activities, influences on physical activity, physical education class and school setting, opportunities for physical activity, activities other than physical activity, access to computers and the Internet, and opinions about the TAAG logo. Each interview required approximately 45 to 60 min to complete and was conducted at the girls' school in private in a classroom or other designated area. Interviews were audiotaped and transcribed.

Boys' Focus Groups. Early interviews with girls revealed that the opinions of boys may greatly influence girls' decisions and behaviors about being physically active. To investigate this further, 13 focus group discussions with a total of 77 boys (approximately two

focus groups per field site) were conducted from January 2002 to March 2002 with middle school boys in the seventh and eighth grades. Sites conducted focus groups with an average of 7 boys (ranging from 5 to 9), homogenous by ethnicity, with Caucasian, African American, and Hispanic groups. Focus group sessions were conducted with seventh and eighth grade boys on separate occasions, except at the Maryland site, where an additional focus group was conducted with sixth grade boys. When possible, boys were selected from two different schools. Within the schools, teachers were asked to select boys from designated ethnic backgrounds and a range of physical activity levels (based on their own estimate) in classes representative of the student body.

During these one-time focus groups, the boys were asked 44 open-ended questions, covering topics such as classification of physical activities for boys, girls, or both, perceptions of girls being active, PE and after school activities for girls, and the TAAG project. The focus groups were conducted privately in an empty classroom or similar setting at the school. Each focus group discussion required approximately 45 to 60 min to complete.

Girls' Focus Groups. Thirteen focus group discussions with a total of 100 girls (two to three focus groups per field site) were conducted with middle school girls in the seventh and eighth grades. Each site conducted focus groups with an average of 8 girls (ranging from 4 to 12) based on designated ethnic representation. When possible, girls were selected from two different schools. Within the schools, teachers were asked to select girls from designated ethnic backgrounds and of varying physical activity levels (based on their own estimate) in classes representative of the student body. During the one-time focus group discussions, girls were asked 44 open-ended questions, covering topics such as overall perceptions of the TAAG project; how girls were typed or segmented by other girls; how best to recruit girls into intervention activities; feedback on TAAG messages, promotional materials, and a TAAG Web site; and ideas for competitions and contests. The focus groups were conducted privately in an empty classroom or similar setting at the school, and each discussion required approximately 45 to 60 min.

PE Instructor Interviews. A total of 36 quantitative interviews (6 per field site) were conducted from August 2002 to January 2003 with PE department heads and teachers at each TAAG study school. Approximately two thirds of the respondents were PE department heads, and the rest were PE teachers with the department. When a school had a separate PE department head for boys and girls, the PE department head for the girls was interviewed. This one-time in-person interview contained 36 questions and covered topics including PE requirements, PE instructor qualifications, PE teacher lesson information, access to office equipment, barriers to quality PE, and PE experiences for girls at the schools. Each interview required approximately 30 min.

Data Analysis

Quantitative data from the school surveys, PE instructor and teacher interviews, parent surveys, community agency surveys, and activity checklists completed by middle school girls were analyzed using the Statistical Analysis System (SAS Version 8.0, SAS Institute, Cary, NC). Descriptive statistics were used to characterize the study populations. Qualitative data from the girls' in-depth interviews, the boys' focus groups, and the girls' focus groups were analyzed using Qualitative Solutions and Research N6 (the latest version of NUD*IST), a software program for analyzing text-based data (Qualitative Solutions and Research PTY LTD, 2002). All interviews and focus group discussions were

tape-recorded with the participants' assent and parents' consent. Tapes were then transcribed verbatim. The three qualitative data collection methods produced 100 transcripts and 5,000 pages of text. To analyze these data, a codebook was developed that contained 144 codes. To further facilitate analysis, the qualitative data were organized into series of matrices for the purpose of identifying similarities and differences in themes among adolescent girls. Responses to selected items from quantitative surveys were then integrated with these analyses to further highlight similarities and differences by region (site) and by race. This mixed-method research strategy of data analysis was used to help generate a more comprehensive understanding of the identified themes.

DISCUSSION AND CONCLUSION

The TAAG formative research addressed many of the key gaps in the formative research literature. The TAAG formative research was based on a clear set of objectives, selected a range of methods appropriate to the information needs of the trial, and used implementation, analysis, and feedback strategies that were adapted to the information needs of the trial. The design of the formative research was guided by the overall TAAG conceptual framework, enabling a close linkage between research goals, questions, and intervention plans. The article by Young et al. (2006) in this issue considers the TAAG formative research approach to address these knowledge gaps and lays out a systematic example of how others could design formative research studies and use the information. This article also summarizes overall lessons learned in the TAAG formative research and how well gaps were addressed and discusses future directions.

The TAAG formative research used multiple types of respondents and data collection methods. This approach allowed a greater understanding of physical activity in adolescent girls from multiple perspectives, including teachers, parents, community agencies, boys, and the girls themselves. Information was collected in a sequence designed to meet intervention information needs as new requests were made by interventionists and other committees. The TAAG formative research, through its emergent design, use of methodological triangulation, and focus on multiple levels, was able to converge on findings and make recommendations. On the other hand, as a result of centralized training and an emphasis placed on structured modes of data gathering, the information was produced in a standardized fashion that permitted ready comparisons across sites.

The articles that follow in this special issue present in detail how the TAAG formative research met its goals. The articles by Vu, Murrie, Gonzalez, and Jobe (2006), Grieser et al. (2006), and Staten et al. (2006) focus on the girls learning about their perspectives on physical activity, social contexts, and how these relate to activity behavior based on the in-depth interviews and focus groups with girls. The article by Moe et al. (2006) describes the formative research, providing information about schools using the school survey data, whereas the article by Saunders and Moody (2006) focuses on information about community agencies related to physical activity for girls. These articles describe how the formative research met its first goal, to provide a description of study communities and schools, needed for planning the intervention. The Staten et al., Moe et al., Saunders and Moody (2006), and Young et al. (2006) also present detailed information on how the formative data were used to develop intervention strategies for TAAG (Goal 2). For example, the Staten et al. article describes how the formative research contributed to the selection of specific target audiences among middle school girls and identified appropriate channels and messages for reaching these girls. The article by Young et al. (2006)

describes the multiple approaches used to provide the formative information to TAAG intervention subcommittee addressing Formative Research Goal 2. Mechanisms for feeding back formative research results in large trials constitute a crucial gap that has not been described in the literature previously.

Limitations

The TAAG formative research had several limitations. The first is practically universal in large intervention trials: The information was needed immediately. Formative research information is used to develop intervention approaches and evaluation tools, but this means that these other program components must wait on the results of the formative research. In TAAG, almost all intervention and measurement working groups had urgent needs for information so they could proceed with their planning in an informed manner. The topics to be addressed, instruments, and procedures for the TAAG formative research were developed in working groups and passed through multiple levels of review, resulting in well-thought-out instruments but requiring time. Another limitation was that although we chose schools for the formative research in Phase 1 that were demographically similar to TAAG schools, we found that schools were very different from each other within a site. This led to challenges in applying the information learned in the first phase of the formative research. We addressed this issue by focusing our data gathering in the Phase 2 formative research on very specific information needs requested from TAAG working groups.

Another potential limitation was that although a range of methods and types of respondents were used for the formative research, the most qualitative and open-ended types of approaches were not employed. Semistructured interviews were employed rather than in-depth interviews, and focus groups used detailed guides with relatively short discussions of each question. This level of structure, even in the more qualitative approaches employed, had distinct advantages in terms of training, standardization, and comparability of information across sites, as has been found in other studies (Gittelsohn et al., 1999). However, the range of information obtained may have been restricted by not employing more narrative and open-ended approaches that would allow exploration of topics in more detail. Centralized training on all instruments, although promoting comparability of results, also served to promote agreement among data collectors on “what we were after” and may have also led to less exploration of emergent themes.

Implications for Practice

It is apparent that not all health intervention studies involve multicenter trials, nor do they all have the funding and resources TAAG had available. Yet all researchers can extract useful information from formative research. Several principles appear to be key both from the literature and from the TAAG formative research experience: emergent design, flexibility, and focus on meeting the needs of the larger trial in an efficient and time-responsive manner.

The two-phase TAAG formative research was successful in providing early information quickly to help intervention working groups begin planning TAAG intervention approaches (Phase 1) and then also permitting the collection of specific follow-up information later as additional needs and issues were defined (Phase 2). Future intervention trials may consider a similar approach.

The TAAG formative research emphasized quantitative over qualitative approaches. The need to use more standardized approaches in formative research in large multicenter trials has been discussed elsewhere (Gittelsohn et al., 1999; Higgins et al., 1996). The emphasis on structured methods reduced training time and costs and still permitted useful qualitative feedback via the semistructured interviews and focus groups on issues key to the project.

References

- Andreason, A. (1995). *Marketing social change: Changing behavior to promote health, social development and the environment*. San Francisco, CA: Jossey-Bass.
- Ayala, G. X., Elder, J. P., Campbell, N. R., Engelberg, M., Olson, S., Moreno, C., et al. (2001). Nutrition communication for a Latino community: Formative research foundations. *Family Community Health, 24*, 72-87.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.
- Caballero, B., Clay, T., Davis, S. M., Ethelbah, B., Holyrock, B., Lohman, T., et al. (2003). Pathways Study Research Group: A school-based, randomized controlled trial for the prevention of obesity in American Indian schoolchildren. *American Journal of Clinical Nutrition, 78*(5), 1030-1038.
- Carbone, E. T., Campbell, M. K., & Honess-Morreale, L. (2002). Use of cognitive interview techniques in the development of nutrition surveys and interactive nutrition messages for low-income populations. *Journal of the American Dietetic Association, 102*(5), 690-696.
- Cortes, L. M., Gittelsohn, J., Alfred, J., & Palafox, N. (2001). Formative research to inform intervention development for diabetes prevention in the Republic of the Marshall Islands. *Health Education Behavior, 28*(6), 696-715.
- Gittelsohn, J., Evans, M., Helitzer, D., Anliker, J., Story, M., Metcalfe, L., et al. (1998). Formative research in a school-based obesity prevention program for Native American school children (Pathways). *Health Education Research, 13*, 251-265.
- Gittelsohn, J., Evans, M., Story, M., Davis, S. M., Metcalfe, L., Helitzer, D. L., et al. (1999). Multisite formative research for the Pathways study to prevent obesity in American Indian schoolchildren. *American Journal of Clinical Nutrition, 69*, 767S-772S.
- Gittelsohn, J., Haberle, H., Vastine, A., Dyckman, W., & Palafox, N. (2003). Macro- and microlevel processes affect food choice and nutritional status in the Republic of the Marshall Islands. *Journal of Nutrition, 133*(1), 310S-313S.
- Gittelsohn, J., Harris, S., Burris, K., Kakegamic, L., Landman, L. T., Sharma, A., et al. (1996). Use of ethnographic methods for applied research on diabetes among the Ojibway-Cree in Northern Ontario. *Health Education Quarterly, 23*(3), 365-382.
- Grieser, M., Vu, M. B., Bedimo-Rung, A. L., Neumark-Sztainer, D., Moody, J., Young, D. R., et al. (2006). Physical Activity Attitudes, Preferences, and Practices in African American, Hispanic, and Caucasian Girls. *Health Education & Behavior*, **PE: PLS INSERT VOLUME NUMBER, PE: PLS INSERT PAGE NUMBERS**.
- Higgins, D. L., O'Reilly, K., Tashima, N., Crain, C., Beeker, C., Goldbaum, G., et al. (1996). Using formative research to lay the foundation for community level HIV prevention efforts: An example from the AIDS community demonstration projects. *Public Health Rep, 111*(Suppl. 1), 28-35.
- Kraft, J. M., Beeker, C., Stokes, J. P., & Peterson, J. L. (2000). Finding the "community" in community-level HIV/AIDS interventions: Formative research with young African American men who have sex with men. *Health Education Behavior, 27*(4), 430-441.
- Kumanyika, S. K., Story, M., Beech, B. M., Sherwood, N. E., Baranowski, J. C., Powell, T. M., et al. (2003). Collaborative planning for formative research and cultural appropriateness in the Girls

- Health Enrichment Multi-site Studies (GEMS): A retrospection. *Ethnicity and Disease*, 13, S15-S29.
- McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15, 351-377.
- Meade, C. D., Calvo, A., & Cuthbertson, D. (2002). Impact of culturally, linguistically, and literacy relevant cancer information among Hispanic farmworker women. *Journal of Cancer Education*, 17(1), 50-54.
- Middlestadt, S. E., Bhattacharyya, K., Rosenbaum, J., Fishbein, M., & Sheperd, M. (1996). The use of theory based semistructured elicitation questionnaires: Formative research for CDC's Prevention Marketing Initiative. *Public Health Report*, 111(Suppl. 1), 18-27.
- Minja, H., Schellenberg, J. A., Mukasa, O., Nathan, R., Abdulla, S., Mponda, H., et al. (2001). Introducing insecticide-treated nets in the Kilombero Valley, Tanzania: The relevance of local knowledge and practice for an information, education and communication (IEC) campaign. *Tropical Medicine and International Health*, 6(8), 614-623.
- Moe, S. G., Pickrel, J., McKenzie, T. L., Stikmiller, P. K., Combs, D., & Murrie, D. (2006). Using School-Level Interviews to Develop a Multisite PE Intervention Program. *Health Education & Behavior*, **PE: PLS INSERT VOLUME NUMBER, PE: PLS INSERT PAGE NUMBERS.**
- Newes-Adeyi, G., Helitzer, D. L., Caulfield, L. E., & Bronner, Y. (2000). Theory and practice: Applying the ecological model to formative research for a WIC training program in New York State. *Health Education Research*, 15, 283-291.
- Nichter, M., Thompson, P. J., Shiffman, S., & Moscicki, B. (2002). Using qualitative research to inform survey development on nicotine dependence among adolescents. *Drug Alcohol Dependence*, 68, S41-S56.
- Saunders, R. P., & Moody, J. (2006). Community Agency Survey Formative Research Results From the TAAG Study. *Health Education & Behavior*, **PE: PLS INSERT VOLUME NUMBER, PE: PLS INSERT PAGE NUMBERS.**
- Staten, L. K., Birnbaum, A. S., Jobe, J. B., & Elder, J. P. (2006). A typology of middle school girls: Audience segmentation related to physical activity. *Health Education & Behavior*, **PE: PLS INSERT VOLUME NUMBER, PE: PLS INSERT PAGE NUMBERS.**
- Stokols, D. (1992). Establishing and maintaining healthy environments. Toward a social ecology of health promotion. *American Psychologist*, 47(1), 6-22.
- Vu, M. B., Murrie, D., Gonzalez, V., & Jobe, J. B. (2006). Listening to girls and boys talk about girls' physical activity behaviors. *Health Education & Behavior*, **PE: PLS INSERT VOLUME NUMBER, PE: PLS INSERT PAGE NUMBERS.**
- Young, D. R., Johnson, C. C., Steckler, A., Gittelsohn, J., Saunders, R., Saksvig, B. I., et al. (2006). Data to action: Using formative research to develop intervention programs to increase physical activity in adolescent girls. *Health Education & Behavior*, **PE: PLS INSERT VOLUME NUMBER, PE: PLS INSERT PAGE NUMBERS.**