The Journal of Child Nutrition & Management
Volume 27, Issue 2, Fall 2003
Published by School Nutrition Association

Differences in Fourth-Graders' Participation Rates Across Four School-Based Nutrition Studies

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ABSTRACT

Federal policy has encouraged researchers to include children in research studies; thus, it is important to report experiences recruiting children to participate in studies. This article compares fourth-graders' participation rates across four school-based nutrition studies conducted in one school district in a southeastern state. For each study, children were observed eating school meals (breakfast and lunch); interviewed regarding dietary intake; and weighed and measured. For Study 1, children from 11 schools received $10 per interview for up to two interviews conducted in the morning at school. For Study 2, children from 10 schools received $25 if interviewed once in the evening, either by telephone or in a van parked outside the child's home. For Study 3, children from three schools received $10 per interview for up to three interviews held in the evening by telephone. For Study 4, children from six schools received $15 per interview for up to two interviews conducted either in the morning or afternoon at school, or in the evening by telephone. Recruitment procedures were similar for all studies.

Participation rates were 73% (n=635) for Study 1, 57% (n=432) for Study 2, 66% (n=158) for Study 3, and 71% (n=296) for Study 4. Logistic regression was used to determine whether study (1, 2, 3, 4), race (black, white), or gender (male, female) were significant predictors of participation (agreed, denied). The results indicated that study ($p<0.0001$), race ($p=0.0198$), and gender ($p=0.0188$) were significant predictors, however, no two-factor interactions among these effects were significant. Post hoc pairwise comparisons with Bonferroni adjustment indicated that agreement to participate for Study 2 was lower ($p<0.0001$) than that for Studies 1, 3, and 4, which did not differ. Agreement to participate across all four studies was higher for black (69%) than white (63%; $p=0.0054$) children and for females (69%) than males (64%; $p=0.0209$). Schools provide a natural environment for nutrition research because school foodservice programs feed millions of children one or two meals (breakfast and/or lunch) each school day. Observations of children eating school meals provide a convenient and relatively unobtrusive means of validating children's dietary recalls. Thus, at some point, most child nutrition professionals are likely to be involved in research either directly (i.e. by conducting studies themselves) or indirectly (i.e. by allowing others access to their school cafeterias to collect data).

This paper references the following data:

- Table 1. Similarities and Differences in the Designs for Each of the Four Studies.
- Table 2. Number and Percent of Fourth-Grade Children Who Agreed or Denied to Participate by Race and Gender Across all Four Studies Combined.
- Table 3. Number and Percent of Fourth-Grade Children Who Agreed or Denied to Participate by Gender and Race for Each of the Four Studies Separately.

Table 1: Similarities and Differences in the Designs for Each of the Four Studies

	Study 1	Study 2	Study 3	Study 4
School Year	2000-01	2001-02	Spring 2002	Fall 2002
Number of Schools	11	10	3	6
School Codes	A, B, C, D, E, F, G, H, I, J, K	A, B, C, D, E, F, G, H, I, J	L, M, N	A, D, I, J, L, M
Number of Children Invited	873	761	238	419
Interview Type, Time, and Location	Morning interviews conducted in-person at school	Evening interviews conducted either in-person in a van parked outside child's home, or by telephone	Evening interviews conducted by telephone	Morning or afternoon interviews conducted in-person at school, or evening interviews conducted by telephone
Number of Interviews Per Child	0, 1, or 2	0 or 1	0, 1, 2, or 3	0, 1, or 2
Incentive Per Interview	$10	$25	$10	$15

Table 2: Number and Percent of Fourth-Grade Children Who Agreed or Denied to Participate by Race and Gender Across all Four Studies Combined

	Agreed to Participate		Denied to Participate	
	n	%	n	%
Across all four studies	1521	66	770	34

Race				
Black	848	69	382	31
White	673	63	388	37
Gender				
Female	773	69	352	31
Male	748	64	418	36

Table 3: Number and Percent of Fourth-Grade Children Who Agreed or Denied to Participate by Gender and Race for Each of the Four Studies Separately

	Gender		Race	
	Male	Female	White	Black
Study 1				
Agreed				
n	307	328	311	324
%	69	77	70	75
Denied				
n	140	98	131	107
%	31	23	30	25
Study 2				
Agreed				
n	215	217	229	203
%	56	58	54	60
Denied				
n	170	159	192	137
%	44	42	46	40
Study 3				
Agreed				

n	78	80	26	132
%	66	67	62	67
Denied				
n	41	39	16	64
%	34	33	38	33
Study 4				
Agreed				
n	148	148	107	189
%	69	73	69	72
Denied				
n	67	56	49	74
%	31	27	31	28

INTRODUCTION

Federal policy has encouraged researchers to include children in research studies (National Institutes of Health, 1997). High participation rates are needed for studies to help reduce sampling bias and enhance study precision. When sampling bias is present, it adversely affects one's ability to make generalizations from the results (Kearney et al., 1983; Severson & Ary, 1983). Participation may be decreased by federal requirements to obtain written parental consent (Ellickson & Hawes, 1989; Kearney et al., 1983; Severson & Biglan, 1989; Severson & Ary, 1983). It is important to investigate barriers of participation to determine ways to increase and sustain participation rates of research subjects (National Institutes of Health, 2002a). For example, a recent program announcement by the National Institutes of Health solicits research addressing topics that affect participation, such as informed consent, willingness to participate, types of incentives, features of the research setting, and characteristics of the subjects (National Institutes of Health, 2002b).

Several articles have considered issues regarding recruiting children for studies. Obtaining written parental consent and child assent is one of the major issues discussed. Written parental consent is required for all federally funded research unless an Institutional Review Board (IRB) approves a waiver of informed consent (National Archives and Records Administration, 2001). An IRB reviews all studies involving human subjects and without the approval of an appropriate IRB, no research can be conducted (Harrell et al., 2000). Obtaining written child assent is not a federally mandated process, although IRBs may require it (Lindeke et al., 2000). However, obtaining child assent is important because it includes the child in the decision-making process

(Bartholome, 1989; Lindeke et al., 2000) and helps to ensure that the child understands his/her involvement in the study (Bartholome, 1989). Obtaining child assent also indicates that researchers respect the child's rights and responsibilities during the research process (Lindeke et al., 2000).

Parental consent forms and child assent forms should be written at a level that is understandable to both the parent and child (Lindeke et al., 2000; Puskar et al., 1994). O'Donnell et al. (1997) suspected that some parental nonresponses and refusals were due to misunderstandings caused by the consent language, rather than an unwillingness to allow children to participate. Belzer et al. (1993) suggested using a consent form that provides parents with an opportunity to request additional information about the study before deciding to grant or deny consent. Some studies have reported initially low response rates for signed consent/assent forms and have used follow-up methods to increase response rates (Croft et al., 1984; Ellickson & Hawes, 1989; Esbensen et al., 1996; Frye et al., 2002; Harrington et al., 1997). These follow-up efforts can be prohibitively expensive and time consuming for large studies (Ellickson & Hawes, 1989) and may not be effective (Frye et al., 2002).

Another reason low response rates may occur when written consent and assent are required is that some children forget to take forms home to parents, or forget to return signed forms (Lamb et al., 2001; Puskar et al., 1994). Reminders and incentives to return signed forms may enhance participation (Lamb et al., 2001). Incentives also may be given to children for participating in studies. Offering gifts or money for participation must be done carefully, as it could be deemed coercive, especially when subjects are young and/or poor (Lamb et al., 2001). When recruiting children for studies, there should be no pressure by researchers, and the incentive(s) offered should reflect what investigators ask children to do and any inconvenience to children (Erlen et al., 1999). Other factors that influence recruitment include logistical considerations, such as time, location, setting of interventions, and the relationship with researchers (Jones & Broome, 2001).

This article discusses the impact of study, race, and gender on participation rates across four school-based nutrition studies that obtained dietary recalls from fourth-grade children. Because schools provide a natural environment for nutrition research, it is logical to discuss participation rates for nutrition studies that are conducted in schools. Schools provide an attractive opportunity for reaching large numbers of children in the general population (Berenson et al., 1991). Schools play a critical role in shaping children's food acceptance patterns and can help to improve children's diets (Centers for Disease Control and Prevention, 1996). School foodservice programs feed millions of children one or two meals (breakfast and/or lunch) each school day (National School Lunch Program, 2003; School Breakfast Program, 2003). Observations of children eating school meals provide a convenient and relatively unobtrusive means of validating portions of children's dietary recalls (Frank, 1991; Frank et al., 1977). The authors have conducted several school-based studies regarding the accuracy of the school breakfast and school lunch portions of fourth-graders' dietary recalls validated with observations of school meals.

METHODOLOGY

The IRB approved all four studies that took place in one public school district in a southeastern state. The schools were selected based on high participation in school breakfast and school lunch. Recruitment methods were the same for all four studies. The school district superintendent granted permission to collect data at several elementary schools, pending approval from each school principal. A brief meeting at each school was held with the principal and all fourth-grade teachers to discuss the study. Consent/assent forms were distributed to each fourth-grade class during 30-minute individual class visits. The consent/assent forms were similar for all four studies, and were worded at a level that parents and children could understand. Project personnel read the assent form to each class and asked questions after each paragraph to determine whether children understood the study; time was allowed for children to ask questions. Children were asked to take the forms home for parents to read and sign. To encourage children to return signed forms, each child was given two small prizes (worth approximately 10¢ each) if they returned forms signed by their parents by the deadline (two to three days later) regardless of whether agreement to participate was granted or denied. The authors used a similar recruitment process previously (Frye et al., 2002).

Agreement to participate was obtained when the parent/guardian provided written consent and the child provided written assent. Participation was denied if the parent or child denied consent or assent, respectively, or if the child failed to return signed forms. Agreement to participate indicated that children 1) might be observed eating school breakfast and school lunch at school on some days; 2) might be interviewed regarding what they ate; 3) would have their weight and height measured one day at school; and 4) would be paid in the form of a check mailed to their home, if interviewed.

The four studies were conducted in three to eleven schools during three school-year periods. Between 238 to 873 children were invited to participate in each study. The four studies differed in aspects regarding interviews, including type (in-person, telephone), time (morning, afternoon, evening), location (school, van parked outside child's home), number per child (0 to 3), and incentive ($10, $15, $25). Table 1 shows the similarities and differences in the designs of each of the four studies.

Logistic regression was conducted to determine whether study (1, 2, 3, 4), race (black, white), or gender (male, female) were significant predictors of participation (agreed, denied). Children of other races were excluded from analyses due to their small number within the school's population. Analyses were conducted using SAS, version 8. Results regarding the accuracy of fourth-graders' dietary recalls are reported elsewhere (Baxter, Smith, Litaker, Baglio et al., in press; Baxter, Smith, Litaker, Guinn et al., in press; Baxter, Thompson, Litaker et al., 2003; Baxter, Thompson, Smith et al., 2003).

RESULTS AND DISCUSSION

Logistic regression indicated that study ($p<0.0001$), race ($p=0.0198$), and gender ($p=0.0188$) were significant predictors of participation and no two-factor interactions were significant among these effects. Post hoc pairwise comparisons with Bonferroni adjustment indicated that

agreement to participate for Study 2 was significantly lower ($p<0.0001$) than that for Studies 1, 3, and 4, which did not differ significantly. Agreement to participate across all four studies was higher for black (69%) than white (63%; $p=0.0054$) children and for females (69%) than males (64%; $p=0.0209$).

Agreement to participate was 73% for Study 1, 57% for Study 2, 66% for Study 3, and 71% for Study 4. For each study, the percentages of children by race/gender groups who agreed to participate were similar to those of the total population of fourth-graders invited to participate at each school (results not shown). This supports the assertion that each sample is representative of the total population. Tables 2 and 3 provide information regarding the number and percent of fourth-graders who agreed or denied to participate by race and gender across all four studies combined and for each of the four studies separately.

It is unknown why Study 2 had a lower participation rate than the other three studies. It was especially surprising to see such a difference between Studies 1 and 2 because Study 2 was held the next school year in 10 of the same 11 schools from Study 1. Study 2 was the only study for which some interviews were held in a van parked outside the child's home, but it was also the study for which the incentive for being interviewed was the greatest. Because of this, it is believed that agreement to participate was strongly influenced by the intrusiveness of the interview location to the child and his/her family, and that the higher incentive was less influential. Consent and assent for Study 2 was obtained around the time of the September 11th terrorist attacks on the United States, which could have negatively influenced participation rates. However, participation rates for Studies 3 and 4, conducted that spring and the next fall, respectively, were not significantly different than for Study 1, which was conducted the previous school year.

Having a telephone at home was not required for Study 1, but was for Studies 2, 3, and 4, which all included telephone interviews. Perhaps some parents denied participation because they did not have a telephone at home; however, only 2.4% of U.S. households have no telephone service (U.S. Census Bureau, 2000). Some parents may have denied participation because they did not want to disclose their home telephone number or did not want to be disturbed at home.

Numerous school-based studies have obtained dietary recalls from children (Crawford et al., 1994; Emmons & Hayes, 1973; Gortmaker et al., 1999; Luepker et al., 1996; Lytle et al., 1998; Meredith et al., 1951; Perry et al., 1985; Wolfe & Campbell, 1993); however, only a few report participation rates (Baranowski et al., 2002; Baxter et al., 2000; Baxter et al., 1997; Baxter et al., 2002; Domel et al., 1994; Perry et al., 1998) or provide some information about participation rates (Bush et al., 1989; Luepker et al., 1988; Lytle et al., 1993; Nader et al., 1999).

The results of this study show that more black (69%) than white (63%) children agreed to participate across the four studies, with 2,291 eligible children. This is similar to that reported by Croft et al. (1984), with 16,904 eligible children across their initial study and three follow-up studies, but contrasts with that of Kearney et al. (1983), with 1,618 eligible children, and Thompson (1984) with 1,314 eligible children over four years, who both reported that more white than black children agreed to participate. The results find that more females (69%) than males (64%) agreed to participate across the four studies is similar to the findings by O'Donnell

et al. (1997), with 3,253 eligible children across three cohorts, but contrasts with Harrington et al. (1997), with 2,436 eligible children, and Thompson (1984), with 1,314 eligible children over four years; both of these studies failed to find gender differences in agreement to participate.

There are some limitations to consider with the current analysis. First, the four studies each included a different number of schools ranging from three to eleven. These schools were not selected randomly, but were included based on high participation in school meal programs. Second, we did not ask parents and children what influenced their decisions to grant or deny participation, so it is unknown what specific aspects regarding the interviews (e.g. type, time, location, incentive) influenced participation. Despite these limitations, these results provide insight regarding participation rates in school-based nutrition studies in elementary schools.

CONCLUSIONS AND APPLICATIONS

Due to the increased federal encouragement to include children in research, it is important to share information regarding children's participation rates in published studies. As discussed in the introduction, it is logical to consider children's participation rates for school-based nutrition studies because schools provide a natural environment for nutrition research. More than 95% of children ages 5 to 17 years are enrolled in schools that serve one or two meals a day (Kennedy, 1996). No other public institution has as much continuous and intensive contact with children during their first 20 years of life as public schools (Resnicow, 1993). Although it is generally agreed that school children's eating habits are influenced by both personal and environmental factors, information and interventions regarding how to reinforce healthly eating habits at school are lacking (Bordi et al., 2002). Thus, at some point, most child nutrition professionals are likely to be involved in research either directly (i.e. by conducting studies themselves) or indirectly (i.e. by allowing others access to their school cafeterias to collect data). The following key points of this article are applicable to researchers and child nutrition professionals alike.

First, participation rates in school-based nutrition studies may vary by study, as well as by children's race and/or gender. It would be helpful to know more about how parents and children decide to provide (or deny) consent and assent, respectively, to participate in nutrition studies at school. Second, be certain that IRB approval has been obtained before any data are collected (whether children are involved directly or indirectly in research). When publishing results of studies, be aware that several journals require reports of studies to indicate that IRB approval was obtained *(American Journal of Public Health,* 2003; *Nutrition Research*, 2003; *The American Journal of Clinical Nutrition*, 2002). Third, when reading reports of studies or publishing results of studies, details regarding participation (i.e. number of children invited, number of children who agreed to participate) should be included, along with methods used to recruit or invite children, whether child assent was obtained, whether incentives were provided for returning signed consent and assent forms, whether incentives were given for data collection, and what types of incentives were used, if applicable. In these four studies, an incentive for returning signed forms was given to each child. This was different than the incentive provided only to those children who were interviewed. In some studies, each child who agrees to participate may receive an incentive, even if data are not collected for that individual child.

Fourth, consider participation rates when interpreting results of studies. Participation rates of 75% and higher are generally considered desirable or acceptable, while participation rates around 50% and lower are generally considered less than desirable or unacceptable (Ellickson & Hawes, 1989; Jessor et al., 1995; Severson & Ary, 1984). Low participation could indicate that bias is a problem. For example, participants could be different in certain characteristics (e.g. race, gender, academic measures, health behaviors) than the entire student population from which they were drawn (Kearney et al., 1983; Severson & Ary, 1983). When participants are not representative of the population from which they are drawn, there is a limited ability to make generalizations or find external validity of the results. In other words, if the same study were conducted in different schools, the results might be very different.

Finally, published results of studies should include race and gender profiles of children invited to participate, as well as of children who agreed to participate. This will indicate how representative those who agreed are to those invited. Race and gender information by grade-level for schools often may be found on the Internet, so race and gender can be determined for children who denied participation.

ACKNOWLEDGEMENTS

This research was supported by grant R01 HL063189 from the National Heart, Lung, and Blood Institute of the National Institutes of Health. Suzanne Domel Baxter was the Principal Investigator. The authors appreciate the children, faculty, and staff of Blythe, Goshen, Glenn Hills, Gracewood, Hephzibah, Lake Forest Hills, McBean, Monte Sano, National Hills, Rollins, Southside, Terrace Manor, Willis Foreman, and Windsor Spring Elementary Schools; the School Nutrition Program of the Richmond County Board of Education in Georgia; and the Richmond County Board of Education in Georgia for allowing data to be collected. Appreciation is given to Michelle Christiano, CCRC, CIP, and Kathleen J. Belinski, EdS, RD, LD, for reviewing a preliminary version of this manuscript.

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