Nutrition Assistance Program Report Series

The Office of Analysis, Nutrition, and Evaluation

Special Nutrition Programs Report No. CN-04A1-SBP

Evaluation of the School Breakfast Program Pilot Project:
Final Report

Appendices A Through H

United States Department of Agriculture
Food and Nutrition Service

December 2004

APPENDIX A

SUPPLEMENTARY EXHIBITS: IMPLEMENTATION STUDY

Appendix A

Supplementary Exhibits: Implementation Study

The tables appearing in this appendix provide detailed background for the findings described in Chapter Three of the report. They are grouped by respondent category as follows:

- District Administrator (Exhibits A-1 to A-5)
- Principal (Exhibits A-6 to A-27)
- Cafeteria Manager (Exhibits A-28 to A-46)
- School Food Service Director (Exhibits A-47 to A-60)

Differences between control schools and treatment schools and between classroom treatment schools and non-classroom treatment schools have been tested for statistical significance using a difference in proportions test. Where statistically significant differences have been observed, they are noted by * for $p<.05$ and ** for $p<.01$.

List of Exhibits

List of Exhibits (continued)

List of Exhibits (continued)

List of Exhibits (continued)

School District Administrator

Exhibit A-1

School District Administrators' Involvement in the SBPP

Activity	Percent
Preparation of district application	16.7
Start-up activities	50.0
Received status reports	16.7
Review First Year Evaluation Report	33.3
Planning for termination of the pilot	16.7

N = 6

Source: Implementation Study—School District Administrator Interview, Spring 2003

Exhibit A-2

School District Administrators Reporting Observations and/or Involvement in the SBPP

Nature of Observations and/or Involvement	Number of Districts Reporting
Administrator observations of impact:	
Constructive influence on educational program of kids getting enough to eat	3
Administrator involvement in implementation:	
Assisted in school issues, e.g. trash removal and teacher reactions to classroom feeding	1
Reporting test scores to evaluators	1
Monitoring use of food in some treatment schools	1

N = 6

Source: Implementation Study—School District Administrator Interview, Spring 2003

Exhibit A-3

Percent of School District Administrators Reporting SBPP Issues Brought to their Attention by Key Stakeholders

Stakeholder	Percent
Principals	66.7
Teachers	50.0
Food Service Staff	50.0
Custodians	50.0
Nurses	0.0
Bus drivers	0.0

N = 6

Source: Implementation Study—School District Administrator Interview, Spring 2003

Exhibit A-4

School District Administrators Reporting Changes in Curriculum or Methods of Instruction Within Past Two Years

Item	N	Percent
Made changes in curriculum/methods of instruction	6	83.3
Of those making changes[1]		
Nature of change:		
New language arts program	5	40.0
New testing standard/achievement test edition	5	40.0
Curriculum revision	5	20.0
New standards-based mathematics program	5	20.0
Adopted new science curriculum	5	20.0

[1] A total of seven changes were identified by the five responding School District Administrators. In two of the districts, there were two changes. Of these seven changes, six (85.7%) were implemented district-wide, and one (14.3%) was implemented in selected schools within the district.

Source: Implementation Study—School District Administrator Interview, Spring 2003

Exhibit A-5

School District Administrator Attitude Toward the SBPP and Possible Changes in the School Breakfast Program After the Pilot Concludes

Item	Yes	No	Maybe
		Percent	
If District had it to do over, would it choose to participate in the SBPP?	83.3	0.0	16.7
Changes in the School Breakfast Program under consideration	16.7	83.3	--

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School District Administrator Interview, Spring 2003

Principal

Exhibit A-6

Percent of School Principals by Tenure at Present School, by School Type and District, School Year 2002-2003

School Type/District	N	Tenure as Principal at Present School			
		Median Years	Less than 3 Years	3-6 Years	More than 6 Years
				Percent	
School Type					
Control schools	74	3.0	45.9	44.6	9.5
Treatment schools	79	3.0	45.6	39.2	15.2
Classroom	14	3.5	35.7	50.0	14.3
Non-classroom	65	3.0	47.7	36.9	15.4
District					
A	17	3.0	35.3	52.9	11.8
B	24	3.0	45.8	33.3	20.8
C	9	5.0	22.2	44.4	33.3
D	34	4.0	35.3	52.9	11.8
E	59	2.0	59.3	33.9	6.8
F	10	3.5	40.0	50.0	10.0
All schools	153	3.0	45.8	41.8	12.4

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-7

Percent of Principals Reporting Unusual Events or Program Changes Occurring in Their Schools During School Years 1999-2000 through 2002-2003, by School Type and District[1]

	School Year 1999-2000		School Year 2000-2001		School Year 2001-2002		School Year 2002-2003	
School Type/District	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**
School Type								
Control Schools	73	13.7	73	13.7	74	20.3	74	44.6
Treatment Schools	79	21.5	79	19.0	79	27.8	79	29.1*
Classroom	18	27.8	18	22.2	14	42.9	14	42.9
Non-classroom	61	19.7	61	18.0	65	24.6	65	26.2
District								
A	16	12.5	16	43.8	17	29.4	17	29.4
B	24	29.2	24	12.5	24	29.2	24	41.7
C	9	22.2	9	44.4	9	44.4	9	77.8
D	34	5.9	34	2.9	34	23.5	34	44.1
E	59	15.3	59	13.6	59	15.3	59	30.5
F	10	50.0	10	20.0	10	40.0	10	10.0
All schools	152	17.8	152	16.4	153	24.2	153	36.6

[1] Respondents were asked to identify unusual events or program changes that might have affected school operations or academic achievement. In School Years 1999/00 and 2000/01, curriculum changes and key staff changes were among the events most frequently identified. In School Year 2001/02, the top three events were: construction (8 responses), redistricting (3 responses), and new academic/enrichment program (3 responses). In School Year 2002-2003, the top three events were: change in staffing (9 responses), construction (7 responses), and budget reductions (4 responses).

Note: Row percentages are independent.

* Difference in proportions is statistically significant at the .05 level. Comparison is between control and treatment schools.

Source: Implementation Study—School Principal Interviews, Spring2001 and 2003

Exhibit A-8

Principal's Perceptions of How Rate of Disciplinary Actions in Their School Compares To That of Other Elementary Schools, By School Type and District, School Year 2002-2003

School Type/District	N	Rate of Disciplinary Actions in Their School						
		Much Lower	Lower	About the Same	Higher	Much Higher	Don't Know	Other
School Type								
Control schools	74	14.9	32.4	29.7	10.8	2.7	9.5	0.0
Treatment schools	79	13.9	31.6	30.4	13.9	1.3	6.3	2.5
Classroom	14	7.1	28.6	28.6	28.6	0.0	0.0	7.1
Non-classroom	65	15.4	32.3	30.8	10.8	1.5	7.7	1.5
District								
A	17	11.8	17.6	47.1	11.8	0.0	11.8	0.0
B	24	16.7	50.0	8.3	8.3	4.2	12.5	0.0
C	9	22.2	11.1	33.3	22.2	0.0	0.0	11.1
D	34	11.8	32.4	32.4	11.8	0.0	11.8	0.0
E	59	15.3	33.9	30.5	11.9	3.4	3.4	1.7
F	10	10.0	20.0	40.0	20.0	0.0	10.0	0.0
All schools	153	14.4	32.0	30.1	12.4	2.0	7.8	1.3

[1] "Other" responses included: just different—a philosophical difference (it's hard to discipline children when they have a reason to be angry); and ranges from about the same to higher.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-9

Principals' Estimate of the Number of Times Students Sent to the School Office for Disciplinary Reasons in a Typical Week and If There Are More Visits in the Morning or Afternoon, by School Type and District, School Year 2002-2003

School Type/ District	N	Number of Visits/Day (per 100 students enrolled) Mean	Median	Share of Principals Indicating Variation in Disciplinary Visits by Time of Day N	Percent	N	How Disciplinary Visits Vary by Time of Day: More in Morning	More in Afternoon	About Same In Morning/ Afternoon	During Recess or After-Lunch Recess	During Lunch	Other
							Percent of Those Principals Indicating Variation in Disciplinary Visits by Time of Day (1)					
School Type												
Control	70	0.40	0.25	74	93.2	69	4.3	42.0	24.6	42.0	0.0	1.4
Treatment	79	0.48	0.33	79	97.5	76	1.3	30.3	19.7	55.3	5.3	1.3
Classroom	14	0.76*	0.74*	14	92.9	13	0.0	23.1	23.1	61.5	7.7	7.7
Non-classroom	65	0.42	0.32	65	98.5	63	1.6	31.7	19.0	54.0	4.8	0.0
District												
A	16	0.17	0.16	17	82.4	14	7.1	50.0	28.6	7.1	0.0	7.1
B	22	0.26	0.18	24	87.5	21	4.8	23.8	19.0	66.7	14.3	0.0
C	9	0.48	0.32	9	88.9	8	0.0	12.5	12.5	87.5	12.5	0.0
D	34	0.42	0.31	34	10.0	34	0.0	14.7	35.3	52.9	0.0	0.0
E	59	0.54	0.34	59	100.0	59	3.4	47.5	13.6	52.5	0.0	1.7
F	9	0.75	0.81	10	100.0	9	0.0	66.7	33.3	0.0	0.0	0.0
All schools	149	0.44	0.31	153	95.4	145	2.8	35.9	22.1	49.0	2.8	1.4

Note: Row percentages (1) may sum to more than 100.0% due to multiple responses.

* Difference is statistically significant at the .05 level. Comparison is between classroom and non-classroom treatment schools.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-10

Principals' Perception of Most Common Reasons for Disciplinary Actions by School Type and District, School Year 2002-2003

School Type/District	N	Reasons for Disciplinary Actions																
		Disrespect Towards Teachers/Staff	Fighting	Aggressive Behavior/ Conflicts	Disruptive Behavior	Disrespect Towards Other Students	Not Focused on Work	Other[1]	Name Calling/ Teasing	Disobedience	Inappropriate Behavior/ Attitude	Theft	Vandalism	Tardiness	Violation of Bus Rules	Absenteeism	Impulse Control/ Anger	Don't Know
		Percent of Principals																
School Type																		
Control	74	44.6	43.2	32.4	13.5	10.8	9.5	8.1	13.5	13.5	12.2	5.4	9.5	2.7	5.4	1.4	2.7	1.4
Treatment	79	54.4	48.1	25.3	16.5	16.5	17.7	16.5	10.1	8.9	8.9	10.1	3.8	6.3	3.8	6.3	3.8	0.0
Classroom	14	71.4	64.3	14.3	28.6	14.3	14.3	28.6	0.0	28.6	0.0	21.4	7.1	7.1	0.0	14.3	7.1	0.0
Non-classroom	65	50.8	44.6	27.7	13.8	16.9	18.5	13.8	12.3	4.6	10.8	7.7	3.1	6.2	4.6	4.6	3.1	0.0
District																		
A	17	35.3	23.5	41.2	23.5	5.9	23.5	5.9	5.9	23.5	11.8	0.0	0.0	0.0	11.8	0.0	0.0	0.0
B	24	37.5	41.7	16.7	25.0	12.5	12.5	8.3	12.5	0.0	8.3	8.3	12.5	0.0	0.0	8.3	0.0	4.2
C	9	11.1	44.4	22.2	11.1	0.0	33.3	44.4	44.4	11.1	11.1	11.1	11.1	22.2	0.0	11.1	11.1	0.0
D	34	41.2	47.1	47.1	2.9	14.7	8.8	20.6	14.7	8.8	8.8	2.9	0.0	2.9	2.9	2.9	5.9	0.0
E	59	67.8	55.9	23.7	10.2	18.6	11.9	6.8	8.5	8.5	10.2	13.6	10.2	5.1	1.7	3.4	3.4	0.0
F	10	60.0	30.0	10.0	50.0	10.0	10.0	10.0	0.0	40.0	20.0	0.0	0.0	10.0	30.0	0.0	0.0	0.0
All schools	153	49.7	45.8	28.8	15.0	13.7	13.7	12.4	11.8	11.1	10.5	7.8	6.5	4.6	4.6	3.9	3.3	0.7

[1] "Other" responses included: use of foul language; competitiveness; rough play; sexual harassment; and dress code violations.

Note: Row percentages may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-11

Percent of Principals Ranking Reasons for Disciplinary Actions as the Three Most Common Reasons, School Year 2002-2003

		Ranking		
Reasons for Disciplinary Actions	**N**	**Most Common**	**Second Most Common**	**Third Most Common**
			Percent	
Disrespect Towards Teachers/Staff	76	31.6	47.4	13.2
Fighting	70	35.7	35.7	18.6
Aggressive Behavior/Conflicts	44	27.3	34.1	9.1
Disruptive Behavior	23	60.9	30.4	0.0
Disrespect Towards Other Students	21	52.4	23.8	9.5
Not Focused on Work	21	42.9	23.8	33.3
Other [1]	19	26.3	36.8	26.3
Name Calling/Teasing	18	50.0	16.7	27.8
Disobedience	17	47.1	35.3	11.8
Inappropriate Behavior/Attitude	16	56.3	18.8	25.0
Theft	12	8.3	8.3	41.7
Vandalism	10	0.0	20.0	50.0
Tardiness	7	14.3	28.6	28.6
Violation of Bus Rules	7	71.4	14.3	14.3
Absenteeism	6	16.7	16.7	16.7
Impulse Control/Anger	5	60.0	20.0	0.0
Don't Know	1	0.0	0.0	0.0

[1] "Other" responses included: use of foul language; competitiveness; rough play; sexual harassment; and dress code violations.

Notes: N = number of principals identifying reasons for disciplinary actions regardless of whether it ranked as one of three most common. Percentages indicate share of principals identifying reason who ranked it as one of three most common.

Row percentages do not always sum to 100.0% due to non-response.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-12

Percent of Principals by Locations Where Disciplinary Incidents Were More Likely to Occur, by School Type and District, School Year 2002-2003

School Type/District	N	Playground	School Bus	Classroom	Cafeteria	Hallways	Bathrooms	Library/Music Class/Art Class	Other[1]
		Locations Where Disciplinary Incidents More Likely to Occur — Percent							
School Type									
Control	67	89.6	23.9	16.4	13.4	13.4	3.0	1.5	3.0
Treatment	69	85.5	13.0	5.8	5.8	4.3	2.9	2.9	5.8
Classroom	12	66.7	8.3	8.3	8.3	16.7	8.3	8.3	16.7
Non-classroom	57	89.5	14.0	5.3	5.3	1.8	1.8	1.8	3.5
District									
A	15	60.0	66.7	6.7	6.7	13.3	6.7	0.0	6.7
B	20	90.0	5.0	5.0	20.0	5.0	0.0	5.0	5.0
C	8	100.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0
D	29	100.0	0.0	10.3	10.3	6.9	0.0	0.0	0.0
E	55	94.5	12.7	7.3	9.1	9.1	3.6	3.6	7.3
F	9	33.3	55.6	66.7	0.0	22.2	11.1	0.0	0.0
All schools	136	87.5	18.4	11.0	9.6	8.8	2.9	2.2	4.4

[1] "Other" responses included: in unstructured settings; at lunch/recess; on the way home; outside, between annex rooms; and at school, before school starts.

Notes: N represents the number of respondents indicating that disciplinary incidents were more likely to occur in certain settings within the school. Row percentages may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-13

Percent of Principals Reporting a Written Policy on School Discipline and Whether the Incidence of Disciplinary Problems Has Changed Over the Past Three Years Compared to Previous Years, by School Type and District, School Year 2002-2003

School Type/District	N	School Has Written Policy	N	Incidence of Disciplinary Problems Has: Changed	Not Changed	Don't Know	N	How Incidence of Disciplinary Problems Has Changed: Increased	Decreased	Other[1]
		Percent		Percent (1)				Percent (2)		
School Type										
Control	74	83.8	74	48.6	37.8	13.5	36	13.9	75.0	8.3
Treatment	79	86.1	79	43.0	46.8	10.1	34	17.6	79.4	2.9
Classroom	14	92.9	14	64.3	28.6	7.1	9	22.2	77.8	0.0
Non-classroom	65	84.6	65	38.5	50.8	10.8	25	16.0	80.0	4.0
District										
A	17	82.4	17	64.7	35.3	0.0	11	0.0	90.9	9.1
B	24	91.7	24	50.0	41.7	8.3	12	16.7	75.0	8.3
C	9	88.9	9	66.7	33.3	0.0	6	33.3	66.7	0.0
D	34	100.0	34	35.3	47.1	17.6	12	25.0	75.0	0.0
E	59	79.7	59	37.3	45.8	16.9	22	9.1	86.4	4.5
F	10	50.0	10	70.0	30.0	0.0	7	28.6	42.9	14.3
All schools	153	85.0	153	45.8	42.5	11.8	70	15.7	77.1	5.7

[1] "Other" responses included: have had more students with severe emotional problems, but most students' behavior is improving; decreased during first years of pilot, but increased again; decreased during first two years of pilot, then slightly increased; and increased last year, but returned to normal this year.

Note: Row percentages (1) sum to 100.0%; row percentages (2) do not always sum to 100.0% due to non-response.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-14

Perceived Changes in School Breakfast Operations in School Year 2001-2002 as Reported by School Principals, by School Type and District

School Type/ District	N	Time of Breakfast Service				Length of Breakfast Service				Breakfast Service Staffing			
		Earlier	Later	No Change	Don't Know	Longer	Shorter	No Change	Don't Know	Increase	Decrease	No Change	Don't Know
		Percent				Percent				Percent			
School Type													
Control	74	0.0	0.0	83.8	16.2	1.4	0.0	82.4	16.2	1.4	0.0	79.7	18.9
Treatment	79	3.8	3.8	83.5	8.9	3.8	1.3	86.1	8.9	10.1	0.0	81.0	8.9
Classroom	14	0.0	14.3	85.7	0.0	0.0	7.1	92.9	0.0	28.6	0.0	71.4	0.0
Non-classroom	65	4.6	1.5	83.1	10.8	4.6	0.0	84.6	10.8	6.2	0.0	83.1	10.8
District													
A	17	5.9	0.0	94.1	0.0	11.8	0.0	88.2	0.0	5.9	0.0	88.2	5.9
B	24	0.0	4.2	75.0	20.8	0.0	4.2	75.0	20.8	4.2	0.0	75.0	20.8
C	9	11.1	0.0	88.9	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0
D	34	0.0	2.9	85.3	11.8	0.0	0.0	88.2	11.8	5.9	0.0	82.4	11.8
E	59	1.7	1.7	79.7	16.9	3.4	0.0	79.7	16.9	5.1	0.0	78.0	16.9
F	10	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0	20.0	0.0	70.0	10.0
All schools	153	2.0	2.0	83.7	12.4	2.6	0.7	84.3	12.4	5.9	0.0	80.4	13.7

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-15

Perceived Changes in School Breakfast Operations in School Year 2001-2002 as Reported by School Principals, by School Type and District (Continued)

		Breakfast Supervision				Location Breakfast Eaten			Related Expenditures			
School Type/ District	**N**	**Increase**	**Decrease**	**No Change**	**Don't Know**	**Changed**	**No Change**	**Don't Know**	**Increase**	**Decrease**	**No Change**	**Don't Know**
		Percent				Percent			Percent			
School Type												
Control	74	1.4	0.0	81.1	17.6	1.4	85.1	13.5	0.0	0.0	81.1	18.9
Treatment	79	6.3	1.3	83.5	8.9	7.6	83.5	8.9	11.4	0.0	79.7	8.9
Classroom	14	0.0	0.0	100.0	0.0	14.3	85.7	0.0	28.6	0.0	71.4	0.0
Non-classroom	65	7.7	1.5	80.0	10.8	6.2	83.1	10.8	7.7	0.0	81.5	10.8
District												
A	17	5.9	0.0	88.2	5.9	5.9	94.1	0.0	5.9	0.0	94.1	0.0
B	24	8.3	0.0	70.8	20.8	8.3	75.0	16.7	8.36	0.0	70.8	20.8
C	9	0.0	11.1	88.9	0.0	0.0	100.0	0.0	11.1	0.0	88.9	0.0
D	34	0.0	0.0	88.2	11.8	2.9	85.3	11.8	2.9	0.0	82.4	14.7
E	59	5.1	0.0	78.0	16.9	1.7	83.1	15.3	3.4	0.0	79.7	16.9
F	10	0.0	0.0	100.0	0.0	20.0	80.0	0.0	20.0	0.0	70.0	10.0
All schools	153	3.9	0.7	82.4	13.1	4.6	84.3	11.1	5.9	0.0	80.4	13.7

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-16

Perceived Changes in School Breakfast Operations in School Year 2002-2003 as Reported by School Principals, by School Type and District

School Type/ District	N	Time of Breakfast Service: Earlier	Time of Breakfast Service: Later	Time of Breakfast Service: No Change	Time of Breakfast Service: Don't Know	Length of Breakfast Service: Longer	Length of Breakfast Service: Shorter	Length of Breakfast Service: No Change	Length of Breakfast Service: Don't Know	Breakfast Service Staffing: Increase	Breakfast Service Staffing: Decrease	Breakfast Service Staffing: No Change	Breakfast Service Staffing: Don't Know
		Percent				Percent				Percent			
School Type													
Control	74	4.1	0.0	94.6	1.4	4.1	0.0	94.6	1.4	2.7	4.1	90.5	2.7
Treatment	79	3.8	2.5	93.7	0.0	6.3	2.5	91.1	0.0	5.1	3.8	91.1	0.0
Classroom	14	0.0	7.1	92.9	0.0	0.0	7.1	92.9	0.0	7.1	0.0	92.9	0.0
Non-classroom	65	4.6	1.5	93.8	0.0	7.7	1.5	90.8	0.0	4.6	4.6	90.8	0.0
District													
A	17	0.0	0.0	100.0	0.0	5.9	0.0	94.1	0.0	0.0	5.9	88.2	5.9
B	24	8.3	0.0	91.7	0.0	12.5	0.0	87.5	0.0	0.0	0.0	100.0	0.0
C	9	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0	0.0
D	34	2.9	5.9	91.2	0.0	2.9	0.0	97.1	0.0	2.9	2.9	94.1	0.0
E	59	3.4	0.0	94.9	1.7	5.1	1.7	91.5	1.7	8.5	6.8	84.7	0.0
F	10	10.0	0.0	90.0	0.0	0.0	10.0	90.0	0.0	0.0	0.0	90.0	10.0
All schools	153	3.9	1.3	94.1	0.7	5.2	1.3	92.8	0.7	3.9	3.9	90.8	1.3

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-17

Perceived Changes in School Breakfast Operations in School Year 2002-2003 as Reported by School Principals, by School Type and District (Continued)

School Type/ District	N	Breakfast Supervision: Increase	Breakfast Supervision: Decrease	Breakfast Supervision: No Change	Breakfast Supervision: Don't Know	Location Breakfast Eaten: Changed	Location Breakfast Eaten: No Change	Location Breakfast Eaten: Don't Know	Related Expenditures: Increase	Related Expenditures: Decrease	Related Expenditures: No Change	Related Expenditures: Don't Know
		Percent				Percent			Percent			
School Type												
Control	74	10.8	5.4	82.4	1.4	4.1	95.9	0.0	5.4	0.0	89.2	5.4
Treatment	79	7.6	0.0	92.4	0.0	2.5	97.5	0.0	6.3	2.5	89.9	1.3
Classroom	14	7.1	0.0	92.9	0.0	7.1	92.9	0.0	14.3	0.0	85.7	0.0
Non-classroom	65	7.7	0.0	92.3	0.0	1.5	98.5	0.0	4.6	3.1	90.8	1.5
District												
A	17	5.9	0.0	88.2	5.9	0.0	100.0	0.0	11.8	0.0	88.2	0.0
B	24	8.3	0.0	91.7	0.0	4.2	95.8	0.0	4.2	0.0	95.8	0.0
C	9	0.0	0.0	100.0	0.0	0.0	100.0	0.0	11.1	0.0	88.9	0.0
D	34	0.0	0.0	100.0	0.0	2.9	97.1	0.0	2.9	0.0	91.2	5.9
E	59	15.3	6.8	78.0	0.0	5.1	94.9	0.0	6.8	1.7	88.1	3.4
F	10	20.0	0.0	80.0	0.0	0.0	100.0	0.0	0.0	10.0	80.0	10.0
All schools	153	9.2	2.6	87.6	0.7	3.3	96.7	0.0	5.9	1.3	89.5	3.3

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-18

Treatment School Principals' Perceptions of the Impact of Universal-Free School Breakfast on Key Stakeholders, by Breakfast Setting and District, School Year 2002-2003

		Impact on Students							Impact on Teachers					
Breakfast Setting/District	**N**	**Very Positive**	**Positive**	**No Effect**	**Negative**	**Very Negative**	**Don't Know**	**Other[1]**	**Very Positive**	**Positive**	**No Effect**	**Negative**	**Very Negative**	**Don't Know**
		Percent							Percent					
Breakfast Setting														
Classroom	14	42.9	57.1	0.0	0.0	0.0	0.0	0.0	28.6	42.9	7.1	21.4	0.0	0.0
Non-classroom	65	36.9	50.8	9.2	0.0	0.0	1.5	1.5	20.0	43.1	33.8	1.5	0.0	1.5
District														
A	8	50.0	37.5	12.5	0.0	0.0	0.0	0.0	50.0	25.0	25.0	0.0	0.0	0.0
B	12	50.0	33.3	0.0	0.0	0.0	8.3	8.3	25.0	41.7	16.7	8.3	0.0	8.3
C	5	40.0	60.0	0.0	0.0	0.0	0.0	0.0	40.0	40.0	20.0	0.0	0.0	0.0
D	17	23.5	58.8	17.6	0.0	0.0	0.0	0.0	11.8	29.4	47.1	11.8	0.0	0.0
E	32	43.8	50.0	6.3	0.0	0.0	0.0	0.0	18.8	50.0	28.1	3.1	0.0	0.0
F	5	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	80.0	20.0	0.0	0.0	0.0
All treatment schools	79	38.0	51.9	7.6	0.0	0.0	1.3	1.3	21.5	43.0	29.1	5.1	0.0	1.3

[1] "Other" response included: ranges from 'no effect' to 'very positive'.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-19

Treatment School Principals' Perceptions of the Impact of Universal-Free School Breakfast on Key Stakeholders, by Breakfast Setting and District, School Year 2002-2003 (Continued)

		Impact on Custodians						Impact on Cafeteria Workers					
Breakfast Setting/District	**N**	**Very Positive**	**Positive**	**No Effect**	**Negative**	**Very Negative**	**Don't Know**	**Very Positive**	**Positive**	**No Effect**	**Negative**	**Very Negative**	**Don't Know**
		Percent						Percent					
Breakfast Setting													
Classroom	14	0.0	35.7	21.4	35.7	7.1	0.0	0.0	42.9	28.6	21.4	7.1	0.0
Non-classroom	65	6.2	15.4	60.0	16.9	0.0	1.5	12.3	29.2	50.8	6.2	0.0	1.5
District													
A	8	25.0	25.0	50.0	0.0	0.0	0.0	37.5	62.5	0.0	0.0	0.0	0.0
B	12	0.0	16.7	66.7	0.0	8.3	8.3	16.7	25.0	41.7	0.0	8.3	8.3
C	5	0.0	0.0	80.0	20.0	0.0	0.0	0.0	0.0	80.0	20.0	0.0	0.0
D	17	5.9	11.8	64.7	17.6	0.0	0.0	5.9	17.6	58.8	17.6	0.0	0.0
E	32	3.1	21.9	43.8	31.3	0.0	0.0	6.3	34.4	53.1	6.3	0.0	0.0
F	5	0.0	40.0	40.0	20.0	0.0	0.0	0.0	60.0	20.0	20.0	0.0	0.0
All treatment schools	79	5.1	19.0	53.2	20.3	1.3	1.3	10.1	31.6	46.8	8.9	1.3	1.3

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-20

Treatment School Principals' Perceptions of the Impact of Universal-Free School Breakfast on School Operations, by Breakfast Setting and District, School Year 2002-2003

		Breakfast Participation							Staffing Requirements					
Breakfast Setting/District	**N**	**Sharp Increase**	**Slight Increase**	**No Effect**	**Slight Decrease**	**Sharp Decrease**	**Don't Know**	**Other[1]**	**Sharp Increase**	**Slight Increase**	**No Effect**	**Slight Decrease**	**Sharp Decrease**	**Don't Know**
		Percent							Percent					
Breakfast Setting														
Classroom	14	64.3	28.6	0.0	7.1	0.0	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0
Non-classroom	65	41.5	40.0	15.4	0.0	0.0	1.5	1.5	0.0	23.1*	75.4	0.0	0.0	1.5
District														
A	8	50.0	37.5	12.5	0.0	0.0	0.0	0.0	0.0	25.0	75.0	0.0	0.0	0.0
B	12	66.7	25.0	0.0	0.0	0.0	8.3	0.0	0.0	16.7	75.0	0.0	0.0	8.3
C	5	60.0	20.0	0.0	0.0	0.0	0.0	20.0	0.0	20.0	80.0	0.0	0.0	0.0
D	17	35.3	47.1	17.6	0.0	0.0	0.0	0.0	0.0	5.9	94.1	0.0	0.0	0.0
E	32	40.6	37.5	18.8	3.1	0.0	0.0	0.0	0.0	43.8	56.3	0.0	0.0	0.0
F	5	40.0	60.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	60.0	0.0	0.0	0.0
All treatment schools	79	45.6	38.0	12.7	1.3	0.0	1.3	1.3	0.0	27.8	70.9	0.0	0.0	1.3

[1] "Other" response included: ranges from slight to sharp increase.

Note: Row percentages sum to 100.0%.

* Difference in proportions is statistically significant at the .05 level. Comparison is between classroom and non-classroom treatment schools.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-21

Treatment School Principals' Perceptions of the Impact of Universal-Free School Breakfast on School Operations, by Breakfast Setting and District, School Year 2002-2003 (Continued)

Breakfast Setting/ District	N	Administrative Requirements: Sharp Increase	Slight Increase	No Effect	Slight Decrease	Sharp Decrease	Don't Know	Operating Expenses: Sharp Increase	Slight Increase	No Effect	Slight Decrease	Sharp Decrease	Don't Know
		Percent						Percent					
Breakfast Setting													
Classroom	14	0.0	21.4	71.4	7.1	0.0	0.0	0.0	50.0	50.0	0.0	0.0	0.0
Non-classroom	65	0.0	15.4	83.1	0.0	0.0	1.5	0.0	7.7**	90.8**	0.0	0.0	1.5
District													
A	8	0.0	12.5	75.0	12.5	0.0	0.0	0.0	25.0	75.0	0.0	0.0	0.0
B	12	0.0	16.7	75.0	0.0	0.0	8.3	0.0	16.7	75.0	0.0	0.0	8.3
C	5	0.0	20.0	80.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
D	17	0.0	23.5	76.5	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0
E	32	0.0	12.5	87.5	0.0	0.0	0.0	0.0	15.6	84.4	0.0	0.0	0.0
F	5	0.0	20.0	80.0	0.0	0.0	0.0	0.0	60.0	40.0	0.0	0.0	0.0
All treatment schools	79	0.0	16.5	81.0	1.3	0.0	1.3	0.0	15.2	83.5	0.0	0.0	1.3

Note: Row percentages sum to 100.0%.

** Difference in proportions is statistically significant at the .01 level. Comparison is between classroom and non-classroom treatment schools.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-22

Overall Impact of Universal-Free School Breakfast as Reported by Treatment School Principals, by Breakfast Setting and District, School Year 2002-2003

Breakfast Setting/ District	N	Very Positive	Positive	No Effect	Negative	Very Negative	Don't Know
				Percent			
Breakfast Setting							
Classroom	14	50.0	35.7	7.1	7.1	0.0	0.0
Non-classroom	65	41.5	44.6	12.3	0.0	0.0	1.5
District							
A	8	50.0	50.0	0.0	0.0	0.0	0.0
B	12	58.3	25.0	8.3	0.0	0.0	8.3
C	5	40.0	60.0	0.0	0.0	0.0	0.0
D	17	29.4	41.2	23.5	5.9	0.0	0.0
E	32	43.8	46.9	9.4	0.0	0.0	0.0
F	5	40.0	40.0	20.0	0.0	0.0	0.0
All treatment schools	79	43.0	43.0	11.4	1.3	0.0	1.3

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-23

Treatment School Principals Perceptions of Attitudinal Changes During the Period that Universal-Free School Breakfasts Were Offered, by Breakfast Setting and District

Breakfast Setting/District	N	Staff Attitude Toward School Breakfast				Student Attitude Toward School Breakfast				
		More Favorable	Less Favorable	No Change	Don't Know	More Favorable	Less Favorable	No Change	Don't Know	Other[1]
		Percent				Percent				
Breakfast Setting										
Classroom	14	57.1	7.1	35.7	0.0	71.4	0.0	21.4	7.1	0.0
Non-classroom	65	50.8	1.5	43.1	4.6	56.9	0.0	36.9	4.6	1.5
District										
A	8	62.5	0.0	37.5	0.0	62.5	0.0	37.5	0.0	0.0
B	12	33.3	0.0	58.3	8.3	50.0	0.0	33.3	8.3	8.3
C	5	40.0	0.0	60.0	0.0	40.0	0.0	60.0	0.0	0.0
D	17	47.1	11.8	35.3	5.9	47.1	0.0	41.2	11.8	0.0
E	32	59.4	0.0	37.5	3.1	68.8	0.0	28.1	3.1	0.0
F	5	60.0	0.0	40.0	0.0	80.0	0.0	20.0	0.0	0.0
All treatment schools	79	51.9	2.5	41.8	3.8	59.5	0.0	34.2	5.1	1.3

[1] "Other" response included: more favorable for some, but no change for others.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-24

Impact of the SBPP on Administrative Requirements and on the Accuracy of School Breakfast Record Keeping as Reported by Treatment School Principals, by Breakfast Setting and District, School Year 2002-2003

		Effect on Administrative Requirements				If Increased Requirements, Distribution of Effort Between Evaluation (Eval.) and Implementation (Imp.) [1]							Effect on Accuracy of School Breakfast Record Keeping[2]			
Breakfast Setting/District	N	Increase	Decrease	No Effect	Don't Know	N	All/ Nearly All Eval.	Majority Eval.	Equal	Majority Imp.	All/ Nearly All Imp.	Don't Know	N	Yes	No	Don't Know
		Percent(1)					Percent(2)							Percent(3)		
Breakfast Setting																
Classroom	14	21.4	7.1	71.4	0.0	3	66.7	0.0	0.0	0.0	0.0	33.3	14	35.7	64.3	0.0
Non-classroom	65	27.7	0.0	70.8	1.5	18	5.6	27.8	16.7	11.1	5.6	11.1	65	4.6	92.3	3.1
District																
A	8	25.0	12.5	62.5	0.0	2	0.0	0.0	0.0	0.0	0.0	50.0	8	0.0	100.0	0.0
B	12	8.3	0.0	83.3	8.3	1	0.0	0.0	0.0	0.0	0.0	100.0	12	8.3	75.0	16.7
C	5	80.0	0.0	20.0	0.0	4	25.0	25.0	0.0	0.0	0.0	25.0	5	40.0	60.0	0.0
D	17	35.3	0.0	64.7	0.0	6	16.7	0.0	33.3	16.7	16.7	0.0	17	5.9	94.1	0.0
E	32	21.9	0.0	78.1	0.0	7	14.3	57.1	14.3	14.3	0.0	0.0	32	6.3	93.8	0.0
F	5	20.0	0.0	80.0	0.0	1	0.0	0.0	0.0	0.0	0.0	0.0	5	40.0	60.0	0.0
All treatment schools	79	26.6	1.3	70.9	1.3	21	14.3	23.8	14.3	9.5	4.8	14.3	79	10.1	87.3	2.5

[1] "All/Nearly All" represents 90.0% or greater share of effort; "Majority" represents 60.0%-90.0% share of effort.

[2] Those principals who said that the SBPP had affected the accuracy of school breakfast record keeping were divided in their perception as to whether the impact was positive or negative. Of the seven principals who commented on the direction of the impact, four described it as positive and three as negative.

Note: Row percentages (1) and (3) sum to 100%. Row percentages (2) do not always sum to 100.0% due to non-response.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-25

Principals' Perceptions That the Availability of Suitable Space is a Constraint in Determining Where School Breakfast is Served, by School Type and District, School Year 2002-2003

School Type/District	N	Availability of Space is Constraining: Yes	Availability of Space is Constraining: No	N	Of Control Schools Responding "No", Space Would be Constraining With Sharply Higher Participation: Yes	No	Depends[1]
		Percent			Percent		
School Type							
Control	74	4.1	95.9	71	19.7	73.2	7.0
Treatment	79	15.2	84.8	--	--	--	--
Classroom	14	28.6	71.4	--	--	--	--
Non-classroom	65	12.3	87.7	--	--	--	--
District							
A	17	11.8	88.2	9	22.2	66.7	11.1
B	24	4.2	95.8	12	25.0	58.3	16.7
C	9	0.0	100.0	4	0.0	50.0	50.0
D	34	2.9	97.1	17	17.6	82.4	0.0
E	59	15.3	84.7	24	20.8	79.2	0.0
F	10	20.0	80.0	5	20.0	80.0	0.0
All schools	153	9.8	90.2	--	--	--	--

[1] "Depends" responses included: could serve double, but not triple; constraint if entire school ate; and not enough tables if number eating doubled or tripled.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-26

Special Efforts Made to Promote the School Breakfast Program During School Year 2001-2002 and/or School Year 2002-2003 as Reported by School Principals, by School Type and District

School Type/District	N	Special Promotional Efforts: Yes	No	Don't Know	Other[1]
		Percent			
School Type					
Control	74	47.3	51.4	1.4	0.0
Treatment	79	75.9**	22.8**	1.3	0.0
Classroom	14	50.0	50.0	0.0	0.0
Non-classroom	65	81.5*	16.9**	1.5	0.0
District					
A	17	64.7	35.3	0.0	0.0
B	24	66.7	33.3	0.0	0.0
C	9	55.6	44.4	0.0	0.0
D	34	58.8	38.2	2.9	0.0
E	59	66.1	32.2	0.0	1.7
F	10	40.0	60.0	0.0	0.0
All schools	153	62.1	36.6	0.7	0.7

[1] "Other" response included: 'Don't Know' for School Year 2001/02 and 'No' for School Year 2002-2003.

Note: Row percentages sum to 100.0%.

* Difference in proportions is statistically significant at the .05 level. Comparison is between classroom and non-classroom treatment schools.

** Difference in proportions is statistically significant at the .01 level. Comparison is between control and treatment schools, and between classroom and non-classroom treatment schools.

Source: Implementation Study—School Principal Interviews, Spring 2003

Exhibit A-27

Attitude of Treatment School Principals Toward Discontinuation of Universal-Free School Breakfast Due to End of the Pilot, by Breakfast Setting and District School Year 2002-2003

Breakfast Setting/ District	N	Has Concerns	Does Not Have Concerns
		Percent	
Breakfast Setting			
Classroom	14	64.3	35.7
Non-classroom	65	64.6	35.4
District			
A	8	100.0	0.0
B	12	66.7	33.3
C	5	40.0	60.0
D	17	41.2	58.8
E	32	65.6	34.4
F	5	100.0	0.0
All treatment schools	79	64.6	35.4

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Principal Interviews, Spring 2003

Cafeteria Manager

Exhibit A-28

Percent of Cafeteria Managers by Tenure in Present Position by School Type and District, School Year 2002-2003

		Tenure in Present Position			
School Type/ District	**N**	**Median Years**	**Less than 3 Years**	**3 to 6 Years**	**More than 6 Years**
			Percent		
School Type					
Control	75	4.0	34.7	30.7	34.7
Treatment	79	5.0	31.6	36.7	31.6
Classroom	14	5.0	28.6	42.9	28.6
Non-classroom	65	5.0	32.3	35.4	32.3
District					
A	17[1]	3.5	35.3	35.3	29.4
B	24	4.5	33.3	33.3	33.3
C	10	4.5	40.0	20.0	40.0
D	34	5.5	29.4	29.4	41.2
E	59	3.5	35.6	33.9	30.5
F	10	5.0	20.0	60.0	20.0
All schools	154	4.0	33.1	33.8	33.1

[1] An additional control school in this district was added to the study in Year 3 when a portion of the enrollment in one of the original schools was transferred to a recently opened school.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-29

Percent of Cafeteria Managers Reporting Unusual Events that Affected Operation of the Cafeteria During School Years 2001-2002 or 2002-2003 by School Type and District

School Type/District	N	Unusual Events in School Year 2001-2002	Unusual Events in School Year 2002-2003
		Percent	
School Type			
Control schools	75	6.7	8.0
Treatment schools	79	3.8	5.1
Classroom	14	7.1	0.0
Non-classroom	65	3.1	6.2
District			
A	17	5.9	0.0
B	24	4.2	8.3
C	10	20.0	30.0
D	34	5.9	8.8
E	59	3.4	3.4
F	10	0.0	0.0
All schools	154	5.2	6.5

Note: Row percentages are independent.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-30

Location Where School Breakfast is Served and Eaten, by School Type and District, School Year 2002-2003

School Type/ District	N	Location Served								Location Eaten								
		Cafeteria	Multi-purpose	Classroom	Gym	Cafeteria/ Gym	Kitchen	Some in Cafeteria/Some in Classroom	Other[1]	Cafeteria	Multi-purpose	Classroom	Gym	Cafeteria/ Gym	Kitchen	Some in Cafeteria/Some in Classroom	Hallway	Other[2]
		Percent								Percent								
School Type																		
Control	75	84.0	6.7	0.0	2.7	0.0	5.3	0.0	1.3	82.7	8.0	2.7	4.0	0.0	0.0	0.0	1.3	1.3
Treatment	79	68.4*	10.1	10.1	1.3	0.0	3.8	2.5	3.8	60.8**	11.4	12.7	2.5	0.0	0.0	6.3	1.3	5.1
Classroom	14	35.7	0.0	50.0	0.0	0.0	0.0	14.3	0.0	0.0	0.0	71.4	0.0	0.0	0.0	21.4	0.0	7.1
Non-classroom	65	75.4	12.3	1.5	1.5	0.0	4.6	0.0	4.6	73.8	13.8	0.0	3.1	0.0	0.0	3.1	1.5	4.6
District																		
A	17	82.4	0.0	17.6	0.0	0.0	0.0	0.0	0.0	82.4	0.0	5.9	0.0	0.0	0.0	0.0	5.9	5.9
B	24	87.5	0.0	12.5	0.0	0.0	0.0	0.0	0.0	87.5	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0
C	10	50.0	30.0	0.0	0.0	0.0	0.0	10.0	10.0	30.0	30.0	10.0	0.0	0.0	0.0	20.0	0.0	10.0
D	34	64.7	11.8	0.0	5.9	0.0	14.7	2.9	0.0	67.6	14.7	0.0	11.8	0.0	0.0	2.9	2.9	0.0
E	59	78.0	10.2	1.7	1.7	0.0	3.4	0.0	5.1	72.9	11.9	6.8	1.7	0.0	0.0	1.7	0.0	5.1
F	10	90.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	60.0	0.0	30.0	0.0	0.0	0.0	10.0	0.0	0.0
All schools	154	76.0	8.4	5.2	1.9	0.0	4.5	1.3	2.6	71.4	9.7	7.8	3.2	0.0	0.0	3.2	1.3	3.2

[1] "Other" responses included: annex building; and multi-purpose room and/or outside.

[2] "Other" response included: annex building; multi-purpose room and/or outside; and some classes eat in the hallway, some eat in the classroom.

Note: Row percentages sum to 100.0%.

* Difference in proportions is statistically significant at the .05 level. Comparison is between control and treatment schools.

** Difference in proportions is statistically significant at the .01 level. Comparison is between control and treatment schools.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-31

Percent of Schools Reporting that the Location Where School Breakfast was Served in School Year 2002-2003 was Same as the Previous Two Years, by School Type and District

		Same Location as in				
		School Year 2000-2001		School Year 2001-2002		
School Type/District	**N**	**Yes**	**No**	**Yes**	**No**	**Don't Know**
		Percent				
School Type						
Control schools	75	96.0	4.0	94.7	4.0	1.3
Treatment schools	79	88.6	11.4	97.5	1.3	1.3
Classroom	14	92.9	7.1	100.0	0.0	0.0
Non-classroom	65	87.7	12.3	96.9	1.5	1.5
District						
A	17	94.1	5.9	100.0	0.0	0.0
B	24	100.0	0.0	95.8	4.2	0.0
C	10	90.0	10.0	90.0	0.0	10.0
D	34	91.2	8.8	100.0	0.0	0.0
E	59	91.5	8.5	94.9	3.4	1.7
F	10	80.0	20.0	90.0	10.0	0.0
All schools	154	92.2	7.8	96.1	2.6	1.3

Note: Row percentages for the separate school years sum to 100.0%.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-32

Number of Treatment Schools Where School Breakfast was Eaten in the Classroom and Year-to-Year Changes, School Year 2000-2001 – School Year 2002-2003

Description			Number of Schools
Breakfast eaten in classroom in Year 1			18
Changes:			
	Year 2	– classroom to cafeteria	3
		– cafeteria to classroom	1
	Year 3	– classroom to cafeteria	3
		– cafeteria to classroom	1
Breakfast eaten in classroom all three years			12
Breakfast eaten in classroom in Year 3			14

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-33

Percent of Schools by Time Allotted for School Breakfast Service, Whether Part of School Day, Initiative Required by Students to Eat School Breakfast, by School Type and District, School Year 2002-2003

School Type/ District	Time Allotted for Breakfast Service: N	Median Minutes	Less than 15 Min.	15 to 20 Min.	21 to 30 Min.	More than 30 Min.	Varies	Breakfast Treated as Part of School Day: N	Percent	Initiative Required to Eat School Breakfast When Breakfast is Not Treated as Part of School Day: N	Significant	Moderate	Little	None	Don't Know	Other[1]
			Percent								Percent					
School Type																
Control	75	30.0	1.3	18.7	41.3	34.7	4.0	75	9.3	68	0.0	11.8	23.5	57.4	5.9	1.5
Treatment	79	30.0	1.3	11.4	38.0	44.3	5.1	79	12.7	68	1.5	14.7	17.6	60.3	5.9	0.0
Classroom	14	25.0	7.1	21.4	42.9	21.4	7.1	14	28.6	9	0.0	0.0	22.2	66.7	11.1	0.0
Non-classroom	65	35.0	0.0	9.2	36.9	49.2	4.6	65	9.2	59	1.7	16.9	16.9	59.3	5.1	0.0
District																
A	17	35.0	0.0	5.9	23.5	70.6	0.0	17	5.9	16	0.0	0.0	25.0	68.8	6.3	0.0
B	24	30.0	4.2	20.8	50.0	25.0	0.0	24	4.2	23	4.3	17.4	13.0	60.9	4.3	0.0
C	10	35.0	0.0	20.0	30.0	50.0	0.0	10	30.0	7	0.0	28.6	57.1	14.3	0.0	0.0
D	34	30.0	2.9	11.8	52.9	32.4	0.0	34	11.8	29	0.0	27.6	27.6	34.5	6.9	3.4
E	59	30.0	0.0	18.6	33.9	37.3	10.2	59	10.2	53	0.0	7.5	13.2	73.6	5.7	0.0
F	10	40.0	0.0	0.0	40.0	50.0	10.0	10	20.0	8	0.0	0.0	25.0	62.5	12.5	0.0
All schools	154	30.0	1.3	14.9	39.6	39.6	4.5	154	11.0	136	0.7	13.2	20.6	58.8	5.9	0.7

[1] "Other" response included: Moderate initiative for students who walk, but none for students taking bus.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-34

Percent of Schools by Change in Time Allotted for School Breakfast Service and Change in Perceived Initiative Required of Students to Eat School Breakfast Between School Year 2000-2001 and School Year 2002-2003, by School Type and District

School Type/ District	N	Time Allotted for Breakfast Service			N	Initiative Required to Eat School Breakfast When Breakfast is Not Treated as Part of School Day		
		Decreased	Remained the Same	Increased		Decreased	Remained the Same	Increased
		Percent				Percent		
School Type								
Control	71	29.6	33.8	36.6	67	41.8	40.3	17.9
Treatment	72	27.8	33.3	38.9	61	41.0	36.1	23.0
Classroom	10	40.0	20.0	40.0	6	16.7	50.0	33.3
Non-classroom	62	25.8	35.5	38.7	55	43.6	34.5	21.8
District								
A	17	41.2	35.3	23.5	14	50.0	42.9	7.1
B	23	34.8	21.7	43.5	22	59.1	22.7	18.2
C	9	11.1	44.4	44.4	6	50.0	33.3	16.7
D	31	25.8	45.2	29.0	29	31.0	41.4	27.6
E	53	30.2	24.5	45.3	50	36.0	42.0	22.0
F	10	10.0	60.0	30.0	7	42.9	42.9	14.3
All schools	143	28.7	33.6	37.8	128	41.4	38.3	20.3

Note: Row percentages sum to 100.0%.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2001 and 2003

Exhibit A-35

Percent of Treatment Schools with Classroom Breakfast by Who is Responsible for Specified Tasks, School Year 2002-2003

Task	N	Food Service (F/S) Staff	Students	Teachers	Custodians	Students & Teachers	F/S Staff & Teachers	Others[1]	Don't Know
					Percent of Schools Serving in Classroom				
Food delivery	14	35.7	57.1	0.0	0.0	0.0	0.0	0.0	0.0
Serving food	14	0.0	64.3	7.1	0.0	14.3	0.0	0.0	7.1
Trash removal	14	21.4	14.3	0.0	35.7	0.0	0.0	14.3	7.1
Record keeping	14	14.3	0.0	28.6	0.0	14.3	21.4	7.1	7.1

[1] "Others" included: cafeteria staff and students; custodians and students; and teachers, students, and cafeteria staff.

Note: Row percentages do not always sum to 100.0% due to non-response.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-36

Percent of Treatment Schools with Classroom Breakfast by Types of Problems Encountered, School Year 2002-2003

Type of Problem	N	Share of schools
		Percent of Treatment Schools Serving in Classroom
Have had problems serving in classroom	14	64.3
Have had problems due to		**Percent of Treatment Schools Reporting Problems Serving in Classroom**
Lack of help delivering food to rooms	9	11.1
Cleaning up spillage	9	33.3
Teacher resistance	9	22.2
Poor record keeping	9	33.3
Other issues[1]	9	22.2

[1] “Other issues” included: hard to get some teachers to understand what makes a reimbursable meal, and waste.

Note: ‘Percent of Treatment Schools Reporting Problems Serving in Classroom’ percentages sum to more than 100.0% due to multiple response.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-37

Percent of Schools by Selected Characteristics of the Meals Served, by School Type and District, School Year 2002-2003

School Type/ District	N	Identical Breakfast Served to All	Offer Versus Serve Available	À la Carte Offered	N	À la Carte Offered: Before Breakfast	During Breakfast	After Breakfast	Other[1]	N	À la Carte Foods Offered: Milk	Juice	Entrée	Other[2]
		Percent(1)				Percent of Those Schools Offering À la Carte(2)					Percent of Those Schools Offering À la Carte(3)			
School Type														
Control	75	90.7	53.3	26.7	20	10.0	95.0	25.0	10.0	20	80.0	60.0	55.0	30.0
Treatment	79	91.1	48.1	30.4	24	16.7	95.8	37.5	0.0	24	87.5	87.5	70.8	20.8
Classroom	14	64.3	42.9	21.4	3	33.3	100.0	100.0	0.0	3	100.0	100.0	100.0	0.0
Non-classroom	65	96.9	49.2	32.3	21	14.3	95.2	28.6	0.0	21	85.7	85.7	66.7	23.8
District														
A	17	100.0	88.2	35.3	6	0.0	100.0	33.3	33.3	6	50.0	50.0	33.3	50.0
B	24	79.2	91.7	29.2	7	0.0	100.0	0.0	0.0	7	100.0	100.0	100.0	0.0
C	10	80.0	100.0	60.0	6	0.0	100.0	33.3	0.0	6	100.0	66.7	83.3	0.0
D	34	97.1	82.4	64.7	22	18.2	100.0	40.9	0.0	22	81.8	77.3	54.5	36.4
E	59	91.5	1.7	3.4	2	50.0	0.0	0.0	0.0	2	100.0	50.0	50.0	0.0
F	10	90.0	20.0	10.0	1	100.0	100.0	100.0	0.0	1	100.0	100.0	100.0	0.0
All schools	154	90.9	50.6	28.6	44	13.6	95.5	31.8	4.6	44	84.1	75.0	63.6	25.0

[1] "Other" responses included: items are purchased for snack time, but some kids may sneak a bite during breakfast; and students can purchase items during breakfast for snack later in the morning, but are not allowed to eat it during breakfast.

[2] "Other" responses included: chips, muffins, donuts, apples or other fruit, animal crackers and other snacks; extra items on menu; snacks; and toast.

Note: Row percentages (1) are independent. Row percentages (2) and (3) may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-38

Percent of Schools with Foods Available from Other On-Campus Sources During Periods of School Breakfast Service, By School Type and District, School Year 2002-2003

School Type/District	N	Foods Available From Other Sources	N	Types of Foods Available: Milk	Juice	Candy/ Chips/Cookies	Snacks	Soda	Other[1]
		Percent		Percent of Schools With Food From Other Sources					
School Type									
Control schools	75	8.0	6	0.0	100.0	66.7	16.7	0.0	16.7
Treatment schools	79	11.4	9	0.0	77.8	44.4	11.1	44.4	0.0
Classroom	14	14.3	2	0.0	50.0	100.0	50.0	100.0	0.0
Non-classroom	65	10.8	7	0.0	85.7	28.6	0.0	28.6	0.0
District									
A	17	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
B	24	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
C	10	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
D	34	38.2	13	0.0	100.0	46.2	7.7	15.4	7.7
E	59	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
F	10	20.0	2	0.0	0.0	100.0	50.0	100.0	0.0
All schools	154	9.7	15	0.0	86.7	53.3	13.3	26.7	6.7

[1] "Other" response included: water.

Note: Row percentages may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-39

Percent of Schools Reporting that Composition of School Breakfasts Changed During School Year 2001-2002 – School Year 2002-2003 and Impact of Change, by School Type and District

School Type/ District	N	Change in Breakfast Composition	N	Impact of Change on: Use of Already Prepared Foods — Increase	Use of Already Prepared Foods — Decrease	Preparation Time — Increase	Preparation Time — Decrease	Variety of Foods — Increase	Variety of Foods — Decrease
		Percent		Percent [1]					
School Type									
Control	75	12.0	9	22.2	0.0	22.2	22.2	33.3	11.1
Treatment	79	16.5	13	38.5	7.7	7.7	38.5	61.5	7.7
Classroom	14	7.1	1	100.0	0.0	0.0	100.0	100.0	0.0
Non-classroom	65	18.5	12	33.3	8.3	8.3	33.3	58.3	8.3
District									
A	17	5.9	1	0.0	100.0	100.0	0.0	0.0	0.0
B	24	4.2	1	0.0	0.0	0.0	0.0	0.0	100.0
C	10	20.0	2	0.0	0.0	0.0	0.0	50.0	0.0
D	34	11.8	4	75.0	0.0	0.0	75.0	75.0	25.0
E	59	22.0	13	30.8	0.0	7.7	30.8	46.2	0.0
F	10	10.0	1	0.0	0.0	100.0	0.0	100.0	0.0
All schools	154	14.3	22	31.8	4.5	13.6	31.8	50.0	9.1

Note: Row percentages (1) are independent and may not sum to 100.0% due to non-response or a response of “Don’t know.”

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-40

Percent of Schools Reporting a Change in the Workload of Cafeteria Staff in School Year 2001-2002 or 2002-2003 and Impact of Change on Hours Worked, by School Type and District

School Type/District	N	Change in Cafeteria Staff Workload in School Year 2001-2002	Change in Cafeteria Staff Workload in School Year 2002-2003
		Percent	Percent
School Type			
Control	75	4.0	6.7
Treatment	79	6.3	10.1
Classroom	14	7.1	14.3
Non-classroom	65	6.2	9.2
District			
A	17	5.9	11.8
B	24	8.3	4.2
C	10	10.0	10.0
D	34	8.8	11.8
E	59	0.0	6.8
F	10	10.0	10.0
All schools	154	5.2	8.4

Note: Row percentages are independent. Changes in daily workload of ½ hour to 1 hour were reported. Of those reporting, increases and decreases in workload were approximately offsetting for both control schools and treatment schools.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-41

Percent of Cafeteria Managers Reporting Changes in Paperwork or Administrative Reporting Requirements Related to School Breakfast During School Year 2001-2002 – School Year 2002-2003

School Type/District	N	Percent
School Type	75	9.3
Control	79	7.6
Treatment	14	7.1
Classroom	65	7.7
Non-classroom		
District		
A	17	23.5
B	24	0.0
C	10	0.0
D	34	14.7
E	59	6.8
F	10	0.0
All schools	154	8.4

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-42

Perception of Cafeteria Managers of Changes in Student Attitude Toward School Breakfast Over the Period School Year 2000-2001 – School Year 2002-2003, by School Type and District

		Student Attitude Has Become						
School Type/ District	**N**	**Substantially More Positive**	**More Positive**	**No Change in Attitude**	**More Negative**	**Substantially More Negative**	**Don't Know**	**Other[1]**
					Percent			
School Type								
Control	75	2.7	24.0	60.0	0.0	0.0	13.3	0.0
Treatment	79	11.4	43.0*	32.9**	1.3	0.0	10.1	1.3
Classroom	14	21.4	35.7	35.7	0.0	0.0	7.1	0.0
Non-classroom	65	9.2	44.6	32.3	1.5	0.0	10.8	1.5
District								
A	17	5.9	47.1	41.2	0.0	0.0	5.9	0.0
B	24	4.2	41.7	50.0	0.0	0.0	4.2	0.0
C	10	20.0	0.0	50.0	0.0	0.0	30.0	0.0
D	34	11.8	23.5	50.0	0.0	0.0	11.8	2.9
E	59	3.4	33.9	47.5	1.7	0.0	13.6	0.0
F	10	10.0	60.0	20.0	0.0	0.0	10.0	0.0
All schools	154	7.1	33.8	46.1	0.6	0.0	11.7	0.6

[1] "Other" response included: Substantially more positive in year 1, but became more accepted over course of three years.

Note: Row percentages sum to 100.0%

* Difference in proportions is statistically significant at the .05 level. Comparison is between control and treatment schools.

** Difference in proportions is statistically significant at the .01 level. Comparison is between control and treatment schools.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-43

Perception of Cafeteria Managers of Changes in the Amount of Individual Plate Waste at School Breakfast Over the Period School Year 2000-2001 – School Year 2002-2003, by School Type and District

School Type/District	N	Plate Waste: Increased	Decreased	Didn't Change	Don't Know
		Percent			
School Type					
Control	75	1.3	9.3	64.0	25.3
Treatment	79	10.1	6.3	60.8	22.8
Classroom	14	14.3	0.0	42.9	42.9
Non-classroom	65	9.2	7.7	64.6	18.5*
District					
A	17	5.9	5.9	82.4	5.9
B	24	4.2	0.0	62.5	33.3
C	10	0.0	0.0	50.0	50.0
D	34	8.8	2.9	67.6	20.6
E	59	6.8	13.6	57.6	22.0
F	10	0.0	20.0	50.0	30.0
All schools	154	5.8	7.8	62.3	24.0

Note: Row percentages sum to 100.0%.

* Difference in proportions is statistically significant at the .05 level. Comparison is between classroom and non-classroom treatment schools.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-44

Comparison of the Perception of School Cafeteria Managers of the Attitude of Cafeteria Staff Toward the SBP in School Year 2000-2001 and School Year 2002-2003, by School Type and District

	Attitude of Staff											
	2000-2001						2002-2003					
School Type/ District	N	Very Positive	Positive	Neutral	Negative	Very Negative	N	Very Positive	Positive	Neutral	Negative	Very Negative
				Percent[1]						Percent[2]		
School Type												
Control	74	39.2	47.3	12.2	0.0	0.0	75	50.7	36.0	13.3	0.0	0.0
Treatment	79	31.6	46.8	19.0	2.5	0.0	79	48.1	35.4	13.9	1.3	1.3
Classroom	18	27.8	38.9	27.8	5.6	0.0	14	21.4	42.9	28.6	0.0	7.1
Non-classroom	61	32.8	49.2	16.4	1.6	0.0	65	53.8	33.8	10.8	1.5	0.0
District												
A	16	25.0	43.8	25.0	6.3	0.0	17	47.1	17.6	35.3	0.0	0.0
B	24	58.3	37.5	4.2	0.0	0.0	24	70.8	29.2	0.0	0.0	0.0
C	10	30.0	70.0	0.0	0.0	0.0	10	50.0	30.0	20.0	0.0	0.0
D	34	38.2	47.1	11.8	0.0	0.0	34	52.9	35.3	8.8	2.9	0.0
E	59	30.5	44.1	23.7	1.7	0.0	59	45.8	42.4	10.2	0.0	1.7
F	10	20.0	70.0	10.0	0.0	0.0	10	10.0	50.0	40.0	0.0	0.0
All schools	153	35.3	47.1	15.7	1.3	0.0	154	49.4	35.7	13.6	0.6	0.6

Note: Row percentages (1) do not always sum to 100.0% because of non-response. Row percentages (2) sum to 100.0%.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2001 and 2003

Exhibit A-45

Perception of Cafeteria Managers of Changes in the Attitude of Cafeteria Staff Toward School Breakfast Over the Period School Year 2000-2001 – School Year 2002-2003, by School Type and District

		Cafeteria Staff Attitude			Nature of Change					
School Type/District	**N**	**Unchanged**	**Changed**	**Don't Know**	**N**	**Much More Positive**	**More Positive**	**Neutral**	**More Negative**	**Much More Negative**
			Percent			**Percent of Those Managers Reporting Change in Attitude**				
School Type										
Control	75	80.0	10.7	9.3	8	0.0	87.5	12.5	0.0	0.0
Treatment	79	59.5**	27.8**	12.7	22	18.2	68.2	4.5	4.5	4.5
Classroom	14	35.7	42.9	21.4	6	16.7	66.7	0.0	16.7	0.0
Non-classroom	65	64.6	24.6	10.8	16	18.8	68.8	6.3	0.0	6.3
District										
A	17	70.6	29.4	0.0	5	0.0	80.0	20.0	0.0	0.0
B	24	87.5	12.5	0.0	3	0.0	100.0	0.0	0.0	0.0
C	10	50.0	20.0	30.0	2	100.0	0.0	0.0	0.0	0.0
D	34	73.5	11.8	14.7	4	50.0	25.0	0.0	0.0	25.0
E	59	67.8	20.3	11.9	12	0.0	91.7	0.0	8.3	0.0
F	10	40.0	40.0	20.0	4	0.0	75.0	25.0	0.0	0.0
All schools	154	69.5	19.5	11.0	30	13.3	73.3	6.7	3.3	3.3

Note: Row percentages sum to 100.0%.

** Difference in proportions is statistically significant at the .01 level. Comparison is between control and treatment schools.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

Exhibit A-46

Percent of Cafeteria Managers in Treatment Schools Reporting That They Have Concerns About Returning to the Regular SBP, by Breakfast Setting and District, School Year 2002-2003

Breakfast Setting/ District	N	Have concerns		Nature of concern					
		Percent	N	Decreased Participation	Students Will Not Be Fed/ Will Be Hungry	Students/Parents Will Assume Breakfast is Free – Students Will Not Have Money	Students Will Not Be Able to Afford Breakfast	General Concern – Wants to See the Free Program Continue	Other[1]
				Percent					
Breakfast Setting									
Classroom	14	92.9	13	30.8	38.5	7.7	30.8	15.4	15.4
Non-classroom	65	63.1	41	39.0	24.4	24.4	7.3	4.9	12.2
District									
A	8	100.0	8	25.0	50.0	25.0	25.0	0.0	12.5
B	12	75.0	9	66.7	11.1	0.0	0.0	22.2	0.0
C	5	60.0	3	33.3	0.0	33.3	33.3	0.0	0.0
D	17	64.7	11	27.3	27.3	27.3	9.1	0.0	18.2
E	32	56.3	18	33.3	22.2	22.2	11.1	11.1	16.7
F	5	100.0	5	40.0	60.0	20.0	20.0	0.0	20.0
All treatment schools	79	68.4	54	37.0	27.8	20.4	13.0	7.4	13.0

[1] "Other" responses included: some kids will not get as much food or as nutritious of a meal; teachers seem to love what it does for the kids – eating in the classroom helped teach table manners; more children may eat if old breakfast comes back and this will create more work for the cafeteria staff; some kids will be embarrassed if they don't have the money; some of the kids are really going to miss it; and if kids don't get to eat because they can't afford it they may do worse in school.

Note: Row percentages may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—Cafeteria Manager Interviews, Spring 2003

School Food Service Director

Exhibit A-47

Changes in Implementation of the SBPP During School Year 2001-2002 and School Year 2002-2003, as Reported by School Food Service Director

Item	Yes	No	Don't know
		Percent	
Made changes in SBPP implementation in:			
School Year 2001-2002	50.0	50.0	0.0
School Year 2002-2003	16.7	83.3	0.0
Change in price of breakfasts in control schools in:			
School Year 2001-2002	0.0	100.0	0.0
School Year 2002-2003	0.0	100.0	0.0
Increase in treatment school food service staffing due to SBPP in:			
School Year 2001-2002	50.0	50.0	0.0
School Year 2002-2003	0.0	100.0	0.0
Reduction in treatment school food service workload due to improved efficiency:			
School Year 2001-2002	16.7	83.3	0.0
School Year 2002-2003	33.3	66.7	0.0
Change from Year 1 in who determines where breakfast is eaten in:			
Control schools	0.0	100.0	0.0
Treatment schools	0.0	100.0	0.0
Change from Year 1 by some schools in where breakfast is eaten	50.0	33.3	16.7
Change from Year 1 in composition of breakfast menu in treatment schools	33.3	66.7	0.0

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-48

SBPP Promotional Activities Reported by School Food Service Director

Item	Yes		No
		Percent	
Follow-up promotion of SBPP originating at District-level within past two years	50.0		50.0
	Should Have Been More	**Optimal**	**Should Have Been Less**
		Percent	
Perception of the level of promotional effort	66.7	33.3	0.0

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-49

Number of Schools by Location of Where School Breakfast Is Eaten, School Year 2002-2003

Location	Control Schools Number	Control Schools Percent	Treatment Schools Number	Treatment Schools Percent
Cafeteria[1]	73	97.3	62	78.5
Classroom	2	2.7	14	17.7
Combination cafeteria and classroom	0	0.0	3	3.8
Total	75	100.0	79	100.0

[1] The 'Cafeteria' location includes the response of 'multi-purpose room'; these rooms are used as cafeterias at meal times, but used for other activities throughout the school day.

Note: Row percentages are independent.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-50

School Food Service Directors' Perceptions of Experience of Schools Where Breakfast was Eaten in the Classroom

Item	Yes	No
	Percent	
Have there been particular problems in schools where breakfast is eaten in the classroom? [1]	66.7	33.3

	Strong Opposition	Slight Opposition	Neutral	Slight Support	Strong Support	Don't Know	Other[2]
				Percent			
Overall reaction of teachers in whose classrooms breakfasts were eaten	0.0	16.7	0.0	0.0	16.7	33.3	33.3

N = 6

[1] Problems included: insects; spillage; finding pre-wrapped food; accountability: Will students take too much or too little? Will the meal count be accurate?; garbage collection; and resistance by teachers.

[2] "Other" responses included: 'Reactions ranged—some complained a lot about it, while others were generally supportive'; and 'Each school is different.'

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-51

Menu Planning System Used in the District

Item	Nutrient Standard	Traditional Food-based
	Percent	
Menu planning system used	66.7	33.3

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-52

School Food Service Directors' Perceptions of the Impact of the SBPP on Paperwork or Administrative Requirements

Level of Impact	Increased Workload[1]	Decreased Workload	No Impact	Don't Know
		Percent		
School District	16.7	0.0	83.3	0.0
School	0.0	0.0	83.3	16.7

N = 6

[1] The one School Food Service Director indicating an increased workload at the school district level could not estimate the share of increased workload attributed to requirements associated with evaluation versus implementation.

Note: Row percentages at school district and school level sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-53

Principal Reasons and Direction of Effect Given by School Food Service Directors for Variations in Impact of the SBPP on Participation Rates Among Treatment Schools

	Reasons					
Direction of Effect	**Serving in the Classroom**	**Timing/Length of Service**	**Menu Differences**	**Household Income**	**Bus Schedules**	**Other[1]**
			Percent			
Increased rate of participation	60.0	0.0	0.0	20.0	0.0	20.0
Decreased rate of participation	0.0	0.0	20.0	0.0	0.0	100.0

N = 5

[1] "Other" responses for 'Increased rate' included: attitude of principal. "Other" responses for 'Decreased rate' included: attitude of principal; decreased encouragement; peer influence; loss of interest; and switch to cafeteria.

Notes: Only five of the six School Food Service Directors reported variation among treatment schools in effect on school breakfast participation. Row percentages may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-54

Principal Reasons and Direction Given by School Food Service Directors for Variations in Overall Changes in the Rate of Participation in the School Breakfast Program in Control Schools

Direction of Change	Accessibility of Breakfast at Home	Timing/Length of Service	Menu Differences	Household Income	Bus Schedules	Other[1]
			Percent			
Higher rate of participation	0.0	0.0	0.0	75.0	0.0	75.0
Lower rate of participation	0.0	25.0	0.0	0.0	25.0	50.0

N = 4

[1] "Other" responses for 'Higher rate' included: when attitude of parents/older siblings is positive; overall promotion of school breakfast; and depends on attitude of staff and principal. "Other" responses for 'Lower rate' included: not being able to get to school early; and depends on attitude of staff and principal.

Notes: Only four of the six School Food Service Directors reported variation among control schools in the overall rate of change in participation in school breakfast between School Year 1999-2000 and School Year 2002-2003.
Row percentages may sum to more than 100.0% due to multiple responses.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-55

School Food Service Directors' Perceptions of Changes in Student Participation in the School Breakfast Program (SBP) and in the National School Lunch Program (NSLP) in School Year 2001-2002 and School Year 2002-2003 Relative to Participation in School Year 1999-2000 Prior to the SBPP[1]

Program/School Type	Sharp Increase	Slight Increase	Stable	Slight Decrease	Sharp Decrease	Other[2]
	Percent					
SBP– Treatment & Control Schools						
School Year 2001-2002 Treatment Schools	16.7	33.3	33.3	0.0	0.0	16.7
Control Schools	0.0	16.7	83.3	0.0	0.0	0.0
School Year 2002-2003 Treatment Schools	0.0	33.3	50.0	0.0	0.0	16.7
Control Schools	0.0	16.7	83.3	0.0	0.0	0.0
NSLP – All schools in district						
School Year 2001-2002	0.0	50.0	33.3	16.7	0.0	0.0
School Year 2002-2003	0.0	33.3	50.0	16.7	0.0	0.0

N = 6

[1] Questions regarding changes in student participation in the SBP were asked in reference to treatment and control schools (those schools participating in the SBPP), whereas changes in participation in the NSLP were asked in reference to the district as a whole (all schools in the district, including secondary schools).

[2] "Other" responses included: Sharp increase in schools with in-classroom breakfast, but slight increase in schools with breakfast in the cafeteria.

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-56

School Food Service Directors' Perceptions that Universal-Free School Breakfast Contributed to Increased Participation in Elementary School Lunches or in Middle School/Secondary School Breakfasts

	Contributed to Increased Participation		
Level/Meal	**Yes**	**No**	**Don't Know**
		Percent	
Elementary school lunches	16.7	50.0	33.3
Middle school/Secondary school breakfasts	33.3	66.7	0.0

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-57

School Food Service Directors' Perceptions of the Effect of Universal-Free School Breakfast on Total Costs During School Year 2001-2002 and School Year 2002-2003

	Costs in School Year 2001-2002 and School Year 2002-2003 Relative to Costs in School Year 2000-2001				Net Effect of Costs During School Year 2001-2002 and School Year 2002-2003			
Year	**Increased**	**Little or No Change**	**Decreased**	**Don't know**	**Increase in Revenue Exceeded Additional Cost**	**Increase in Cost Exceeded Additional Revenue**	**Change in Cost and Revenue Offsetting**	**Don't Know**
	Percent							
School Year 2001-2002	33.3	66.7	0.0	0.0	66.7	0.0	0.0	33.3
School Year 2002-2003	50.0	50.0	0.0	0.0	66.7	0.0	0.0	33.3

N = 6

Note: Row percentages for 'Costs' and Net Effects of Costs' independently sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-58

School Food Service Directors' Perceptions of the Importance of Serving Space and Serving Time as a Constraint in Effectiveness of the School Breakfast Program

Factor	Very Important	Important	Slightly Important	Not Important	Don't Know
			Percent		
Serving Space	50.0	50.0	0.0	0.0	0.0
Serving Time	66.7	33.3	0.0	0.0	0.0

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-59

School Food Service Directors' Perceptions of the Attitude of Key Stakeholders In Treatment Schools Toward the School Breakfast Program

Stakeholder	Extremely Positive	Positive	Neutral	Negative	Extremely Negative	Ranges from Extremely Positive to Extremely Negative	Don't Know
				Percent			
Food Service Staff	50.0	50.0	0.0	0.0	0.0	0.0	0.0
Teachers	0.0	0.0	33.3	0.0	0.0	50.0	16.7
Administrators	33.3	0.0	50.0	0.0	0.0	16.7	0.0
School Board	33.3	33.3	33.3	0.0	0.0	0.0	0.0
Students	33.3	66.7	0.0	0.0	0.0	0.0	0.0
Parents	33.3	33.3	0.0	0.0	0.0	16.7	16.7
Custodial Staff	16.7	0.0	66.7	0.0	0.0	0.0	16.7

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

Exhibit A-60

School Food Service Directors' Perceptions of the Attitude of Key Stakeholders in Control Schools Toward the School Breakfast Program

Stakeholder	Extremely Positive	Positive	Neutral	Negative	Extremely Negative	Ranges from Extremely Positive to Extremely Negative	Don't Know
				Percent			
Food service staff	33.3	66.7	0.0	0.0	0.0	0.0	0.0
Teachers	0.0	0.0	50.0	0.0	0.0	33.3	16.7
Administrators	16.7	33.3	50.0	0.0	0.0	0.0	0.0
School board	16.7	50.0	33.3	0.0	0.0	0.0	0.0
Students	16.7	83.3	0.0	0.0	0.0	0.0	0.0
Parents	16.7	66.7	0.0	0.0	0.0	0.0	16.7
Custodial Staff	16.7	33.3	50.0	0.0	0.0	0.0	0.0

N = 6

Note: Row percentages sum to 100.0%.

Source: Implementation Study—School Food Service Director Interview, Spring 2003

APPENDIX B

SUMMARY OF ACHIEVEMENT TEST SCORE DATA

List of Exhibits

Appendix B

Summary of Achievement Test Score Data Received for Years 2 and 3 of the SBPP (School Years 2001-2002 and 2002-2003)

Exhibit B-1

School Year 2001-2002 School–Level Achievement Test Data, by District

District	Test	Test Administered in	Grades	Subject	Measure
Harrison	CTBS	Spring	5	Math, Reading	National Percentile Rank
Phoenix	SAT-9	Spring	2-6	Math, Reading	National Percentile Rank
Shelby	SAT-9	Spring	3-5	Math, Reading	National Percentile Rank
Santa Rosa	SAT-9	Spring	2-6	Math, Reading	National Percentile Rank
Wichita	State	Spring	4	Math	Mean Raw Score
	State	Spring	5	Reading	Mean Raw Score
	Local	Spring	5	Math	Mean Raw Score
	MAT-7	Fall	4	Reading	Mean Scale Score
Boise	NWEA	Fall	2-5	Math, Reading	Rasch Score

Legend:

CTBS:	Comprehensive Test of Basic Skills, Terra Nova
SAT-9:	Stanford Achievement Test, Ninth Edition
State:	Kansas State Assessment Test
Local:	Local Benchmark Test
MAT-7:	Metropolitan Achievement Test, Seventh Edition
NWEA:	Northwest Educational Association – Idaho State Assessment

Exhibit B-2

School Year 2002-2003 School–Level Achievement Test Data, by District

District	Test	Test Administered in	Grades	Subject	Measure
Harrison	CTBS	Spring	5-6	Math, Reading	National Percentile Rank
Phoenix	SAT-9	Spring	2-6	Math, Reading	National Percentile Rank
Shelby	SAT-10	Spring	3-5	Math, Reading	National Percentile Rank
Santa Rosa	SAT-9	Spring	2-6	Math, Reading	National Percentile Rank
Wichita	State	Spring	4	Math	Mean Raw Score
	State	Spring	5	Reading	Mean Raw Score
	Local	Spring	2, 5	Math, Reading	Mean Raw Score
	MAT7	Spring	3, 6	Math, Reading	National Percentile Rank
Boise	NWEA	Spring	2-6	Math, Reading	Rasch Score

Legend:

CTBS:	Comprehensive Test of Basic Skills, Terra Nova
SAT-9:	Stanford Achievement Test, Ninth Edition
SAT-10:	Stanford Achievement Test, Tenth Edition
State:	Kansas State Assessment Test
Local:	Local Benchmark Test
MAT-7:	Metropolitan Achievement Test, Seventh Edition
NWEA:	Northwest Educational Association – Idaho State Assessment

Exhibit B-3

School Year 2001-2002 Student–Level Achievement Test Data, by District

District	Test	Test Administered in	Grades	Subject	Measure
Harrison	CTBS	Spring	5	Math, Reading	Scale Score
Phoenix	SAT-9	Spring	4-6	Math, Reading	Scale Score
Shelby	SAT-9	Spring	5	Math, Reading	Scale Score
Santa Rosa	SAT-9	Spring	4-6	Math, Reading	Scale Score
Wichita	State	Spring	4	Math	Raw Score
	State	Spring	5	Reading	Raw Score
	Local	Spring	5	Math, Reading	Raw Score
	MAT-7	Fall	4	Reading	Scale Score
Boise	NWEA	Fall	4-5	Math, Reading	Rasch Score

Legend:

CTBS:	Comprehensive Test of Basic Skills, Terra Nova
SAT-9:	Stanford Achievement Test, Ninth Edition
State:	Kansas State Assessment Test
Local:	Local Benchmark Test
MAT-7:	Metropolitan Achievement Test, Seventh Edition
NWEA:	Northwest Educational Association – Idaho State Assessment

Exhibit B-4

School Year 2002-2003 Student-Level Achievement Test Data, by District

District	Test	Test Administered in	Grades	Subject	Measure
Harrison	CTBS	Spring	5-6	Math, Reading	Scale Score
Phoenix	SAT-9	Spring	5-6	Math, Reading	Scale Score
Shelby	SAT-10	Spring	4	Math, Reading	Scale Score
Santa Rosa	SAT-9	Spring	5-6	Math, Reading	Scale Score
Wichita	State	Spring	4	Math	Raw Score
	State	Spring	5	Reading	Raw Score
	Local	Spring	5	Math, Reading	Raw Score
	MAT-7	Spring	6	Math, Reading	Scale Score
Boise	NWEA	Spring	5, 6	Math, Reading	Rasch Score

Legend:

CTBS:	Comprehensive Test of Basic Skills, Terra Nova
SAT-9:	Stanford Achievement Test, Ninth Edition
SAT-10:	Stanford Achievement Test, Tenth Edition
State:	Kansas State Assessment Test
Local:	Local Benchmark Test
MAT-7:	Metropolitan Achievement Test, Seventh Edition
NWEA:	Northwest Educational Association – Idaho State Assessment

APPENDIX C

STATISTICAL MODELS USED TO ASSESS THE IMPACTS OF THE AVAILABILITY OF UNIVERSAL-FREE SCHOOL BREAKFAST

List of Exhibits

APPENDIX C

STATISTICAL MODELS USED TO ASSESS THE IMPACTS OF THE AVAILABILITY OF UNIVERSAL-FREE SCHOOL BREAKFAST

List of Exhibits

Appendix C

Statistical Models Used to Assess Impacts of the Availability of Universal-Free School Breakfast

This appendix describes in detail the statistical models used to assess impacts reported on for this evaluation. We first present various models for assessing student-level impacts, followed by a series of models for assessing school-level impacts. These descriptions have been taken directly from Appendix C in the report of the first year of findings (McLaughlin et al., 2002). We then separately describe the models used for student and school-level longitudinal growth curve analyses. Finally, we discuss the issue of statistical power in the analyses conducted for this evaluation.

Models for Student-Level Outcomes

Models for Gain Scores

This section describes the models that were used for analyses of student-level gain scores. These models were used for the analyses of gains on achievement test scores[1], breakfast participation, and measures of attendance and tardiness. For each outcome measure (e.g., a student achievement gain score), three types of models were fit to the data:

- A treatment main effects model;
- A district-by-treatment interaction model; and
- A separate main effects model for data from each of the six districts.

In the text that follows, we will describe the first type of model in the greatest detail. Subsequently, we provide brief discussions of how the latter two differ from the first.

The Treatment Main Effects Model

The student-level data used in this evaluation were based on hierarchically nested clusters. In many applications, observations within clusters are correlated, because the outcome measures of units within a cluster tend to be more similar than those of units in different clusters. Such correlation, if unaccounted for, can violate independent assumptions of standard statistical models and can therefore threaten their internal validity. The lowest level of clustering involves repeated observations on students. Each student had a pre-implementation, or baseline score, and a test score from the following year, the implementation year. The next level of clustering involves students within schools. It is often found that there is a correlation among the scores of students within a school. Next, schools are clustered into treatment-control pairs. The schools comprising the treatment-control pair were specifically chosen to be similar to one another, as part of the randomization process. In most cases the treatment-control pairs were comprised of just two schools, one treatment

[1] The models described here for achievement gains correspond to analyses of student gains from one particular grade level to the next (e.g., students that went from third to fourth grade during the time span from pre-implementation to the implementation year). The model for data from all grade levels combined is described in a subsequent section.

school and one control school. In a few cases, two or three treatment schools were matched to one or more control schools. Finally, the treatment-control pairs were nested within school districts. In the modeling approach described below, the clustering of repeated observations within students is accounted for by converting the two observations into a single outcome variable, a gain score. The model accounts for clustering of students within each of the two halves of a treatment-control pair. For most of the treatment-control pairs, since there is only one treatment and one control school in the pair, the strategy of accounting for clustering of students within pairs is equivalent to accounting for clustering of students within schools. For those few pairs with more than one treatment school or more than one control school, the clustering within pairs is accounted for, but the clustering within schools is ignored. This omission is expected to have little effect on the estimates or their standard errors.[2] The clustering of students within pairs is accounted for in the models by random effect terms for pairs. The clustering of pairs within districts is accounted for by the use of fixed effects dummy-coded variables for districts. The two-level hierarchical linear model is shown below.

$$gain_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(pre_{ij}) + \beta_3(elig_{ij}) + \beta_4(Minority_{ij}) + \beta_5(female_{ij}) + \beta_6(age_{ij}) + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01} + \alpha_{1j}$$

where,

$gain_{ij}$ = the gain score of the i^{th} student in the j^{th} school-pair, and is calculated by subtracting the student's pre-implementation score (pre_{ij}) from the same student's score during the implementation year;

trt_j = a dummy variable indicating whether the school in the j^{th} pair is a treatment school ($trt_j = 1$) or a comparison school ($trt_j = 0$);

$elig_{ij} = 1$ if the i^{th} student in the j^{th} school-pair was eligible for free or reduced-price lunch during the pre-implementation year, and $elig_{ij} = 0$ otherwise;

$Minority_{ij} = 1$ if the i^{th} student in the j^{th} school-pair is non-white, and $Minority_{ij} = 0$ otherwise;

$female_{ij} = 1$ if the i^{th} student in the j^{th} school-pair is female, and $female_{ij} = 0$ otherwise;

---

[2] To test this hypothesis, an alternative model was fitted, whereby students were nested within schools, and schools nested within pairs. This model yields very similar estimates of the fixed effects and their standard errors compared to the model illustrated here. For example, in this alternative formulation of the model, the main treatment effect is equal to 2.14 with a standard error equal to 2.21 compared to corresponding estimates of 2.29 and 2.18 in the original model. Moreover, in the alternative model, there was not significant variation in the treatment effect among schools in the pair, implying that clustering within pairs was equivalent to clustering within schools.

age_{ij} = the age (in years) of the i^{th} student in the j^{th} school-pair at the time of the pre-implementation assessment;

$\sum_{k=1}^{5}(District_k)$ represents five dummy coded variables for the six school districts;

and,

ε_{ij} = the student-level residual of the i^{th} student in the j^{th} school-pair. The assumed distribution of these residuals is normal, with mean = 0, and variance = σ^2.

Note that the fixed effects parameter γ_{00} represents the grand mean intercept, and the random effects parameters α_{0j} represent the deviation of the j^{th} school-pair from the grand mean intercept. The grand mean intercept in this model can be interpreted as the mean of the control school means, after controlling for the other terms in the model. More accurately, α_{0j} represents the deviation of the control school mean in the j^{th} school-pair from the grand mean of all control schools. The assumed distribution of the α_{0j} is normal, with mean = 0, and variance = τ_{00}^2.

Each pair of schools has its own treatment effect, which is simply the difference between the treatment school mean and the control school mean. The parameter γ_{01}, represents the grand mean treatment effect; that is, the mean of treatment effects over all school-pairs, after controlling for the other terms in the model. The term α_{1j} represents the difference between the treatment effect in the j^{th} school-pair, and the grand mean treatment effect. The assumed distribution of the α_{1j} is normal, with mean = 0, and variance = τ_{11}^2. In these models, the covariance between the random deviations from the grand mean intercept and the deviations from the grand mean treatment effect was not estimated, i.e., the assumed covariance between α_{0j} and α_{1j} was zero. An additional model assumption is that the ε_{ij} are independent of the α_{0j} and α_{1j}.

An Example

In this section, an example is provided for the model specified above, fitted to data on math score gains of students who were in fourth grade during the baseline year and were in fifth grade during the implementation year. The hierarchical linear model (HLM) was fit to the data using the “mixed procedure” of SAS Version 8 software. The parameter estimates are shown in Exhibit C-1.

The intercept estimate is the expected mean gain when all of the other terms in the model are zero (i.e., pre-implementation score = 0, treatment = 0, eligibility = 0, minority = 0, female = 0, deviation age = 0, and each of the five district dummy variables = 0). Since none of the students had a pre-implementation score of zero, the intercept estimate, 196.3, cannot be interpreted on its own. In actuality, the average pre-implementation score among the students in this analysis was 637. If the intercept estimate is added to the product of the coefficient for *pre* and the mean for *pre*, [(193.6 + (637*-.28)) = 15.2], with all of the other terms set to zero, the expected mean gain is estimated for students who are in the control group, paid eligibility status, white, male in District F, who are at the average age for their class, and who had an average pre-implementation score.

Exhibit C-1 indicates that the pre-implementation score (labeled “pre_{ij}” in the table) has a relationship to the gain score that is statistically significant at $p < .0001$. The parameter estimate is a negative value. This indicates that, on average, students that had higher pre-implementation scores tended to gain less than students with lower baseline scores.

Exhibit C-1

Model Results: Student-Level Fourth Grade to Fifth Grade Math Gain

	Solution for Fixed Effects					
Model Name	**Effect**	**Estimate**	**S.E.**	**DF**	**t Value**	**Pr > |t|**
	Intercept	196.30	19.11	59	10.27	<.0001
pre_{ij}	TOTMATH_SS	-0.28	0.03	470	-9.64	<.0001
$\sum_{k=1}^{5}(District_k)$	Distid A	3.11	5.61	470	0.55	0.581
	Distid B	8.40	3.94	470	2.13	0.033
	Distid C	11.21	5.72	470	1.96	0.050
	Distid D	4.05	5.88	470	0.69	0.491
	Distid E	14.71	3.30	470	4.45	<.0001
trt_j	cv_trcn	2.29	2.18	58	1.05	0.296
$elig_{ij}$	cv2_eliga	-4.93	2.16	470	-2.28	0.023
$Minority_{ij}$	cv2_eth	-0.92	2.26	470	-0.41	0.686
$female_{ij}$	cv2_gender	1.66	1.99	470	0.84	0.403
age_{ij}	cv2_age	-3.22	2.71	470	-1.19	0.236

	Covariance Parameter Estimates					
	Cov Parm	**Subject**	**Estimate**	**S.E.**	**Z Value**	**Pr Z**
α_{0j}	Intercept	Pair	25.9431	18.7508	1.38	0.0832
α_{1j}	cv_trcn	Pair	47.4446	38.6739	1.23	0.1093
ε_{ij}	Residual		548.3517	35.1733	15.59	<.0001

Exhibit C-1 further shows parameter estimates for the five dummy variables corresponding to five of the six districts. The five districts shown are each contrasted to the sixth. The results indicate that Districts B and E each had higher average gains than District F ($p < .05$). Not shown in Exhibit C-1, are the results of an overall F-test of the null hypothesis of no variation among districts in intercepts (average gains). The hypothesis was rejected in favor of the alternative that there is variation among districts in average gain.

Exhibit C-1 shows that the main effect of treatment (*Trt*) is 2.29 gain score points and is not statistically significant at $p < .05$. The coefficient, 2.29 means that the average treatment effect across all of the treatment pairs, after controlling for the other terms in the model, was 2.29 points. In other words, treatment schools gained an average of 2.29 points more than control group schools (after controlling for other factors), but it would not be unusual to find a difference of this size, even if the true, underlying mean gains were equal.

The variation in impacts among pairs is indicated in Exhibit C-1 by the estimate of the variance of the random effects for impacts (α_{1j}, estimated variance = 47.4). Note that, even after accounting for some of the student-level variation with the student-level covariates (e.g., age, gender, pre-implementation score, school meal eligibility status, ethnicity), the amount of total variation that is accounted for by differences among school-pairs is quite small compared to the student-level residual variation. Examination of the covariance parameter estimates in Exhibit C-1 indicates that school pairings account for about 12 percent of the total residual variation [(25.9 + 47.4) / (25.9 + 47.4 + 548.3) = 0.12].

The results in Exhibit C-1 indicate that students that were eligible for free or reduced-price school meals had average gains that were 4.93 points lower than those of students who were eligible for paid meals. There were no significant differences in gains, however, by ethnicity, gender, or age.

Choice of Covariates

There are two reasons to add covariates to a model such as the one specified above. The first is to control for differences between student characteristics in the control and treatment schools. The second is to reduce residual variance and hence increase the power to detect a main effect of treatment. In a true randomized design, the first reason is often not very important because the randomization often results in balanced distributions of student characteristics between control and treatment schools. In the current study, in which entire schools within school-pairs were randomly assigned to control or treatment, there existed some potential for imbalance on student characteristics between the two groups. But analyses of the demographic characteristics of students in control and treatment groups indicated the randomization process appears to have worked well (see Chapter Five and Appendix B). So, in the current study, the first reason given for adding covariates to the model might not be of crucial importance in terms of inferences to the treatment impact.

The second reason for including covariates is perhaps more important to the current analyses. The student-level covariates used in the model (pre-implementation score, eligibility status, minority status, gender, age) were utilized because they were available for all students, they were not highly correlated with one another, and they could be reasonably expected to account for some of the residual variation among students. There were some other student-level variables available that were obtained from the parent survey, but they were not available for substantial proportions of students that had test scores. Therefore, gains in precision would be offset by loss of sample size if they were included in the models.

The use of school-level covariates in models like the one specified above were explored. However, it was found that the available variables were either the same as or highly correlated with the factors on which the original randomization was based. Thus, within pairs, there was practically no variation on the school-level measures. It was found that adding them to the models more often resulted in estimation problems than in any appreciable reduction in residual variance. Therefore any school-level covariates were not included in the models.

The District-by-Treatment Interaction Model

The second model to be fit for each gain score was the district-by-treatment interaction model. The level 1 model was identical to the one specified above for the main effects model:

$$gain_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(pre_{ij}) + \beta_3(elig_{ij}) + \beta_4(Minority_{ij}) + \beta_5(female_{ij}) + \beta_6(age_{ij}) + \varepsilon_{ij}$$

On the other hand, the level 2 model included a district dummy variable interacted with the treatment dummy (see β_{1j}):

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01} + \sum_{k=1}^{5} \gamma_{1k}(District_k) + \alpha_{1j}$$

In these models, an F-test was computed to determine whether there was significant variation among districts in the treatment effect. Rejection of the null hypothesis would imply that the average treatment impact was significantly larger in some districts than in others. This finding would warrant further investigation into the magnitude of the variation in treatment effects among districts. We presented descriptive statistics and estimated impacts for each district.

The Main Effect Model for Each District

We fit separate models to the data for each individual school district. The models were the same as the main effects model previously specified, except that there were no dummy variables for districts.

Level 1 model:

$$gain_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(pre_{ij}) + \beta_3(elig_{ij}) + \beta_4(Minority_{ij}) + \beta_5(female_{ij})$$
$$+ \beta_6(age_{ij}) + \varepsilon_{ij}$$

Level 2 model:

$$\beta_{0j} = \gamma_{00} + \alpha_{0j}$$
$$\beta_{1j} = \gamma_{01} + \alpha_{1j}$$

The Summary Tables

The summary table for the current example, math gain scores of students that were in fourth grade during the baseline year and fifth grade during the implementation year, is shown in Exhibit C-2. The impact shown for "All" districts is 2.29. If the impact main effect had been significantly different than zero, this result would have been indicated with a "*" (p < .05) or "**" (p <. 01) next to the impact estimate. If the district-by-treatment interaction model had found a significant interaction effect, this result would have been shown next to the impact estimate with a "+" (p < .05) or "++" (p < .01). The impacts from each of the individual districts were estimated from the models of individual districts, discussed above.

The "unadjusted means" shown in Exhibit C-2 are simple arithmetic means of the baseline scores and the gain scores. They are not estimated from the models, i.e., they have not been adjusted for other terms in the model. For example, the mean gain score shown for students in treatment schools is simply the mean gain of all students in treatment schools.

The effect size represents the impact estimate divided by the standard deviation of the pre-implementation scores of both control and treatment school students, combined.

Exhibit C-2

Student-Level Fourth Grade to Fifth Grade Math Gain

	Unadjusted Means						Results of Impact Models	
	Treatment Schools			Control Schools				
District	N	Yr 1	Gain	N	Yr 1	Gain	Impact	Effect Size
All	299	635.40	25.98	300	638.73	23.76	2.29	0.06
A	22	624.41	37.91	12	647.83	19.00	22.53	0.54
B	56	633.18	27.52	40	635.15	24.58	5.26	0.14
C	16	626.94	27.81	18	607.72	25.67	-6.62	-0.15
D	73	634.60	16.72	66	637.42	18.32	-2.20	-0.07
E	112	639.96	28.07	146	644.14	27.48	-0.22	-0.01
F	20	637.80	29.15	18	632.58	12.97	17.08	0.51

Notes: Yr 1 = pre-implementation or baseline year
Gain = first year of implementation – pre-implementation year

Models for Achievement Gains When Data are Combined Across All Grade Levels

The previously described models for achievement gain were used to analyze achievement gains for a single grade cohort (e.g., students that were assessed in fourth and fifth grades in pre-implementation and implementation years). In this section we describe the models that were used when the data from four grade cohorts were combined in a single analysis (the four cohorts correspond to students that advanced from second to third grade, third to fourth grade, fourth to fifth grade, and fifth to sixth grade). The strategy is essentially the same as that previously described: there was a main effects model, a model to test for district-by-treatment interaction, and separate models fit to the data from each of the six individual districts. The only change to the models was that there were extra dummy-coded terms included to represent the baseline year grade level and terms for interactions between baseline grade level and baseline achievement test score. The form of the main effects model is shown below.

$$\begin{aligned} gain_{ij} &= \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(pre_{ij}) + \beta_3(elig_{ij}) + \beta_4(Minority_{ij}) + \beta_5(female_{ij}) \\ &+ \beta_6(age_{ij}) + \beta_7(bgrade2_{ij}) + \beta_8(bgrade3_{ij}) + \beta_9(bgrade4_{ij}) + \beta_{10}(bgrade5_{ij}) + \\ &\beta_{11}(bgrade2_{ij} * pre_{ij}) + \beta_{12}(bgrade3_{ij} * pre_{ij}) + \beta_{13}(bgrade4_{ij} * pre_{ij}) \\ &+ \beta_{14}(bgrade5_{ij} * pre_{ij}) + \varepsilon_{ij} \end{aligned}$$

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01} + \alpha_{1j}$$

where,

$bgrade2_{ij}$ = 1 if student was in second grade during the baseline year, and 0 otherwise,
$bgrade3_{ij}$ = 1 if student was in third grade during the baseline year, and 0 otherwise,
$bgrade4_{ij}$ = 1 if student was in fourth grade during the baseline year, and 0 otherwise,
$bgrade5_{ij}$ = 1 if student was in fifth grade during the baseline year, and 0 otherwise,

and, the other terms are as previously described.

Models for the district-by-treatment interaction and the models for data from each individual district also included these extra dummy-coded terms. The rationale for the extra dummy-coded terms and interaction is as follows. The outcome measures are achievement test gains, where the metric used was scale scores on the Stanford-9 test. There is no a priori reason to expect that the average gains of the four grade cohorts should be equivalent. For example, if one examines the summary tables for reading gains, it is evident that, on average, students advancing from second to third grade made bigger gains than students advancing from fourth to fifth grades. The dummy variables for baseline grade allow for different average gain scores for the four grade cohorts in the combined model. Furthermore, there was evidence that the relationship between students' pre-implementation score (pre) and gain varied across the grade cohorts. Therefore, the grade cohort dummies were interacted with the pre-test score to allow for different slopes for the pre-implementation score in each of the four grade cohorts.

Models for Continuous Outcome Measures at a Single Time Point

Many of the outcome variables were measured only at one time point during the implementation year. Examples include measures of cognitive functioning, student behavior, and food insecurity. The models fit to these outcome measures were the same as those specified for the gain scores, with the following exceptions:

- The outcome measure is an implementation year measurement, rather than a gain score;
- There is no pre-implementation score used as a covariate; and
- The standard deviation used in the calculation of effect sizes is the pooled standard deviation of treatment and comparison group students on the implementation year outcome measure.

Thus, the model specification for the main effects model is as follows:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(elig_{ij}) + \beta_3(Minority_{ij}) + \beta_4(female_{ij}) + \beta_5(age_{ij}) + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01} + \alpha_{1j}$$

where,

Y_{ij} = the outcome measure of the i^{th} student in the j^{th} school-pair, and the other terms in the model are as previously described.

Models for Binary Outcome Measures at a Single Time Point

The previously described models were used for outcome data that were measured on a continuous scale (either gain scores or implementation year scores). Those models are often not a good choice for outcome measures that are binary (e.g., 1 = "yes", 0 = "no"). The main problem with using simple linear models for binary outcome data is the likelihood that the predicted means (the proportion of “yes” responses) would sometimes be less than zero or greater than one, outside the mathematical limits of a proportion. Additionally, binary data often do not come close to satisfying the normality assumptions of linear models, nor are the assumptions regarding variances justifiable. Hence, the statistical inferences drawn from these models might not be trustworthy.

An example of a binary outcome is psychosocial impairment. The variable takes the value of “1” if a child meets the criteria for psychosocial impairment, and takes the value of “0”, otherwise. The research question is whether the proportion of students with psychosocial impairment (in the implementation year) is different for students in control and treatment schools. Logistic regression models are useful analytic tools for answering this type of research question with these kinds of data. However, traditional logistic regression models do not take into account clustering of students within schools and schools within pairs and pairs within districts. To address this issue, the generalized estimating equations (GEE) approach can be utilized. This is an iterative procedure that can be implemented in the GENMOD procedure of SAS to model and account for potential correlation among observations within clusters.

We utilized a GEE approach in which we modeled the correlation among students that are nested within schools. The clustering of schools within districts is accounted for in the model by the district dummy variables. The model, however, does not explicitly take into account the pairing of control and treatment schools, as was done in the HLM models for continuous outcome variables.[3]

The main effects model is of the form:

$$\log\frac{\pi_{ij}}{(1-\pi_{ij})} = \beta_0 + \beta_1(trt_j) + \beta_2(elig_{ij}) + \beta_3(Minority_{ij}) + \beta_4(female_{ij}) + \beta_5(age_{ij})$$
$$+\sum_{k=1}^{5}\beta_{5+k}(District_k)$$

where,

> π_{ij} = the probability that the i^{th} student in the j^{th} school takes the value “1” (rather than “0”) on the outcome measure.

Using the typical nomenclature of logistic regression modeling, we will refer to an outcome taking the value “1” as a “success”, and an outcome taking the value “0” as a “failure”.

In this model, an overall average treatment effect is estimated. The estimated coefficient for the treatment effect, $\hat{\beta}_1$, is interpreted as the log odds ratio of success (after controlling for the other

[3] For binary outcomes, models that had fixed or random effects corresponding to the treatment pairs resulted in estimation problems and non-convergence whenever all of the students in one half of a school-pair assumed the same value (i.e., all zeros or all ones). On the other hand, the marginal modeling approach (the GEE approach) does not have this problem unless all students across either all treatment schools or all control schools have the same value on the outcome variable. When this situation arose, modeling is not possible with either the GEE or the HLM modeling approaches, but it suffices to present the results descriptively.

terms in the model). If we take the exponential of the estimate, $\exp(\hat{\beta}_1)$, we obtain the odds ratio of success. The odds ratio of success is the odds of success in the treatment group, divided by the odds of success in the control group. The odds of success in the treatment group is the probability of success (the proportion of students with psychosocial impairment) in treatment schools divided by the probability of failure of students in treatment schools.

In the summary tables, the odds ratio is shown in the "effect size" column. In the column labeled "impact" we present an estimate of the difference between the probability of success for students in treatment schools and the probability of success of students in control schools (after controlling for the other factors in the model). We used the odds ratio estimated from the model, the definition of an odds ratio, and the proportion of students in control schools who were "successes" to estimate the impact as follows:

The odds ratio is defined as:

$$OR = T/(1\text{-}T) \;/\; C/(1\text{-}C)$$

where,

T = probability of success for students in treatment schools, and

C = probability of success for students in control schools.

Solving the equation above for T yields:

$$T = (OR * (C/(1\text{-}C)))\;/(1+ (OR * (C/(1\text{-}C)))).$$

Next, we substitute the value of $\hat{\beta}_1$ for "OR" and the proportion of control group students who were successes (shown in the summary tables in the unadjusted proportions for control group column) for "C" to obtain "T" (the impact of treatment, after controlling for the other terms in the model).

An additional model was fit for each outcome variable to test for a district-by-treatment interaction effect. Finally, separate models were fit to the data from each individual district.

Models for Subgroup Analyses

Models for subgroup analyses were fit to the data to determine whether there were differential treatment impacts for different subgroups. An example research question that can be addressed using these analyses is, "Are the treatment impacts different for students that were eligible for free or reduced-price school meals, relative to the impacts of students that were eligible for paid meals?"

The example model specification shown below builds on the main effects model for gain scores. The only difference from the previous models is the addition of a term for the treatment-by-subgroup interaction (*trt*subgrp*).[4] The key result of interest from this model is the test of whether there is a statistically significant treatment-by-subgroup interaction. A significant treatment-by-subgroup

[4] In this model the *subgrp* variable is represented by school meal eligibility status.

interaction is interpreted as evidence of differential treatment effects for the members of the two subgroups.

$$gain_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(subgrp_{ij}) + \beta_3(trt_j * subgrp_{ij}) + \beta_4(pre_{ij})$$
$$+ \beta_5(Minority_{ij}) + \beta_6(female_{ij}) + \beta_7(age_{ij}) + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01} + \alpha_{1j}$$

A second model adds a three-way interaction between treatment, subgroup and district, and the additional two-way interaction terms that are necessary to fit the three-way interaction (i.e., there are terms for district-by-treatment, district-by-subgroup, and treatment-by-subgroup, in addition to the three-way district-by-treatment-by-subgroup interaction). A significant three-way interaction is interpreted as evidence that there are differential treatment effects between the two subgroups, and these differences in treatment effects vary across districts. For example, in one district there could be a large difference between treatment effects for the two subgroups, and in other districts there might be no differences between the subgroups on the treatment effect.

And as with the previous models, separate models were fit to the data from each individual district. For subgroup analyses for continuous and binary outcomes measured at a single time point, the corresponding previously described models were modified by adding the same set of interaction terms as was described here.

Presentation of Results

In the event of a lack of significant results between the respective impacts on the two groups of students, the best estimate of the respective subgroup means and their impacts will be the means and overall impact for the entire study sample. For this reason, subgroup analyses for non-significant findings will not be presented in tables.[5]

For illustration purposes, we present in Exhibit C-3 how subgroup impacts are displayed in Appendix G. The table mirrors the tables presented for the overall impacts shown in Appendix D. Results are only shown in instances where there is a significant interaction between the subgroup variable and treatment status. In addition, results are only shown at the district level when there is a reported three-way interaction between subgroup, treatment, and district.

In this example, results are shown for the differences between impacts on free/reduced-price eligible students and paid-eligible students for two measures of achievement test score gains. In the first case, focusing on second to third grade math gain, there is an overall interaction effect between school meal eligibility and treatment status. Moreover, the interaction effect varies significantly across districts, implying that the overall effect may not be the best estimate of each district's unique effect.

---

[5] A total of 209 subgroup analyses were conducted across all outcomes and the four subgroups: ethnicity, age, gender, and school meal eligibility status.

Exhibit C-3

Academic Achievement Outcomes by School Meal Eligibility Status[1]

	Unadjusted Means (Standard Errors)								Results of Impact Models		
	Paid				Free/Reduced						
	Treatment		Control		Treatment		Control				
Measure/District	N	Mean	N	Mean	N	Mean	N	Mean	Paid Impact	Free/ Reduced Impact	Interaction Effect
Math Score Gain, Second to Third Grade											
All	52	31.19 (4.39)	38	18.50 (4.05)	51	19.04 (4.73)	50	29.42 (3.85)	14.94	-6.82	** +
B	47	27.66 (4.28)	36	16.67 (4.04)	32	17.69 (6.11)	32	22.09 (3.84)	12.94	-1.22	n.s.
C	5	64.40 (16.25)	2	51.50 (9.50)	19	21.32 (7.63)	18	42.44 (7.41)	37.78	-4.83	n.s.
Reading Score Gain, Third to Fourth Grade											
All[2]	264	18.14 (2.53)	259	28.35 (2.36)	277	25.01 (2.32)	286	21.55 (1.99)	-8.97♦	2.77	*

n.s. = Not significant

[1] All test scores have been converted to Stanford–9 scale scores.

[2] Schools in Districts A, D, E, and F did not administer tests to students in second grade.

* The two-way interaction between treatment and eligibility status is statistically significant at the .05 level.
**The two-way interaction between treatment and eligibility status is statistically significant at the .01 level.
\+ The three-way interaction between treatment, eligibility status, and district is statistically significant at the .05 level.
♦ Difference between treatment and control students is statistically significant at the .05 level.

Source: Impact Study – Student-Level Academic Achievement Test Scores, 1999-2000 and 2000-2001

Results are thus shown both overall and by district. The reader must use caution, however, in looking at findings at the district level, given the small sample size and the corresponding unreliability of the results. In contrast, when looking at third to fourth grade reading gain, there is only an interaction effect between eligibility and treatment status, with no further interaction by district. In this case, only the overall effects across districts are displayed.

Models for School-Level Outcomes

Models for Change Scores

This section describes the models that were used for analyses of school-level change scores. The modeling approach for school-level change was very similar to that described for the student-level change scores. The main difference is that as opposed to the student-level data, where there were multiple observations on students clustered within schools, the school-level data has just one observation per school. These models were used for the analyses of changes on achievement test scores, breakfast participation, and measures of attendance and tardiness. In the case of achievement scores, the changes correspond to the difference between mean scores for students at a particular grade level (e.g., fourth grade) in the pre-implementation year, and the mean scores for students in the same grade (e.g. fourth grade) obtained during the implementation year. Thus, these models measured “change” for different cohorts of students. For each outcome measure three types of models were fit to the data:

- A treatment main effects model;
- A district-by-treatment interaction model; and
- A separate main effects model for data from each of the six districts.

With only one observation per school, the sample sizes for the analyses for each separate district were very small. Therefore, the results of the third type of model (main effect for each district) were presented for descriptive purposes only. No hypothesis tests were performed using these models.

The school-level main effects models were of the form:

$$change_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \beta_2(pre_{ij}) + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01}$$

where,

> $change_{ij}$ = the change score of the i^{th} school in the j^{th} school-pair, calculated by subtracting the school’s pre-implementation score (pre_{ij}) from the same school’s score during the implementation year ($post_{ij}$).

An example of a pre-implementation score is a school-level mean math score of fourth grade students (expressed as a national normal curve equivalent). The implementation year score represents the school-level mean math score of fourth grade students (expressed as a national normal curve equivalent) during the implementation year.

> trt_j = a dummy variable indicating whether the school in the j^{th} pair is a treatment school (trt_j = 1) or a comparison school (trt_j = 0).
>
> $\sum_{k=1}^{5}(District_k)$ represents five dummy variables for the six school districts.
>
> ε_{ij} = the school-level residual of the i^{th} school in the j^{th} school-pair. The assumed distribution of these residuals is normal, with mean = 0, and variance = σ^2.

The fixed effects parameter γ_{00} represents the grand mean intercept and the random effects parameters α_{0j} represent the deviation of the j^{th} school-pair's intercept from the grand mean intercept. The assumed distribution of the α_{0j} is normal, with mean = 0, and variance = τ_{00}^2. With only two observations per pair (a treatment school and a control school) it is not possible to specify a random treatment effect, (as was done in the models for student-level data). Within pairs, the deviation of the control school from the grand mean of control schools (the grand intercept) is represented by the α_{0j}. The deviation of the treatment school from the grand mean of treatment schools (i.e., the grand mean intercept plus the grand mean treatment effect) is captured by the ε_{ij}.

In order to test for district-by-treatment interactions, the level 2 equation for the treatment effects shown above was replaced by the equation shown below. An F-test was then computed to determine whether there was significant variation among districts in the treatment effect.

$$\beta_{1j} = \gamma_{01} + \sum_{k=1}^{5}\gamma_{1k}(District_k).$$

Attempts to add school-level covariates to the models, specified above, often resulted in estimation problems and non-convergence. An alternative model formulation allowed the addition of covariates without causing the convergence problems. These models, shown below, are ordinary least squares regression models.

$$change_i = \beta_0 + \beta_1(trt_i) + \beta_2(pre_i) + \beta_3(enrollment_i) + \beta_4(attendance_i) + \beta_5(PctFR_i) + \sum_{k=1}^{5}\gamma_k(District_k) + \varepsilon_i$$

where,

> $enrollment_i$ = the enrollment of the i^{th} school during the pre-implementation year;
>
> $attendance_i$ = the school-level average daily attendance divided by the school enrollment of the i^{th} school during the pre-implementation year; and

$PctFR_i$ = the percent of students eligible for free or reduced-price lunch of the i^{th} school during the pre-implementation year.

As with previous model formulations, additional terms were added to test for district-by-treatment interactions. Finally, in another set of models, the district terms were dropped and separate models were fit to the data to estimate individual districts effects.

The results from these ordinary least squares models with the school-level covariates were generally very similar to the results generated by the models previously described that took into account the pairings of the matched schools (i.e., the random intercept models).[6]

All Grades Combined Models

The previously described models were fit to data corresponding to achievement gains of a single grade level. That is, separate models were fit for second grade, third grade, fourth grade, fifth grade, and sixth grade achievement gain scores. An additional set of models was fit to the data from all grades combined. The set included a main effects model, a district-by-treatment interaction model, and separate models for each district. When data are utilized from all grades in a single model, the data structure becomes such that there are multiple observations within schools (i.e., gains from second, third, fourth, fifth, and sixth), schools nested in pairs, and pairs nested in districts. This structure is similar to that described for disciplinary and health incidents outcomes below. Therefore, models of the same form as those specified in the section on disciplinary and health incidents outcomes were fit to the data for the all grades combined school-level gains with the exception that a pre-implementation measure was also included.

Models for Disciplinary and Health Incidents Outcomes

The disciplinary and health incidents outcomes were measures that were expressed as the number of events in a week per 100 students enrolled in a school. At each school, measurements were taken on multiple occasions during the implementation year. Thus, there are multiple measurements nested within schools, with schools nested in pairs and the pair nested in districts. This data structure is similar to the structure of the student-level data for continuous outcomes at a single time point. Very similar models were fit to these outcomes, except that there are no corresponding demographic covariates as there were for the student-level outcomes. Thus, the model specification for the main effects model is as follows:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(trt_j) + \varepsilon_{ij}$$

$$\beta_{0j} = \gamma_{00} + \sum_{k=1}^{5} \gamma_{0k}(District_k) + \alpha_{0j}$$

$$\beta_{1j} = \gamma_{01} + \alpha_{1j}$$

---

6 In addition, a variant of the model in which the dependent variable was expressed as average achievement score and prior achievement was not included as a regressor showed fairly consistent results compared to the school-level model used in this report.

where,

Y_{ij} = the outcome measured on the i^{th} occasion in the j^{th} school-pair.

As with the previous types of outcomes, an additional model was fit to test for a district-by-treatment interaction, and separate models were fit to the data from each individual district.

Growth Curve Models for Student-Level Outcomes

The purpose of this section is to outline our approach to modeling student-level measures of breakfast participation using longitudinal growth curve analyses. We focus on the school breakfast participation outcome primarily because this was the sole variable that showed a significant trend over time. Our discussion is primarily narrative, supplemented by statistical tables and plots.

Models for Breakfast Participation

Breakfast participation is a measure of the percentage of school days that each student participated in school breakfast. The minimum possible value for this measure is 0% participation and the maximum possible value is 100% participation.

This section provides a brief overview of results, then describes in detail, the models that were used for longitudinal analyses of student-level breakfast participation. Two types of models were fit to the data:

- A treatment-by-time interaction model; and
- A district-by-treatment-by-time interaction model.

The reader is strongly advised that the models and results will be easier to understand if the reader examines the graphs in Exhibits C-6 and C-10 before reading further in this section. The "treatment-by-time interaction model" corresponds to the "All Districts" plot in Exhibit C-6. The "district-by-treatment-by-time interaction model" traces the variation among districts in breakfast participation over time. This model can be better understood after examination of the five plots in Exhibit C-10 showing the respective means for Districts A, B, D, E, and F. Student-level breakfast participation data were not available from District C.

Overview of Results for Treatment-by-Time Interaction Model

There were no statistically significant differences between treatment and control average breakfast participation rates at baseline. Control group students had a significant increase in participation from *Baseline* to *Implementation Year 1*. Mean percent participation for control group students increased by an average of 5.4 percentage points (see Exhibit C-4). Treatment group students had significantly larger gains in breakfast participation than control students from *Baseline* to *Implementation Year 1.* Treatment group students gained an average of 17.9 percentage points more than control group students during this period (this is the size of the treatment effect). The total model estimated gain for treatment group students during this period was 23.3 percentage points. However, participation rates stayed flat for both treatment and control group students during the time periods spanning *Implementation Year 1* to *Implementation Year 2,* and *Implementation Year 2* to *Implementation Year 3*. There were no statistically significant changes in control group participation rates for either of those two time periods. And, participation rates of treatment group students did not change at a rate that was significantly different than the change in rates for control group students during those two time periods.

Overview of Results for District-by-Treatment-by-Time Interaction Model

There was statistically significant variation among districts in control group *Baseline* to *Implementation Year 1* gain (see Exhibit C-8). Districts E and F had larger control group gains during that time period than the other districts. There was also statistically significant variation among districts in treatment effects during the period *Baseline* to *Implementation Year 1*. District F had the largest treatment effect (difference between control and treatment groups). The treatment effects during this time range were somewhat smaller for Districts A, B, and E, and were the smallest for District D.

For the period *Implementation Year 1* to *Implementation Year 2*, there was statistically significant variation among districts in treatment effects. Districts A and D had the largest treatment effects during this time period. For the period *Implementation Year 2* to *Implementation Year 3*, there were no statistically significant differences among districts in either control group changes or treatment effects.

The Treatment-by-Time Interaction Model

Breakfast participation was analyzed in the three-level HLM model with repeated observations on students (level-1) clustered within students (level-2), and students clustered in school treatment-control matched pairs at level-3. Time (*Baseline, Implementation Year 1, Implementation Year 2*, and *Implementation Year 3*) was coded such that the functional form of the growth curve represents piecewise linear growth. The random term at level-1 represents residual variation of measurements at each time point around each student's growth curve. The random term at level-2 represents the variation of individual students' growth curves around their school mean curves. Student growth curves are constrained to be parallel to school mean curves, but their intercepts (baseline participation) are allowed to vary randomly among students. There are eight random terms at level-3. The first allows for variation in intercepts among school-pairs. The second allows for treatment-control group differences at *Baseline*. The third, fourth, and fifth represent variation among pairs in control group changes from *Baseline* to *Implementation Year 1*, from *Implementation Year 1* to *Implementation Year 2*, and from *Implementation Year 2* to *Implementation Year 3.* The fifth allows for variation among pairs in the *Baseline* to *Implementation Year* 1 treatment effect. That is, the difference between treatment and control growth slopes from the *Baseline* to *Implementation Year 1*. The last two allow for variation between school pairs in *Implementation Year 1* to *Implementation Year 2*, *and Implementation Year 2* to *Implementation Year 3* treatment effects.

Level-1 Model (Time)

$$\begin{aligned} Y_{hij} &= \beta_{0ij} + \beta_{1j}(trt_j) + \beta_{2j}(I1_{hij}) + \beta_{3j}(I2_{hij}) + \beta_{4j}(I3_{hij}) \\ &+ \beta_{5j}(trt_j * I1_{hij}) + \beta_{6j}(trt_j * I2_{hij}) + \beta_{7j}(trt_j * I3_{hij}) + \varepsilon_{hij} \end{aligned}$$

Level-2 Model (Students)

$$\beta_{0ij} = \beta_{00j} + \beta_{01}(elig_{ij}) + \beta_{02}(Minority_{ij}) + \beta_{03}(female_{ij}) + \beta_{04}(age_{ij}) + \alpha_{0ij}$$

Level-3 Model (School Pairs)

$$\beta_{00j} = \beta_{000} + \sum_{k=1}^{4} \beta_{00k}(District_k) + \mu_{00j}$$

$$\beta_{1j} = \beta_{100} + \mu_{10j}$$
$$\beta_{2j} = \beta_{200} + \mu_{20j}$$
$$\beta_{3j} = \beta_{300} + \mu_{30j}$$
$$\beta_{4j} = \beta_{400} + \mu_{40j}$$
$$\beta_{5j} = \beta_{500} + \mu_{50j}$$
$$\beta_{6j} = \beta_{600} + \mu_{60j}$$
$$\beta_{7j} = \beta_{700} + \mu_{70j}$$

$$\varepsilon_{hij} \sim N(0, \sigma^2)$$
$$\alpha_{0ij} \sim N(0, \tau^2)$$

$$\begin{bmatrix} \mu_{00j} \\ \mu_{10j} \\ \mu_{20j} \\ \mu_{30j} \\ \mu_{40j} \\ \mu_{50j} \\ \mu_{60j} \\ \mu_{70j} \end{bmatrix} \sim N(\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \phi_{11}^2 & \phi_{12} & \phi_{13} & \phi_{14} & \phi_{15} & \phi_{16} & \phi_{17} & \phi_{18} \\ \phi_{21} & \phi_{22}^2 & \phi_{23} & \phi_{24} & \phi_{25} & \phi_{26} & \phi_{27} & \phi_{28} \\ \phi_{31} & \phi_{32} & \phi_{33}^2 & \phi_{34} & \phi_{35} & \phi_{36} & \phi_{37} & \phi_{38} \\ \phi_{41} & \phi_{42} & \phi_{43} & \phi_{44}^2 & \phi_{45} & \phi_{46} & \phi_{47} & \phi_{48} \\ \phi_{51} & \phi_{52} & \phi_{53} & \phi_{54} & \phi_{55}^2 & \phi_{56} & \phi_{57} & \phi_{58} \\ \phi_{61} & \phi_{62} & \phi_{63} & \phi_{64} & \phi_{65} & \phi_{66}^2 & \phi_{67} & \phi_{68} \\ \phi_{71} & \phi_{72} & \phi_{73} & \phi_{74} & \phi_{75} & \phi_{76} & \phi_{77}^2 & \phi_{78} \\ \phi_{81} & \phi_{82} & \phi_{83} & \phi_{84} & \phi_{85} & \phi_{86} & \phi_{87} & \phi_{88}^2 \end{bmatrix})$$

where,

Y_{hij} = the outcome measure at the h^{th} time point of the i^{th} student in the j^{th} school-pair;

trt_j = a dummy variable indicating whether the school in the j^{th} pair is a treatment school (trt_j = 1) or a comparison school (trt_j = 0);

$I1_{hij}$, $I2_{hij}$, and $I3_{hij}$ are time variables, coded to model piecewise linear growth, as shown below:

	Time Point			
	Baseline	Implementation Year 1	Implementation Year 2	Implementation Year 3
$I1_{hij}$	0	1	1	1
$I2_{hij}$	0	0	1	1
$I3_{hij}$	0	0	0	1

$elig_{ij}$ = 1 if the i^{th} student in the j^{th} school-pair was eligible for free or reduced-price lunch during the pre-implementation year, and $elig_{ij}$ = 0 otherwise;

$Minority_{ij}$ = 1 if the i^{th} student in the j^{th} school-pair is non-white, and $Minority_{ij}$ = 0 otherwise;

$female_{ij}$ = 1 if the i^{th} student in the j^{th} school-pair is female, and $female_{ij}$ = 0 otherwise;

age_{ij} = the age (in years) of the i^{th} student in the j^{th} school-pair at the time of the pre-implementation assessment; and

$\sum_{k=1}^{5}(District_k)$ represents four dummy coded variables for the five school districts;

Results and Interpretation

The estimates of fixed-effects and random effect covariance parameters from the "Treatment-by-Time Interaction Model of Participation" are shown in Exhibits C-4 and C-5, respectively. We will use the "Plot of Treatment and Control Group Breakfast Participation Over Time" shown in Exhibit C-6 to aid in the interpretation of the parameter estimates.

Exhibit C-4

Estimates of Fixed Effects From School-Level Treatment-by-Time Model

Effect	District ID	Estimate	Standard Error	DF	t Value	PR > ItI
Intercept		6.4077	3.2300	59	1.98	0.0519
trt		-0.4000	0.9769	1.10E+04[1]	-0.41	0.6822
I1		5.4009	0.8833	1.10E+04	6.11	<.0001
I2		-0.6204	0.8984	1.10E+04	-0.69	0.4898
I3		-1.0235	0.9171	1.10E+04	-1.12	0.2644
trt*I1		17.9190	2.1536	1.10E+04	8.32	<.0001
trt*I2		2.0814	1.6225	1.10E+04	1.28	0.1996
trt*I3		-2.0762	1.3022	1.10E+04	-1.59	0.1109
distid	F	12.6750	2.3026	59	5.50	<.0001
distid	B	8.1083	1.6854	59	4.81	<.0001
distid	A	14.8046	2.1001	59	7.05	<.0001
distid	E	2.2400	1.4355	59	1.56	0.1240
distid	D	0	.	.	.	.
Elig		15.7707	0.7550	1.10E+04	20.89	<.0001
Minority		4.0575	0.8001	1.10E+04	5.07	<.0001
female		-0.1516	0.6940	1.10E+04	-0.22	0.8271
Age		-0.4215	0.2899	1.10E+04	-1.45	0.1459

[1] The method for calculating degrees of freedom was SAS Proc Mixed "Between-within" method. The notation used here indicates that the degrees of freedom for the within terms was large, near 11,000.

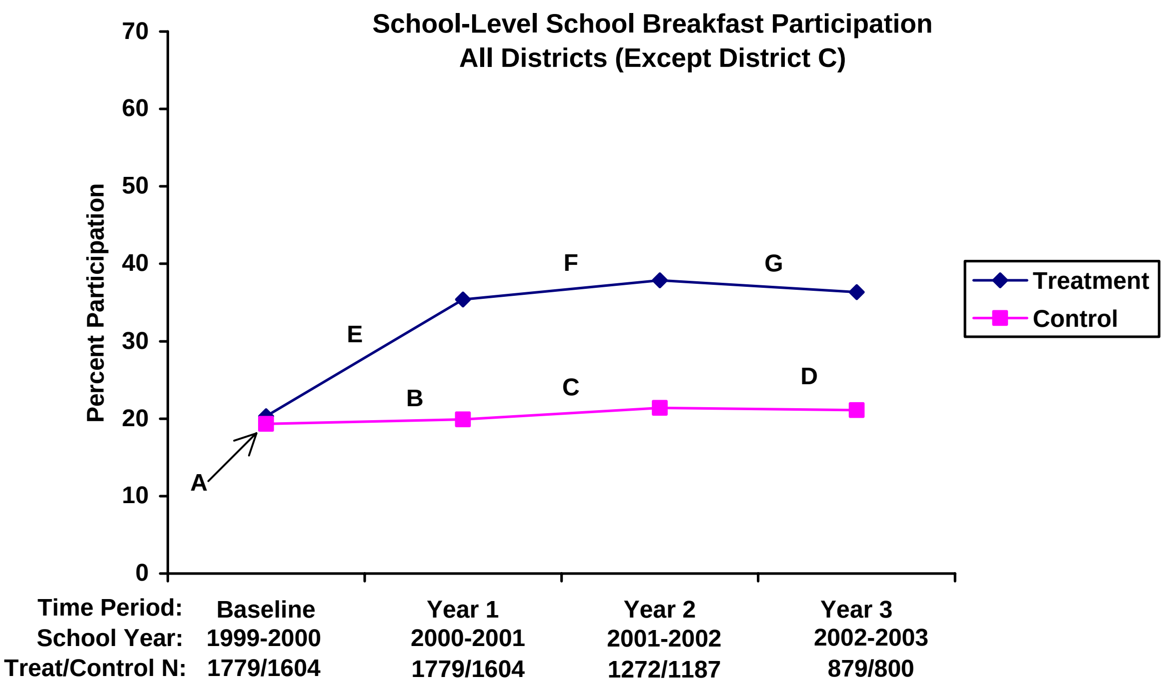
Exhibit C-5

Random Effects (Covariance Parameters) Estimates From Student-Level Treatment-by-Time Model

Level	Label	Cov Parm	Subject	Estimate	Standard Error	Z Value	PrZ
Level-3	Intercept	UN(1,1)	Pair	13.3514	6.9884	1.91	0.0280
		UN(2,1)	Pair	-7.3405	7.3274	-1.00	0.3164
	Trt	UN(2,2)	Pair	13.4380	10.6902	1.26	0.1044
		UN(3,1)	Pair	7.2471	6.2880	1.15	0.2491
		UN(3,2)	Pair	-3.3825	6.9955	-0.48	0.6287
	I1	UN(3,3)	Pair	23.5654	9.1389	2.58	0.0050
		UN(4,1)	Pair	-10.2074	6.1582	-1.66	0.0974
		UN(4,2)	Pair	6.0357	7.2746	0.83	0.4067
		UN(4,3)	Pair	14.8803	6.7476	2.21	0.0274
	I2	UN(4,4)	Pair	19.2079	10.0361	1.91	0.0278
		UN(5,1)	Pair	-2.6504	5.7485	-0.46	0.6448
		UN(5,2)	Pair	-7.0195	7.1515	-0.98	0.3263
		UN(5,3)	Pair	-8.7930	6.8724	-1.28	0.2007
		UN(5,4)	Pair	0.3657	7.3021	0.05	0.9601
	I3	UN(5,5)	Pair	8.8098	9.3940	0.94	0.1742
		UN(6,1)	Pair	9.1861	14.6930	0.63	0.5318
		UN(6,2)	Pair	-14.0104	17.7378	-0.79	0.4296
		UN(6,3)	Pair	-7.6818	15.7886	-0.49	0.6266
		UN(6,4)	Pair	4.3842	15.8359	0.28	0.7819
		UN(6,5)	Pair	-4.3174	16.3447	-0.26	0.7917
	Trt * I1	UN(6,6)	Pair	240.0500	52.5489	4.57	<.0001
		UN(7,1)	Pair	7.1488	10.8140	0.66	0.5086
		UN(7,2)	Pair	-11.4575	12.8541	-0.89	0.3727
		UN(7,3)	Pair	-23.2832	11.6848	-1.99	0.0463
		UN(7,4)	Pair	-24.2682	14.1783	-1.71	0.0870
		UN(7,5)	Pair	-4.9114	11.9263	-0.41	0.6805
		UN(7,6)	Pair	-14.4422	28.2605	-0.51	0.6093
	Trt * I2	UN(7,7)	Pair	104.0300	29.8006	3.49	0.0002
		UN(8,1)	Pair	6.6005	8.3518	0.79	0.4294
		UN(8,2)	Pair	-2.5273	10.1864	-0.25	0.8041
		UN(8,3)	Pair	-7.8399	9.4516	-0.83	0.4068
		UN(8,4)	Pair	-6.8486	9.4078	-0.73	0.4666
		UN(8,5)	Pair	3.8947	10.0611	0.39	0.6987
		UN(8,6)	Pair	-13.4031	22.8011	-0.59	0.5566
		UN(8,7)	Pair	-3.0106	17.0467	-0.18	0.8598
	Trt * I3	UN(8,8)	Pair	20.5403	18.0562	1.14	0.1276
Level-2	Intercept	Intercept	Studentid (Pair)	294.6700	9.9459	29.63	<.0001
Level-1	Residual	Residual		312.3000	5.2101	59.94	<.0001

Exhibit C-6

Plot of Treatment and Control Group School Breakfast Participation Over Time



Interpretations of the fixed effects parameter estimates shown in Exhibit C-4 follow:

Intercept: This estimate is not of direct interest for this model. It is the model-predicted mean breakfast participation when all terms in the model are set to zero.

Trt : This is the mean difference between treatment and control group breakfast participation at *Baseline*. See the point labeled "A" in Exhibit C-6. The results indicate that there is no significant difference between treatment and control group participation rates at baseline (p=.6822).

I1 : This is the average change in percent participation from *Baseline* to *Implementation Year 1* for control group students. See the segment labeled "B" in Exhibit C-6. The model-averaged change for these students was 5.4 percentage points. This gain was statistically significantly greater than zero (p<0.0001).

I2 : This is the average change in percent participation from *Implementation Year 1* to *Implementation Year 2* for control group students. See the segment labeled "C" in Exhibit C-6. The model-averaged change for these students was -0.6 percentage points. This change in participation was not statistically significantly different from zero (p=0.4898).

I3 : This is the average change in percent participation from *Implementation Year 2* to *Implementation Year 3* for control group students. See the segment labeled "D" in Exhibit C-6. The model-averaged change for these students was -1.0 percentage points. This change in participation was not statistically significantly different from zero (p=0.2644).

Trt*I1 : This is the *Baseline* to *Implementation Year 1* treatment effect. It is the difference between treatment and control group students in their mean change in breakfast participation from *Baseline* to *Implementation Year 1*. The results indicate that treatment group students gained an average of 17.9 percentage points more than control group students during this time period. Average gain for treatment group students during this time period is calculated as (*I1* + *Trt*I1*) = (5.4 + 17.9) = 23.3 percentage points. See the segment labeled "E" in Exhibit C-6. Treatment group students gained significantly more during this period than control group students (p<0.0001).

Trt*I2 : This is the *Implementation Year 1* to *Implementation Year 2* treatment effect. It is the difference between treatment and control group students in their mean change in breakfast participation from *Implementation Year 1* to *Implementation Year 2*. Treatment group students gained an average of 2.1 percentage points more than control group students during this time period. This difference was not statistically significant (p=0.1996). Average gain for treatment group students during this time period is calculated as (*I2* + *Trt*I2*) = (-0.6 + 2.1) = 1.5 percentage points. See the segment labeled "F" in Exhibit C-6.

Trt*I3 : This is the *Implementation Year 2* to *Implementation Year 3* treatment effect. It is the difference between treatment and control group students in their mean change in breakfast participation from *Implementation Year 2* to *Implementation Year 3*. Treatment group students lost an average of 2.1 percentage points more than control group students during this time period. This difference was not statistically significant (p=0.1109). Average change for treatment group students during this time period is calculated as (*I2* + *Trt*I2*) = (-1.0 - 2.1) = - 3.1 percentage points. See the segment labeled "G" in Exhibit C-6.

Distid 1-5 : These coefficients indicate the average difference between each of districts 1-5, and the comparison district (District 6) for *Baseline* breakfast participation rates. An F-test on the factor *District* indicated that there was statistically significant variation among districts in their mean baseline breakfast participation rates.

Elig : This coefficient indicates that students that were eligible for free- or reduced-price lunch at baseline had participated in breakfast an average of 16 percentage points more than non-eligible students at baseline (p<0.0001).

Minority : Minority students were more likely to participate in breakfast at baseline (p<0.0001).

Female : There were no differences between males and females in baseline participation (p=0.8371)

Age : Age at baseline was not a significant predictor of baseline participation (p=0.1459)

Interpretations of covariance parameter estimates shown in Exhibit 5 follow:

Level 3 parameter UN(1,1) : There was statistically significant variation among school pairs in control group participation at *Baseline* (p=0.0280).

Level 3 parameter UN(2,2) : Variation among school pairs in treatment-control group differences in participation at *Baseline* was not significant at the $p<0.05$ level ($p=0.1044$).

Level 3 parameter UN(3,3) : There was statistically significant variation among school pairs in control group change in participation from *Baseline to Implementation Year 1* ($p=0.0050$).

Level 3 parameter UN(4,4) : There was statistically significant variation among school pairs in control group change in participation from *Implementation Year 1* to *Implementation Year 2* ($p <0.0278$).

Level 3 parameter UN(5,5) : Variation among school pairs in control group change in participation from *Implementation Year 2* to *Implementation Year 3* was not significant at the $p <0.05$ level ($p = 0.1742$).

Level 3 parameter UN(6,6) : There was statistically significant variation among school pairs in the treatment-control difference in change from *Baseline* to *Implementation Year 1* ($p <0.0001$). The size of the variance estimate for *Baseline* to *Implementation Year 1* treatment effects was far larger than any of the other level-3 variance terms. This indicates that there were considerable differences among the school pairs in the size of the treatment effect. This finding may motivate future exploratory analyses that would seek to determine whether there is anything about the implementation of school breakfast programs that could potentially explain some of the variation among school pairs in the sizes of treatment effects. Such analyses would be exploratory in nature and the findings would be strictly correlational because schools were not randomly assigned to different implementation strategies.

Level 3 parameter UN(7,7) : There was statistically significant variation among school pairs in the treatment-control difference in change from *Implementation Year 1* to *Implementation Year 2* ($p = 0.0002$).

Level 3 parameter UN(8,8) : Variation among school pairs in the treatment-control difference in change from *Implementation Year 1* to *Implementation Year 2* was not statistically significant at the $p<0.05$ level ($p=0.1276$).

Level 2 parameter Intercept-studentid (Pair) : There was statistically significant variation among students in breakfast participation at *baseline* ($p <0.0001$).

Level 1 residual : There was statistically significant residual variation of repeated observations around student growth trajectories ($p <0.0001$).

The District-by-Treatment-by-Time Interaction Model

To determine whether there was significant variation across districts in the treatment effects for any of the three time periods, a district-by-treatment-by-time interaction model was fit to the data. This model included terms for three-way interactions between district, treatment, and time variables, and all associated low-order interaction terms. The coding of variables is the same described in the preceding section for the treatment-by-time interaction model. The model specification is similar to the previous model except that a random term for variation among pairs in treatment-control differences at baseline was dropped from the current model. That variance term was not significantly different than zero in the previous model, and the current model would not converge when that term was included. The model specification for the district-by-treatment-by-time interaction model is shown below.

Level-1 Model (Time)

$$Y_{hij} = \beta_{0ij} + \beta_{1j}(trt_j) + \beta_{2j}(I1_{hij}) + \beta_{3j}(I2_{hij}) + \beta_{4j}(I3_{hij})$$
$$+ \beta_{5j}(trt_j * I1_{hij}) + \beta_{6j}(trt_j * I2_{hij}) + \beta_{7j}(trt_j * I3_{hij}) + \varepsilon_{hij}$$

Level-2 Model (Students)

$$\beta_{0ij} = \beta_{00j} + \beta_{01}(elig_{ij}) + \beta_{02}(Minority_{ij}) + \beta_{03}(female_{ij}) + \beta_{04}(age_{ij}) + \alpha_{0ij}$$

Level-3 Model (School Pairs and Districts)

$$\beta_{00j} = \beta_{000} + \sum_{k=1}^{4} \beta_{00k}(District_k) + \mu_{00j}$$

$$\beta_{1j} = \beta_{100} + \sum_{k=1}^{4} \beta_{10k}(District_k)$$

$$\beta_{2j} = \beta_{200} + \sum_{k=1}^{4} \beta_{20k}(District_k) + \mu_{20j}$$

$$\beta_{3j} = \beta_{300} + \sum_{k=1}^{4} \beta_{30k}(District_k) + \mu_{30j}$$

$$\beta_{4j} = \beta_{400} + \sum_{k=1}^{4} \beta_{40k}(District_k) + \mu_{40j}$$

$$\beta_{5j} = \beta_{500} + \sum_{k=1}^{4} \beta_{50k}(District_k) + \mu_{50j}$$

$$\beta_{6j} = \beta_{600} + \sum_{k=1}^{4} \beta_{60k}(District_k) + \mu_{60j}$$

$$\beta_{7j} = \beta_{700} + \sum_{k=1}^{4} \beta_{70k}(District_k) + \mu_{70j}$$

$$\varepsilon_{hij} \sim N(0, \sigma^2)$$

$$\begin{bmatrix} \mu_{00j} \\ \mu_{20j} \\ \mu_{30j} \\ \mu_{40j} \\ \mu_{50j} \\ \mu_{60j} \\ \mu_{70j} \end{bmatrix} \sim N \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \phi_{11}^2 & \phi_{12} & \phi_{13} & \phi_{14} & \phi_{15} & \phi_{16} & \phi_{17} \\ \phi_{21} & \phi_{22}^2 & \phi_{23} & \phi_{24} & \phi_{25} & \phi_{26} & \phi_{27} \\ \phi_{31} & \phi_{32} & \phi_{33}^2 & \phi_{34} & \phi_{35} & \phi_{36} & \phi_{37} \\ \phi_{41} & \phi_{42} & \phi_{43} & \phi_{44}^2 & \phi_{45} & \phi_{46} & \phi_{47} \\ \phi_{51} & \phi_{52} & \phi_{53} & \phi_{54} & \phi_{55}^2 & \phi_{56} & \phi_{57} \\ \phi_{61} & \phi_{62} & \phi_{63} & \phi_{64} & \phi_{65} & \phi_{66}^2 & \phi_{67} \\ \phi_{71} & \phi_{72} & \phi_{73} & \phi_{74} & \phi_{75} & \phi_{76} & \phi_{77}^2 \end{bmatrix}$$

where,

all variables are coded as described in the preceding section.

Results and Interpretation

The results of F-tests for district interaction effects are summarized in Exhibit C-7. The results of the test labeled "`I1*distid`" indicate that there was statistically significant variation among districts in control group participation gains from *Baseline* to *Implementation Year 1.* Examination of the model coefficients shown in Exhibit C-8, and the plots of means, shown in Exhibit C-9, show that districts E and F had larger control group gains than other districts during that period. The results of the test labeled "`Trt*I1*distid`" indicate that there was also statistically significant variation among districts in the treatment effects from *Baseline* to *Implementation Year 1*. District F had the largest treatment effects (difference between control and treatment groups). The treatment effects during this time range were somewhat smaller for Districts A, B, and E, and were the smallest for District D.

Results of the test labeled "`Trt*I2*distid`" indicate that variation among districts in treatment effects for the period *Implementation Year 1* to *Implementation Year 2* did not meet statistical significance at the $p<0.05$ level ($p = 0.0771$). Districts A and D had the largest treatment effects during this time period (see Exhibits C-8 and C-10).

Exhibit C-7

F-Test for Interaction Effects from Student-Level District-by-Treatment-By-Time Model of Participation

		Type 3 Tests of Fixed Effects		
Effect	**Numerator DF**	**Denominator DF**	**F Value**	**Pr > F**
I1*distid	4	11E3	4.99	0.0005
I2*distid	4	11E3	0.17	0.9561
I3*distid	4	11E3	0.94	0.4411
Trt*I1*distid	4	11E3	3.47	0.0167
Trt*I1*distid	4	11E3	2.50	0.0771
Trt*I1*distid	4	11E3	1.05	0.3485

Exhibit C-8

Estimates of Fixed Effects from Student-Level District-by-Treatment-By-Time Model of Participation

			Solution for Fixed Effects			
Effect	**District ID**	**Estimate**	**Standard Error**	**DF**	**t Value**	**PR > Itl**
Intercept		5.9640	3.3786	59	1.77	0.0827
Trt		-0.5259	1.9649	1.10E+04	-0.27	0.7890
I1		1.8726	1.8029	1.10E+04	1.04	0.2990
I2		-1.2270	2.0179	1.10E+04	-0.61	0.5432
I3		1.0746	1.9644	1.10E+04	0.55	0.5844
Trt*I1		7.3935	4.1665	1.10E+04	1.77	0.0760
Trt*I2		7.1227	3.3294	1.10E+04	2.14	0.0324
Trt*I3		-2.0859	2.8406	1.10E+04	-0.73	0.4628
distid	F	12.7397	3.2765	59	3.89	0.0003
distid	B	8.6992	2.3671	59	3.68	0.0005
distid	A	14.9045	2.9303	59	5.09	<.0001
distid	E	2.7451	1.9764	59	1.39	0.1701
distid	D	0	.	.	.	.
Trt*distid	F	2.4986	3.7789	1.10E+04	0.66	0.5085
Trt*distid	B	0.3913	2.8126	1.10E+04	0.14	0.8894
Trt*distid	A	-0.3713	3.3702	1.10E+04	-0.11	0.9123
Trt*distid	E	-0.0949	2.3406	1.10E+04	-0.04	0.9677
Trt*distid	D	0	.	.	.	.
I1*distid	F	4.4552	3.6171	1.10E+04	1.23	0.2181
I1*distid	B	-0.7145	2.6027	1.10E+04	-0.27	0.7837
I1*distid	A	1.0101	3.2513	1.10E+04	0.31	0.7560
I1*distid	E	7.2986	2.1596	1.10E+04	3.38	0.0007
I1*distid	D	0	.	.	.	.
I2*distid	F	-1.0972	4.0142	1.10E+04	-0.27	0.7846
I2*distid	B	1.3575	2.9488	1.10E+04	0.46	0.6453
I2*distid	A	1.7277	3.6497	1.10E+04	0.47	0.6360

Exhibit C-8 (continued)

Estimates of Fixed Effects from Student-Level District-by-Treatment-By-Time Model of Participation

Solution for Fixed Effects						
Effect	**District ID**	**Estimate**	**Standard Error**	**DF**	**t Value**	**PR > Itl**
I2*distid	E	1.0893	2.4373	1.10E+04	0.45	0.6549
I2*distid	D	0	.	.	.	.
I3*distid	F	-4.4986	3.7789	1.10E+04	-1.19	0.2339
I3*distid	B	-4.6381	2.8758	1.10E+04	-1.61	0.1068
I3*distid	A	-4.3551	3.9250	1.10E+04	-1.11	0.2672
I3*distid	E	-1.5349	2.3899	1.10E+04	-0.64	0.5207
I3*distid	D	0	.	.	.	.
Trt*I1*distid	F	26.2442	8.7144	1.10E+04	3.01	0.0026
Trt*I1*distid	B	14.8940	6.1174	1.10E+04	2.43	0.0149
Trt*I1*distid	A	8.0387	7.9601	1.10E+04	1.01	0.3126
Trt*I1*distid	E	12.4417	5.1094	1.10E+04	2.44	0.0149
Trt*I1*distid	D	0	.	.	.	.
Trt*I2*distid	F	-4.2340	6.8007	1.10E+04	-0.62	0.5336
Trt*I2*distid	B	-6.1637	4.8871	1.10E+04	-1.26	0.2073
Trt*I2*distid	A	3.4410	6.2249	1.10E+04	0.55	0.5804
Trt*I2*distid	E	-9.4218	4.0819	1.10E+04	-2.31	0.0210
Trt*I2*distid	D	0	.	.	.	.
Trt*I3*distid	F	1.2785	5.3343	1.10E+04	0.24	0.8106
Trt*I3*distid	B	5.2295	4.0847	1.10E+04	1.28	0.2005
Trt*I3*distid	A	-1.1381	5.5944	1.10E+04	-0.20	0.8388
Trt*I3*distid	E	-2.0768	3.4388	1.10E+04	-0.60	0.5459
Trt*I3*distid	D	0	.	.	.	.
Elig		15.7084	0.7559	1.10E+04	20.78	<.0001
Minority		4.0683	0.8005	1.10E+04	5.08	<.0001
Female		-0.1385	0.6955	1.10E+04	-0.20	0.8421
Age		-0.4140	0.2905	1.10E+04	-1.43	0.1541

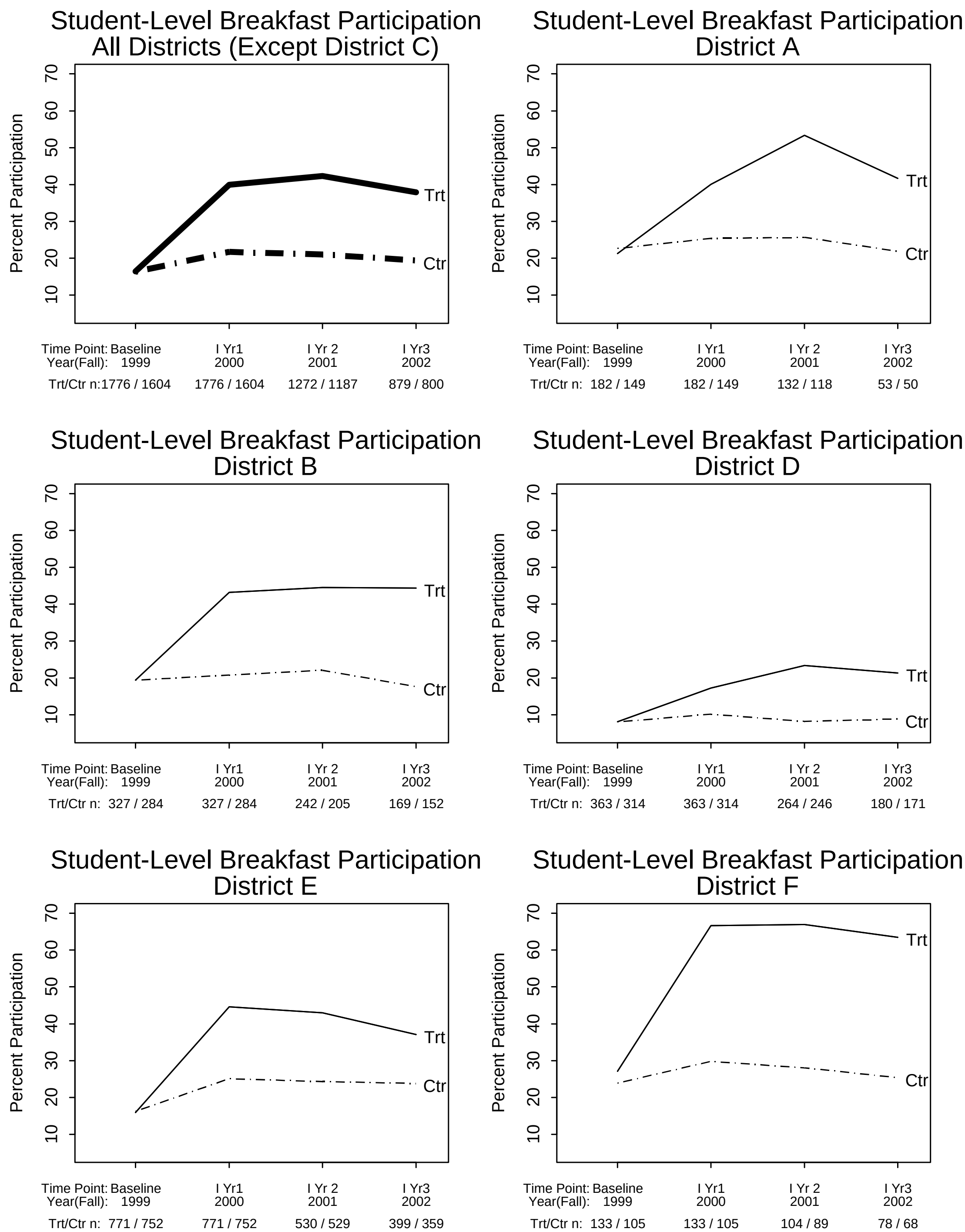
Exhibit C-9

Random Effects (Covariance Parameters) Estimates From Student-Level District-by-Treatment-by-Time Model

Level	Label	Cov Parm	Subject	Estimate	Standard Error	Z Value	PrZ
Level-3	Intercept	UN(1,1)	Pair	9.0084	3.8997	2.31	0.0104
		UN(2,1)	Pair	5.0787	3.6868	1.38	0.1683
	I1	UN(2,2)	Pair	15.4923	7.1787	2.16	0.0155
		UN(3,1)	Pair	-7.1819	4.5543	-1.58	0.1148
		UN(3,2)	Pair	13.5387	6.1663	2.20	0.0281
	I2	UN(3,3)	Pair	21.4016	10.7126	2.00	0.0229
		UN(4,1)	Pair	-5.9159	4.3859	-1.35	0.1774
		UN(4,2)	Pair	-9.3480	6.1237	-1.53	0.1269
		UN(4,3)	Pair	0.2579	7.6480	0.03	0.9731
	I3	UN(4,4)	Pair	7.9173	9.6921	0.82	0.2070
		UN(5,1)	Pair	-2.2821	9.0723	-0.25	0.8014
		UN(5,2)	Pair	-17.0955	12.8576	-1.33	0.1836
		UN(5,3)	Pair	8.4451	14.7596	0.57	0.5672
		UN(5,4)	Pair	2.3155	14.8454	0.16	0.8761
	Trt * I1	UN(5,5)	Pair	190.9500	42.2534	4.52	<.0001
		UN(6,1)	Pair	2.4200	7.4549	0.32	0.7455
		UN(6,2)	Pair	-9.0302	10.1025	-0.89	0.3714
		UN(6,3)	Pair	-25.8155	14.5845	-1.77	0.0767
		UN(6,4)	Pair	-6.2210	11.8695	-0.52	0.6002
		UN(6,5)	Pair	-3.2766	24.6997	-0.13	0.8945
	Trt * I2	UN(6,6)	Pair	91.0379	28.5322	3.19	0.0007
		UN(7,1)	Pair	4.5563	6.1855	0.74	0.4614
		UN(7,2)	Pair	0.2436	8.3229	0.03	0.9767
		UN(7,3)	Pair	-6.4432	9.8919	-0.65	0.5148
		UN(7,4)	Pair	6.1095	10.3651	0.59	0.5556
		UN(7,5)	Pair	-22.4778	20.8542	-1.08	0.2811
		UN(7,6)	Pair	-6.8491	17.0982	-0.40	0.6887
	Trt * I3	UN(7,7)	Pair	18.5280	18.4060	1.01	0.1571
Level-2	Intercept	Intercept	Studentid (Pair)	296.5400	9.9806	29.71	<.0001
Level-1	Residual	Residual		312.5800	5.2141	59.95	<.0001

Exhibit C-10

Plots of Student-Level School Breakfast Participation Means for Districts, Treatment Groups and Time



Growth Curve Models for School-Level Outcomes

The models of student-level outcomes were based on data obtained from a sample of students nested within school. The school-level outcome data represent aggregate measures across all students in each school (not a sample of students). In this section we outline our approach to modeling school-level breakfast participation outcomes using longitudinal growth curve analyses. We focus on the school breakfast participation outcome primarily because this was the sole variable that showed a significant trend over time. Our discussion is primarily narrative, supplemented by statistical tables and plots

Models for School Breakfast Participation

Breakfast participation is a measure of the percentage of school days that each student participated in school breakfast. The minimum possible value for this measure is 0% participation and the maximum possible value is 100% participation.

This section provides a brief overview of results, then describes in detail, the models that were used for longitudinal analyses of school level participation. Two types of models were fit to the data:

- A treatment-by-time interaction model; and
- A district-by-treatment-by-time interaction model.

The reader is strongly advised that the models and results will be easier to understand if the reader examines the graphs in Exhibits C-13 and C-18 before reading further in this section. The "treatment-by-time interaction model" corresponds to Exhibit C-13 and the "district-by-treatment-by-time interaction model" which models the variation among districts in breakfast participation over time corresponds to Exhibit C-17.

Overview of Results for Treatment-by-Time Interaction Model

There were no differences between treatment and control average breakfast participation rates at baseline. Participation in control group schools increased an average of 0.8 percentage points from *baseline* to *Implementation Year 1*. Treatment group schools had significantly larger gains in breakfast participation than control schools from *baseline* to *Implementation Year 1.* Treatment group schools gained an average of 15.6 percentage points more than control group schools during this period (this is the size of the treatment effect). The total model estimated gain for treatment group schools during this period was 16.4 percentage points.

There were significant changes in control group participation rates from *Implementation Year 1* to *Implementation Year2.* The model averaged change was 1.5 percentage points. There were no significant changes in control group participation rates for the time period and *Implementation Year 2* to *Implementation Year 3.*

Participation rates stayed flat for treatment group schools during the time periods spanning *Implementation Year 1* to *Implementation Year 2,* and *Implementation Year 2* to *Implementation Year 3.* And, participation rates of treatment group schools did not change at a rate that was significantly different than the change in rates for control group schools during this time period.

Overview of Results for District-by-Treatment-by-Time Interaction Model

There was significant variation among districts in control group changes for the period from B*aseline* to *Implementation Year 1* (p=0.0261), but there was no significant variation among districts in control group participation changes for the periods *Implementation Year 1* to *Implementation Year 2* or *Implementation Year 2* to *Implementation Year 3*.

There was significant variation among districts in treatment effects during the period *Baseline* to *Implementation Year 1*. District F had the largest treatment effects (difference between control and treatment groups). The treatment effects during this time range were somewhat smaller for Districts A, B, C, and E, and were the smallest for District D.

For the periods *Implementation Year 1* to *Implementation Year 2* and *Implementation Year 2* to *Implementation Year 3* there were no significant differences among districts in treatment effects.

The Treatment-by-Time Interaction Model

Breakfast participation was analyzed in a two-level HLM model with repeated observations over time on schools (level-1) and schools clustered in school treatment-control matched pairs at level-2. Time (*Baseline, Implementation Year 1, Implementation Year 2,* and, *Implementation Year 3*) was coded such that the functional form of the growth curve is piecewise linear growth. The random term at level-1 represents residual variation of measurements at each time point around each school's growth curve. There were seven random terms at level-2. The first allows for variation in intercepts among school-pairs. The second allows for variation among pairs in treatment-control group differences at baseline. The third and fourth random terms allow for variation among pairs in control group participation changes from *Implementation Year 1* to *Implementation Year 2*, and *Implementation Year 1* to *Implementation Year 3.* A model with an additional random term for control group participation changes from *Baseline* to *Implementation Year 1* would not converge[7]. The fifth, sixth, and seventh random terms allow for variation in treatment effects among school pairs for the periods *Baseline* to *Implementation Year 1*, *Implementation Year 1* to *Implementation Year 2*, and *Implementation Year 2* to *Implementation Year 3*.

Level-1 Model (Time)

$$\begin{aligned} Y_{hj} &= \beta_{0j} + \beta_{1j}(trt_j) + \beta_{2j}(I1_{hj}) + \beta_{3j}(I2_{hj}) + \beta_{4j}(I3_{hj}) \\ &+ \beta_{5j}(trt_j * I1_{hj}) + \beta_{6j}(trt_j * I2_{hj}) + \beta_{7j}(trt_j * I3_{hj}) + \varepsilon_{hj} \end{aligned}$$

Level-2 Model (School Pairs)

$$\beta_{0j} = \beta_{00} + \sum_{k=1}^{5} \beta_{0k}(District_k) + \mu_{0j}$$

7 Separate models that had a random term for control group participation changes from *Baseline* to *Implementation Year 1,* but that did not include random terms for control group changes from *Implementation Year 1* to *Implementation Year 2*, and *Implementation Year 1* to *Implementation Year 3* did converge, but the variance term for control group *Baseline* to *Implementation Year 1* changes was not significantly different than zero. Therefore, the random term for control group participation changes from *Baseline* to *Implementation Year 1* was dropped from subsequent models.

$$\beta_{1j} = \beta_{10} + \mu_{1j}$$
$$\beta_{2j} = \beta_{20}$$
$$\beta_{3j} = \beta_{30} + \mu_{3j}$$
$$\beta_{4j} = \beta_{40} + \mu_{4j}$$
$$\beta_{5j} = \beta_{50} + \mu_{5j}$$
$$\beta_{6j} = \beta_{60} + \mu_{6j}$$
$$\beta_{7j} = \beta_{70} + \mu_{7j}$$

$$\varepsilon_{hij} \sim N(0, \sigma^2)$$

$$\begin{bmatrix} \mu_{00j} \\ \mu_{10j} \\ \mu_{30j} \\ \mu_{40j} \\ \mu_{50j} \\ \mu_{60j} \\ \mu_{70j} \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \phi_{11}^2 & \phi_{12} & \phi_{13} & \phi_{14} & \phi_{15} & \phi_{16} & \phi_{17} \\ \phi_{21} & \phi_{22}^2 & \phi_{23} & \phi_{24} & \phi_{25} & \phi_{26} & \phi_{27} \\ \phi_{31} & \phi_{32} & \phi_{33}^2 & \phi_{34} & \phi_{35} & \phi_{36} & \phi_{37} \\ \phi_{41} & \phi_{42} & \phi_{43} & \phi_{44}^2 & \phi_{45} & \phi_{46} & \phi_{47} \\ \phi_{51} & \phi_{52} & \phi_{53} & \phi_{54} & \phi_{55}^2 & \phi_{56} & \phi_{57} \\ \phi_{61} & \phi_{62} & \phi_{63} & \phi_{64} & \phi_{65} & \phi_{66}^2 & \phi_{67} \\ \phi_{71} & \phi_{72} & \phi_{73} & \phi_{74} & \phi_{75} & \phi_{76} & \phi_{77}^2 \end{bmatrix} \right)$$

where,

Y_{hj} = the outcome measure at the h^{th} time point of the j^{th} school-pair;

trt_j = a dummy variable indicating whether the school in the j^{th} pair is a treatment school (trt_j = 1) or a comparison school (trt_j = 0);

$I1_{hj}$, $I2_{hj}$, and $I3_{hj}$ are time variables, coded to model piecewise linear growth, as shown below:

	Time Point			
	Baseline	Implementation Year 1	Implementation Year 2	Implementation Year 3
$I1_{hj}$	0	1	1	1
$I2_{hj}$	0	0	1	1
$I3_{hj}$	0	0	0	1

and $\sum_{k=1}^{5}(District_k)$ represents five dummy coded variables for the six school districts.

Results and Interpretation

The estimates of fixed-effects and random effect covariance parameters from the “Treatment-by-Time Interaction Model of Participation” are shown in Exhibits C-11 and C-12, respectively.

Interpretations of the fixed effects parameter estimates shown in Exhibit C-11 follow:

Intercept: This estimate is not of direct interest for this model. It is the model-predicted mean breakfast participation when all terms in the model are set to zero.

Trt : This is the mean difference between treatment and control group breakfast participation at *Baseline*. See the point labeled "A" in Exhibit C-13. The results indicate that there was no significant difference between treatment and control group participation rates at baseline (p=0.8676).

I1 : This is the average change in percent participation from *Baseline* to *Implementation Year 1* for control group schools. See the segment labeled "B" in Exhibit C-13. The model-averaged change for these schools was 0.8 percentage points. This gain was significantly greater than zero (p=0.0013).

Exhibit C-11

Estimates of Fixed Effects

Solution for Fixed Effects						
Effect	**District ID**	**Estimate**	**Standard Error**	**DF**	**t Value**	**PR > ltl**
Intercept		9.6661	1.8072	63	5.35	<.0001
WTRCN		-0.1054	0.6320	494	-0.17	0.8676
I1		0.8443	0.2612	494	3.23	0.0013
I2		1.5056	0.5916	494	2.54	0.0112
I3		-0.3035	0.6602	494	-0.46	0.6459
wTRCN*I1		15.6166	1.7149	494	9.11	<.0001
wTRCN*I2		0.9421	1.1123	494	0.85	0.3974
wTRCN*I3		-1.2159	0.9804	494	-1.24	0.2155
distid	F	19.1033	3.9764	63	4.80	<.0001
distid	B	9.6454	2.7024	63	3.57	0.0007
distid	A	15.0940	3.6370	63	4.15	0.0001
distid	C	21.2203	3.9831	63	5.33	<.0001
distid	E	10.9345	2.2184	63	4.93	<.0001
distid	D	0	.	.	.	.

Exhibit C-12

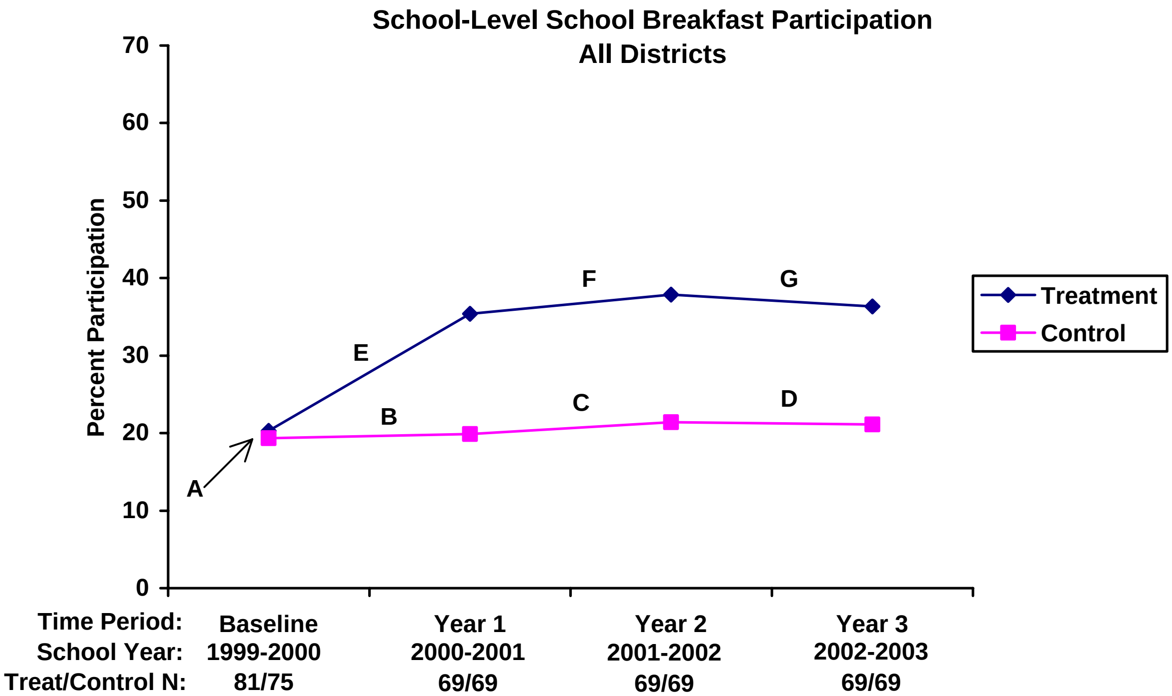
Random Effects (Covariance Parameters) Estimates From School-Level Treatment-by-Time Model

Level	Label	Cov Parm	Subject	Estimate	Standard Error	Z Value	PrZ
Level-2	Intercept	UN(1,1)	Pair	65.9698	12.0190	5.49	<.0001
		UN(2,1)	Pair	-17.0302	5.6845	-3.00	0.0027
	Trt	UN(2,2)	Pair	23.0043	4.3988	5.23	<.0001
		UN(3,1)	Pair	-3.6228	4.9849	-0.73	0.4674
		UN(3,2)	Pair	1.3450	2.9873	0.45	0.6525
	I2	UN(3,3)	Pair	19.3370	3.9663	4.88	<.0001
		UN(4,1)	Pair	1.9426	5.6862	0.34	0.7326
		UN(4,2)	Pair	1.9645	3.4357	0.57	0.5675
		UN(4,3)	Pair	-10.7662	3.5817	-3.01	0.0026
	I3	UN(4,4)	Pair	25.2566	5.2065	4.85	<.0001
		UN(5,1)	Pair	5.5782	16.5038	0.34	0.7354
		UN(5,2)	Pair	7.5015	8.8144	0.85	0.3947
		UN(5,3)	Pair	-12.1407	8.3086	-1.46	0.1440
		UN(5,4)	Pair	9.3758	9.4344	0.99	0.3203
	Trt * I1	UN(5,5)	Pair	193.5600	34.0152	5.69	<.0001
		UN(6,1)	Pair	-6.2587	9.8751	-0.63	0.5262
		UN(6,2)	Pair	2.6224	5.7257	0.46	0.6470
		UN(6,3)	Pair	-24.6789	6.3553	-3.88	0.0001
		UN(6,4)	Pair	8.8651	6.2615	1.42	0.1568
		UN(6,5)	Pair	25.7971	15.9231	1.62	0.1052
	Trt * I2	UN(6,6)	Pair	75.7348	14.4796	5.23	<.0001
		UN(7,1)	Pair	-6.5636	8.7215	-0.75	0.4517
		UN(7,2)	Pair	-5.3855	5.1295	-1.05	0.2938
		UN(7,3)	Pair	10.1128	4.9811	2.03	0.0423
		UN(7,4)	Pair	-26.0280	6.6205	-3.93	<.0001
		UN(7,5)	Pair	-35.4125	14.5559	-2.43	0.0150
		UN(7,6)	Pair	-7.5677	9.2104	-0.82	0.4113
	Trt * I3	UN(7,7)	Pair	56.6910	11.4635	4.95	<.0001
Level-1	Residual	Residual		2.4079	0.3562	6.76	<.0001

I2 : This is the average change in percent participation from *Implementation Year 1* to *Implementation Year 2* for control group schools. See the segment labeled "C" in Exhibit C-13. The model-averaged change for these schools was 1.5 percentage points. This change in participation was significantly different than zero (p=0.0112).

Exhibit C-13

Plot of Treatment and Control Group School Breakfast Participation Over Time



Note: Labels "A" though "G" are explained in the text (see pages C-33-35, C-37).

I3 : This is the average change in percent participation from *Implementation Year 2* to *Implementation Year 3* for control group schools. See the segment labeled "D" in Exhibit C-13. The model-averaged change for these schools was -0.3 percentage points. This change in participation was not significantly different than zero (p=0.6459).

Trt*I1 : This is the *Baseline* to *Implementation Year 1* treatment effect. It is the difference between treatment and control group schools in their mean change in breakfast participation from *Baseline* to *Implementation Year 1*. The results indicate that treatment group schools gained an average of 15.6 percentage points more than control group students during this time period. Average gain for treatment group students during this time period is calculated as (*I1* + *Trt*I1*) = (0.8 + 15.6) = 16.4 percentage points. See the segment labeled "E" in Exhibit C-13. Treatment group schools gained significantly more during this period than control group schools (p<0.0001).

Trt*I2 : This is the *Implementation Year 1* to *Implementation Year 2* treatment effect. It is the difference between treatment and control group schools in their mean change in breakfast participation from *Implementation Year 1* to *Implementation Year 2*. Treatment group schools gained an average of 0.9 percentage points more than control group students during this time period. This difference was not statistically significant (p=0.3974). Average gain for treatment group schools during this time period is calculated as (*I2* + *Trt*I2*) = (1.5 + 0.9) = 2.4 percentage points. See the segment labeled "F" in Exhibit C-13.

Trt*I3 : This is the *Implementation Year 2* to *Implementation Year 3* treatment effect. It is the difference between treatment and control group schools in their mean change in breakfast participation from *Implementation Year 2* to *Implementation Year 3*. Treatment group schools lost an average of—1.2 percentage points more than control group schools during this time period. This difference was not statistically significant (p=0.2155). Average change for treatment group schools during this time period is calculated as (*I3* + *Trt*I3*) = (-0.3 - 1.2) = - 1.5 percentage points. See the segment labeled "G" in Exhibit C-13.

Distid 1-5 : These coefficients indicate the average difference between each of districts 1-5, and the comparison district (District 6) for *Baseline* breakfast participation rates. An F-test on the factor *District* indicated that there was significant variation among districts in their mean baseline breakfast participation rates.

Interpretations of covariance parameter estimates shown in Exhibit 17 follow:

Level 2 parameter UN(1,1) : There was significant variation among school pairs in mean control group participation rates at *baseline* (p<0.0001).

Level 2 parameter UN(2,2) : There was significant variation among school pairs in the treatment-control difference at *Baseline* (p <0.0001).

Level 2 parameter UN(3,3) : There was significant variation among school pairs in the control group participation change from *Implementation Year 1* to *Implementation Year 2* (p <0.0001).

Level 2 parameter UN(4,4) : There was significant variation among school pairs in the control group participation change from *Implementation Year 2* to *Implementation Year 3* (p <0.0001).

Level 2 parameter UN(5,5) : There was significant variation among school pairs in the treatment-control difference in change from *Baseline* to *Implementation Year 1* ($p <.00001$). The size of the variance estimate for the *Baseline* to *Implementation Year 1* treatment effect was far larger than any of the other level-2 variance terms. This indicates that there were considerable differences among the school pairs in the size of the treatment effect. This finding may motivate future exploratory analyses that would seek to determine whether there is anything about the implementation of school breakfast programs that could potentially explain some of the variation among school pairs in the sizes of treatment effects. Such analyses would be exploratory in nature and the findings would be strictly correlational because schools were not randomly assigned to different implementation strategies.

Level 2 parameter UN(6,6) : There was significant variation among school pairs in the treatment-control difference in change from *Implementation Year 1* to *Implementation Year 2* ($p <0.0001$).

Level 2 parameter UN(7,7) : There was significant variation among school pairs in the treatment-control difference in change from *Implementation Year 2* to *Implementation Year 3* ($p <0.0001$).

Level 1 residual : There was significant residual variation of repeated observations around school growth trajectories ($p <0.0001$).

The District-by-Treatment-by-Time Interaction Model

To determine whether there was variation across districts in the treatment effects for any of the three time periods, a district-by-treatment-by-time interaction model was fit to the data. This model included terms for three-way interactions between district, treatment, and time variables, and all associated low-order interaction terms. Otherwise, the coding of variables and model specification were the same as described in the preceding section for the treatment-by-time interaction model. The model specification for the district-by-treatment-by-time interaction model is shown below.

Level-1 Model (Time)

$$
\begin{aligned}
Y_{hj} &= \beta_{0j} + \beta_{1j}(trt_j) + \beta_{2j}(I1_{hj}) + \beta_{3j}(I2_{hj}) + \beta_{4j}(I3_{hj}) \\
&+ \beta_{5j}(trt_j * I1_{hj}) + \beta_{6j}(trt_j * I2_{hj}) + \beta_{7j}(trt_j * I3_{hj}) + \varepsilon_{hj}
\end{aligned}
$$

Level-2 Model (School Pairs and Districts)

$$\beta_{0j} = \beta_{00} + \sum_{k=1}^{5} \beta_{0k}(District_k) + \mu_{0j}$$

$$\beta_{1j} = \beta_{10} + \sum_{k=1}^{5} \beta_{1k}(District_k)$$

$$\beta_{2j} = \beta_{20} + \sum_{k=1}^{5} \beta_{2k}(District_k) + \mu_{2j}$$

$$\beta_{3j} = \beta_{30} + \sum_{k=1}^{5} \beta_{3k}(District_k) + \mu_{3j}$$

$$\beta_{4j} = \beta_{40} + \sum_{k=1}^{5} \beta_{4k}(District_k) + \mu_{4j}$$

$$\beta_{5j} = \beta_{50} + \sum_{k=1}^{5} \beta_{5k}(District_k) + \mu_{5j}$$

$$\beta_{6j} = \beta_{60} + \sum_{k=1}^{5} \beta_{6k}(District_k) + \mu_{6j}$$

$$\beta_{7j} = \beta_{70} + \sum_{k=1}^{5} \beta_{7k}(District_k) + \mu_{7j}$$

$$\varepsilon_{hij} \sim N(0, \sigma^2)$$

$$\begin{bmatrix} \mu_{00j} \\ \mu_{10j} \\ \mu_{30j} \\ \mu_{40j} \\ \mu_{50j} \\ \mu_{60j} \\ \mu_{70j} \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \phi_{11}^2 & \phi_{12} & \phi_{13} & \phi_{14} & \phi_{15} & \phi_{16} & \phi_{17} \\ \phi_{21} & \phi_{22}^2 & \phi_{23} & \phi_{24} & \phi_{25} & \phi_{26} & \phi_{27} \\ \phi_{31} & \phi_{32} & \phi_{33}^2 & \phi_{34} & \phi_{35} & \phi_{36} & \phi_{37} \\ \phi_{41} & \phi_{42} & \phi_{43} & \phi_{44}^2 & \phi_{45} & \phi_{46} & \phi_{47} \\ \phi_{51} & \phi_{52} & \phi_{53} & \phi_{54} & \phi_{55}^2 & \phi_{56} & \phi_{57} \\ \phi_{61} & \phi_{62} & \phi_{63} & \phi_{64} & \phi_{65} & \phi_{66}^2 & \phi_{67} \\ \phi_{71} & \phi_{72} & \phi_{73} & \phi_{74} & \phi_{75} & \phi_{76} & \phi_{77}^2 \end{bmatrix} \right)$$

where,

all variables are coded as described in the preceding section.

Results and Interpretation

The results of F-tests for district interaction effects are summarized in Exhibit C-14. The results of the tests labeled "`I1*distid`", "`I2*distid`", and "`I3*distid`" indicate that there was significant variation among districts in control group participation gains for the period from *Baseline* to *Implementation Year 1,* but there was not significant variation among districts in control group participation changes for the periods *Implementation Year 1* to *Implementation Year 2*, and *Implementation Year 2* to *Implementation Year 3.* The results of the test labeled "`Wtrcn*I1*distid`" indicate that there was significant variation among districts in the treatment effects from *Baseline* to *Implementation Year 1*. District F had the largest treatment effects (difference between control and treatment groups). The treatment effects during this time range were somewhat smaller for Districts A, B, C, and E, and were the smallest for District D.

There was no significant variation among districts in treatment effects for the time periods spanning *Implementation Year 1* to *Implementation Year 2*, and *Implementation Year 2* to *Implementation Year 3*.

Exhibit C-14

F-Test for Interaction Effects from School-Level District-by-Treatment-By-Time Model of Participation

	Type 3 Tests of Fixed Effects			
Effect	**Numerator DF**	**Denominator DF**	**F Value**	**Pr > F**
I1*distid	5	459	2.57	0.0261
I2*distid	5	459	1.07	0.3737
I3*distid	5	459	1.31	0.2584
wTRCN*I1*distid	5	459	4.26	0.0009
wTRCN*I2*distid	5	459	1.39	0.2248
wTRCN*I3*distid	5	459	2.02	0.0748

Exhibit C-15

Estimates of Fixed Effects from School-Level District-by-Treatment-By-Time Model of Participation

Effect	District ID	Estimate	Standard Error	DF	t Value	PR > ltl
Intercept		9.1412	1.9975	63	4.58	<.0001
wTRCN		-0.3731	1.2751	459	-0.29	0.7700
I1		0.2611	0.5127	459	0.51	0.6108
I2		0.6987	1.1867	459	0.59	0.5563
I3		0.3466	1.3151	459	0.26	0.7923
wTRCN*I1		6.4774	3.0570	459	2.12	0.0346
wTRCN*I2		4.6132	2.1766	459	2.12	0.0346
wTRCN*I3		-0.2382	1.9051	459	-0.13	0.9005
distid	F	18.8320	4.5627	63	4.13	0.0001
distid	B	9.5858	3.1052	63	3.09	0.0030
distid	A	14.1094	4.1716	63	3.38	0.0012
distid	C	21.1608	4.5768	63	4.62	<.0001
distid	E	12.6171	2.5499	63	4.95	<.0001
distid	D	0	.	.	.	.
wTRCN*distid	F	3.1267	2.8816	459	1.09	0.2785
wTRCN*distid	B	0.0275	1.9822	459	0.01	0.9889
wTRCN*distid	A	3.6942	2.6219	459	1.41	0.1595
wTRCN*distid	C	-0.2429	2.9215	459	-0.08	0.9338
wTRCN*distid	E	-0.5217	1.6257	459	-0.32	0.7484
wTRCN*distid	D	0	.	.	.	.
I1*distid	F	1.8567	1.1187	459	1.66	0.0977
I1*distid	B	-0.4169	0.7971	459	-0.52	0.6012
I1*distid	A	1.3632	1.0019	459	1.36	0.1743
I1*distid	C	-1.4079	1.1748	459	-1.20	0.2314
I1*distid	E	1.2734	0.6545	459	1.95	0.0523
I1*distid	D	0	.	.	.	.
I2*distid	F	2.5383	2.7190	459	0.93	0.3510
I2*distid	B	3.4973	1.8448	459	1.90	0.0586
I2*distid	A	0.4149	2.4892	459	0.17	0.8677
I2*distid	C	0.1780	2.7190	459	0.07	0.9478
I2*distid	E	0.0285	1.5149	459	0.02	0.9850
I2*distid	D	0	.	.	.	.
I3*distid	F	2.5819	3.0132	459	0.86	0.3920
I3*distid	B	-3.8025	2.0444	459	-1.86	0.0635
I3*distid	A	-0.8652	2.7586	459	-0.31	0.7539
I3*distid	C	-2.0902	3.0132	459	-0.69	0.4882
I3*distid	E	0.1160	1.6788	459	0.07	0.9449
I3*distid	D	0	.	.	.	.
wTRCN*I1*distid	F	26.8138	6.9879	459	3.84	0.0001
wTRCN*I1*distid	B	12.1705	4.7523	459	2.56	0.0108
wTRCN*I1*distid	A	19.9207	6.3906	459	3.12	0.0019
wTRCN*I1*distid	C	10.2619	7.0044	459	1.47	0.1436
wTRCN*I1*distid	E	8.8469	3.9016	459	2.27	0.0238
wTRCN*I1*distid	D	0	.	.	.	.
wTRCN*I2*distid	F	-9.1614	4.9873	459	-1.84	0.0669

Exhibit C-15 (continued)

Estimates of Fixed Effects from School-Level District-by-Treatment-By-Time Model of Participation

Solution for Fixed Effects						
Effect	**District ID**	**Estimate**	**Standard Error**	**DF**	**t Value**	**PR > ltl**
wTRCN*I2*distid	B	-4.4924	3.3837	459	-1.33	0.1850
wTRCN*I2*distid	A	-6.2201	4.5658	459	-1.36	0.1738
wTRCN*I2*distid	C	1.6780	4.9873	459	0.34	0.7367
wTRCN*I2*distid	E	-5.1245	2.7786	459	-1.84	0.0658
wTRCN*I2*distid	D	0	.	.	.	.
wTRCN*I3*distid	F	-7.4573	4.3651	459	-1.71	0.0882
wTRCN*I3*distid	B	3.3120	2.9616	459	1.12	0.2640
wTRCN*I3*distid	A	-1.9944	3.9962	459	-0.50	0.6180
wTRCN*I3*distid	C	3.8773	4.3651	459	0.89	0.3749
wTRCN*I3*distid	E	-3.0707	2.4320	459	-1.26	0.2074
wTRCN*I3*distid	D	0	.	.	.	.

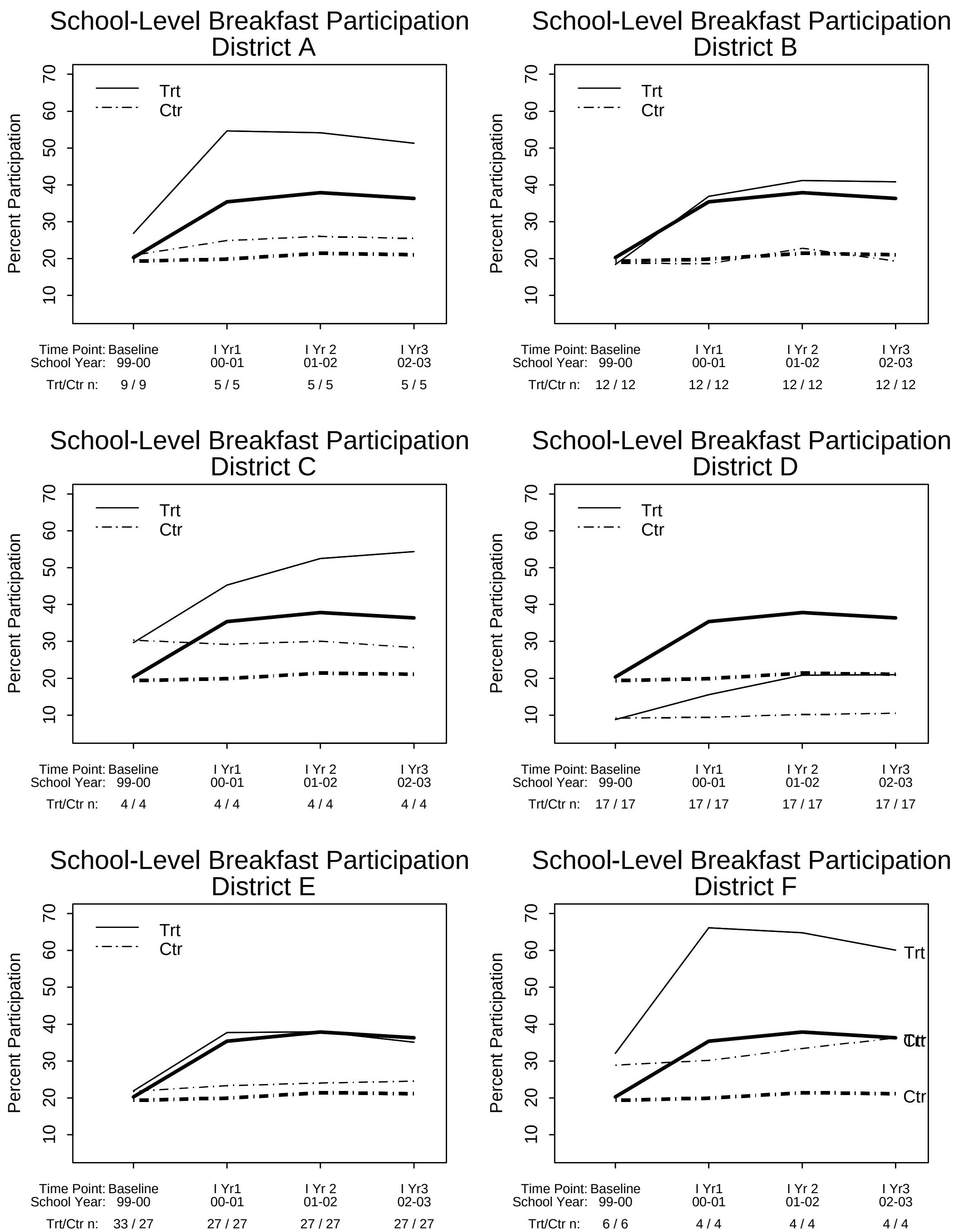
Exhibit C-16

Random Effects (Covariance Parameters) Estimates From School-Level District-by-Treatment-by-Time Model

Level	Label	Cov Parm	Subject	Estimate	Standard Error	Z Value	PrZ
Level-2	Intercept	UN(1,1)	Pair	65.5931	11.8854	5.52	<.0001
		UN(2,1)	Pair	-17.1544	5.7527	-2.98	0.0029
	Trt	UN(2,2)	Pair	23.1688	4.5951	5.04	<.0001
		UN(3,1)	Pair	-3.6368	4.9521	-0.73	0.4627
		UN(3,2)	Pair	0.7821	3.0918	0.25	0.8003
	I2	UN(3,3)	Pair	19.4705	4.0952	4.75	<.0001
		UN(4,1)	Pair	0.9820	5.5809	0.18	0.8603
		UN(4,2)	Pair	2.2770	3.5259	0.65	0.5184
		UN(4,3)	Pair	-10.9866	3.6800	-2.99	0.0028
	I3	UN(4,4)	Pair	24.9314	5.2831	4.72	<.0001
		UN(5,1)	Pair	5.2477	12.7929	0.41	0.6817
		UN(5,2)	Pair	2.3931	8.0385	0.30	0.7659
		UN(5,3)	Pair	-19.8020	7.8795	-2.51	0.0120
		UN(5,4)	Pair	9.1341	8.5646	1.07	0.2862
	Trt * I1	UN(5,5)	Pair	149.9300	27.5067	5.45	<.0001
		UN(6,1)	Pair	-4.4439	9.1807	-0.48	0.6283
		UN(6,2)	Pair	3.4293	5.7830	0.59	0.5532
		UN(6,3)	Pair	-24.5003	6.4291	-3.81	0.0001
		UN(6,4)	Pair	11.4402	6.3365	1.81	0.0710
		UN(6,5)	Pair	48.8395	15.1387	3.23	0.0013
	Trt * I2	UN(6,6)	Pair	71.6035	14.2018	5.04	<.0001
		UN(7,1)	Pair	-4.3091	8.0999	-0.53	0.5947
		UN(7,2)	Pair	-5.9905	5.1385	-1.17	0.2437
		UN(7,3)	Pair	10.8684	5.0179	2.17	0.0303
		UN(7,4)	Pair	-23.9732	6.4888	-3.69	0.0002
		UN(7,5)	Pair	-28.0074	12.7883	-2.19	0.0285
		UN(7,6)	Pair	-16.0059	9.2140	-1.74	0.0824
	Trt * I3	UN(7,7)	Pair	52.7607	11.0783	4.76	<.0001
Level-1	Residual	Residual		2.2347	0.3426	6.52	<.0001

Exhibit C-17

Plots of School-Level School Breakfast Participation Means for Districts, Treatment Groups and Time



Thick lines are all districts combined, thin lines are for individual districts

Statistical Power

Student-Level

The Evaluation of the School Breakfast Program Pilot Project is dependent on having adequate statistical power, so that significant differences between treatment and control group students that are large enough to be important to policymakers can be detected. The treatment effects (effect sizes) that we would like to detect, as well as the sample sizes required in the Request for Proposals (RFP), form the basis of a statistical power analysis.[8] The sample design for this study was based on recommendations made in the Universal-Free School Breakfast Program Evaluation Design Project (Ponza et al., 1999). As part of their initial sample design, statistical power calculations indicated a necessary sample size of approximately 4,000 students in 144 schools to estimate minimum detectable impacts. Furthermore, in order to maximize the efficiency of the data collection, it was decided that a two-stage stratified cluster sample would be used. Thus, because students in the study are nested within schools, the research design constitutes a cluster randomized trial and is dependent on the following factors:

- Number of schools (J);
- Number of students within each school (n);
- Intraclass correlation (rho)[9]; and
- Magnitude of true treatment effect in the population (delta).

The intra-class correlation expresses the amount of dependence of the observations within each school.[10] We estimate power here for four values of rho, ranging from .05 representing a minimal amount of dependence within units or very heterogeneous schools to .20 representing a significant amount of between-unit variation as a result of very homogeneous schools. Research by Davison et al. (1999) based on a large-scale study of student achievement in over 100 schools in Minnesota suggests typical intra-class correlations on the magnitude of .10 to .15.

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[8] The power of a statistical test is defined as the probability of rejecting a false null hypothesis. In other words, power gives an indication of the probability that a study design will detect an effect or difference of a given magnitude, provided that effect or difference really exists in the population. The true magnitude of the effect, as represented by the population parameter, naturally exists independent of the study and is dependent on the relationship of the intervention and the dependent variables in question (e.g., student academic achievement).

[9] Specifically, a multilevel design has the following implications in terms of estimating the standard error of the impact estimate:

$$SE_{Ic} = SE_I * \sqrt{1 + rho(n - 1)}$$

where, SE_{Ic} = the standard error of estimate when clusters or groups are randomly assigned; SE_I = the standard error of estimate where individuals are randomly assigned; and rho is the intra-class correlation of the outcome. Thus, when rho is positive, the standard error of estimate is higher under random assignment of clusters, leading to a subsequent loss of statistical power.

[10] The hierarchical linear modeling strategy that we employed in our analyses resolves the problem of dependent observations by fitting a unique random effect for each school. The variability in these random effects is taken into account in estimating standard errors, which in turn helps adjust for the intra-class correlation or design effect within each school (Bryk & Raudenbush, 1992).

Treatment effect sizes are traditionally divided into three categories. As a rule of thumb for social science research, when effects are measured as standardized differences between group means, a small effect can be defined as 0.20, a medium effect as 0.50 and a large effect as 0.80 (Cohen, 1977). A generally accepted minimum standard for this type of research is power = .80 at a .05 level of significance. Exhibit C-18 shows the varying levels of power we are able to achieve through conducting a multilevel test at $\alpha = .05$ of the difference between treatment and control group means for various combinations of n, J, rho, and delta.[11]

Exhibit C-18 shows that using our final analytic sample of 138 school "units",[12] even with within-school n's as small as 18, we are able to detect effects greater than or equal to 0.3 in terms of treatment/control group differences with an optimal level of power (i.e., 0.97 or higher). For small effects of 0.2, the power level drops below the desired level of confidence (i.e., 0.80) only where we have a relatively high value of the intra-class correlation (i.e., rho = 0.20). However, where rho = 0.15, which realistically reflects the maximal amount of between-school variation that we can expect to find, power is acceptable (i.e., 0.82 or higher).

Exhibit C-18

Power Analysis Summary Table

Effect Size (delta)	Intraclass Correlation (rho)	J=138			J=120			J=100		
		n=30	n=24	n=18	n=30	n=24	n=18	n=30	n=24	n=18
0.2	.05	.99	.99	.98	.98	.98	.96	.97	.95	.93
	.10	.95	.93	.92	.92	.90	.88	.87	.85	.82
	.15	.87	.86	.84	.82	.81	.79	.76	.75	.72
	.20	.79	.78	.76	.74	.73	.71	.67	.66	.64
0.3	.05	.99	.99	.99	.99	.99	.99	.99	.99	.99
	.10	.99	.99	.99	.99	.99	.99	.99	.99	.99
	.15	.99	.99	.99	.99	.98	.98	.97	.97	.96
	.20	.98	.98	.97	.96	.96	.95	.93	.92	.91
0.4 and above	.05	.99	.99	.99	.99	.99	.99	.99	.99	.99
	.10	.99	.99	.99	.99	.99	.99	.99	.99	.99
	.15	.99	.99	.99	.99	.99	.99	.99	.99	.99
	.20	.99	.99	.99	.99	.99	.99	.99	.99	.99

Dropping the number of school units to 120 or even 100, which may be possible when we do not have data for entire groups of schools or districts, reduces our power somewhat, notably in the case of detecting small effect sizes. However, even here, we have close to or greater than acceptable levels of power when detecting an effect size of 0.2 under most scenarios.

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11 In addition, the use of baseline covariates in our analytic models further reduces the amount of variation in our outcome measures, resulting in an increase to our levels of power indicated in Exhibit x.1.

12 The original number of schools in the study sample actually was equal to 153. See Chapter 4 for further details on how schools were combined to form unique school units.

These estimates show that our high levels of statistical power are dependent on the number of school units in our study sample, as opposed to the number of students within schools. Our discussion on power has been based on the assumption that substantially greater power will be available for estimating treatment impacts within a “pooled” analytic model, allowing us to detect much smaller effects. Finally, it should be noted that these power estimates pertain to the sample sizes as required for the analyses to be conducted under the experimental design. However, when the sample is split into smaller subgroups used to conduct the various non-experimental analyses described in Chapter Six of this report, these smaller sample sizes may not be adequate to detect differences of the magnitude specified in this discussion.

School-Level

At the school level, our power is determined primarily by the number of schools available in our analyses.[13] Exhibit C-19 summarizes the differences in population proportions that we can detect with 80 percent power based on a one-tailed significance test at the .05 level.[14.] The differences that we can detect are listed based on the value of the sample proportion in the group of schools that is the smaller of the two proportions. For example, when comparing the two groups of treatment and control schools with sample proportions of 0.20 and 0.40 respectively, we would look at the sample proportion = 0.20.

Exhibit C-19

Minimal Detectable Differences for Proportions (Power = 80%, p = .05)

	Number of Schools	
Population Proportion	**N=153 (74, 79)**	**N=138 (69, 69)**
0.1, 0.9	.152	.164
0.2, 0.8	.182	.192
0.3, 0.7	.196	.209
0.4, 0.6	.200	.212
0.5	.196	.206

For example, when comparing two groups of 69 schools each (i.e., 138 school units), with the smaller proportion near 20 percent (0.2), the difference between the two proportions is statistically significant at the .05 level if the difference is 19.2 percentage points or greater.

For continuous outcomes, we can also estimate power using the example of 138 school units. For example, in the case of comparing achievement test Normal Curve Equivalent scores (NCEs) between treatment and control schools, assuming a mean of 50 and a standard deviation of 21.06, we can

[13] For these power analyses, we have chosen two sample sizes of schools: 153 representing the original number of schools in the study, and 138 representing the number of unique number of school pairs (69) used in our impact analyses.

[14] A one-tailed significance test is used for these power analyses with the expectation that any differences will favor the treatment group.

detect an effect size of 0.304 with 80% power and an effect size of 0.356 with 90% power under a one-tailed paired t-test. Thus, if the control school group has an NCE mean of 50, we can detect with 80% power a statistically significant difference if the treatment school group mean is 56.4 or higher (50 + (.304)*(21.06)).

APPENDIX D

SUPPLEMENTARY EXHIBITS: IMPACT STUDY FINDINGS FOR YEARS 2 AND 3

Appendix D

Supplementary Exhibits: Impact Study Findings for Years 2 and 3

The tables appearing in this appendix provide detailed background for the findings described in Chapter Five of the report. They are grouped by outcome measure category as follows:

- School Breakfast Participation (Exhibits D-1a to D-2b)
- Disciplinary Incidents (Exhibits D-3a to D-5b)
- Achievement Test Scores (Exhibits D-6a to D-25b)
- Attendance and Tardiness (Exhibits D-26a to D-29b)
- School Nurse Visits (Exhibits D-30a to D-31b)
- Impact Study Subgroup Findings (Exhibits D-32 to D-35)

Differences between the sample of control and treatment students and between control and treatment schools have been tested for statistical significance using hierarchical linear models (see Appendix C for the details of these models). Where statistically significant differences have been observed, they are noted by * for $p<.05$ and ** for $p<.01$. Significant district-by-treatment interactions are denoted by + for $p<.05$ and ++ for $p<.01$.

List of Exhibits

School Breakfast Participation

Exhibit D-1a

Student-Level School Breakfast Participation Gain, School Year 1999-2000 to 2001-2002

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[1]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	1272	16.27 (0.68)	25.99	1187	16.19 (0.72)	4.78	20.41**	0.83
A	132	21.41 (1.83)	31.97	118	22.33 (2.68)	3.3	27.26**	1.08
B	242	19.19 (1.79)	25.34	205	20.64 (2.00)	1.39	24.56**	0.87
D	264	7.71 (1.10)	15.64	246	7.39 (1.07)	0.76	14.82**	0.86
E	530	16.24 (0.99)	26.78	529	15.55 (0.98)	8.74	17.18**	0.76
F	104	24.83 (3.22)	42.09	89	25.92 (3.46)	2.11	38.28*	1.17

[1] Complete data were not available for District C.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

* Difference is statistically significant at the .05 level.
** Difference is statistically significant at the .01 level.

Source: Impact Study—Student-Level School Breakfast Participation Data, 1999-2000 and 2001-2002

Exhibit D-1b

Student-Level School Breakfast Participation Gain, School Year 1999-2000 to 2002-2003

	Unadjusted Means (Standard Errors)								Results of Impact Models	
	Treatment Schools				Control Schools					
District[1]	N	Pre		Gain	N	Pre		Gain	Impact	Effect Size
All	879	15.19	(0.82)	22.70	800	15.52	(0.86)	3.88	18.10** +	0.74
A	53	16.94	(2.86)	24.76	50	21.40	(3.98)	0.45	23.20*	0.94
B	169	19.24	(2.18)	25.17	152	18.52	(2.27)	-0.94	26.09**	0.93
D	180	6.20	(1.19)	15.07	171	7.67	(1.31)	1.12	12.92**	0.78
E	399	15.81	(1.16)	21.31	359	15.00	(1.17)	8.77	13.28**	0.59
F	78	22.84	(3.67)	40.65	68	27.04	(3.96)	-1.70	36.11*	1.11

[1] Complete data were not available for District C.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

* Difference is statistically significant at the .01 level.
** Difference is statistically significant at the .05 level.
\+ District-by-treatment interaction is statistically significant at the .05 level.

Source: Impact Study—Student-Level School Breakfast Participation Data, 1999-2000 and 2002-2003

Exhibit D-2a

School-Level School Breakfast Participation Gain, School Year 1999-2000 to 2001-2002

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N**	**Pre**	**Gain**	**N**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	69	18.93 (1.19)	18.93	69	19.11 (1.24)	2.29	16.63**	1.65
A	5	26.42 (5.65)	27.68	5	23.76 (4.08)	2.23	24.98	2.38
B	12	18.38 (2.11)	22.81	12	18.73 (2.76)	4.04	18.67	2.24
C	4	29.69 (3.49)	22.76	4	30.30 (7.00)	-0.27	23.16	2.26
D	17	8.77 (1.21)	12.05	17	9.14 (1.06)	0.96	10.98	2.38
E	27	20.85 (1.47)	17.09	27	21.76 (1.67)	2.26	14.87	1.83
F	4	30.66 (3.97)	34.16	4	27.80 (4.39)	5.53	30.28	3.83

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

** Difference is statistically significant at the .01 level.

Source: Impact Study—School-Level School Breakfast Participation Data, 1999-2000 and 2001-2002

Exhibit D-2b

School-Level School Breakfast Participation Gain, School Year 1999-2000 to 2002-2003

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N**	**Pre**	**Gain**	**N**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	69	18.93 (1.19)	17.42	69	19.11 (1.24)	1.99	15.41**	1.53
A	5	26.42 (5.65)	24.93	5	23.76 (4.08)	1.71	23.15	2.21
B	12	18.38 (2.11)	22.43	12	18.73 (2.76)	0.58	21.81	2.62
C	4	29.69 (3.49)	24.66	4	30.30 (7.00)	-2.01	26.77	2.61
D	17	8.77 (1.21)	12.20	17	9.14 (1.06)	1.34	10.74	2.33
E	27	20.85 (1.47)	14.24	27	21.76 (1.67)	2.72	11.40	1.40
F	4	30.66 (3.97)	29.40	4	27.80 (4.39)	8.46	21.67	2.75

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

** Difference is statistically significant at the .01 level.

Source: Impact Study—School-Level School Breakfast Participation Data, 1999-2000 and 2002-2003

Disciplinary Incidents

Exhibit D-3a

School-Level Average Number of Daily Disciplinary Incidents, School Year 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				Effect
District	N	Mean		N	Mean		Impact	Size
All	1439	1.15	(0.05)	1285	0.82	(0.02)	0.36	0.25
A	154	0.49	(0.05)	154	0.53	(0.04)	0.05	0.08
B	225	1.81	(0.22)	219	0.83	(0.05)	0.94	0.39
C	74	0.88	(0.12)	66	0.60	(0.06)	0.27	0.33
D	328	1.07	(0.06)	319	0.84	(0.05)	0.26	0.25
E	565	1.16	(0.06)	462	0.90	(0.05)	0.29	0.22
F	93	1.06	(0.08)	65	1.06	(0.08)	-0.05	-0.07

[1] Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2001-2002*

Exhibit D-3b

School-Level Average Number of Daily Disciplinary Incidents, School Year 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				Effect
District	N	Mean		N	Mean		Impact	Size
All	1484	1.19	(0.04)	1354	0.90	(0.03)	0.30	0.21
A	152	0.42	(0.05)	172	0.48	(0.04)	-0.03	-0.06
B	231	1.80	(0.20)	217	1.06	(0.09)	0.78	0.34
C	96	0.90	(0.09)	89	0.48	(0.06)	0.43	0.59
D	323	1.28	(0.09)	327	0.84	(0.06)	0.43	0.31
E	586	1.18	(0.05)	475	1.03	(0.06)	0.17	0.13
F	96	0.98	(0.08)	74	1.39	(0.10)	-0.55	-0.66

[1] Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2002-2003*

Exhibit D-4a

School-Level Average Number of Daily Disciplinary Incidents, by Time of Incident, School Year 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				Effect
District	N	Mean		N	Mean		Impact	Size
Morning Disciplinary Incidents								
All	1438	0.57	(0.03)	1285	0.42	(0.02)	0.17	0.19
A	154	0.29	(0.04)	154	0.32	(0.03)	0.04	0.08
B	225	1.10	(0.15)	219	0.51	(0.04)	0.56	0.33
C	74	0.49	(0.08)	66	0.37	(0.05)	0.12	0.20
D	327	0.51	(0.04)	319	0.40	(0.03)	0.11	0.17
E	565	0.49	(0.03)	462	0.40	(0.03)	0.11	0.17
F	93	0.49	(0.05)	65	0.64	(0.06)	-0.24	-0.48
Afternoon Disciplinary Incidents								
All	1438	0.58	(0.03)	1285	0.40	(0.01)	0.19*	0.24
A	154	0.20	(0.03)	154	0.20	(0.02)	0.01	0.04
B	225	0.71	(0.08)	219	0.31	(0.02)	0.38	0.42
C	74	0.39	(0.07)	66	0.24	(0.04)	0.16	0.32
D	328	0.56	(0.04)	319	0.44	(0.03)	0.14	0.21
E	564	0.67	(0.05)	462	0.50	(0.03)	0.18	0.19
F	93	0.57	(0.06)	65	0.43	(0.05)	0.19	0.38

[1] Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

* Difference is statistically significant at the 0.05 level.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2001-2002*

Exhibit D-4b

School-Level Average Number of Daily Disciplinary Incidents, by Time of Incident, School Year 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				Effect
District[2]	N	Mean		N	Mean		Impact	Size
Morning Disciplinary Incidents								
All	1444	0.56	(0.03)	1329	0.41	(0.02)	0.17	0.20
A	152	0.26	(0.04)	172	0.23	(0.02)	0.05	0.12
B	231	0.93	(0.11)	217	0.59	(0.05)	0.37	0.28
C	96	0.46	(0.06)	89	0.27	(0.04)	0.20	0.41
D	323	0.63	(0.05)	327	0.40	(0.04)	0.22	0.27
E	586	0.51	(0.03)	475	0.36	(0.02)	0.16	0.23
F	56	0.27	(0.04)	49	0.97	(0.08)	-0.70*	-1.53
Afternoon Disciplinary Incidents								
All	1444	0.62	(0.02)	1329	0.49	(0.02)	0.13	0.15
A	152	0.16	(0.03)	172	0.25	(0.03)	-0.09	-0.26
B	231	0.87	(0.09)	217	0.47	(0.04)	0.41	0.36
C	96	0.44	(0.06)	89	0.21	(0.04)	0.24	0.49
D	323	0.66	(0.05)	327	0.44	(0.04)	0.21	0.25
E	586	0.67	(0.03)	475	0.67	(0.05)	0.01	0.01
F	56	0.34	(0.05)	49	0.41	(0.07)	-0.08	-0.19

[1] Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

[2] Disciplinary logs for two schools in District F were missing data on time of incident.

* Difference is statistically significant at the .05 level.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2002-2003*

Exhibit D-5a

School-Level Average Number of Daily Disciplinary Incidents, by Location of Incident, School Year 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				Effect
District	**N**	**Mean**		**N**	**Mean**		**Impact**	**Size**
Bus Incidents								
All	1439	0.08	(0.01)	1283	0.08	(0.01)	0.00	0.01
A	154	0.11	(0.02)	154	0.07	(0.01)	0.09	0.45
B	225	0.01	(0.00)	217	0.04	(0.01)	-0.03**	-0.35
C	74	0.05	(0.02)	66	0.02	(0.01)	0.04	0.25
D	328	0.09	(0.01)	319	0.08	(0.02)	0.02	0.06
E	565	0.07	(0.01)	462	0.09	(0.01)	-0.03	-0.11
F	93	0.27	(0.03)	65	0.21	(0.04)	0.07	0.22
Classroom Incidents								
All	1439	0.63	(0.03)	1285	0.40	(0.01)	0.24	0.24
A	154	0.29	(0.04)	154	0.31	(0.03)	0.00	0.00
B	225	1.39	(0.18)	219	0.45	(0.04)	0.91	0.45
C	74	0.38	(0.06)	66	0.33	(0.05)	0.05	0.10
D	328	0.33	(0.03)	319	0.28	(0.02)	0.05	0.12
E	565	0.62	(0.03)	462	0.44	(0.03)	0.19	0.28
F	93	0.66	(0.06)	65	0.71	(0.06)	-0.11	-0.21
Cafeteria/Hallway Incidents								
All	1439	0.13	(0.02)	1285	0.09	(0.01)	0.04	0.08
A	154	0.03	(0.01)	154	0.08	(0.02)	-0.05	-0.25
B	225	0.07	(0.02)	219	0.09	(0.01)	-0.02	-0.11
C	74	0.06	(0.02)	66	0.08	(0.02)	-0.03	-0.17
D	328	0.08	(0.01)	319	0.06	(0.01)	0.02	0.11
E	565	0.23	(0.04)	462	0.11	(0.01)	0.11	0.15
F	93	0.05	(0.01)	65	0.05	(0.02)	0.00	-0.03
Playground Incidents								
All	1439	0.29	(0.02)	1285	0.22	(0.01)	0.09	0.17
A	154	0.04	(0.01)	154	0.03	(0.01)	0.01	0.10
B	225	0.32	(0.04)	219	0.21	(0.02)	0.10	0.19
C	74	0.36	(0.07)	66	0.16	(0.04)	0.19	0.37
D	328	0.54	(0.04)	319	0.40	(0.03)	0.14	0.20
E	565	0.24	(0.02)	462	0.20	(0.02)	0.06	0.14
F	93	0.07	(0.01)	65	0.09	(0.02)	-0.02	-0.14
Incidents in Other Locations								
All	1439	0.02	(0.00)	1285	0.03	(0.00)	-0.01	-0.08
A	154	0.02	(0.01)	154	0.03	(0.01)	-0.01	-0.11
B	225	0.02	(0.01)	219	0.03	(0.01)	-0.01	-0.07
C	74	0.03	(0.01)	66	0.00	(0.00)	0.03	0.27
D	328	0.03	(0.01)	319	0.02	(0.01)	0.01	0.09
E	565	0.02	(0.00)	462	0.05	(0.01)	-0.04**	-0.24
F	93	0.02	(0.01)	65	0.00	(0.00)	0.02	0.34

[1] Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

* Difference is statistically significant at the .05 level.
** Difference is statistically significant at the .01 level.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2001-2002*

Exhibit D-5b

School-Level Average Number of Daily Disciplinary Incidents, by Location of Incident, School Year 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				Effect
District[2]	N	Mean		N	Mean		Impact	Size
Bus Incidents								
All	1444	0.07	(0.01)	1329	0.08	(0.01)	-0.01	-0.05
A	152	0.11	(0.03)	172	0.07	(0.01)	0.05	0.17
B	231	0.01	(0.00)	217	0.02	(0.01)	-0.01	-0.13
C	96	0.06	(0.02)	89	0.01	(0.00)	0.05	0.42
D	323	0.07	(0.01)	327	0.07	(0.01)	0.01	0.03
E	586	0.07	(0.01)	475	0.12	(0.01)	-0.04	-0.16
F	56	0.17	(0.04)	49	0.25	(0.04)	-0.07	-0.23
Classroom Incidents								
All	1444	0.62	(0.03)	1329	0.44	(0.02)	0.18	0.18
A	152	0.22	(0.03)	172	0.29	(0.03)	-0.06	-0.18
B	231	1.40	(0.18)	217	0.64	(0.06)	0.79	0.38
C	96	0.35	(0.06)	89	0.22	(0.03)	0.13	0.29
D	323	0.40	(0.03)	327	0.30	(0.03)	0.10	0.17
E	586	0.60	(0.03)	475	0.48	(0.03)	0.11	0.16
F	56	0.33	(0.06)	49	0.93	(0.08)	-0.60	-1.18
Cafeteria/Hallway Incidents								
All	1444	0.13	(0.01)	1329	0.10	(0.01)	0.03	0.07
A	152	0.03	(0.01)	172	0.04	(0.01)	-0.01	-0.08
B	231	0.07	(0.01)	217	0.08	(0.02)	-0.01	-0.06
C	96	0.08	(0.02)	89	0.05	(0.02)	0.04	0.19
D	323	0.14	(0.02)	327	0.08	(0.01)	0.07	0.20
E	586	0.19	(0.02)	475	0.15	(0.04)	0.05	0.07
F	56	0.05	(0.01)	49	0.07	(0.02)	-0.03	-0.23
Playground Incidents								
All	1444	0.33	(0.02)	1329	0.23	(0.01)	0.10*	0.19
A	152	0.06	(0.02)	172	0.05	(0.01)	0.00	0.02
B	231	0.28	(0.03)	217	0.23	(0.03)	0.05	0.12
C	96	0.39	(0.06)	89	0.19	(0.03)	0.20	0.45
D	323	0.64	(0.06)	327	0.36	(0.03)	0.28*	0.33
E	586	0.26	(0.02)	475	0.23	(0.02)	0.04	0.09
F	56	0.04	(0.01)	49	0.10	(0.03)	-0.06	-0.45
Incidents in Other Locations								
All	1444	0.04	(0.01)	1329	0.04	(0.00)	-0.01	-0.04
A	152	0.01	(0.00)	172	0.02	(0.01)	-0.01	-0.25
B	231	0.04	(0.01)	217	0.09	(0.02)	-0.05	-0.22
C	96	0.02	(0.01)	89	0.02	(0.01)	0.00	0.04
D	323	0.02	(0.01)	327	0.04	(0.01)	-0.02	-0.11
E	586	0.06	(0.01)	475	0.05	(0.01)	0.01	0.06
F	56	0.01	(0.01)	49	0.03	(0.01)	-0.01	-0.18

1 Logs of incidents represent the number of daily incidents per 100 students. Disciplinary incident logs were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

2 Disciplinary logs for two schools in District F were missing data on location of incident.

* Difference is statistically significant at the .05 level.

** Difference is statistically significant at the .01 level.

Source: *Impact Study—Logs of Visits by Students to the School Office for Disciplinary Reasons, 2001-2002*

Achievement Test Scores

Exhibit D-6a

Student-Level Math Gain, All Grades Combined, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	762	604.61 (1.40)	40.33	759	601.41 (1.37)	43.02	-1.99	-0.06
A	41	617.49 (4.93)	48.83	31	612.90 (7.19)	41.35	10.07	0.29
B	167	608.07 (3.05)	50.76	146	599.29 (3.34)	51.87	1.58	0.04
C	50	603.84 (6.83)	43.68	49	600.18 (6.43)	54.22	-10.23	-0.23
D	176	596.95 (2.86)	37.71	175	595.15 (2.61)	44.39	-6.58*	-0.18
E	309	604.38 (2.10)	34.29	336	603.52 (2.04)	36.57	-1.63	-0.04
F	19	623.37 (7.76)	44.24	22	619.52 (4.03)	49.39	-3.46	-0.13

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

* Difference is statistically significant at the .05 level.

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-6b

Student-Level Math Gain, All Grades Combined, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	614	600.72 (1.52)	64.28	651	599.63 (1.46)	66.70	-1.77	-0.05
B	121	597.55 (3.31)	71.55	107	591.56 (3.43)	74.81	-1.81	-0.05
C	33	596.67 (7.14)	61.82	32	595.34 (8.86)	73.41	-3.39	-0.08
D	177	596.33 (2.87)	58.31	185	596.38 (2.56)	61.68	-2.66	-0.07
E	265	603.96 (2.26)	65.75	308	603.58 (2.16)	66.12	1.39	0.04
F	18	624.83 (8.05)	57.11	19	619.97 (4.64)	67.95	-5.11	-0.19

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in District A did not administer tests to students in second grade, so the gain scores could not be calculated.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-7a

Student-Level Second Grade to Fourth Grade Math Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	398	594.25 (1.86)	38.06	387	588.84 (1.84)	44.24	-4.82*	-0.13
B	58	590.72 (4.93)	47.60	53	578.91 (4.57)	53.06	-4.20	-0.12
C	20	586.10 (9.07)	47.25	12	564.75 (11.26)	63.00	-2.08**	-0.05
D	113	590.65 (3.52)	36.86	117	587.44 (3.11)	45.28	-7.96**	-0.22
E	207	597.99 (2.54)	35.15	205	593.62 (2.61)	40.28	-3.00	-0.08

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in districts A and F did not administer tests to students in second grade.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

* Difference is significant at the .05 level.

** Difference is significant at the .01 level.

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-7b

Student-Level Second Grade to Fifth Grade Math Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	365	592.94 (1.97)	65.22	371	588.81 (1.89)	65.91	0.10	0.00
B	55	589.56 (5.27)	76.82	45	577.76 (4.93)	81.56	-2.54	-0.07
C	17	588.47 (10.52)	64.88	13	561.08 (11.32)	85.38	-9.71	-0.22
D	115	589.60 (3.49)	62.13	125	588.62 (3.02)	63.88	-1.85	-0.05
E	178	596.56 (2.74)	63.67	188	593.50 (2.72)	62.16	3.06	0.08

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in districts A and F did not administer tests to students in second grade.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-8a

Student-Level Third Grade to Fifth Grade Math Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N**	**Pre**	**Gain**	**N**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	313	611.78 (1.96)	42.95	331	613.06 (1.87)	40.77	1.48	0.04
A	41	617.49 (4.93)	48.83	31	612.90 (7.19)	41.35	10.07	0.29
B	70	603.59 (3.79)	58.13	67	600.70 (4.23)	52.82	7.53	0.23
C	18	599.22 (9.77)	41.22	22	615.27 (9.47)	49.36	-17.51	-0.40
D	63	608.26 (4.63)	39.23	58	610.70 (4.10)	42.60	-2.96	-0.09
E	102	617.33 (3.38)	32.53	131	619.00 (2.79)	30.76	1.58	0.05
F	19	623.37 (7.76)	44.24	22	619.52 (4.03)	49.39	-3.46	-0.13

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-8b

Student-Level Third Grade to Sixth Grade Math Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N**	**Pre**	**Gain**	**N**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	249	612.12 (2.19)	62.91	280	613.97 (2.01)	67.74	-4.47	-0.13
B	66	604.21 (4.05)	67.17	62	601.58 (4.31)	69.92	-0.26	-0.01
C	16	605.38 (9.46)	58.56	19	618.79 (9.70)	65.21	-1.70	-0.04
D	62	608.81 (4.65)	51.24	60	612.55 (4.09)	57.08	-5.30	-0.15
E	87	619.09 (3.47)	69.99	120	619.38 (3.04)	72.31	-4.12	-0.13
F	18	624.83 (8.05)	57.11	19	619.97 (4.64)	67.95	-5.11	-0.19

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in district A did not administer tests to students in sixth grade.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-9

Student-Level Fourth Grade to Sixth Grade Math Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)								Results of Impact Models	
	Treatment Schools				Control Schools					
District[2]	N	Pre		Gain	N	Pre		Gain	Impact	Effect Size
All	51	641.53	(5.50)	42.04	41	625.93	(6.44)	49.68	-4.65	-0.11
B	39	641.90	(5.56)	42.23	26	637.19	(7.89)	47.00	-2.31	-0.06
C	12	640.33	(15.39)	41.42	15	606.40	(9.40)	54.33	-3.77	-0.08

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in districts A, D, E and F did not administer tests to students in sixth grade.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-10a

Student-Level Reading Gain, All Grades Combined, School Year 1999-2000 to 2001-2002[1]

District	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	678	619.12 (1.77)	40.73	673	619.59 (1.78)	39.34	0.28	0.01
A	41	620.59 (6.13)	39.73	31	628.48 (8.15)	34.39	2.36	0.07
B	166	621.31 (3.21)	44.66	137	616.10 (3.87)	44.94	1.77	0.05
C	50	598.30 (6.96)	42.98	44	597.23 (6.88)	43.48	-1.93	-0.04
D	165	615.95 (3.50)	41.77	176	616.68 (3.13)	43.13	-2.70	-0.08
E	237	623.23 (3.24)	36.04	262	625.09 (3.04)	33.18	1.10	0.03
F	19	627.61 (8.76)	52.00	23	630.91 (6.99)	46.04	8.73	0.30

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-10b

Student-Level Reading Gain, All Grades Combined, School Year 1999-2000 to 2002-2003[1]

District[2]	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	610	616.71 (1.90)	54.58	642	617.96 (1.80)	51.56	2.01	0.06
B	119	611.73 (3.71)	61.36	99	608.69 (4.38)	58.71	3.14	0.09
C	33	583.70 (7.71)	73.42	27	595.56 (9.58)	58.59	8.12	0.19
D	178	616.13 (3.44)	48.70	186	616.52 (3.00)	49.70	-1.23	-0.03
E	261	622.60 (3.07)	54.18	311	622.52 (2.72)	49.81	4.93	0.13
F	19	629.79 (8.44)	40.00	19	637.61 (6.83)	51.39	-9.44	-0.35

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Data were not available for students in district A.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-11a

Student-Level Second Grade to Fourth Grade Reading Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	321	609.26 (2.68)	46.82	308	603.47 (2.48)	50.33	-1.75	-0.04
B	56	608.04 (5.60)	55.64	50	592.92 (5.42)	56.80	1.05	0.03
C	20	576.25 (9.81)	57.85	10	557.10 (10.65)	55.90	11.49	0.28
D	109	605.62 (4.06)	46.27	117	603.87 (3.57)	52.94	-7.75	-0.19
E	136	617.54 (4.54)	42.01	131	610.68 (4.13)	45.10	-0.44	-0.01

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in districts A and F did not administer tests to students in second grade.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-11b

Student-Level Second Grade to Fifth Grade Reading Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N		Gain	N	Pre	Gain	Impact	Effect Size
All	360	609.30 (2.55)	60.68	366	605.21 (2.24)	58.12	4.03	0.09
B	53	603.38 (6.12)	68.74	42	590.90 (6.30)	65.67	4.73	0.11
C	17	573.12 (10.98)	84.24	9	557.78 (11.89)	73.89	15.65	0.37
D	115	605.21 (3.94)	58.54	125	604.49 (3.33)	58.39	0.16	0.00
E	175	617.30 (3.90)	57.35	190	611.10 (3.27)	55.53	5.27	0.11

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in districts A and F did not administer tests to students in second grade.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-12a

Student-Level Third Grade to Fifth Grade Reading Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)								Results of Impact Models	
	Treatment Schools				Control Schools					
District	N	Pre		Gain	N	Pre		Gain	Impact	Effect Size
All	306	625.03	(2.41)	36.77	326	632.66	(2.42)	29.88	3.07	0.07
A	41	620.59	(6.13)	39.73	31	628.48	(8.15)	34.39	2.36	0.06
B	71	616.49	(4.34)	45.56	62	620.21	(5.30)	41.40	3.45	0.09
C	18	598.89	(10.28)	40.17	20	607.15	(9.86)	43.45	4.48	0.10
D	56	636.06	(5.82)	33.02	59	642.08	(4.57)	23.69	7.54	0.19
E	101	630.90	(4.41)	28.00	131	639.49	(4.10)	21.25	1.33	0.03
F	19	627.61	(8.76)	52.00	23	630.91	(6.99)	46.04	8.73	0.25

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-12b

Student-Level Third Grade to Sixth Grade Reading Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)								Results of Impact Models	
	Treatment Schools				Control Schools					
District[2]	N	Pre		Gain	N	Pre		Gain	Impact	Effect Size
All	250	627.38	(2.70)	45.80	276	634.87	(2.62)	42.87	-0.88	-0.02
B	66	618.44	(4.40)	55.44	57	621.79	(5.45)	53.58	1.71	0.04
C	16	594.94	(10.43)	61.94	18	614.44	(10.69)	50.94	3.32	0.08
D	63	636.06	(5.78)	30.74	61	641.19	(4.76)	31.89	-3.92	-0.09
E	86	633.38	(4.66)	47.72	121	640.45	(4.30)	40.82	1.46	0.03
F	19	629.79	(8.44)	40.00	19	637.61	(6.83)	51.39	-9.44	-0.28

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in district A did not administer tests to students in sixth grade.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-13

Student-Level Fourth Grade to Sixth Grade Reading Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)								Results of Impact Models	
	Treatment Schools				Control Schools					
District[2]	N	Pre		Gain	N	Pre		Gain	Impact	Effect Size
All	51	645.63	(5.49)	26.12	39	637.72	(7.17)	31.67	-3.57	-0.09
B	39	649.15	(5.81)	27.26	25	652.28	(8.17)	30.00	-2.68	-0.07
C	12	634.17	(13.65)	22.42	14	611.71	(10.85)	34.64	-16.13	-0.36

[1] All test scores have been converted to Stanford-9 scale scores using the equipercentile equating method.
[2] Schools in districts A, D, E and F did not administer tests to students in sixth grade.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-14a

School-Level Math Score Gain, All Grades Combined, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	164	53.55 (0.80)	-1.91	164	53.33 (0.73)	-1.91	0.16+	0.02
A	12	51.20 (0.93)	1.28	12	51.91 (1.03)	-0.11	1.30	0.39
B	60	53.05 (1.03)	0.86	60	52.13 (0.94)	-0.37	1.53	0.20
C	20	49.09 (1.44)	-0.53	20	47.01 (1.69)	3.80	-3.18	-0.45
D	68	55.56 (1.60)	-5.61	68	56.32 (1.36)	-5.26	-1.00	-0.08
F	4	56.43 (2.42)	2.83	4	56.45 (1.51)	-1.90	4.72	1.26

[1] Based on normal curve equivalent scores.
[2] School-level data not available for district E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

+ District-by-treatment interaction is statistically significant at the .05 level.

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-14b

School-Level Math Score Gain, All Grades Combined, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	N[2]	Pre	Gain	N[2]	Pre	Gain	Impact	Effect Size
All	178	53.56 (0.69)	-1.20	178	53.27 (0.67)	-1.56	0.55+	0.06
A	12	51.20 (0.93)	-0.97	12	51.91 (1.03)	-1.90	0.92	0.27
B	60	53.05 (1.03)	1.39	60	52.13 (0.94)	-0.26	2.12*	0.28
C	20	49.09 (1.44)	-6.20	20	47.01 (1.69)	-1.73	-3.21	-0.46
D	51	56.55 (1.77)	-4.25	51	57.00 (1.65)	-4.04	-0.58	-0.05
E	27	52.88 (1.25)	1.17	27	53.59 (1.34)	0.25	0.52	0.08
F	8	55.40 (1.58)	3.01	8	54.58 (1.32)	-0.65	4.11	1.03

[1] Based on normal curve equivalent scores.
[2] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

* Difference is statistically significant at the .05 level.

+ District-by-treatment interaction is statistically significant at the .05 level.

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-15a

School-Level Second Grade Math Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	33	55.13 (1.79)	-3.13	33	54.96 (1.90)	-3.74	0.70	0.07
B	12	51.99 (2.41)	2.02	12	50.48 (2.16)	-0.46	3.51	0.45
C	4	48.25 (2.18)	-1.85	4	44.58 (4.18)	5.70	-5.43	-0.84
D	17	58.96 (2.71)	-7.07	17	60.57 (2.54)	-8.27	0.27	0.03

[1] Based on normal curve equivalent scores.
[2] Schools in districts A, E, and F did not administer tests to students in second grade.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-15b

School-Level Second Grade Math Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	33	55.13 (1.79)	-2.47	33	54.96 (1.90)	-2.58	0.22	0.02
B	12	51.99 (2.41)	1.49	12	50.48 (2.16)	0.99	1.23	0.16
C	4	48.25 (2.18)	-6.40	4	44.58 (4.18)	2.03	-7.08	-1.09
D	17	58.96 (2.71)	-4.34	17	60.57 (2.54)	-6.18	0.62	0.06

[1] Based on normal curve equivalent scores.
[2] Schools in districts A, B, E, and F did not administer tests to students in second grade.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-16a

School-Level Third Grade Math Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	37	51.11 (1.46)	-0.57	37	51.33 (1.40)	-0.26	-0.41+	-0.05
A	4	53.04 (1.16)	-1.32	4	51.83 (2.33)	-2.88	0.97	0.28
B	12	48.89 (2.46)	1.88	12	49.70 (2.18)	-0.70	2.26	0.29
C	4	53.40 (2.37)	-3.55	4	47.65 (4.41)	6.00	-8.94	-1.23
D	17	51.68 (2.60)	-1.42	17	53.22 (2.37)	-0.81	-1.48	-0.15

[1] Based on normal curve equivalent scores.
[2] School-level data for students in third grade not available for districts E and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

+ District-by-treatment interaction is statistically significant at the .05 level.

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-16b

School-Level Third Grade Math Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	64	51.86 (0.99)	0.57	64	52.28 (0.99)	0.10	0.26	0.03
A	4	53.04 (1.16)	-5.83	4	51.83 (2.33)	-4.32	-2.30	-0.66
B	12	48.89 (2.46)	3.88	12	49.70 (2.18)	0.75	2.75	0.35
C	4	53.40 (2.37)	-9.25	4	47.65 (4.41)	0.58	-10.78	-1.49
D	17	51.68 (2.60)	1.08	17	53.22 (2.37)	0.34	0.04	0.00
E	27	52.88 (1.25)	1.17	27	53.59 (1.34)	0.25	0.52	0.08

[1] Based on normal curve equivalent scores.
[2] School-level data for students in third grade not available for district F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-17a

School-Level Fourth Grade Math Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	37	51.71 (1.78)	-1.70	37	51.63 (1.37)	-0.78	-0.87	-0.09
A	4	51.03 (1.13)	1.62	4	51.49 (1.84)	3.86	-2.03	-0.72
B	12	52.68 (1.65)	-0.56	12	50.77 (2.09)	-0.15	-0.15	-0.02
C	4	45.73 (4.69)	1.90	4	43.13 (2.61)	4.65	-0.66	-0.09
D	17	52.59 (3.55)	-4.13	17	54.27 (2.26)	-3.60	-1.76	-0.15

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fourth grade not available for districts E and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-17b

School-Level Fourth Grade Math Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	20	50.96 (1.44)	-0.12	20	49.38 (1.54)	0.40	-0.06	-0.01
A	4	51.03 (1.13)	2.80	4	51.49 (1.84)	0.58	2.60	0.92
B	12	52.68 (1.65)	0.28	12	50.77 (2.09)	0.33	0.08	0.01
C	4	45.73 (4.69)	-4.28	4	43.13 (2.61)	0.43	-2.49	-0.35

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fourth grade not available for districts D, E, and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-18a

School-Level Fifth Grade Math Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	41	55.55 (1.77)	-3.52	41	54.12 (1.63)	-3.52	0.90	0.08
A	4	49.52 (2.19)	3.55	4	52.42 (1.64)	-1.29	6.75	1.73
B	12	54.86 (2.22)	0.06	12	52.73 (1.68)	-0.20	0.56	0.08
C	4	48.08 (3.96)	-0.88	4	44.50 (3.16)	3.23	-1.88	-0.27
D	17	59.01 (3.62)	-9.82	17	57.21 (3.44)	-8.35	-0.19	-0.01
F	4	56.43 (2.42)	2.83	4	56.45 (1.51)	-1.90	4.72	1.26

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fifth grade not available for districts E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-18b

School-Level Fifth Grade Math Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	41	55.55 (1.77)	-4.21	41	54.12 (1.63)	-3.46	0.26	0.02
A	4	49.52 (2.19)	0.13	4	52.42 (1.64)	-1.97	3.78	0.97
B	12	54.86 (2.22)	1.47	12	52.73 (1.68)	-0.33	2.55	0.38
C	4	48.08 (3.96)	-7.30	4	44.50 (3.16)	-2.25	-3.52	-0.51
D	17	59.01 (3.62)	-9.50	17	57.21 (3.44)	-6.27	-1.80	-0.13
F	4	56.43 (2.42)	0.03	4	56.45 (1.51)	-3.55	3.59	0.96

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fifth grade not available for districts E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-19

School-Level Sixth Grade Math Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	20	54.97 (1.65)	0.34	20	55.76 (1.37)	-3.24	3.36*	0.50
B	12	56.83 (2.38)	-0.17	12	56.98 (2.04)	-3.02	2.82	0.38
C	4	50.00 (2.69)	-3.78	4	55.18 (2.34)	-9.40	-1.26	-0.23
F	4	54.37 (2.25)	5.98	4	52.70 (1.87)	2.25	4.35	1.11

[1] Based on normal curve equivalent scores.
[2] School-level data for students in sixth grade not available for districts A, D, and E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

* Difference is statistically significant at the .05 level.

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-20a

School-Level Reading Score Gain, All Grades Combined, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	164	55.76 (0.94)	-4.98	164	55.52 (0.87)	-4.37	-0.44+	-0.04
A	12	49.83 (0.70)	1.10	12	51.96 (0.84)	3.10	-1.93	-0.68
B	60	52.29 (0.91)	0.25	60	52.03 (0.76)	-0.84	1.23	0.19
C	20	44.67 (1.17)	-2.46	20	43.35 (1.68)	-0.97	-0.78	-0.12
D	68	63.21 (1.68)	-11.85	68	62.94 (1.45)	-9.97	-1.66	-0.13
F	4	54.71 (2.61)	2.43	4	53.35 (1.08)	-1.50	4.22	1.12

[1] Based on normal curve equivalent scores.
[2] School-level data not available for district E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

+ District-by treatment interaction is statistically significant at the .05 level.

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-20b

School-Level Reading Score Gain, All Grades Combined, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N[2]**	**Pre**	**Gain**	**N[2]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	178	55.08 (0.85)	-5.18	178	55.06 (0.80)	-5.48	0.28	0.03
A	12	49.83 (0.70)	2.00	12	51.96 (0.84)	1.41	2.30	0.81
B	60	52.29 (0.91)	-0.53	60	52.03 (0.76)	-1.30	0.97	0.15
C	20	44.67 (1.17)	-5.35	20	43.35 (1.68)	-6.73	2.27	0.35
D	51	64.78 (2.00)	-14.55	51	64.55 (1.69)	-12.85	-1.54	-0.12
E	27	53.10 (1.28)	-2.66	27	54.32 (1.56)	-4.42	1.04	0.14
F	8	54.72 (1.58)	0.79	8	53.69 (0.85)	-0.59	1.69	0.48

[1] Based on normal curve equivalent scores.
[2] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-21a

School-Level Second Grade Reading Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	33	56.29 (2.08)	-4.32	33	56.01 (1.90)	-6.27	2.09*	0.18
B	12	52.44 (2.32)	1.06	12	50.28 (1.57)	-0.20	2.72	0.40
C	4	44.45 (2.15)	-0.75	4	44.68 (3.86)	-4.88	4.02	0.69
D	17	61.79 (3.05)	-8.95	17	62.72 (2.46)	-10.89	1.55	0.14

[1] Based on normal curve equivalent scores.
[2] Schools in districts A, E, and F did not administer tests to students in second grade.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

* Difference is statistically significant at the .05 level.

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-21b

School-Level Second Grade Reading Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	33	56.29 (2.08)	-6.57	33	56.01 (1.90)	-6.07	-0.29	-0.03
B	12	52.44 (2.32)	-1.43	12	50.28 (1.57)	-0.11	-0.16	-0.02
C	4	44.45 (2.15)	-4.98	4	44.68 (3.86)	-7.60	2.31	0.40
D	17	61.79 (3.05)	-10.58	17	62.72 (2.46)	-9.92	-1.35	-0.12

[1] Based on normal curve equivalent scores.
[2] Schools in districts A, E, and F did not administer tests to students in second grade.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-22a

School-Level Third Grade Reading Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	37	55.63 (2.12)	-6.06	37	55.77 (2.24)	-5.00	-1.13	-0.09
A	4	49.77 (0.72)	-0.96	4	51.04 (1.48)	1.36	-0.88	-0.39
B	12	48.73 (2.12)	0.63	12	49.50 (1.61)	0.09	0.33	0.05
C	4	45.13 (2.06)	-3.43	4	39.13 (5.23)	3.10	-4.42	-0.55
D	17	64.36 (3.27)	-12.60	17	65.22 (3.20)	-12.00	-1.06	-0.08

[1] Based on normal curve equivalent scores.
[2] School-level data for students in third grade not available for districts E and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-22b

School-Level Third Grade Reading Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	N[3]	Pre	Gain	N[3]	Pre	Gain	Impact	Effect Size
All	64	54.57 (1.34)	-5.37	64	55.16 (1.44)	-5.89	0.21	0.02
A	4	49.77 (0.72)	-3.04	4	51.04 (1.48)	-3.97	3.67	1.62
B	12	48.73 (2.12)	1.28	12	49.50 (1.61)	1.59	-0.69	-0.11
C	4	45.13 (2.06)	-10.03	4	39.13 (5.23)	-5.70	0.24	0.03
D	17	64.36 (3.27)	-13.82	17	65.22 (3.20)	-14.02	-0.25	-0.02
E	27	53.10 (1.28)	-2.66	27	54.32 (1.56)	-4.42	1.04	0.14

[1] Based on normal curve equivalent scores.
[2] School-level data for students in third grade not available for district F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-23a

School-Level Fourth Grade Reading Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	37	53.93 (1.64)	-3.41	37	54.34 (1.57)	-2.31	-1.29	-0.13
A	4	50.57 (1.20)	2.94	4	52.15 (1.77)	6.23	-2.78	-0.95
B	12	52.53 (1.78)	0.73	12	53.66 (1.93)	-2.04	2.54	0.40
C	4	42.15 (3.37)	-0.03	4	42.65 (4.03)	0.05	-0.15	-0.02
D	17	58.48 (2.73)	-8.62	17	58.09 (2.54)	-5.06	-3.33	-0.31

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fourth grade not available for districts E and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-23b

School-Level Fourth Grade Reading Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	20	50.06 (1.53)	-0.20	20	51.15 (1.70)	-2.37	1.95	0.27
A	4	50.57 (1.20)	6.09	4	52.15 (1.77)	4.40	2.01	0.69
B	12	52.53 (1.78)	-0.71	12	53.66 (1.93)	-2.51	1.74	0.28
C	4	42.15 (3.37)	-4.95	4	42.65 (4.03)	-8.75	3.47	0.50

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fourth grade not available for districts D, E, and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-24a

School-Level Fifth Grade Reading Score Gain, School Year 1999-2000 to 2001-2002[1]

District[2]	Treatment Schools N[3]	Treatment Schools Pre	Treatment Schools Gain	Control Schools N[3]	Control Schools Pre	Control Schools Gain	Impact	Effect Size
	Unadjusted Means (Standard Errors)						**Results of Impact Models**	
All	41	58.45 (2.24)	-7.62	41	57.21 (1.87)	-5.50	-1.46	-0.11
A	4	49.16 (1.78)	1.30	4	52.68 (1.42)	1.72	0.35	0.10
B	12	53.79 (1.86)	-1.79	12	52.73 (1.70)	-1.80	0.11	0.02
C	4	44.08 (3.20)	-3.23	4	42.88 (3.51)	-0.48	-2.45	-0.39
D	17	68.19 (4.05)	-17.24	17	65.72 (3.17)	-11.94	-3.81	-0.26
F	4	54.71 (2.61)	2.43	4	53.35 (1.08)	-1.50	4.29	1.14

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fifth grade not available for district E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-24b

School-Level Fifth Grade Reading Score Gain, School Year 1999-2000 to 2002-2003[1]

District[2]	Treatment Schools N[2]	Treatment Schools Pre	Treatment Schools Gain	Control Schools N[2]	Control Schools Pre	Control Schools Gain	Impact	Effect Size
	Unadjusted Means (Standard Errors)						**Results of Impact Models**	
All	41	58.45 (2.24)	-8.59	41	57.21 (1.87)	-7.24	-0.61	-0.05
A	4	49.16 (1.78)	2.95	4	52.68 (1.42)	3.80	-0.58	-0.16
B	12	53.79 (1.86)	-1.55	12	52.73 (1.70)	-3.08	1.74	0.29
C	4	44.08 (3.20)	-3.95	4	42.88 (3.51)	-6.58	2.94	0.47
D	17	68.19 (4.05)	-19.24	17	65.72 (3.17)	-14.61	-2.97	-0.20
F	4	54.71 (2.61)	-0.70	4	53.35 (1.08)	-0.13	0.03	0.01

[1] Based on normal curve equivalent scores.
[2] School-level data for students in fifth grade not available for district E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-25a

School-Level Sixth Grade Reading Score Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	16	52.34 (1.78)	-0.73	16	52.36 (1.49)	-0.83	0.09	0.01
B	12	53.93 (2.03)	0.65	12	54.00 (1.57)	-0.23	0.86	0.14
C	4	47.55 (2.79)	-4.88	4	47.43 (2.56)	-2.63	-2.21	-0.45

[1] Based on normal curve equivalent scores.
[2] School-level data for students in sixth grade not available for districts A, D, E and F.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-25b

School-Level Sixth Grade Reading Score Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[2]	**N[3]**	**Pre**	**Gain**	**N[3]**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	20	52.82 (1.49)	-0.25	20	52.69 (1.22)	-2.66	2.42	0.40
B	12	53.93 (2.03)	-0.24	12	54.00 (1.57)	-2.42	2.17	0.35
C	4	47.55 (2.79)	-2.83	4	47.43 (2.56)	-5.00	2.23	0.45
F	4	54.73 (2.22)	2.28	4	54.03 (1.46)	-1.05	3.47	0.99

[1] Based on normal curve equivalent scores.
[2] School-level data for students in sixth grade not available for districts A, D, and E.
[3] Based on number of grades across schools.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Attendance and Tardiness

Exhibit D-26a

Student-Level Attendance Gain, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N**	**Pre**	**Gain**	**N**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	1368	95.93 (0.12)	-0.20	1328	95.74 (0.11)	-0.19	0.13	0.03
A	113	96.35 (0.32)	-0.57	85	96.42 (0.35)	-0.67	0.22	0.06
B	242	95.42 (0.29)	-0.09	207	95.14 (0.29)	0.21	-0.12	-0.03
C	76	94.71 (0.49)	-0.14	79	95.00 (0.54)	-0.25	-0.28	-0.06
D	320	96.52 (0.33)	-0.25	342	96.39 (0.18)	-0.03	-0.06	-0.01
E	538	95.86 (0.15)	-0.13	526	95.64 (0.17)	-0.44	0.43	0.12
F	79	96.07 (0.43)	-0.39	89	95.28 (0.37)	0.26	-0.31	-0.08

[1] Based on average percent of days student present.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Attendance Data, 1999-2000 and 2001-2002

Exhibit D-26b

Student-Level Attendance Gain, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N**	**Pre**	**Gain**	**N**	**Pre**	**Gain**	**Impact**	**Effect Size**
All	931	96.04 (0.12)	-0.31	896	95.64 (0.13)	-0.12	0.02+	0.01
A	42	95.80 (0.62)	-0.57	35	96.80 (0.44)	-1.82	1.16	0.33
B	169	95.54 (0.36)	0.26	153	95.21 (0.36)	0.26	0.25	0.05
C	47	94.71 (0.65)	1.25	53	94.80 (0.72)	-0.66	1.84	0.38
D	222	96.79 (0.19)	-0.58	234	96.19 (0.24)	0.12	-0.44	-0.13
E	393	96.04 (0.16)	-0.59	353	95.58 (0.22)	-0.09	-0.25	-0.07
F	58	95.90 (0.53)	-0.17	68	95.15 (0.40)	-0.66	0.86	0.23

[1] Based on average percent of days student present.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

+ District-by-treatment interaction is statistically significant at the .05 level.

Source: Impact Study—Student-Level Attendance Data, 1999-2000 and 2002-2003

Exhibit D-27a

Gain in School-Level Average Daily Attendance, School Year 1999-2000 to 2001-2002

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	69	93.94 (0.43)	-0.16	69	94.06 (0.36)	-0.26	0.00	0.00
A	5	95.27 (0.43)	-1.03	5	95.60 (0.80)	0.33	-1.62	-1.19
B	12	89.39 (1.21)	-0.37	12	89.78 (0.96)	-1.42	0.74	0.20
C	4	93.51 (1.29)	0.02	4	92.87 (0.90)	1.34	-0.68	-0.32
D	17	94.52 (1.08)	0.06	17	95.18 (0.46)	-0.49	-0.06	-0.02
E	27	95.32 (0.16)	-0.09	27	95.43 (0.17)	-0.29	0.17	0.20
F	4	94.62 (1.16)	-0.01	4	92.07 (1.98)	2.08	0.90	0.27

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Attendance Data, 1999-2000 and 2001-2002

Exhibit D-27b

Gain in School-Level Average Daily Attendance, School Year 1999-2000 to 2002-2003

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	69	93.94 (0.43)	-0.74	69	94.06 (0.36)	-1.23	0.38	0.12
A	5	95.27 (0.43)	-0.45	5	95.60 (0.80)	-0.41	-0.44	-0.32
B	12	89.39 (1.21)	-2.19	12	89.78 (0.96)	-4.94	2.33	0.63
C	4	93.51 (1.29)	-1.04	4	92.87 (0.90)	0.44	-0.89	-0.43
D	17	94.52 (1.08)	-0.86	17	95.18 (0.46)	-1.28	-0.28	-0.08
E	27	95.32 (0.16)	-0.27	27	95.43 (0.17)	-0.30	-0.02	-0.02
F	4	94.62 (1.16)	0.90	4	92.07 (1.98)	1.16	1.15	0.35

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Attendance Data, 1999-2000 and 2002-2003

Exhibit D-28a

Student-Level Days Tardy as a Percent of School Days Enrolled, School Year 1999-2000 to 2001-2002

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[1]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	541	1.52 (0.13)	-0.26	535	1.80 (0.15)	-0.53	0.25	0.08
A	113	1.51 (0.25)	-1.34	84	1.94 (0.40)	-1.90	0.17	0.05
C	76	1.87 (0.36)	-0.09	79	1.76 (0.32)	-0.01	0.12	0.04
D	319	1.61 (0.18)	0.04	336	1.96 (0.20)	-0.43	0.35	0.10
F	33	0.00 (0.00)	0.10	36	0.03 (0.03)	0.66	-0.33	-2.45

[1] Data were not available for Districts B and E.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—Student-Level Attendance Data, 1999-2000 and 2001-2002

Exhibit D-28b

Student-Level Days Tardy as a Percent of School Days Enrolled, School Year 1999-2000 to 2002-2003

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[1]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	327	1.68 (0.19)	-0.02	349	1.83 (0.19)	0.03	-0.06+	-0.02
A	42	1.85 (0.50)	1.38	35	1.44 (0.29)	0.68	0.98	0.37
C	47	1.58 (0.46)	-0.60	53	2.47 (0.55)	0.23	-1.30	-0.36
D	221	1.80 (0.25)	-0.16	229	2.00 (0.25)	-0.15	0.04	0.01
F	17	0.00 (0.00)	0.00	32	0.03 (0.03)	0.21	-0.32	-2.00

[1] Data were not available for Districts B and E.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

+ District-by-district treatment interaction is statistically significant at the .05 level.

Source: Impact Study—Student-Level Attendance Data, 1999-2000 and 2002-2003

Exhibit D-29a

Gain in School-Level Days Tardy as a Percent of School Days Enrolled, School Year 1999-2000 to 2001-2002

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[1]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	20	1.89 (0.15)	-0.09	20	1.89 (0.23)	0.45	-0.29	-0.34
C	4	1.73 (0.38)	-0.21	4	1.82 (0.52)	0.11	-0.36	-0.43
D	16	1.93 (0.17)	-0.06	16	1.91 (0.27)	0.53	-0.25	-0.28

[1] Data were not available for Districts A, B, E, and F.

Notes: Pre = pre-implementation or baseline year
Gain = second year of implementation – pre-implementation year

Source: Impact Study—School-Level Attendance Data, 1999-2000 and 2001-2002

Exhibit D-29b

Gain in School-Level Days Tardy as a Percent of School Days Enrolled, School Year 1999-2000 to 2002-2003

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District[1]	N	Pre	Gain	N	Pre	Gain	Impact	Effect Size
All	10	1.67 (0.22)	-0.27	10	2.13 (0.44)	-0.19	-0.39	-0.36
C	4	1.73 (0.38)	-0.15	4	1.82 (0.52)	0.63	-0.81	-0.96
D	6	1.63 (0.30)	-0.35	6	2.33 (0.67)	-0.74	-0.15	-0.12

[1] Data were not available for Districts A, B, E, and F.

Notes: Pre = pre-implementation or baseline year
Gain = third year of implementation – pre-implementation year

Source: Impact Study—School-Level Attendance Data, 1999-2000 and 2002-2003

School Nurse Visits

Exhibit D-30a

School-Level Average Number of Daily Health Office/Nurse Visits, School Year 2001-2002[1]

District	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
	N	Mean		N	Mean		Impact	Effect Size
All	1454	3.31	(0.05)	1320	4.02	(0.07)	-0.65*	-0.28
A	154	2.73	(0.12)	152	4.11	(0.16)	-1.32*	-0.75
B	225	3.22	(0.08)	218	4.65	(0.23)	-1.35	-0.53
C	74	2.08	(0.14)	71	2.95	(0.24)	-0.92	-0.55
D	329	3.63	(0.11)	325	3.50	(0.11)	0.13	0.06
E	582	3.50	(0.09)	488	4.27	(0.14)	-0.60	-0.23
F	90	3.12	(0.19)	66	3.66	(0.21)	-1.18	-0.66

[1] Logs of visits represent the number of daily visits per 100 students. Logs of health office/nurse visits were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

* Difference is statistically significant at the .05 level.

Source: *Impact Study—Logs of Vists by Students to the Health Office/School Nurse, 2001-2002*

Exhibit D-30b

School-Level Average Number of Daily Health Office/Nurse Visits, School Year 2002-2003[1]

District	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
	N	Mean		N	Mean		Impact	Effect Size
All	1500	3.53	(0.06)	1358	3.78	(0.07)	-0.28	-0.11
A	151	2.88	(0.13)	173	2.97	(0.13)	-0.29	-0.18
B	236	3.72	(0.12)	225	4.44	(0.20)	-0.96	-0.40
C	96	1.88	(0.11)	89	2.45	(0.12)	-0.56	-0.50
D	328	4.22	(0.15)	325	3.37	(0.09)	0.80	0.35
E	594	3.56	(0.11)	469	4.24	(0.13)	-0.54	-0.19
F	95	3.16	(0.12)	77	4.11	(0.23)	-0.73	-0.45

[1] Logs of visits represent the number of daily visits per 100 students. Logs of health office/nurse visits were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

* Difference is statistically significant at the .05 level.

Source: *Impact Study—Logs of Visits by Students to the Health Office/School Nurse, 2002-2003*

Exhibit D-31a

School-Level Average Number of Daily Health Office/Nurse Visits, by Time of Visit, School Year 2001-2002[1]

District	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
	N	Mean		N	Mean		Impact	Effect Size
Morning Health Office/Nurse Visits								
All	1454	1.80	(0.03)	1320	2.22	(0.05)	-0.43**	-0.29
A	154	1.85	(0.09)	152	2.29	(0.10)	-0.46	-0.39
B	225	1.85	(0.06)	218	2.76	(0.13)	-0.86	-0.57
C	74	1.43	(0.11)	71	2.26	(0.24)	-0.87	-0.56
D	329	1.85	(0.06)	325	1.84	(0.07)	0.00	0.00
E	582	1.69	(0.05)	488	2.22	(0.09)	-0.48	-0.30
F	90	2.48	(0.19)	66	2.07	(0.12)	-0.21	-0.14
Afternoon Health Office/Nurse Visits								
All	1454	1.50	(0.03)	1320	1.80	(0.04)	-0.22	-0.16
A	154	0.88	(0.06)	152	1.82	(0.09)	-0.87*	-0.91
B	225	1.37	(0.05)	218	1.89	(0.11)	-0.49	-0.38
C	74	0.65	(0.07)	71	0.69	(0.07)	-0.05	-0.08
D	329	1.78	(0.07)	325	1.66	(0.07)	0.13	0.11
E	582	1.81	(0.06)	488	2.05	(0.08)	-0.13	-0.08
F	90	0.64	(0.08)	66	1.59	(0.11)	-0.96	-1.13

[1] Logs of visits represent the number of daily visits per 100 students. Logs of health office/nurse visits were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

* Difference is statistically significant at the .05 level.
** Difference is statistically significant at the .01 level.

Source: *Impact Study—Logs of Visits by Students to the Health Office/School Nurse, 2001-2002*

Exhibit D-31b

School-Level Average Number of Daily Health Office/Nurse Visits, by Time of Visit, School Year 2002-2003[1]

	Unadjusted Means (Standard Errors)						Results of Impact Models	
	Treatment Schools			Control Schools				
District	**N**	**Mean**		**N**	**Mean**		**Impact**	**Effect Size**
Morning Health Office/Nurse Visits								
All	1461	1.85	(0.04)	1332	2.04	(0.04)	-0.19	-0.13
A	151	1.65	(0.09)	173	1.90	(0.10)	-0.34	-0.29
B	236	2.24	(0.09)	225	2.68	(0.11)	-0.56	-0.36
C	96	1.30	(0.08)	89	1.82	(0.10)	-0.49	-0.55
D	328	2.22	(0.10)	325	1.76	(0.06)	0.42	0.29
E	594	1.62	(0.05)	469	2.06	(0.08)	-0.39	-0.26
F	56	1.96	(0.13)	51	1.65	(0.10)	0.35	0.41
Afternoon Health Office/Nurse Visits								
All	1461	1.68	(0.04)	1332	1.69	(0.04)	-0.06	-0.04
A	151	1.23	(0.08)	173	1.08	(0.06)	0.06	0.07
B	236	1.49	(0.07)	225	1.75	(0.10)	-0.39	-0.31
C	96	0.57	(0.07)	89	0.63	(0.07)	-0.07	-0.10
D	328	2.00	(0.09)	325	1.61	(0.06)	0.38	0.27
E	594	1.94	(0.07)	469	2.18	(0.08)	-0.17	-0.09
F	56	0.85	(0.10)	51	1.40	(0.14)	-0.48	-0.54

[1] Logs of visits represent the number of daily visits per 100 students. Logs of health office/nurse visits were requested weekly from each study school for 20 weeks during the school year. The N represents the number of logs actually obtained from treatment and control schools during the data collection period.

* Difference is statistically significant at the .05 level.

Source: *Impact Study—Logs of Visits by Students to the Health Office/School Nurse, 2002-2003*

Impact Study Subgroup Findings

Exhibit D-32

Participation by School Meal Eligibility Status, School Year 1999-2000 to 2001-2002

	Unadjusted Means (Standard Errors)								Results of Impact Models		
	Paid				Free/Reduced						
	Treatment		Control		Treatment		Control				
Measure	N	Mean	N	Mean	N	Mean	N	Mean	Paid Impact	Free/ Reduced Impact	Inter-action Effect
School Breakfast Participation Gain[1]	689	26.86 (1.27)	644	1.60 (0.82)	583	24.95 (1.47)	543	8.54 (1.26)	25.08♦♦	14.81♦♦	**

[1] Complete data were not available for District C.

** The two-way interaction between treatment and eligibility status is statistically significant at the .01 level.
♦♦ Difference between treatment and control students is statistically significant at the .01 level.

Sources: Impact Study—Student-Level School Breakfast Participation Data, 1999-2000 and 2001-2002

Exhibit D-33

Academic Achievement Outcomes by School Meal Eligibility Status, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)								Results of Impact Models		
	Paid				Free/Reduced						
	Treatment		Control		Treatment		Control				
Measure/District	N	Mean	N	Mean	N	Mean	N	Mean	Paid Impact	Free/ Reduced Impact	Inter-action Effect
Math Score Gain, All Grades											
All	316	64.73 (1.68)	310	67.93 (1.85)	298	63.81 (1.78)	341	65.57 (1.78)	-2.71	-1.60	n.s.+
B	70	74.39 (3.87)	56	77.04 (3.43)	51	67.67 (3.39)	51	72.37 (3.93)	-1.92	-1.73	n.s.
C	9	89.67 (11.79)	11	58.09 (9.25)	24	51.38 (7.16)	21	81.43 (5.51)	21.77	-20.23	*
D	113	55.73 (2.40)	106	60.83 (2.45)	64	62.87 (3.26)	79	62.82 (2.78)	-3.67	-1.29	n.s.
E	116	66.78 (2.72)	130	70.31 (3.39)	149	64.94 (2.74)	178	63.05 (2.79)	-1.70	2.35	n.s.
F	8	49.44 (6.14)	7	74.07 (15.85)	10	63.25 (11.03)	12	64.38 (9.47)	-20.76	5.49	n.s.

n.s. = Not significant.

[1] All test scores have been converted to Stanford-9 scale scores.

[2] Schools in Districts A and F did not administer tests to students in second grade.

* The two-way interaction between treatment and eligibility status is statistically significant at the .05 level.

+ The three-way interaction between treatment, eligibility, and district is statistically significant at the .05 level.

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

Exhibit D-34

Academic Achievement Outcomes by Gender of Students, School Year 1999-2000 to 2001-2002[1]

	Unadjusted Means (Standard Errors)								Results of Impact Model		
	Male				Female						
	Treatment		Control		Treatment		Control		Male	Female	Interaction
Measure/District	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**Impact**	**Impact**	**Effect**
Math Score Gain, All Students											
All	344	38.69 (1.60)	359	42.34 (1.56)	418	41.69 (1.48)	400	43.64 (1.39)	-2.77	-1.34	*
A	21	50.24 (6.23)	17	45.47 (5.45)	20	47.35 (6.96)	14	36.36 (8.21)	1.87	17.96	n.s.
B	80	50.90 (2.76)	78	50.17 (2.72)	87	50.63 (2.82)	68	53.82 (3.27)	1.79	0.88	n.s.
C	20	36.95 (7.85)	19	53.16 (5.32)	30	48.17 (5.19)	30	54.90 (4.79)	-10.91	-8.89	n.s.
D	76	37.35 (2.75)	85	47.50 (2.79)	100	37.99 (2.63)	90	41.46 (2.20)	-11.88	-2.75	n.s.
E	136	31.10 (2.81)	152	32.89 (2.67)	173	36.79 (2.50)	184	39.60 (2.20)	0.33	-3.11	n.s.
F	11	34.14 (4.57)	8	58.19 (9.90)	8	58.13 (12.35)	14	44.36 (7.68)	-20.87	12.11	*

n.s. = Not significant.

[1] All test scores have been converted to Stanford–9 scale scores.

* The two-way interaction between treatment and gender is statistically significant at the .05 level.

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2001-2002

Exhibit D-35

Academic Achievement Outcomes by Minority Status of Students, School Year 1999-2000 to 2002-2003[1]

	Unadjusted Means (Standard Errors)												Results of Impact Model		
	White						Non-white								
	Treatment			Control			Treatment			Control			White	Non-White	Interaction
Measure/District	**N**	**Mean**		**N**	**Mean**		**N**	**Mean**		**N**	**Mean**		**Impact**	**Impact**	**Effect**
Math Score Gain, 2nd to 5th Grade															
All	228	66.30	2.02	212	65.62	1.88	121	62.59	2.84	139	66.06	2.98	1.12	-1.42	** +
B	43	79.12	4.54	23	82.65	4.05	12	68.58	8.30	22	80.41	5.49	2.27	-11.48	n.s.
C	4	107.25	19.05	4	68.75	5.72	13	51.85	10.76	9	92.78	8.17	70.66	-25.82	*
D	83	60.79	2.81	82	61.21	2.04	16	61.50	7.48	23	69.91	6.37	-1.38	-4.29	n.s.
E	98	63.68	3.23	103	65.20	3.27	80	63.65	3.44	85	58.48	4.02	1.82	4.56	n.s.

n.s. = Not significant.

[1] All test scores have been converted to Stanford–9 scale scores.

* The two-way interaction between treatment and minority status is statistically significant at the .05 level.
** The two-way interaction between treatment and minority status is statistically significant at the .01 level.
\+ The three-way interaction between treatment, minority status, and district is statistically significant and the .05 level.

Source: Impact Study—Student-Level Academic Achievement Test Scores, 1999-2000 and 2002-2003

APPENDIX E

SUPPLEMENTARY EXHIBITS: IMPACT STUDY LONGITUDINAL FINDINGS

List of Exhibits

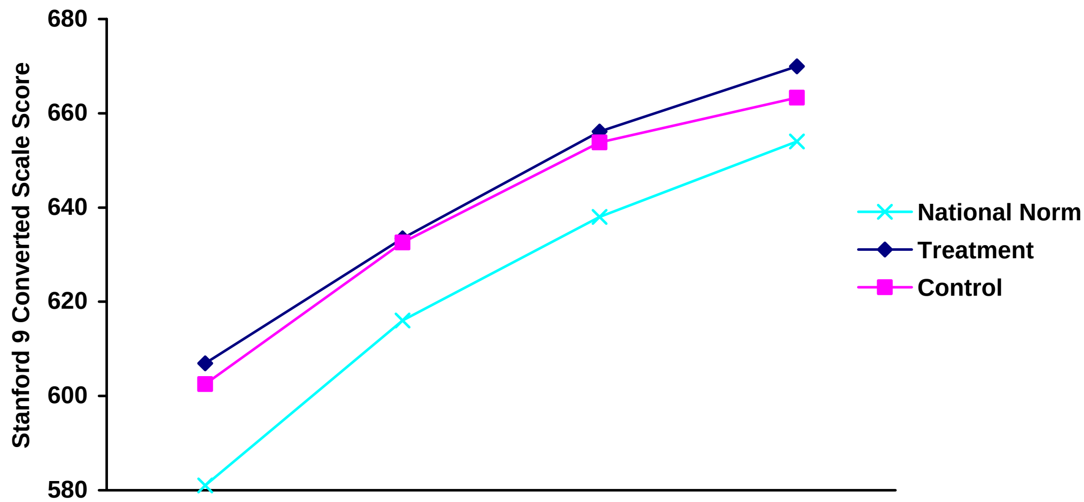
Appendix E

Supplementary Exhibits: Impact Study Longitudinal Findings

Growth Curves for Each Student-Level Grade Cohort by Treatment and Control Groups Compared to National Norms (All Districts Combined)

Exhibit E-1

Change in Student-Level Reading: Grade 2 Cohort in Four Districts[1]



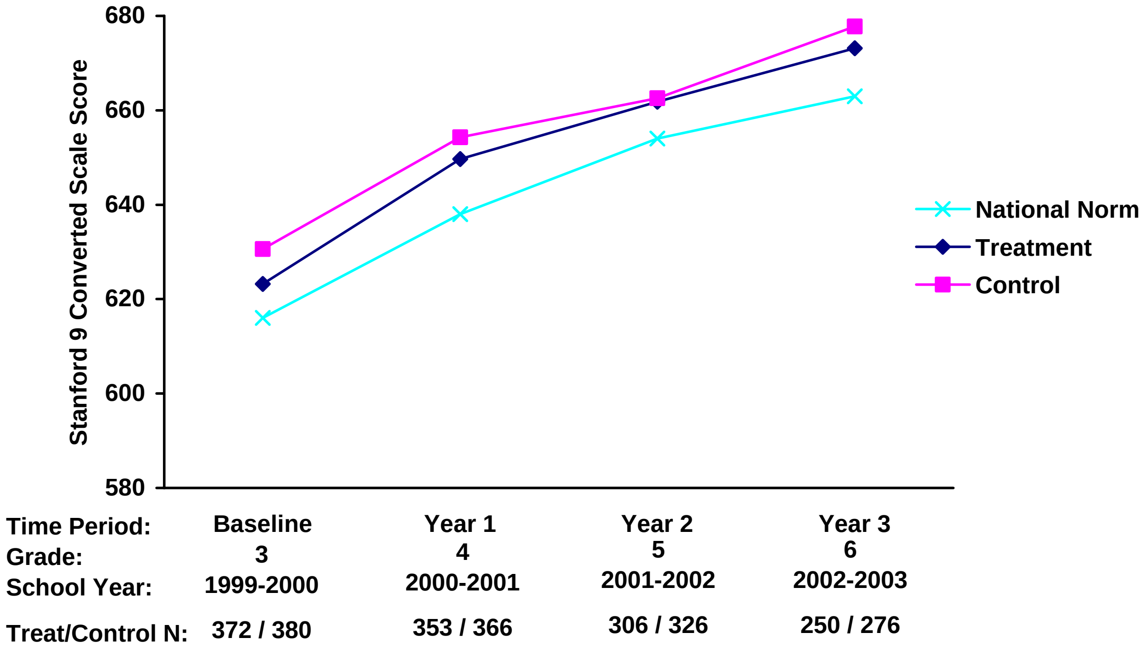
Time Period:	Baseline	Year 1	Year 2	Year 3
Grade:	2	3	4	5
School Year:	1999-2000	2000-2001	2001-2002	2002-2003
Treat/Control N:	485 / 480	474 / 473	321 / 308	360 / 366

[1] School districts A and F did not administer tests to students in Grade 2.

Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-2

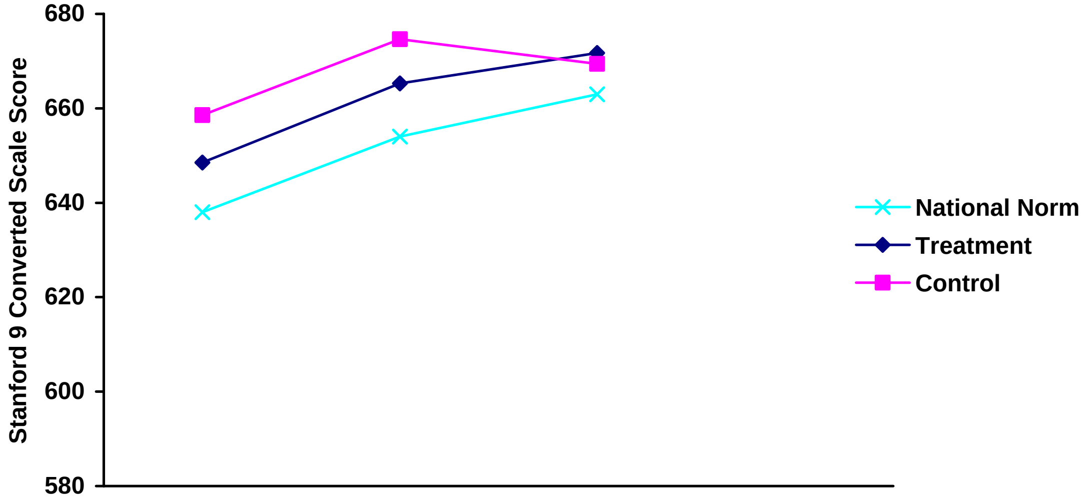
Change in Student-Level Reading: Grade 3 Cohort, All Districts



Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-3

Change in Student-Level Reading: Grade 4 Cohort, All Districts

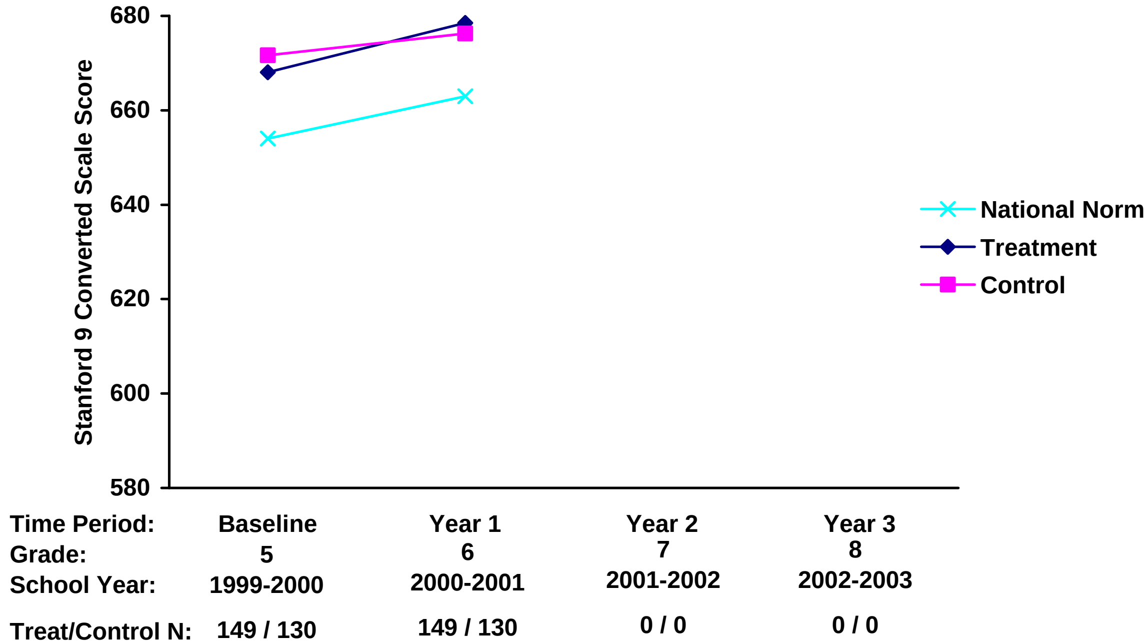


Time Period:	Baseline	Year 1	Year 2	Year 3
Grade:	4	5	6	7
School Year:	1999-2000	2000-2001	2001-2002	2002-2003
Treat/Control N:	290 / 266	290 / 266	51 / 39	0 / 0

Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-4

Change in Student-Level Reading: Grade 5 Cohort in Four Districts[1]

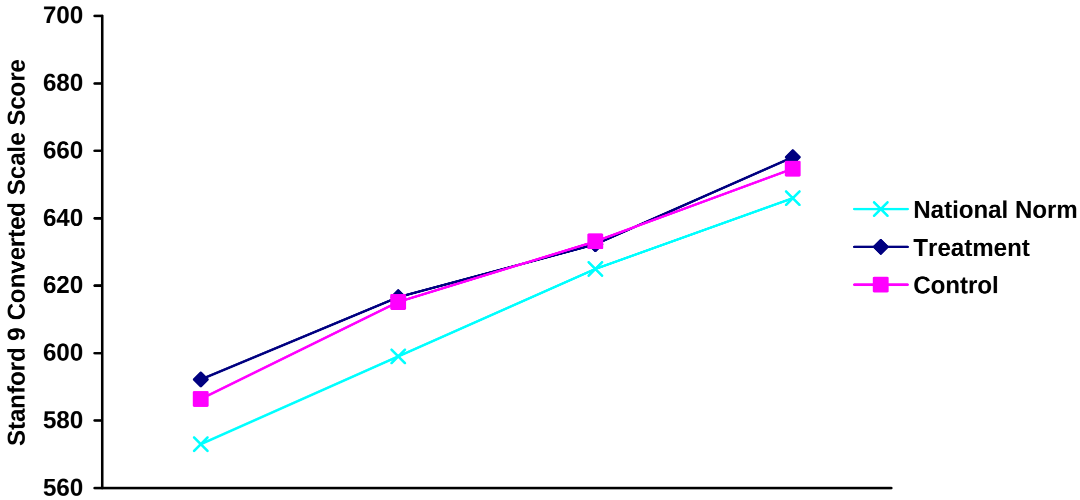


[1] School districts A and E did not administer tests to students in Grade 6.

Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-5

Change in Student-Level Math: Grade 2 Cohort in Four Districts[1]



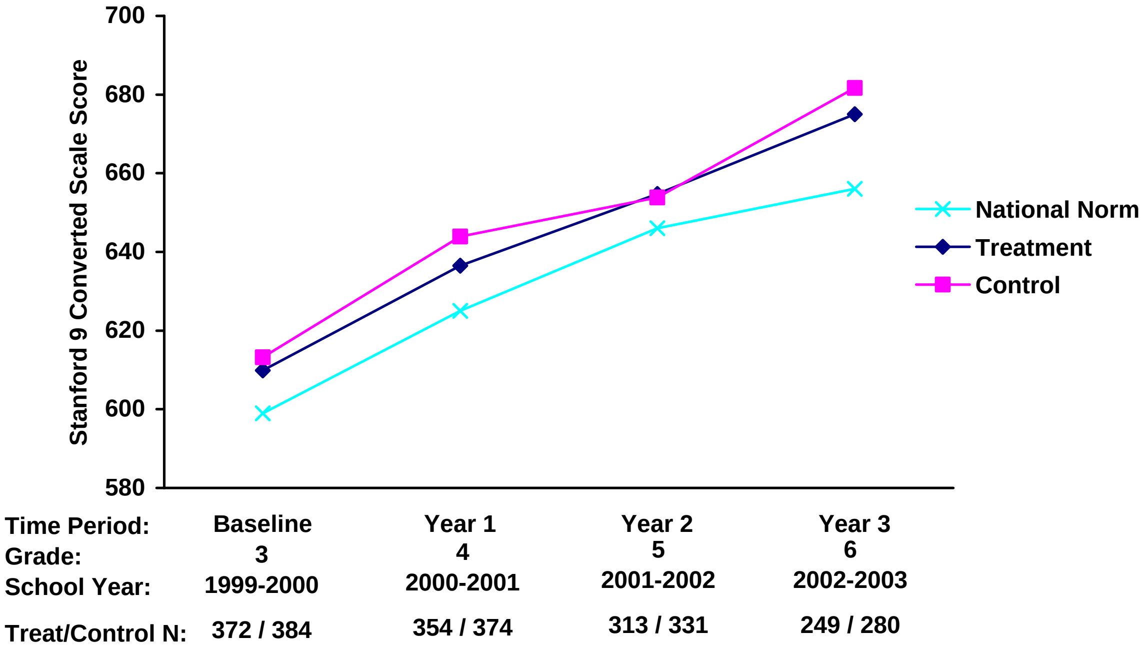
Time Period:	**Baseline**	**Year 1**	**Year 2**	**Year 3**
Grade:	**2**	**3**	**4**	**5**
School Year:	**1999-2000**	**2000-2001**	**2001-2002**	**2002-2003**
Treat/Control N:	**494 / 486**	**482 / 480**	**398 / 387**	**365 / 371**

[1] School districts A and F did not administer tests to students in Grade 2.

Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-6

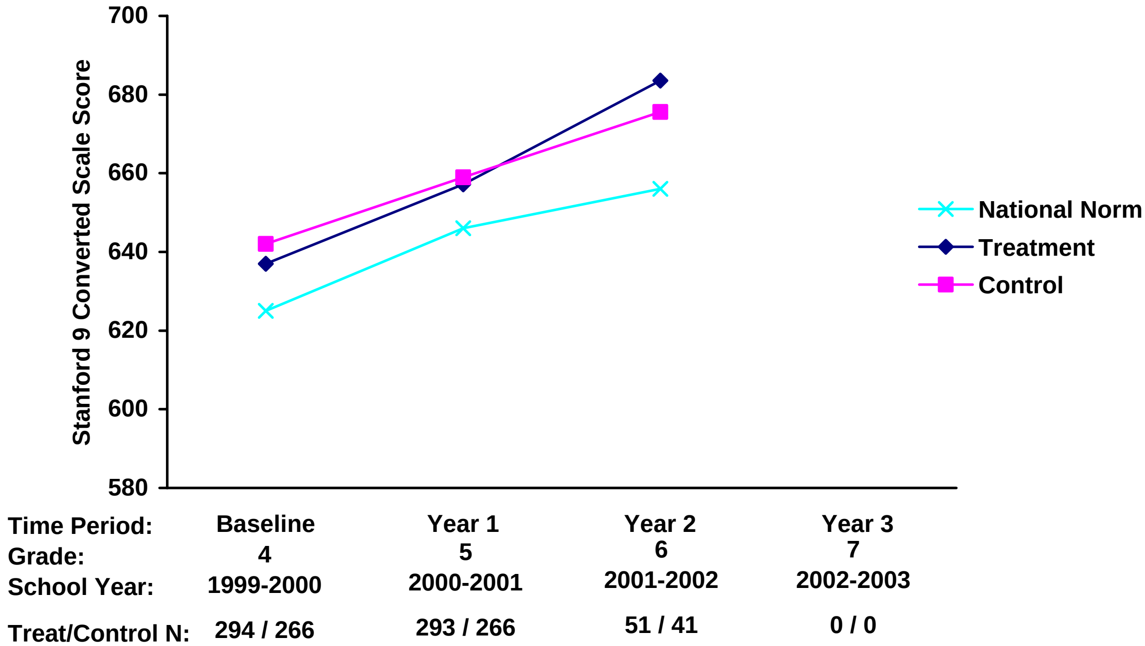
Change in Student-Level Math: Grade 3 Cohort, All Districts



Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-7

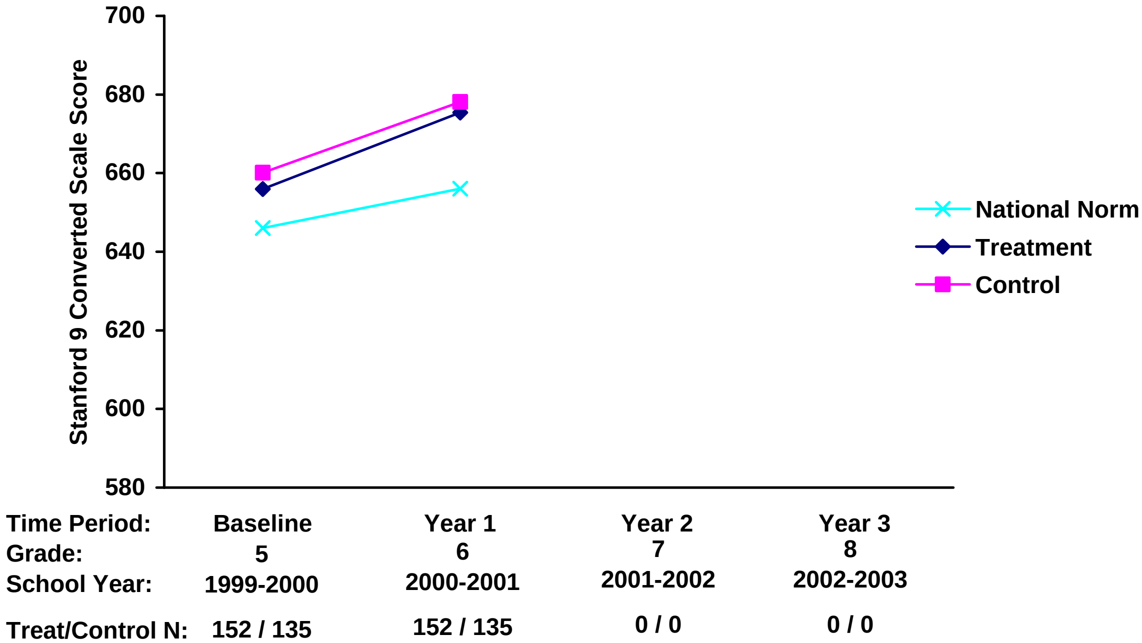
Change in Student-Level Math: Grade 4 Cohort, All Districts



Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

Exhibit E-8

Change in Student-Level Math: Grade 5 Cohort in Four Districts[1]



[1] School districts A and E did not administer tests to students in Grade 6.

Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

APPENDIX F

SUMMARY OF THE FIRST YEAR FINDINGS OF THE IMPACTS ON SCHOOL BREAKFAST PARTICIPANTS

Appendix F

Summary of the First Year Findings of Supplementary Analyses: Impacts on School Breakfast Participants

While the main analyses of the first year report (McLaughlin et al., 2002) looked at the results of making universal-free school breakfasts *available* in treatment schools, additional analyses were done to look at the effects of the program on those that actually *participated*. This set of analyses was conducted in a way that maintained the integrity of the experimental design (based on Bloom, 1984). The pattern of statistically significant results was identical to those in the main analyses, although the magnitude of the effects was larger for participants. These results, reported in Appendix F of the first year report, are summarized here.

Two separate sets of analyses were completed on school breakfast participants: one looking at school breakfast participation on the target day (i.e., students reported participating in school breakfast on the day the 24-hour intake was obtained); and, the other looking at the cumulative pattern of participation in school breakfast over the course of the school year. Target day participation was hypothesized to affect the more immediate outcomes, including the likelihood of consuming breakfast, dietary intake at breakfast and over 24 hours, and cognitive functioning (i.e., student's ability to attend, recall, and retrieve information on that day). Longer-term school breakfast participation over the course of the school year was hypothesized to influence the more distal outcomes, including student health, and academic and behavioral outcomes.

Overall findings for the analyses of target day school breakfast participation were as follows:

- The likelihood that students consumed a nutritionally robust breakfast was significantly greater (i.e., 20 percentage points) for school breakfast participants in the treatment schools.
- The percentage of students eating more than one substantive breakfast was substantially greater among participants in the treatment schools (16 percentage points higher), but a relatively small number of students demonstrated this eating pattern.
- Of the few significant effects of school breakfast participation on dietary intake, only the reduction in cholesterol intake, both at breakfast and over 24 hours, was large enough to be considered nutritionally important. At breakfast, the reduction represented about one sixth of the recommended maximum daily intake of 300 milligrams (mg) of cholesterol; for the 24-hour cholesterol intake, the reduction was about 18 percent of the recommended daily maximum.
- Breakfast from all sources contributed more to total daily nutrient intake for treatment school breakfast participants relative to their control counterparts;[1] the differences were most notable

[1] In estimating impacts on participants only, we are implicitly comparing them to the subset of controls who would have participated had they been assigned to the treatment group, not to all controls. So, we used the term "control counterparts" to distinguish it from all controls.

for calcium, where breakfast contributed an average of 11 percentage points more to total daily calcium intake for treatment school participants than for similar students in the control group.

- There was no significant impact of target day school breakfast participation on three different measures of cognitive functioning.

Analyses of the impact of cumulative participation in universal school breakfast over the course of the school year suggested:

- There were more negative behavior ratings for school breakfast participants, with a significant four-point difference in teacher ratings of student oppositional behavior.
- Student attitudes about breakfast, from both the student and parent perspectives, showed significant impacts indicating more favorable attitudes on the part of participants. Participating treatment school students and parents had ratings of 60 and 65 percentage points higher, respectively, than their control counterparts.

Analyses were also performed that focused on the long-term participation of low-income students, as defined by their eligibility for free or reduced-price meals. The only significant findings were more favorable attitudes on the part of participants towards school breakfast than their control counterparts.

Appendix G

Supplementary Exhibits: Non-Experimental Analyses

Appendix G

Supplementary Exhibits: Non-Experimental Analyses

The tables appearing in this appendix provide detailed background for the findings described in Chapter Six of the report. They are grouped by analysis category as follows:

- Substantive Breakfast Eaters (Exhibits G-1 to G-9)
- Breakfast Skippers (Exhibits G-10 to G-13)
- Breakfast Source (Exhibits G-14 and G-15)
- Breakfast Location (Exhibits G-16 to G22)
- Household Income (Exhibits G-23 to G-30)
- Participation Patterns (Exhibits G-31 to G-33)
- Food Security (Exhibits G-34 to G-44)
- Model Results (Exhibits G-45 to G-88)

For the majority of comparisons, differences between groups have been tested for statistical significance, controlling for student age, gender, school meal eligibility, and minority status. Where statistically significant differences have been observed, they are noted by * for $p<.05$ and ** for $p<.01$.

List of Exhibits

List of Exhibits

List of Exhibits

List of Exhibits

List of Exhibits

SUBSTANTIVE BREAKFAST EATERS

Exhibit G-1

Percent of Students Who Consumed a Substantive Breakfast on a Typical School Day, by District and Breakfast Definition

	Substantive Breakfast Definition 2			Substantive Breakfast Definition 3			Substantive Breakfast Definition 4		
District	**N**	**Percent**	**SE**	**N**	**Percent**	**SE**	**N**	**Percent**	**SE**
All	2627	78.49	(0.71)	2052	61.31	(0.84)	591	17.66	(0.66)
A	208	74.29	(2.62)	158	56.43	(2.97)	45	16.07	(2.20)
B	406	78.08	(1.82)	303	58.27	(2.16)	87	16.73	(1.64)
C	147	76.56	(3.07)	119	61.98	(3.51)	36	18.75	(2.82)
D	669	79.74	(1.39)	503	59.95	(1.69)	132	15.73	(1.26)
E	1030	78.81	(1.13)	832	63.66	(1.33)	247	18.90	(1.08)
F	167	79.90	(2.78)	137	65.55	(3.29)	44	21.05	(2.83)

Differences were not tested for statistical significance.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-2a

Demographic Characteristics: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 2				Definition 3			
	Substantive		Non-substantive		Substantive		Non-substantive	
Characteristic	Value	SE	Value	SE	Value	SE	Value	SE
School Meals Eligibility Status								
Percent free/reduced price eligible	50.61	(0.98)	51.54	(1.87)	50.84	(1.11)	50.78	(1.40)
Ethnicity								
Percent minority	37.20	(0.95)	37.32	(1.82)	37.49	(1.08)	36.80	(1.35)
Gender								
Percent female	50.27*	(0.98)	54.35	(1.87)	48.92*	(1.11)	54.68	(1.39)
Age								
Average age	9.75*	(0.02)	9.88	(0.05)	9.73*	(0.03)	9.85	(0.04)
Household Size								
Average number people in household	4.56	(0.03)	4.45	(0.05)	4.57	(0.03)	4.49	(0.04)
Average number children in household	2.58	(0.02)	2.50	(0.04)	2.59	(0.03)	2.53	(0.03)
Income								
Percent < $20,000 per year	17.82	(0.76)	18.95	(1.50)	17.82	(0.86)	18.44	(1.10)
Percent > $70,000 per year	21.18	(0.81)	22.16	(1.59)	21.42	(0.92)	21.34	(1.16)
Percent two-income households	50.46	(0.98)	52.39	(1.87)	50.69	(1.11)	51.17	(1.40)
Family Structure								
Percent single-parent families	24.37	(0.84)	25.98	(1.64)	24.70	(0.96)	24.73	(1.21)
Education of Parent/Guardian								
Percent without a high school degree	10.91	(0.61)	10.04	(1.13)	11.12	(0.70)	10.11	(0.84)
Percent college degree or above	23.95	(0.84)	24.33	(1.61)	23.37	(0.94)	25.08	(1.21)
Number of Students	2602		712		2032		1282	

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-2b

Demographic Characteristics: Substantive vs. Non-Substantive Breakfast Eaters

	Definition 4			
	Substantive		Non-substantive	
Characteristic	**Value**	**SE**	**Value**	**SE**
School Meals Eligibility Status				
Percent free/reduced price eligible	55.50*	(2.06)	49.82	(0.96)
Ethnicity				
Percent minority	41.75*	(2.05)	36.26	(0.92)
Gender				
Percent female	44.16*	(2.06)	52.64	(0.96)
Age				
Average age	9.57*	(0.05)	9.82	(0.02)
Household Size				
Average number people in household	4.62	(0.07)	4.52	(0.03)
Average number children in household	2.62	(0.05)	2.55	(0.02)
Income				
Percent < $20,000 per year	20.60	(1.71)	17.52	(0.74)
Percent > $70,000 per year	20.96	(1.72)	21.48	(0.80)
Percent two-income households	49.48	(2.07)	51.17	(0.96)
Family Structure				
Percent single-parent families	24.23	(1.78)	24.82	(0.83)
Education of Parent/Guardian				
Percent without a high school degree	13.43*	(1.42)	10.15	(0.58)
Percent college degree or above	21.51	(1.71)	24.57	(0.83)
Number of Students	582		2732	

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-3

Mean Food Energy and Nutrient Intake at Breakfast: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 3			
	Substantive		Non-substantive	
Dietary Component	**Mean**	**SE**	**Mean**	**SE**
Food energy (as % 1989 RDA)	26.88*	(0.25)	10.85	(0.19)
Protein (as % 1989 RDA)	55.77*	(0.65)	21.00	(0.40)
Percent of Food Energy from:				
Total fat	25.63*	(0.26)	21.02	(0.38)
Saturated fat	10.09*	(0.12)	8.49	(0.18)
Carbohydrate	63.76*	(0.31)	69.05	(0.47)
Protein	12.36*	(0.09)	11.93	(0.17)
Vitamins (as percent of RDA)[2]				
Vitamin A	76.92*	(1.23)	35.44	(0.95)
Vitamin C	107.08*	(2.72)	47.62	(1.99)
Vitamin B_6	97.74*	(1.80)	45.09	(1.29)
Vitamin B_{12}	125.60*	(2.53)	51.15	(1.83)
Niacin	74.02*	(1.26)	34.93	(0.93)
Thiamin	97.89*	(1.31)	44.37	(1.02)
Riboflavin	138.27*	(1.83)	61.58	(1.39)
Folate	63.75*	(0.99)	29.64	(0.73)
Minerals (as percent of RDA)[2]				
Calcium	47.41*	(0.61)	19.55	(0.47)
Calcium (as percent of AI)	45.04*	(0.58)	18.59	(0.45)
Iron	79.55*	(1.43)	37.17	(0.98)
Magnesium	41.20*	(0.60)	17.17	(0.39)
Phosphorous	49.12*	(0.77)	19.85	(0.52)
Zinc	64.35*	(1.27)	29.90	(0.91)
Other Dietary Components				
Cholesterol (mg)	66.20*	(2.68)	15.85	(1.14)
Sodium (mg)	713.25*	(10.20)	279.88	(6.14)
Fiber (gm)	3.27*	(0.06)	1.39	(0.04)
Fiber (as percent of age-plus-5 gm)	23.06*	(0.41)	9.78	(0.27)
Number of Students[3]	2052		1295	

RDA = Recommended Dietary Allowance

[1] Substantive breakfast eaters consumed a Definition 3 breakfast on a typical school day.
[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).
[3] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-4

Mean Food Group Intake at Breakfast: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 2				Definition 3			
	Substantive		Non-substantive		Substantive		Non-substantive	
Food Group	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**
	Number of Servings[2]							
Grain Products	**2.0***	(0.03)	**0.9**	(0.05)	**2.2***	(0.03)	**1.0**	(0.03)
Whole grains	0.6*	(0.02)	0.2	(0.02)	0.6*	(0.02)	0.3	(0.02)
Non-whole grains	1.4*	(0.03)	0.7	(0.04)	1.6*	(0.03)	0.7	(0.03)
Vegetables	**0.0**	(0.01)	**0.0**	(0.00)	**0.0***	(0.01)	**0.0**	(0.00)
Dark green vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Deep yellow vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
White potatoes	0.0	(0.00)	0.0	(0.00)	0.0*	(0.01)	0.0	(0.00)
Other starchy vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Tomatoes	0.0*	(0.00)	0.0	(0.00)	0.0*	(0.00)	0.0	(0.00)
Cooked dry beans and peas	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Other vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Fruits	**0.6***	(0.01)	**0.2**	(0.02)	**0.7***	(0.02)	**0.3**	(0.01)
Citrus fruits, melons, and berries	0.3*	(0.01)	0.1	(0.01)	0.4*	(0.01)	0.1	(0.01)
Other fruits	0.3*	(0.01)	0.1	(0.01)	0.3*	(0.01)	0.1	(0.01)
Dairy Products	**0.9***	(0.01)	**0.2**	(0.01)	**1.0***	(0.02)	**0.4**	(0.01)
Milk	0.9*	(0.01)	0.2	(0.01)	1.0*	(0.02)	0.4	(0.01)
Yogurt	0.0*	(0.00)	0.0	(0.00)	0.0*	(0.00)	0.0	(0.00)
Cheese	0.0*	(0.00)	0.0	(0.00)	0.0*	(0.00)	0.0	(0.00)
Meat and Meat Substitutes	**0.1***	(0.01)	**0.0**	(0.00)	**0.1***	(0.01)	**0.0**	(0.00)
Red meat (beef, pork, veal, lamb, game)	0.0*	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Frankfurters, sausage, luncheon meats	0.0*	(0.00)	0.0	(0.00)	0.0*	(0.00)	0.0	(0.00)
Poultry (chicken, turkey, other)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Fish and shellfish	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)

Exhibit G-4 (continued)

Mean Food Group Intake at Breakfast: Substantive vs. Non-Substantive Breakfast Eaters[1]

Food Group	Definition 2				Definition 3			
	Substantive		Non-substantive		Substantive		Non-substantive	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE
	Number of Servings[2]							
Eggs	0.1*	(0.00)	0.0	(0.00)	0.1*	(0.00)	0.0	(0.00)
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Nuts and seeds	0.0	(0.00)	0.0	(0.00)	0.0*	(0.00)	0.0	(0.00)
Other								
Discretionary fat (gm)	10.9*	(0.19)	4.3	(0.25)	12.7*	(0.22)	4.4	(0.15)
Added sugars (tsp)	5.7*	(0.10)	3.0	(0.16)	6.5*	(0.12)	3.0	(0.10)
Number of Students[3]	2627		720		2052		1295	

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.
[2] Based mainly on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.
[3] Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-5

Percent of Students Whose Breakfast Intake on a Typical School Day Met Standard

	Unadjusted Percentages (Standard Errors)				Results of Impact Models	
Standard/Dietary Component	**Treatment Schools**		**Control Schools**		**Impact**	**Odds Ratio**
At least 25 percent of RDA:						
Food Energy	28.78	(1.10)	28.34	(1.11)	0.63+	1.03
Protein	72.34	(1.09)	67.66	(1.15)	5.13**++	1.28
Vitamin A	73.16	(1.08)	71.84	(1.11)	1.99	1.11
Vitamin C	62.57	(1.17)	60.01	(1.21)	3.21	1.15
Vitamin B_6	73.75	(1.07)	72.39	(1.10)	1.89	1.10
Vitamin B_{12}	78.40	(1.00)	73.12	(1.09)	5.65**	1.36
Niacin	74.16	(1.06)	72.51	(1.10)	2.30	1.13
Thiamin	87.82	(0.79)	86.10	(0.85)	1.95+	1.19
Riboflavin	90.11	(0.72)	86.53	(0.84)	3.90**++	1.47
Folate	72.04	(1.09)	70.93	(1.12)	2.00	1.10
Calcium	64.04	(1.16)	60.68	(1.20)	3.79*	1.18
Iron	77.05	(1.02)	73.24	(1.09)	4.33**+	1.26
Magnesium	53.38	(1.21)	51.76	(1.23)	2.35	1.10
Phosphorous	59.33	(1.19)	54.98	(1.23)	5.13**++	1.23
Zinc	63.98	(1.17)	60.50	(1.20)	4.19*	1.20
Percent of Food Energy:						
30% or less from total fat	73.03	(1.09)	72.86	(1.11)	0.79	1.04
Less than 10% from saturated fat	60.06	(1.21)	60.62	(1.22)	0.02	1.00
Other						
No more than 75 mg cholesterol	89.70	(0.74)	87.32	(0.82)	2.30*	1.25
No more than 600 mg sodium	67.33	(1.14)	68.81	(1.14)	-1.4	0.94
At least 25% Age plus 5 gm dietary fiber	21.95	(1.00)	22.39	(1.03)	-0.06	1.00
Number of Students	1,699		1,648			

RDA=Recommended Dietary Allowance

* Difference is statistically significant at the .05 level.
** Difference is statistically significant at the .01 level.

\+ Treatment-by district interaction is statistically significant at the .05 level.
++ Treatment-by district interaction is statistically significant at the .01 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001.

Exhibit G-6

Mean Food Energy and Nutrient Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 3			
	Substantive		Non-substantive	
Dietary Component	**Mean**	**SE**	**Mean**	**SE**
Food energy (as % 1989 RDA)	107.91*	(0.65)	90.27	(0.74)
Protein (as % 1989 RDA)	263.29*	(2.09)	215.02	(2.38)
Percent of Food Energy from:				
Total fat	31.62*	(0.14)	32.18	(0.19)
Saturated fat	11.77	(0.07)	11.94	(0.09)
Carbohydrate	55.37	(0.17)	54.83	(0.22)
Protein	14.46	(0.07)	14.42	(0.11)
Vitamins (as percent of RDA)[2]				
Vitamin A	184.36*	(2.19)	133.34	(2.40)
Vitamin C	284.91*	(5.01)	212.55	(5.21)
Vitamin B_6	244.55*	(2.79)	180.98	(2.64)
Vitamin B_{12}	339.63*	(5.37)	247.92	(4.63)
Niacin	227.95*	(2.22)	180.37	(2.30)
Thiamin	269.06*	(2.40)	204.74	(2.42)
Riboflavin	345.95*	(3.04)	254.93	(3.04)
Folate	165.78*	(1.71)	124.55	(1.61)
Minerals (as percent of RDA)[2]				
Calcium	148.93*	(1.44)	112.72	(1.52)
Calcium (as percent of AI)	141.43*	(1.38)	107.10	(1.47)
Iron	200.52*	(2.09)	151.32	(1.77)
Magnesium	146.76*	(1.44)	117.06	(1.55)
Phosphorous	175.82*	(2.18)	139.76	(2.41)
Zinc	188.25*	(2.05)	147.25	(1.96)
Other Dietary Components				
Cholesterol (mg)	229.79*	(3.65)	174.08	(3.26)
Sodium (mg)	3454.19*	(27.90)	2952.23	(31.15)
Fiber (gm)	15.05*	(0.14)	12.73	(0.16)
Fiber (as percent of age-plus-5 gm)	106.37*	(1.01)	89.46	(1.14)
Number of Students[3]	2052		1295	

RDA = Recommended Dietary Allowance

[1] Substantive breakfast eaters consumed a Definition 3 breakfast on a typical school day.

[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[3] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-7

Mean Food Group Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 3			
	Substantive		Non-substantive	
Food Group	Mean	SE	Mean	SE
	Number of Servings[2]			
Grain Products	**8.2***	(0.07)	**6.7**	(0.08)
Whole grains	1.3*	(0.03)	0.9	(0.03)
Non-whole grains	6.9*	(0.07)	5.8	(0.08)
Vegetables	**2.2**	(0.04)	**2.1**	(0.05)
Dark green vegetables	0.1	(0.01)	0.1	(0.01)
Deep yellow vegetables	0.1	(0.01)	0.1	(0.01)
White potatoes	0.9	(0.03)	0.9	(0.04)
Other starchy vegetables	0.2	(0.01)	0.1	(0.01)
Tomatoes	0.4	(0.01)	0.4	(0.01)
Cooked dry beans and peas	0.1	(0.01)	0.1	(0.01)
Other vegetables	0.5	(0.01)	0.5	(0.02)
Fruits	**1.9***	(0.04)	**1.4**	(0.04)
Citrus fruits, melons, and berries	0.8*	(0.02)	0.6	(0.03)
Other fruits	1.1*	(0.03)	0.8	(0.03)
Dairy Products	**2.9***	(0.03)	**2.2**	(0.04)
Milk	2.3*	(0.03)	1.6	(0.03)
Yogurt	0.1	(0.00)	0.0	(0.01)
Cheese	0.6	(0.02)	0.6	(0.02)
Meat and Meat Substitutes	**1.4***	(0.02)	**1.3**	(0.03)
Red meat (beef, pork, veal, lamb, game)	0.6	(0.02)	0.6	(0.02)
Organ meats	0.0	(0.00)	0.0	(0.00)
Frankfurters, sausage, luncheon meats	0.2	(0.01)	0.2	(0.01)
Poultry (chicken, turkey, other)	0.3	(0.01)	0.3	(0.02)
Fish and shellfish	0.1	(0.01)	0.1	(0.01)
Eggs	0.1*	(0.01)	0.0	(0.00)
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)
Nuts and seeds	0.1*	(0.00)	0.1	(0.00)
Other				
Discretionary fat (gm)	63.1*	(0.58)	54.6	(0.66)
Added sugars (tsp)	25.1*	(0.29)	22.8	(0.36)
Number of Students[3]	2052		1295	

[1] Substantive breakfast eaters consumed a Definition 3 breakfast on a typical school day.
[2] Based mainly on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.
[3] Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-8

Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 2				Definition 3			
	Substantive		Non-substantive		Substantive		Non-substantive	
Dietary Component	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**
Food energy	23.19%*	(0.18)	10.47%	(0.31)	25.50%*	(0.19)	12.45%	(0.20)
Macronutrients								
Protein	20.30*	(0.20)	7.86	(0.27)	22.11*	(0.22)	10.53	(0.21)
Total fat	18.52*	(0.23)	8.01	(0.36)	21.08*	(0.27)	8.62	(0.23)
Saturated fat	19.83*	(0.26)	8.22	(0.39)	22.30*	(0.29)	9.46	(0.25)
Carbohydrate	26.79*	(0.20)	12.78	(0.37)	29.02*	(0.23)	15.46	(0.25)
Vitamins								
Vitamin A	40.77*	(0.41)	19.71	(0.79)	42.25*	(0.46)	26.72	(0.61)
Vitamin C	34.99*	(0.50)	15.34	(0.82)	36.27*	(0.58)	22.02	(0.67)
Vitamin B_6	36.78*	(0.37)	15.74	(0.62)	37.90*	(0.42)	23.30	(0.53)
Vitamin B_{12}	34.50*	(0.41)	12.33	(0.65)	36.07*	(0.46)	19.69	(0.56)
Niacin	30.50*	(0.31)	13.88	(0.49)	31.89*	(0.35)	19.06	(0.41)
Thiamin	34.70*	(0.28)	16.12	(0.48)	36.50*	(0.31)	21.52	(0.40)
Riboflavin	37.82*	(0.29)	16.87	(0.54)	39.52*	(0.33)	23.48	(0.44)
Folate	36.65*	(0.33)	17.31	(0.57)	38.16*	(0.37)	23.50	(0.47)
Minerals								
Calcium	31.36*	(0.31)	12.07	(0.48)	33.10*	(0.35)	17.87	(0.41)
Iron	36.27*	(0.33)	16.73	(0.55)	37.68*	(0.38)	23.18	(0.47)
Magnesium	26.50*	(0.22)	10.77	(0.34)	28.29*	(0.25)	14.91	(0.28)
Phosphorous	26.41*	(0.23)	10.29	(0.35)	28.31*	(0.26)	14.43	(0.29)
Zinc	31.22*	(0.34)	12.76	(0.51)	32.35*	(0.38)	19.16	(0.46)

Exhibit G-8 (continued)

Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 2				Definition 3			
	Substantive		Non-substantive		Substantive		Non-substantive	
Dietary Component	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**
Other Dietary Components								
Cholesterol	20.69*	(0.39)	7.79	(0.52)	23.44*	(0.47)	9.17	(0.37)
Sodium	19.58*	(0.21)	8.29	(0.32)	21.46*	(0.25)	10.32	(0.22)
Fiber	20.32*	(0.25)	9.28	(0.35)	22.04*	(0.29)	11.46	(0.29)
Number of Students[2]	2627		720		2052		1295	

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.
[2] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the 0.05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-9

Weight Status: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 4			
	Substantive[2]		Non-substantive	
Variable	**Percent**	**SE**	**Percent**	**SE**
BMI percentile	63.87%	(1.16)	63.12%	(0.55)
At risk of overweight	32.59	(1.94)	32.12	(0.89)
Overweight	17.92	(1.59)	16.41	(0.71)
Number of Students	591		2756	

[1] BMI percentiles, based on students' age and gender, were determined using methods and growth curves published by the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), 2000. A BMI at or above the 95th percentile identifies students who are overweight; and a BMI at or above the 85th percentile identifies those at risk for overweight (which includes overweight students).

[2] Substantive breakfast eaters consumed food from at least three major food groups and more than 25 percent of the RDA for food energy on a typical school day.

None of the differences between substantive and non-substantive breakfast eaters is statistically significant.

Source: Impact Study–Height and Weight Measurements, Spring 2001

BREAKFAST SKIPPERS

Exhibit G-10

Percent of Students Who Usually Skip Breakfast, by District[1]

District	Breakfast Skippers N	Breakfast Skippers Percent	Breakfast Skippers SE
All	172	5.03%	(0.37)
A	23	8.21	(1.64)
B	35	6.76	(1.10)
C	16	6.64	(1.61)
D	32	3.72	(0.65)
E	49	3.76	(0.53)
F	17	7.73	(1.80)

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Differences were not tested for statistical significance.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-11

Demographic Characteristics: Breakfast Skippers vs. Breakfast Non-Skippers[1]

Characteristic	Breakfast Skippers		Breakfast Non-Skippers	
	Value	SE	Value	SE
School Meals Eligibility Status				
Percent free/reduced price eligible	51.76	(3.84)	50.76	(0.88)
Ethnicity				
Percent minority	46.43*	(3.86)	36.63	(0.85)
Gender				
Percent female	50.58	(3.82)	51.18	(0.88)
Age				
Average age	9.99	(0.10)	9.77	(0.02)
Household Size				
Average number people in household	4.50	(0.12)	4.54	(0.02)
Average number children in household	2.50	(0.09)	2.56	(0.02)
Income				
Percent < $20,000 per year	21.95	(3.24)	17.91	(0.68)
Percent > $70,000 per year	18.90	(3.07)	21.58	(0.73)
Percent two-income households	51.76	(3.84)	50.86	(0.88)
Family Structure				
Percent single-parent families	27.33	(3.41)	24.65	(0.76)
Education of Parent/Guardian				
Percent without a high school degree	13.33	(2.65)	10.74	(0.55)
Percent college degree or above	19.39	(3.09)	24.26	(0.76)
Number of Students	172		3249	

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

* Difference between breakfast skippers and non-breakfast skippers is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-12

Percent of Students Whose Usual 24-Hour Intake Met Dietary Recommendations: Breakfast Skippers vs. Breakfast Non-Skippers[1]

Dietary Component	Breakfast Skippers		Breakfast Non-Skippers	
	Percent	SE	Percent	SE
Percent of Food Energy				
No more than 30% from total fat	20.63%	(15.40)	24.12%	(8.66)
Less than 10% from saturated fat	4.59	(16.70)	3.20	(8.25)
More than 55% from carbohydrate	37.65	(11.20)	52.46	(1.79)
No more than twice the 1989 RDA for protein	16.26	(41.78)	19.91	(3.90)
Other Dietary Components				
No more than 300 mg cholesterol	87.19	(14.20)	93.88	(6.80)
No more than 2,400 mg sodium	6.09	(25.80)	4.90	(3.75)
Age plus 5 gm or more dietary fiber	34.94	(6.93)	48.84	(1.57)
	169		3143	

RDA = Recommended Dietary Allowance

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-13

Cognitive Outcomes: Breakfast Skippers vs. Non-Breakfast Skippers[1]

	Breakfast Skippers		Non-Breakfast Skippers	
Outcome	**Mean**	**SE**	**Mean**	**SE**
Stimulus Discrimination				
Number of trials completed	73.29	(0.18)	73.05	(0.03)
Trial time (sec)	4.34	(0.11)	4.45	(0.02)
Decision time (sec)	3.75	(0.10)	3.87	(0.02)
Digit Span				
Scaled scores	9.14	(0.23)	9.28	(0.05)
Verbal Fluency				
Animals	15.45	(0.39)	15.52	(0.07)
Things to eat	14.81	(0.40)	14.44	(0.08)
Total score	30.25	(0.70)	29.95	(0.14)
Number of Students	177		4181	

[1] Breakfast-skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on the day of cognitive testing.

None of the differences is statistically significant.

Source: Impact Study—Cognitive Measures, Spring 2001

BREAKFAST SOURCE

Exhibit G-14

Percent of Students Eating a Substantive Breakfast on a Typical School Day, by Source of Breakfast

Breakfast Type[1]	Home Only		School Only		Home and School		Significant Differences
	Percent	SE	Percent	SE	Percent	SE	
Food from at least two main food groups[2] and >10% RDA for food energy (Definition 2)	75.31%	(1.01)	84.77%	(1.30)	96.68%	(0.84)	a,b,c
Food from at least two main food groups[2] and >15% RDA for food energy (Definition 3)	57.66	(1.15)	57.16	(1.79)	91.37	(1.32)	b,c
Number of Students[3]	1835		768		452		

RDA = Recommended Dietary Allowance

[1] Both definitions of breakfast are based on all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.
[2] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.
[3] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

a Difference between Home Only and School Only is statistically significant at the .05 level.
b Difference between Home Only and Home and School is statistically significant at the .05 level.
c Difference between School Only and Home and School is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-15

Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours, by Source of Breakfast

Dietary Component	Home Only Mean	Home Only SE	School Only Mean	School Only SE	Home and School Mean	Home and School SE	Significant Differences
Food energy	20.17%	(0.22)	18.34%	(0.28)	27.91%	(0.47)	a,b,c
Macronutrients:							
Protein	17.35	(0.24)	16.08	(0.30)	24.20	(0.52)	a,b,c
Total fat	15.71	(0.28)	14.28	(0.36)	22.59	(0.62)	a,b,c
Saturated fat	17.26	(0.31)	14.16	(0.36)	23.97	(0.67)	a,b,c
Carbohydrate	23.59	(0.26)	21.78	(0.34)	32.11	(0.51)	a,b,c
Vitamins							
Vitamin A	36.40	(0.53)	35.66	(0.72)	46.02	(0.96)	b,c
Vitamin C	29.06	(0.62)	32.82	(0.89)	40.38	(1.17)	a,b,c
Vitamin B_6	32.93	(0.49)	30.31	(0.62)	40.55	(0.85)	a,b,c
Vitamin B_{12}	30.18	(0.54)	27.65	(0.67)	38.39	(0.95)	a,b,c
Niacin	27.77	(0.40)	24.36	(0.49)	33.36	(0.73)	a,b,c
Thiamin	31.31	(0.37)	28.47	(0.47)	38.06	(0.68)	a,b,c
Riboflavin	33.76	(0.40)	31.44	(0.50)	42.31	(0.68)	a,b,c
Folate	33.69	(0.43)	29.39	(0.55)	39.99	(0.78)	a,b,c
Minerals:							
Calcium	26.74	(0.40)	26.76	(0.52)	36.56	(0.76)	b,c
Iron	33.24	(0.44)	29.29	(0.53)	39.13	(0.79)	a,b,c
Magnesium	22.89	(0.29)	21.66	(0.35)	31.63	(0.56)	b,c
Phosphorous	22.32	(0.30)	22.15	(0.37)	31.40	(0.59)	b,c
Zinc	27.74	(0.45)	25.50	(0.53)	34.78	(0.80)	a,b,c
Other Dietary Components							
Cholesterol (mg)	18.89	(0.48)	13.06	(0.54)	23.03	(0.93)	a,b,c
Sodium (mg)	17.39	(0.27)	15.04	(0.32)	22.36	(0.53)	a,b,c
Fiber (gm)	18.10	(0.31)	15.91	(0.40)	24.30	(0.59)	a,b,c
Number of Students[1]	1835		768		452		

[1] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

a Difference between Home Only and School Only is statistically significant at the .05 level.
b Difference between Home Only and Home and School is statistically significant at the .05 level.
c Difference between School Only and Home and School is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

BREAKFAST LOCATION

Exhibit G-16

Mean Food Energy and Nutrient Intake at Breakfast, by Availability of Breakfast at School

	Treatment Schools				Control Schools		
	Classroom		Non-classroom[1]		Non-classroom[1]		Significant Differences
Dietary Component	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	
Food energy (as % 1989 RDA)	22.45	(0.61)	20.54	(0.35)	20.33	(0.30)	a,b
Protein (as % 1989 RDA)	44.44	(1.56)	42.64	(0.82)	41.53	(0.74)	
Percent of Food Energy from:							
Total fat	26.19	(0.59)	23.37	(0.35)	23.79	(0.32)	a,b
Saturated fat	9.98	(0.26)	9.31	(0.16)	9.52	(0.15)	
Carbohydrate	63.26	(0.70)	66.03	(0.41)	66.08	(0.40)	a,b
Protein	11.78	(0.22)	12.52	(0.14)	12.06	(0.13)	a,c
Vitamins (as percent of RDA)[2]							
Vitamin A	56.84	(2.53)	63.24	(1.50)	60.06	(1.28)	
Vitamin C	72.41	(4.60)	87.19	(3.04)	84.63	(2.83)	a
Vitamin B_6	67.26	(3.40)	80.17	(2.09)	77.77	(1.86)	a,b
Vitamin B_{12}	89.01	(4.88)	97.44	(2.78)	98.28	(2.72)	
Niacin	52.93	(2.29)	60.53	(1.50)	59.16	(1.32)	a
Thiamin	72.94	(2.65)	78.59	(1.59)	77.17	(1.48)	
Riboflavin	102.05	(3.90)	111.31	(2.19)	108.16	(2.05)	
Folate	44.29	(1.86)	52.36	(1.16)	50.75	(1.06)	a,b
Minerals (as percent of RDA)[2]							
Calcium	37.63	(1.42)	37.90	(0.76)	35.39	(0.68)	c
Calcium (as percent of AI)	35.57	(1.36)	36.10	(0.73)	33.61	(0.64)	c
Iron	56.85	(2.31)	64.65	(1.65)	63.59	(1.52)	
Magnesium	29.23	(1.07)	33.49	(0.77)	31.36	(0.62)	a
Phosphorous	38.33	(1.67)	39.32	(0.94)	36.47	(0.79)	c
Zinc	44.98	(2.38)	53.38	(1.44)	50.72	(1.31)	a
Other Dietary Components							
Cholesterol (mg)	39.31	(4.19)	43.05	(2.40)	51.45	(2.84)	
Sodium (mg)	596.11	(20.74)	530.07	(11.16)	544.73	(11.66)	a
Fiber (gm)	2.23	(0.08)	2.65	(0.07)	2.54	(0.06)	a
Fiber (as percent of age-plus-5 gm)	15.60	(0.56)	18.72	(0.50)	17.90	(0.43)	a,b
Number of Students[3]	420		1279		1648		

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.
[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).
[3] Includes students who skipped breakfast.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.
b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.
c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-17

Mean Food Group Intake at Breakfast, by Availability of Breakfast at School

	Treatment Schools				Control Schools		
	Classroom		Non-classroom[1]		Non-classroom[1]		Significant Differences
Food Group	Mean	SE	Mean	SE	Mean	SE	
	Number of Servings[2]						
Grain Products	**2.0**	(0.06)	**1.7**	(0.04)	**1.7**	(0.03)	a,b
Whole grains	0.3	(0.03)	0.5	(0.02)	0.5	(0.02)	a,b
Non-whole grains	1.7	(0.06)	1.2	(0.04)	1.2	(0.03)	a,b
Vegetables	**0.0**	(0.01)	**0.0**	(0.01)	**0.0**	(0.01)	
Dark green vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Deep yellow vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
White potatoes	0.0	(0.00)	0.0	(0.01)	0.0	(0.00)	
Other starchy vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Tomatoes	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	b
Cooked dry beans and peas	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Other vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Fruits	**0.6**	(0.03)	**0.5**	(0.02)	**0.5**	(0.02)	
Citrus fruits, melons, and berries	0.3	(0.02)	0.3	(0.01)	0.3	(0.01)	
Other fruits	0.3	(0.02)	0.2	(0.01)	0.2	(0.01)	b
Dairy Products	**0.8**	(0.03)	**0.8**	(0.02)	**0.8**	(0.02)	c
Milk	0.8	(0.03)	0.8	(0.02)	0.7	(0.02)	
Yogurt	0.0	(0.01)	0.0	(0.00)	0.0	(0.00)	b
Cheese	0.0	(0.01)	0.0	(0.00)	0.0	(0.00)	
Meat and Meat Substitutes	**0.1**	(0.01)	**0.1**	(0.01)	**0.1**	(0.01)	
Red meat (beef, pork, veal, lamb, game)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Frankfurters, sausage, luncheon meats	0.0	(0.01)	0.0	(0.00)	0.0	(0.00)	a,b
Poultry (chicken, turkey, other)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Fish and shellfish	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Eggs	0.0	(0.01)	0.0	(0.00)	0.1	(0.01)	b
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	b
Nuts and seeds	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Other							
Discretionary fat (gm)	10.2	(0.43)	9.5	(0.27)	9.3	(0.23)	
Added sugars (tsp)	5.6	(0.24)	5.0	(0.13)	5.1	(0.13)	
Number of Students[3]	420		1279		1648		

[1] Non-classroom locations are primarily school cafeterias.
[2] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.
[3] Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.
b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.
c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-18

Mean Food Group Intake Over 24 Hours, by Availability of Breakfast at School

	Treatment Schools				Control Schools		
	Classroom		Non-classroom[1]		Non-classroom[1]		
Food Group	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	**Significant Differences**
	Number of Servings[2]						
Grain Products	**7.5**	(0.15)	**7.5**	(0.09)	**7.6**	(0.09)	
Whole grains	1.0	(0.06)	1.2	(0.04)	1.1	(0.03)	a
Non-whole grains	6.5	(0.14)	6.4	(0.08)	6.5	(0.08)	
Vegetables	**2.1**	(0.08)	**2.1**	(0.05)	**2.2**	(0.04)	
Dark green vegetables	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	
Deep yellow vegetables	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	a,b
White potatoes	0.9	(0.06)	0.8	(0.04)	0.9	(0.03)	c
Other starchy vegetables	0.2	(0.02)	0.1	(0.01)	0.1	(0.01)	
Tomatoes	0.4	(0.02)	0.4	(0.01)	0.4	(0.01)	
Cooked dry beans and peas	0.1	(0.02)	0.1	(0.01)	0.1	(0.01)	
Other vegetables	0.5	(0.03)	0.5	(0.02)	0.5	(0.02)	
Fruits	**1.7**	(0.07)	**1.7**	(0.04)	**1.7**	(0.04)	
Citrus fruits, melons, and berries	0.6	(0.04)	0.7	(0.03)	0.7	(0.03)	
Other fruits	1.0	(0.06)	1.0	(0.03)	1.0	(0.03)	
Dairy Products	**2.5**	(0.07)	**2.7**	(0.04)	**2.7**	(0.04)	
Milk	1.9	(0.06)	2.0	(0.03)	2.0	(0.03)	
Yogurt	0.1	(0.01)	0.1	(0.01)	0.0	(0.00)	
Cheese	0.6	(0.03)	0.6	(0.02)	0.6	(0.02)	
Meat and Meat Substitutes	**1.5**	(0.05)	**1.3**	(0.03)	**1.4**	(0.02)	a
Red meat (beef, pork, veal, lamb, game)	0.6	(0.04)	0.5	(0.02)	0.6	(0.02)	
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Frankfurters, sausage, luncheon meats	0.2	(0.02)	0.2	(0.01)	0.2	(0.01)	
Poultry (chicken, turkey, other)	0.4	(0.03)	0.3	(0.02)	0.3	(0.01)	
Fish and shellfish	0.1	(0.03)	0.1	(0.01)	0.1	(0.01)	
Eggs	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	b
Soybean products (tofu, meat analogues)	0.0	(0.01)	0.0	(0.00)	0.0	(0.00)	
Nuts and seeds	0.1	(0.01)	0.1	(0.01)	0.1	(0.00)	
Other							
Discretionary fat (gm)	60.4	(1.20)	58.8	(0.72)	60.4	(0.64)	
Added sugars (tsp)	24.9	(0.65)	24.0	(0.36)	24.2	(0.32)	
Number of Students[3]	420		1279		1648		

[1] Non-classroom locations are primarily school cafeterias.

[2] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[3] Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.
b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.
c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-19

Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours, by Availability of Breakfast at School

	Treatment Schools				Control Schools		
	Classroom		Non-classroom[1]		Non-classroom[1]		Significant Differences
Dietary Component	**Mean**	**SE**	**Mean**	**SE**	**Mean**	**SE**	
Food energy	22.21%	(0.52)	20.55%	(0.29)	19.93%	(0.25)	a,b
Macronutrients:							
Protein	18.81	(0.56)	18.11	(0.30)	16.95	(0.26)	b,c
Total fat	18.66	(0.60)	16.09	(0.35)	15.78	(0.30)	a,b
Saturated fat	19.50	(0.65)	17.25	(0.38)	16.85	(0.33)	a,b
Carbohydrate	25.19	(0.59)	23.90	(0.33)	23.32	(0.29)	b
Vitamins							
Vitamin A	36.94	(1.15)	36.91	(0.63)	35.55	(0.56)	
Vitamin C	31.06	(1.25)	31.68	(0.73)	29.97	(0.65)	
Vitamin B_6	30.30	(0.96)	33.51	(0.57)	31.78	(0.50)	a
Vitamin B_{12}	29.85	(1.07)	30.54	(0.61)	29.08	(0.56)	
Niacin	25.98	(0.77)	27.70	(0.47)	26.56	(0.41)	
Thiamin	30.77	(0.75)	31.19	(0.44)	30.31	(0.39)	
Riboflavin	33.50	(0.83)	34.06	(0.47)	32.68	(0.42)	
Folate	30.88	(0.86)	33.19	(0.50)	32.35	(0.46)	
Minerals:							
Calcium	29.19	(0.88)	28.08	(0.47)	26.02	(0.42)	b,c
Iron	30.84	(0.83)	32.79	(0.52)	31.82	(0.46)	
Magnesium	23.44	(0.60)	23.89	(0.35)	22.43	(0.32)	c
Phosphorous	24.95	(0.66)	23.59	(0.36)	21.93	(0.32)	b,c
Zinc	25.80	(0.86)	28.74	(0.51)	26.46	(0.45)	a,c
Other Dietary Components							
Cholesterol (mg)	17.40	(0.90)	17.79	(0.54)	18.15	(0.50)	
Sodium (mg)	18.77	(0.57)	17.00	(0.32)	16.86	(0.28)	a,b
Fiber (gm)	17.50	(0.58)	18.41	(0.37)	17.70	(0.33)	
Number of Students[2]	420		1279		1648		

[1] Non-classroom locations are primarily school cafeterias.
[2] Includes students who skipped breakfast.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.
b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.
c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-20

Percent of Students Whose Usual 24-Hour Food Energy and Nutrient Intakes Met Standard for Dietary Adequacy, by Availability of Breakfast at School[1]

	Treatment Schools				Control Schools	
	Classroom		Non-classroom[2]		Non-classroom[2]	
Dietary Component	**Percent**	**SE**	**Percent**	**SE**	**Percent**	**SE**
Food energy	90.65%	(9.88)	93.37%	(6.70)	94.38%	(5.17)
Protein	99.99	(0.28)	99.99	(0.06)	100.00	(0.00)
Vitamins						
Vitamin A	96.23	(6.57)	99.45	(1.49)	97.75	(2.41)
Vitamin C	94.80	(5.22)	99.13	(2.47)	99.83	(0.33)
Vitamin B_6	99.96	(0.12)	99.84	(0.44)	99.80	(0.36)
Vitamin B_{12}	100.00	(0.00)	99.88	(0.26)	100.00	(0.00)
Niacin	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Thiamin	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Riboflavin	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Folate	95.87	(7.88)	99.52	(2.12)	97.61	(2.65)
Minerals						
Calcium	86.47	(3.91)	96.81	(5.65)	96.84	(4.27)
Iron	99.91	(1.31)	100.00	(0.00)	100.00	(0.00)
Magnesium	89.89	(11.48)	93.15	(4.79)	94.34	(4.20)
Phosphorous	88.15	(5.81)	94.40	(5.00)	94.32	(4.26)
Zinc	99.58	(2.92)	97.53	(2.14)	99.34	(1.58)
Number of Students[3]	420		1279		1648	

[1] For vitamins and minerals, except calcium, the Estimated Average Requirements (EARs) based on DRIs are used as standards. There is no EAR for total food energy, protein, or calcium. For energy, protein, and calcium, 80 percent of the 1989 RDA was used as an approximation of the estimated average requirements.
[2] Non-classroom locations are primarily school cafeterias.
[3] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-21

24-Hour Usual Intake Distributions for Food Energy, Protein, and Calcium, by Availability of Breakfast at School

	Treatment Schools				Control Schools		
	Classroom		Non-classroom[1]		Non-classroom[1]		Significant Differences
Dietary Component	Value	SE	Value	SE	Value	SE	
Food Energy (as % RDA)							
Mean	102	(0.82)	100	(0.40)	103	(0.37)	c
Percentile:							
5th	77	(5.30)	78	(3.41)	79	(3.07)	
10th	81	(4.08)	83	(2.78)	84	(2.50)	
25th	90	(2.48)	90	(1.66)	92	(1.48)	
50th	100	(1.36)	100	(0.78)	102	(0.70)	c
75th	112	(3.06)	110	(1.93)	112	(1.73)	
90th	123	(5.99)	119	(3.71)	122	(3.34)	
95th	131	(8.54)	125	(4.94)	129	(4.45)	
Protein (as % RDA)							
Mean	241	(2.30)	242	(1.48)	248	(1.11)	b,c
Percentile:							
5th	170	(15.30)	164	(7.97)	180	(8.75)	
10th	183	(12.80)	179	(6.62)	193	(7.28)	
25th	207	(8.00)	205	(4.11)	216	(4.50)	
50th	237	(4.10)	238	(2.25)	245	(2.18)	c
75th	270	(10.00)	274	(5.21)	277	(5.40)	
90th	303	(19.10)	311	(10.40)	308	(10.30)	
95th	324	(25.30)	336	(14.30)	327	(13.60)	
Calcium (as % AI)							
Mean	120	(2.08)	129	(0.85)	129	(0.67)	a,b
Percentile:							
5th	60	(5.70)	84	(5.79)	88	(5.73)	a,b
10th	70	(5.04)	92	(4.86)	96	(4.76)	
25th	89	(3.62)	108	(3.06)	110	(2.93)	
50th	115	(2.58)	127	(1.55)	127	(1.39)	a,b
75th	145	(5.04)	148	(3.72)	146	(3.58)	
90th	177	(9.37)	169	(7.04)	165	(7.00)	
95th	197	(12.60)	183	(9.34)	177	(9.39)	
Number of Students[2]	420		1279		1648		

RDA = Recommended Dietary Allowance
AI = Adequate Intake

[1] Non-classroom locations are primarily school cafeterias.
[2] Includes students who skipped breakfast.

Table reads: "Percentile: 95 percent of students in treatment schools with classroom breakfast (i.e., students at the 5th percentile) have a usual food energy intake of at least 77 percent of the RDA. Similarly, 90 percent of students in schools offering breakfast in the classroom (i.e., students at the 10th percentile) have a usual food energy intake of at least 81 percent of the RDA."

Notes: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

Differences between means and the 5th, 50th and 95th percentile values were tested for statistical significance.

a Difference between Treatment Classroom and Treatment Non-classroom is statistically significant at the .05 level.
b Difference between Treatment Classroom and Control Non-classroom is statistically significant at the .05 level.
c Difference between Treatment Non-classroom and Control Non-classroom is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-22

Percent of Students Whose Usual 24-Hour Intake Met Dietary Recommendations, by Availability of Breakfast at School

	Treatment Schools				Control Schools	
	Classroom		Non-classroom[1]		Non-classroom[1]	
Dietary Component	**Percent**	**SE**	**Percent**	**SE**	**Percent**	**SE**
Percent of Food Energy						
No more than 30% from total fat	3.57%	(62.30)	22.59%	(25.50)	28.95%	(4.71)
Less than 10% from saturated fat	3.33	(19.70)	0.77	(10.20)	4.71	(9.71)
More than 55% from carbohydrate	43.30	(7.21)	55.88	(3.84)	50.21	(2.12)
No more than twice the 1989 RDA for protein	20.10	(8.62)	22.21	(6.14)	19.85	(15.44)
Other Dietary Components						
No more than 300 mg cholesterol	92.27	(12.20)	94.67	(9.04)	91.52	(10.20)
No more than 2,400 mg sodium	6.06	(9.82)	6.04	(5.99)	3.18	(5.24)
More than (age-plus-5 gm) dietary fiber	35.40	(10.60)	49.79	(2.07)	49.47	(2.26)
Number of Students[2]	420		1279		1648	

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.
[2] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

HOUSEHOLD INCOME

Exhibit G-23

Percent of Students Eating Breakfast on the Target Day, by Household Income, Relative to the Federal Poverty Level

Breakfast Type[1]	<130%		<130%-185%		>185%	
	Percent	**SE**	**Percent**	**SE**	**Percent**	**SE**
Any food or beverage (Definition 1)	96.42%	(0.62)	98.24%	(0.58)	97.27%	(0.38)
Food from at least two main food groups[2] and >10% RDA for food energy (Definition 2)	79.40	(1.35)	81.02	(1.74)	78.72	(0.95)
Food from at least two main food groups[2] and >15% RDA for food energy (Definition 3)	62.93	(1.62)	62.62	(2.14)	62.22	(1.12)
Number of Students[3]	893		511		1866	

RDA = Recommended Dietary Allowance

[1] All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

[2] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

[3] Includes students who skipped breakfast.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-24a

Mean Food Energy and Nutrient Intake at Breakfast: Students with Household Income Below 130 Percent of Federal Poverty Level

	Unadjusted Means (Standard Errors)				Results of Impact Models	
Dietary Component	**Treatment Schools**		**Control Schools**		**Impact**	**Effect Size**
Food Energy (as % 1989 RDA)	21.27	(0.63)	19.82	(0.56)	1.55	0.12
Protein (as % 1989 RDA)	42.27	(1.37)	40.47	(1.33)	2.49	0.09
Percent of Food Energy from:						
Total fat	24.68	(0.61)	23.93	(0.62)	0.73	0.06
Saturated fat	9.98	(0.29)	9.57	(0.27)	0.60	0.11
Carbohydrate	64.82	(0.71)	65.85	(0.74)	-1.10	-0.07
Protein	12.25	(0.23)	11.96	(0.24)	0.36	0.08
Vitamins (as percent of RDA)[1]						
Vitamin A	61.16	(2.51)	53.71	(2.17)	8.81*	0.18
Vitamin C	83.16	(4.94)	83.17	(5.12)	1.02	0.01
Vitamin B_6	80.14	(3.73)	70.96	(3.32)	11.50*	0.16
Vitamin B_{12}	101.80	(4.79)	83.60	(4.34)	22.20**	0.23
Niacin	58.54	(2.51)	54.09	(2.29)	6.06	0.12
Thiamin	77.14	(2.82)	72.54	(2.68)	6.78	0.12
Riboflavin	109.88	(3.87)	101.11	(3.79)	12.10*	0.15
Folate	49.11	(1.86)	46.50	(1.78)	3.92	0.10
Minerals (as percent of RDA)[1]						
Calcium	38.26	(1.22)	34.63	(1.25)	4.70**	0.18
Calcium (as percent of AI)	36.38	(1.17)	32.88	(1.19)	4.62**	0.19
Iron	59.37	(2.56)	58.05	(2.46)	1.57	0.03
Magnesium	32.59	(1.18)	30.21	(1.14)	3.37*	0.14
Phosphorous	38.91	(1.56)	35.01	(1.49)	5.61**	0.18
Zinc	47.64	(2.12)	46.60	(2.20)	2.12	0.05
Other Dietary Components						
Cholesterol (mg)	39.98	(3.92)	43.99	(4.46)	-3.80	-0.04
Sodium (mg)	510.21	(20.37)	504.90	(18.02)	3.66	0.01
Fiber (gm)	2.51	(0.12)	2.38	(0.10)	0.12	0.05
Fiber (as percent of age-plus-5 gm)	17.65	(0.82)	16.81	(0.72)	0.89	0.06
Number of Students[2]	445		427			

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the Recommended Dietary Allowances (RDAs) based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.
** Difference is statistically significant at the .01 level.

Source: Impact Study – 24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-24b

Mean Food Energy and Nutrient Intake at Breakfast: Students with Household Income Between 130 and 185 Percent of Federal Poverty Level

Dietary Component	Unadjusted Means (Standard Errors)				Results of Impact Models	
	Treatment Schools		Control Schools		Impact	Effect Size
Food Energy (as % 1989 RDA)	20.97	(0.78)	21.97	(0.79)	-0.64	-0.05
Protein (as % 1989 RDA)	44.07	(1.95)	45.42	(1.91)	-0.76	-0.02
Percent of Food Energy from:						
Total fat	23.98	(0.82)	25.53	(0.84)	-2.30	-0.18
Saturated fat	9.33	(0.35)	10.30	(0.37)	-1.20	-0.21
Carbohydrate	65.53	(0.97)	63.83	(1.00)	2.54	0.16
Protein	12.29	(0.30)	12.33	(0.29)	-0.06	-0.01
Vitamins (as percent of RDA)[1]						
Vitamin A	69.29	(3.81)	63.57	(3.22)	7.97	0.14
Vitamin C	90.14	(6.75)	85.23	(7.00)	8.04	0.07
Vitamin B_6	83.45	(4.72)	82.67	(4.59)	2.75	0.04
Vitamin B_{12}	104.40	(6.57)	104.32	(6.81)	2.10	0.02
Niacin	61.15	(3.20)	61.47	(3.24)	0.56	0.01
Thiamin	79.09	(3.61)	80.57	(3.53)	-0.51	-0.01
Riboflavin	113.01	(5.17)	114.65	(4.99)	0.73	0.01
Folate	51.38	(2.47)	52.04	(2.59)	0.66	0.02
Minerals (as percent of RDA)[1]						
Calcium	38.31	(1.78)	37.17	(1.69)	2.02	0.07
Calcium (as percent of AI)	36.36	(1.70)	35.34	(1.61)	1.84	0.07
Iron	64.58	(3.27)	66.79	(3.86)	-0.48	-0.01
Magnesium	32.27	(1.60)	33.43	(1.55)	-0.49	-0.02
Phosphorous	39.29	(2.26)	39.59	(1.98)	0.14	0.00
Zinc	55.06	(3.20)	55.34	(3.47)	1.54	0.03
Other Dietary Components						
Cholesterol (mg)	42.96	(5.68)	69.11	(9.16)	-24.00*	-0.20
Sodium (mg)	549.92	(24.30)	594.98	(30.33)	-42.00	-0.10
Fiber (gm)	2.53	(0.14)	2.65	(0.18)	-0.07	-0.03
Fiber (as percent of age-plus-5 gm)	17.97	(0.97)	18.70	(1.22)	-0.41	-0.02
Number of Students[2]	251		257			

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the Recommended Dietary Allowances (RDAs) based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study – 24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-24c

Mean Food Energy and Nutrient Intake at Breakfast: Students with Household Income Above 185 Percent of Federal Poverty Level

	Unadjusted Means (Standard Errors)				Results of Impact Models	
Dietary Component	**Treatment Schools**		**Control Schools**		**Impact**	**Effect Size**
Food Energy (as % 1989 RDA)	20.87	(0.40)	20.16	(0.42)	0.84	0.07
Protein (as % 1989 RDA)	43.35	(0.98)	41.26	(1.04)	2.04	0.07
Percent of Food Energy from:						
Total fat	23.84	(0.39)	23.20	(0.44)	0.44	0.04
Saturated fat	9.29	(0.17)	9.26	(0.20)	-0.08	-0.01
Carbohydrate	65.48	(0.47)	66.84	(0.56)	-1.20	-0.08
Protein	12.41	(0.16)	12.06	(0.18)	0.28	0.06
Vitamins (as percent of RDA)[1]						
Vitamin A	60.27	(1.69)	61.72	(1.82)	-0.75	-0.01
Vitamin C	81.78	(3.48)	86.23	(4.07)	-4.60	-0.04
Vitamin B_6	74.41	(2.34)	79.33	(2.65)	-4.10	-0.05
Vitamin B_{12}	91.31	(3.25)	102.56	(3.98)	-10.00*	-0.09
Niacin	58.25	(1.72)	60.86	(1.90)	-1.80	-0.03
Thiamin	76.93	(1.78)	78.44	(2.10)	-0.76	-0.01
Riboflavin	108.07	(2.53)	109.64	(2.88)	-0.86	-0.01
Folate	50.79	(1.39)	52.38	(1.54)	-1.20	-0.03
Minerals (as percent of RDA)[1]						
Calcium	37.66	(0.93)	35.46	(0.95)	2.17	0.08
Calcium (as percent of AI)	35.83	(0.89)	33.65	(0.90)	2.10	0.08
Iron	63.80	(1.93)	65.67	(2.21)	-1.20	-0.02
Magnesium	32.61	(0.90)	31.37	(0.87)	1.15	0.04
Phosphorous	39.24	(1.11)	36.33	(1.09)	2.44	0.07
Zinc	51.98	(1.77)	51.78	(1.88)	0.44	0.01
Other Dietary Components						
Cholesterol (mg)	42.77	(2.82)	49.90	(3.80)	-6.90	-0.07
Sodium (mg)	559.77	(12.87)	553.56	(17.18)	9.49	0.02
Fiber (gm)	2.57	(0.08)	2.60	(0.09)	-0.02	-0.01
Fiber (as percent of age-plus-5 gm)	18.14	(0.54)	18.28	(0.60)	-0.14	-0.01
Number of Students[2]	937		900			

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the Recommended Dietary Allowances (RDAs) based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study – 24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-25

Mean Food Group Intake at Breakfast, by Household Income, Relative to the Federal Poverty Level

Food Group	<130%		130-185%		>185%		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
			Number of Servings[1]				
Grain Products	**1.7**	(0.05)	**1.8**	(0.06)	**1.8**	(0.03)	
Whole grains	0.4	(0.02)	0.5	(0.04)	0.5	(0.02)	
Non-whole grains	1.3	(0.04)	1.3	(0.06)	1.3	(0.03)	
Vegetables	**0.0**	(0.01)	**0.0**	(0.01)	**0.0**	(0.00)	
Dark green vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Deep yellow vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
White potatoes	0.0	(0.01)	0.0	(0.01)	0.0	(0.00)	
Other starchy vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Tomatoes	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Cooked dry beans and peas	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Other vegetables	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Fruits	**0.6**	(0.02)	**0.5**	(0.03)	**0.5**	(0.02)	a,b
Citrus fruits, melons, and berries	0.3	(0.02)	0.3	(0.02)	0.3	(0.01)	
Other fruits	0.3	(0.02)	0.2	(0.02)	0.2	(0.01)	a,b
Dairy Products	**0.8**	(0.02)	**0.8**	(0.03)	**0.8**	(0.02)	
Milk	0.7	(0.02)	0.8	(0.03)	0.8	(0.02)	
Yogurt	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Cheese	0.0	(0.00)	0.0	(0.01)	0.0	(0.00)	
Meat and Meat Substitutes	**0.1**	(0.01)	**0.1**	(0.01)	**0.1**	(0.01)	a
Red meat (beef, pork, veal, lamb, game)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Frankfurters, sausage, luncheon meats	0.0	(0.01)	0.0	(0.01)	0.0	(0.00)	
Poultry (chicken, turkey, other)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Fish and shellfish	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Eggs	0.0	(0.00)	0.1	(0.01)	0.0	(0.00)	a
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Nuts and seeds	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Other							
Discretionary fat (gm)	9.6	(0.30)	10.1	(0.42)	9.3	(0.21)	
Added sugars (tsp)	4.9	(0.16)	5.4	(0.23)	5.4	(0.12)	
Number of Students[2]	893		511		1866		

[1] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[2] Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

a Difference between <130% and 130-185% is statistically significant at the .05 level.
b Difference between <130% and >185% is statistically significant at the .05 level.
c Difference between 130-185% and >185% is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-26

Mean Food Energy and Nutrient Intake Over 24 Hours, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130%		130-185%		>185%		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
Food energy (as % 1989 RDA)	99.52	(0.99)	101.70	(1.29)	101.59	(0.70)	
Protein (as % 1989 RDA)	247.35	(3.10)	247.55	(4.17)	242.54	(2.22)	
Percent of Food Energy from:							
Total fat	31.63	(0.23)	32.35	(0.28)	31.79	(0.15)	
Saturated fat	11.86	(0.11)	11.92	(0.13)	11.80	(0.08)	
Carbohydrate	54.95	(0.27)	54.63	(0.34)	55.40	(0.18)	
Protein	14.80	(0.12)	14.44	(0.15)	14.28	(0.08)	b
Vitamins (as percent of RDA)[1]							
Vitamin A	159.59	(3.16)	167.23	(4.42)	165.50	(2.30)	
Vitamin C	267.03	(7.69)	249.69	(9.20)	255.69	(5.02)	
Vitamin B_6	224.17	(4.14)	223.53	(5.21)	216.66	(2.78)	
Vitamin B_{12}	313.85	(9.92)	310.80	(8.22)	297.73	(4.50)	
Niacin	209.22	(3.27)	207.02	(4.09)	210.15	(2.27)	
Thiamin	242.55	(3.72)	245.51	(4.53)	244.52	(2.45)	
Riboflavin	307.47	(4.64)	313.54	(5.89)	311.03	(3.16)	
Folate	151.73	(2.69)	150.22	(3.11)	148.36	(1.65)	
Minerals (as percent of RDA)[1]							
Calcium	135.04	(2.08)	134.11	(2.84)	135.15	(1.52)	
Calcium (as percent of AI)	128.20	(1.99)	127.37	(2.73)	128.38	(1.46)	
Iron	180.77	(3.02)	184.73	(3.62)	180.64	(2.07)	
Magnesium	134.64	(2.13)	135.16	(2.86)	135.29	(1.48)	
Phosphorous	160.78	(3.15)	162.94	(4.33)	161.91	(2.25)	
Zinc	170.93	(2.79)	178.99	(3.84)	171.36	(2.09)	
Other Dietary Components							
Cholesterol (mg)	208.22	(5.08)	225.00	(7.79)	202.26	(3.32)	c
Sodium (mg)	3189.23	(40.06)	3296.62	(52.94)	3281.44	(29.40)	
Fiber (gm)	14.26	(0.24)	14.09	(0.26)	14.05	(0.14)	
Fiber (as percent of age-plus-5 gm)	100.93	(1.72)	99.67	(1.89)	98.97	(0.99)	
Number of Students[2]	872		508		1837		

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

a Difference between <130% and 130-185% is statistically significant at the 0.05 level.
b Difference between <130% and >185% is statistically significant at the 0.05 level.
c Difference between 130-185% and >185% is statistically significant at the 0.05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-27

Mean Food Group Intake Over 24 Hours, by Household Income, Relative to the Federal Poverty Level

Food Group	<130%		130-185%		>185%		Significant Differences
	Mean	SE	Mean	SE	Mean	SE	
	Number of Servings[1]						
Grain Products	**7.5**	(0.11)	**7.4**	(0.14)	**7.7**	(0.08)	
Whole grains	1.0	(0.04)	1.1	(0.06)	1.2	(0.03)	b
Non-whole grains	6.5	(0.11)	6.3	(0.14)	6.5	(0.07)	
Vegetables	**2.1**	(0.06)	**2.2**	(0.08)	**2.1**	(0.04)	
Dark green vegetables	0.1	(0.01)	0.1	(0.02)	0.1	(0.01)	
Deep yellow vegetables	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	
White potatoes	0.8	(0.04)	0.9	(0.07)	0.9	(0.03)	
Other starchy vegetables	0.2	(0.01)	0.1	(0.02)	0.1	(0.01)	
Tomatoes	0.4	(0.02)	0.4	(0.02)	0.4	(0.01)	
Cooked dry beans and peas	0.2	(0.02)	0.2	(0.02)	0.1	(0.01)	b
Other vegetables	0.5	(0.02)	0.5	(0.03)	0.5	(0.02)	
Fruits	**1.8**	(0.06)	**1.7**	(0.07)	**1.7**	(0.04)	
Citrus fruits, melons, and berries	0.8	(0.04)	0.7	(0.05)	0.7	(0.02)	
Other fruits	1.0	(0.04)	1.0	(0.05)	1.0	(0.03)	
Dairy Products	**2.6**	(0.05)	**2.7**	(0.06)	**2.7**	(0.03)	
Milk	2.0	(0.04)	2.0	(0.05)	2.0	(0.03)	
Yogurt	0.1	(0.01)	0.0	(0.01)	0.1	(0.00)	
Cheese	0.6	(0.02)	0.6	(0.03)	0.6	(0.01)	
Meat and Meat Substitutes	**1.4**	(0.03)	**1.4**	(0.05)	**1.3**	(0.02)	
Red meat (beef, pork, veal, lamb, game)	0.6	(0.03)	0.6	(0.03)	0.6	(0.02)	
Organ meats	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Frankfurters, sausage, luncheon meats	0.2	(0.01)	0.2	(0.02)	0.2	(0.01)	
Poultry (chicken, turkey, other)	0.4	(0.02)	0.3	(0.03)	0.3	(0.01)	
Fish and shellfish	0.1	(0.01)	0.1	(0.02)	0.1	(0.01)	
Eggs	0.1	(0.01)	0.1	(0.01)	0.1	(0.01)	c
Soybean products (tofu, meat analogues)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	
Nuts and seeds	0.1	(0.00)	0.1	(0.01)	0.1	(0.00)	b
Other							
Discretionary fat (gm)	58.2	(0.84)	60.7	(1.11)	60.1	(0.60)	
Added sugars (tsp)	22.8	(0.42)	24.1	(0.58)	24.9	(0.31)	b
Number of Students[2]	872		508		1837		

[1] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[2] Includes students who skipped breakfast.

Note: Means have been rounded. Differences of 0.0 represent less than 0.05 of a serving.

a Difference between <130% and 130-185% is statistically significant at the .05 level.
b Difference between <130% and >185% is statistically significant at the .05 level.

c Difference between 130-185% and >185% is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-28

Percent of Students Whose Usual 24-Hour Food Energy and Nutrient Intakes Met Standard for Dietary Adequacy, by Household Income, Relative to the Federal Poverty Level[1]

Dietary Component	<130%		130-185%		>185%	
	Percent	SE	Percent	SE	Percent	SE
Food energy	95.25%	(9.06)	94.06%	(8.20)	94.00%	(6.57)
Protein	100.00	(0.00)	99.99	(0.09)	100.00	(0.00)
Vitamins						
Vitamin A	95.09	(3.13)	99.74	(1.53)	97.81	(2.26)
Vitamin C	99.75	(0.38)	98.99	(4.12)	99.25	(1.94)
Vitamin B_6	99.91	(0.38)	100.00	(0.00)	99.75	(0.42)
Vitamin B_{12}	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Niacin	100.00	(0.00)	99.97	(0.11)	100.00	(0.00)
Thiamin	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Riboflavin	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Folate	99.44	(3.27)	98.47	(3.78)	98.51	(2.64)
Minerals						
Calcium	98.21	(8.08)	93.44	(3.23)	93.63	(2.97)
Iron	100.00	(0.00)	100.00	(0.00)	100.00	(0.00)
Magnesium	94.06	(7.28)	94.08	(8.15)	92.58	(3.65)
Phosphorous	97.86	(7.48)	93.75	(6.63)	91.70	(3.35)
Zinc	99.31	(2.18)	98.88	(2.47)	99.41	(1.60)
Number of Students[2]	872		508		1837	

[1] For vitamins and minerals, except for calcium, the Estimated Average Requirements (EARs) based on the Dietary Reference Intakes (DRIs) are used as standards. There is no EAR for total food energy, protein, or calcium. For energy, protein, and calcium, 80 percent of the 1989 Recommended Dietary Allowance (RDA) was used as an approximation of the estimated average requirements.

[2] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-29

24-Hour Usual Intake Distributions for Food Energy, Protein, and Calcium, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130%		130-185%		>185%		Significant Differences
	Value	SE	Value	SE	Value	SE	
Food Energy (as % RDA)							
Mean	100	(0.41)	102	(0.70)	102	(0.36)	a,b
Percentile:							
5th	81	(4.71)	77	(4.81)	78	(2.80)	
10th	85	(3.81)	82	(3.95)	83	(2.27)	
25th	92	(2.24)	91	(2.43)	91	(1.34)	
50th	100	(0.96)	101	(1.25)	101	(0.65)	
75th	108	(2.49)	112	(2.77)	112	(1.61)	
90th	116	(4.64)	123	(5.07)	122	(3.21)	
95th	121	(6.05)	129	(6.61)	129	(4.34)	
Protein (as % RDA)							
Mean	248	(1.67)	248	(2.54)	243	(1.07)	b,c
Percentile:							
5th	174	(10.40)	163	(11.70)	174	(8.04)	
10th	188	(8.71)	179	(9.93)	187	(6.62)	
25th	213	(5.51)	207	(6.52)	211	(4.02)	
50th	245	(2.85)	243	(3.88)	239	(1.97)	
75th	279	(6.81)	283	(8.29)	271	(4.94)	
90th	313	(13.00)	324	(15.60)	303	(9.78)	
95th	335	(17.40)	350	(20.70)	323	(13.20)	
Calcium (as % AI)							
Mean	130	(0.81)	127	(1.52)	127	(0.77)	b
Percentile:							
5th	93	(8.31)	77	(7.42)	78	(4.60)	
10th	100	(6.85)	86	(6.35)	87	(3.90)	
25th	113	(4.16)	103	(4.20)	104	(2.50)	
50th	128	(1.86)	124	(2.44)	125	(1.32)	
75th	145	(4.91)	148	(5.42)	148	(3.13)	
90th	162	(9.37)	173	(10.30)	171	(5.98)	
95th	172	(12.40)	188	(13.80)	186	(7.97)	
Number of Students[1]	872		508		1837		

RDA = Recommended Dietary Allowance
AI = Adequate Intake

[1] Includes students who skipped breakfast.

Table reads: "Percentile: 95 percent of students with household incomes below 130 percent of poverty (i.e., students at the 5th percentile) have a usual food energy intake of at least 81 percent of the RDA. Similarly, 90 percent of students with household incomes below 130 percent of poverty (i.e., students at the 10th percentile) have a usual food energy intake of at least 85 percent of the RDA."

Notes: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

Differences between means and the 5th, 50th and 95th percentile values were tested for statistical significance.

a Difference between <130% and 130-185% is statistically significant at the .05 level.
b Difference between <130% and >185% is statistically significant at the .05 level.
c Difference between 130-185% and >185% is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-30

Percent of Students Whose Usual 24-Hour Intake Met Dietary Recommendations, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130%		130-185%		>185%	
	Percent	SE	Percent	SE	Percent	SE
Percent of Food Energy						
No more than 30% from total fat	27.60%	(12.80)	11.19%	(12.80)	25.75%	(9.61)
Less than 10% from saturated fat	0.00	(0.00)	2.56	(0.00)	6.10	(11.50)
More than 55% from carbohydrate	48.41	(2.71)	43.91	(2.71)	55.61	(3.23)
No more than twice the 1989 RDA for protein	19.95	(8.18)	19.14	(8.18)	22.71	(8.65)
Other Dietary Components						
No more than 300 mg cholesterol	92.44	(11.00)	86.45	(11.00)	96.94	(8.54)
No more than 2,400 mg sodium	7.71	(8.01)	8.61	(8.01)	1.88	(4.57)
More than (age-plus-5 gm) dietary fiber	50.64	(3.37)	47.97	(3.37)	45.85	(2.09)
Number of Students[1]	872		508		1837	

RDA = Recommended Dietary Allowance

[1] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

PARTICIPATION PATTERNS

Most Frequent Participation Patterns for Treatment School Students with Four Years of Data

Attached are the most frequent patterns of participation for those students in treatment schools with data for the baseline year and all three years of SBPP implementation (n=853). Patterns were developed based on the level of change that occurred for each year. Specifically, participation was regarded as “flat” if it stayed between a 20 percent gain or drop during the course of the year. Participation was said to “drop” if there was more than a 20 percent decrease in participation in a year. A “gain” was noted if there was more than a 20 percent increase in participation during a year. Thus, a pattern that is “flat, flat, flat” as in Exhibit G-31 means that there was a 20 percent or less increase or decrease in participation from Baseline to Year 1, Year 1 to Year 2, and Year 2 to Year 3.

Exhibit G-31 shows the two most frequent patterns of participation for all students with four years of data. Thirty-three percent followed a “flat, flat, flat” pattern, where they primarily maintained their status quo. Eighteen percent gained from the Baseline Year to Year 1, and did not subsequently change very much (gain, flat, flat).

Earlier exploratory work had indicated that there were differences in the demographic characteristics of students that had high participation rates at baseline, compared to students that had low participation rates at baseline. In trying to figure out whether particular patterns of participation were related to demographics, we decided that we had to take into consideration the amount of participation at baseline. For example, students that had flat participation rates across the four years but who started with low participation rates may be demographically different than students with the same pattern of little change over time, but who had started off at baseline with high participation rates. We therefore split the students into two groups: low participation at baseline and high participation at baseline. The criteria we used to make the split (low = less than or equal to 20 percent participation at baseline, high = greater than 20 percent participation at baseline). There were 627 students who had low participation at baseline, and 226 students who had high participation at baseline.

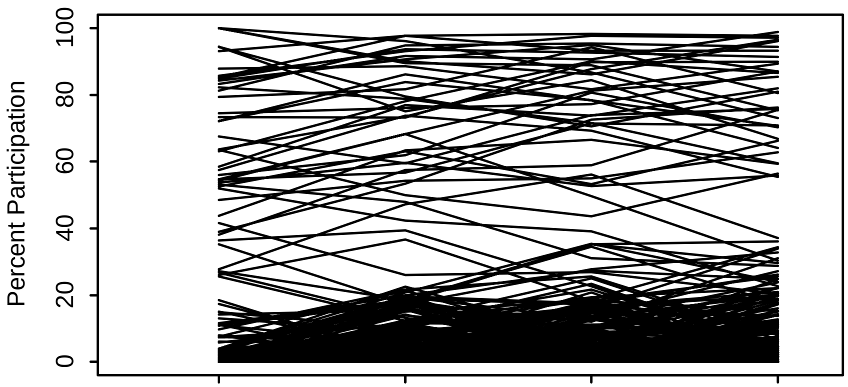
The two most frequent patterns of participation for those with low participation at baseline are presented in Exhibit G-32. Thirty-eight percent of these students had low participation at baseline and stayed at that same level for the remaining years. Eighteen percent gained during the first year, and then remained around that level.

The three most frequent participation patterns for those with high participation at baseline are presented in Exhibit G-33. Ten percent stayed high through the second year of SBPP, and then dropped their participation; 20 percent stayed flat across the three years of the SBPP; and 19 percent gained in the first year, and then stayed at the higher level.

Exhibit G-31

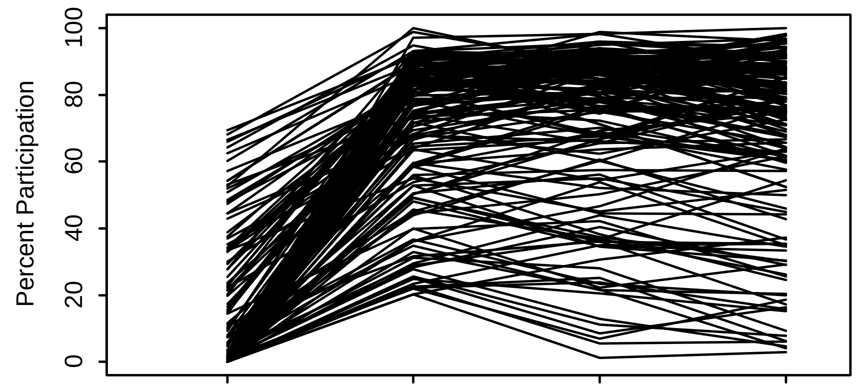
Participation Plots for All Treatment School Students with Four Years of Data

Overall Participation: Flat, Flat, Flat



Time Point:	Baseline	Year 1	Year 2	Year 3
School Year:	1999-2000	2000-2001	2001-2002	2002-2003
n:	284	284	284	284
% of Students (n/853):	33.3	33.3	33.3	33.3

Overall Participation: Gain, Flat, Flat



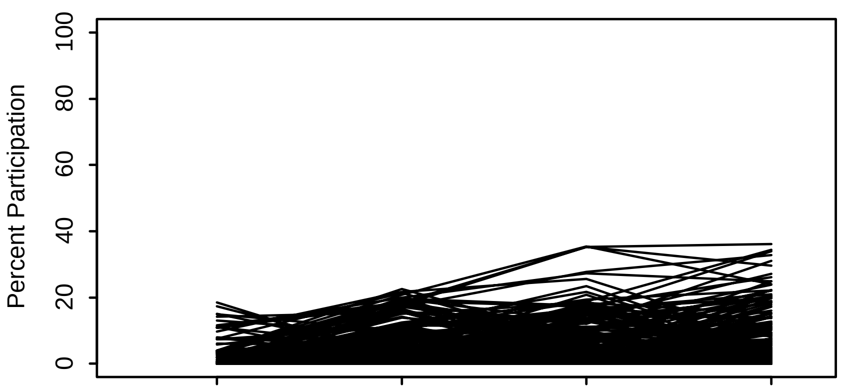
Time Point:	Baseline	Year 1	Year 2	Year 3
School Year:	1999-2000	2000-2001	2001-2002	2002-2003
n:	155	155	155	155
% of Students (n/853):	18.2	18.2	18.2	18.2

Sources: *Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.*

Exhibit G-32

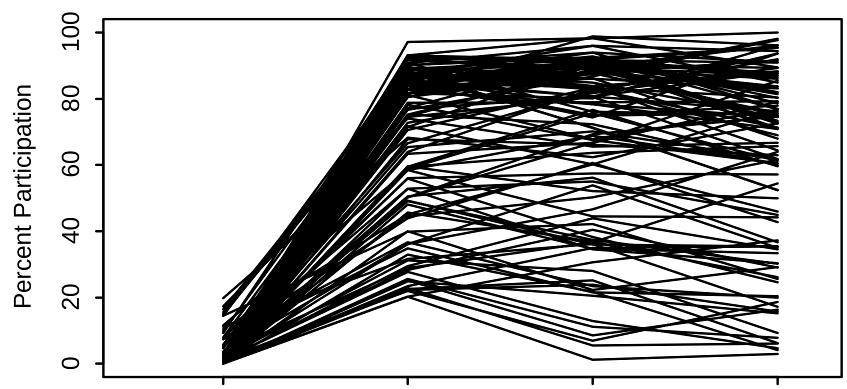
Participation Plots for All Treatment School Students with Low Participation at Baseline and Four Years of Data

Low Participation at Baseline: Flat, Flat, Flat



Time Point:	Baseline	Year 1	Year 2	Year 3
School Year:	1999-2000	2000-2001	2001-2002	2002-2003
n:	239	239	239	239
% of Students (n/627):	38.1	38.1	38.1	38.1

Low Participation at Baseline: Gain, Flat, Flat



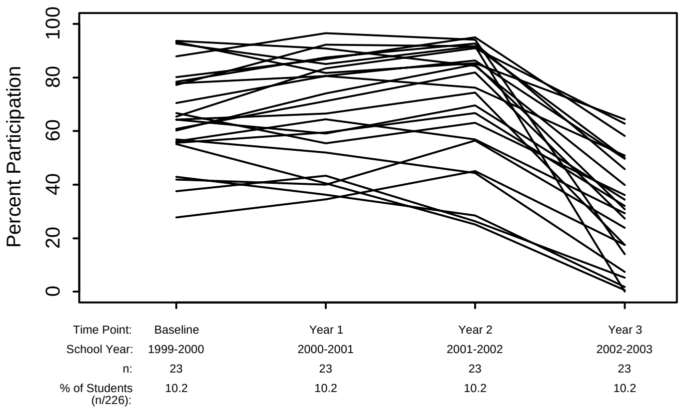
Time Point:	Baseline	Year 1	Year 2	Year 3
School Year:	1999-2000	2000-2001	2001-2002	2002-2003
n:	112	112	112	112
% of Students (n/627):	17.9	17.9	17.9	17.9

Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

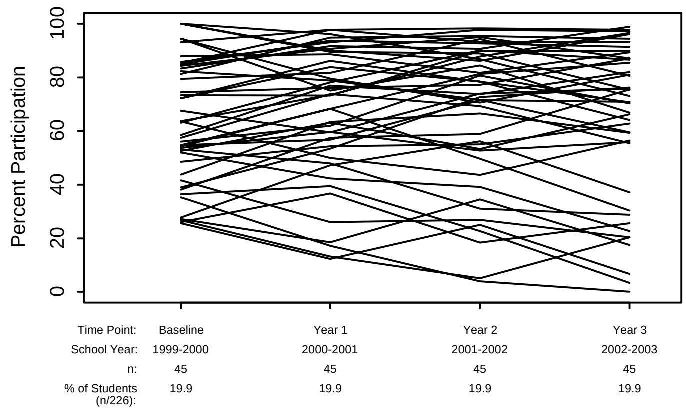
Exhibit G-33

Participation Plots for All Treatment School Students with High Participation at Baseline and Four Years of Data

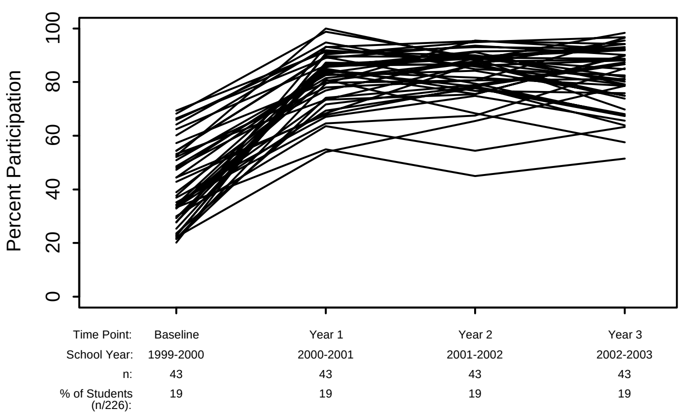
High Participation at Baseline: Flat, Flat, Drop



High Participation at Baseline: Flat, Flat, Flat



High Participation at Baseline: Gain, Flat, Flat

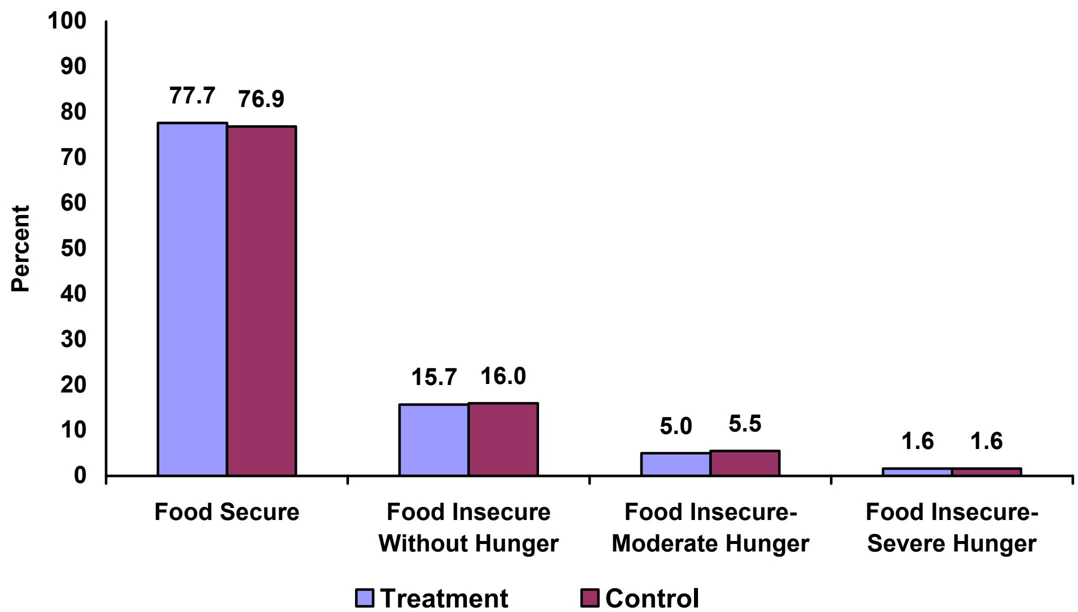


Sources: Impact Study—School-Level School Breakfast Participation Data, 1999-2000, 2000-2001, 2001-2002, and 2002-2003.

FOOD SECURITY

Exhibit G-34

Treatment Status by Food Security Status



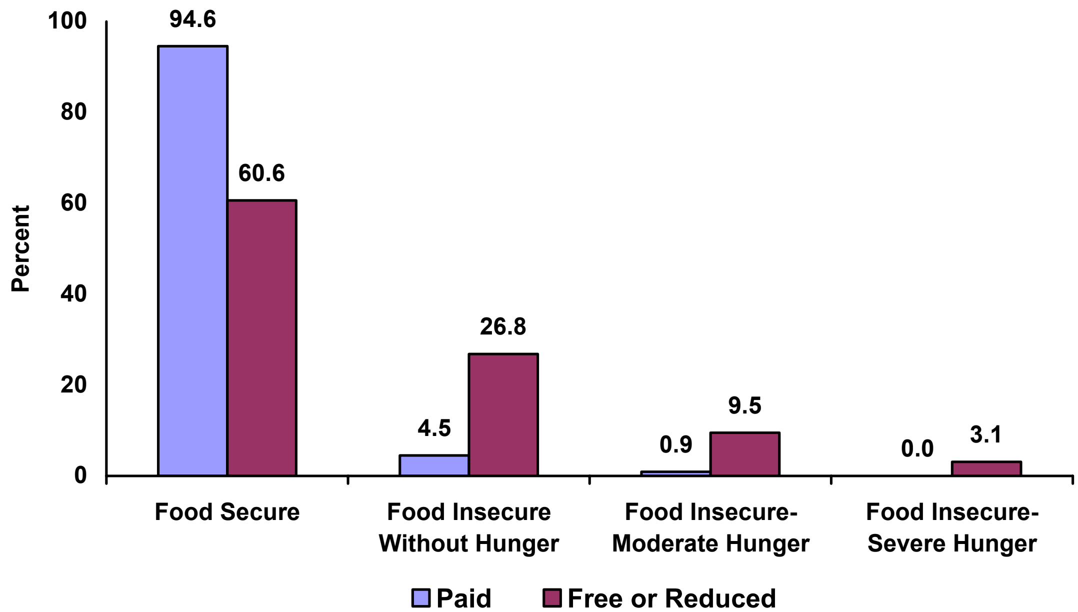
N = 3,375

Note: Chi-square test for independence between treatment status and food security status is not statistically significant.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-35

School Meal Eligibility by Food Security Status



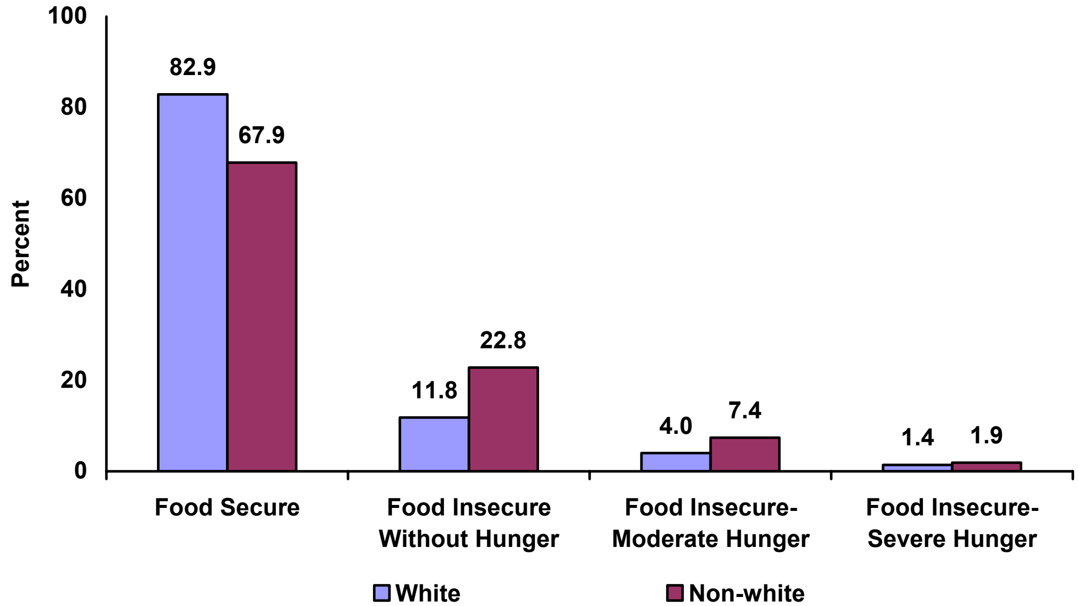
N = 3,375

Note: Chi-square test for independence between school meal eligibility status and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-36

Minority Status by Food Security Status



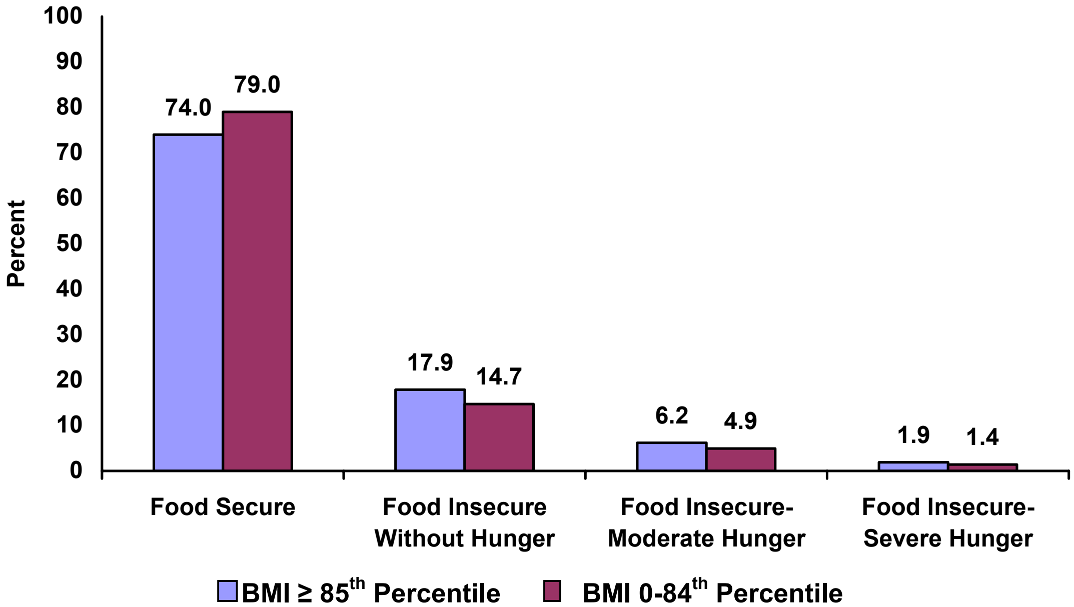
N = 3,375

Note: Chi-square test for independence between minority status and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-37

Prevalence of Risk of Overweight by Food Security Status[1]



n=3,356

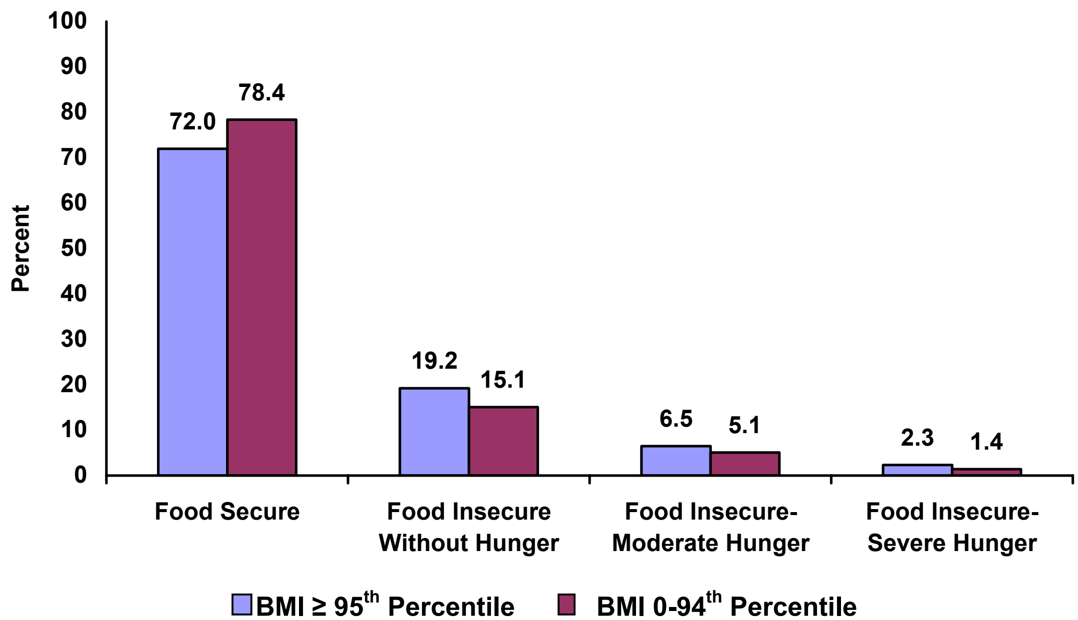
[1] Based on Body Mass Index (BMI) at or above the 85th percentile (includes overweight students).

Note: Chi-square test for independence between BMI percentile and food security status is statistically significant, p<.05.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-38

Prevalence of Overweight by Food Security Status[1]



n=3,356

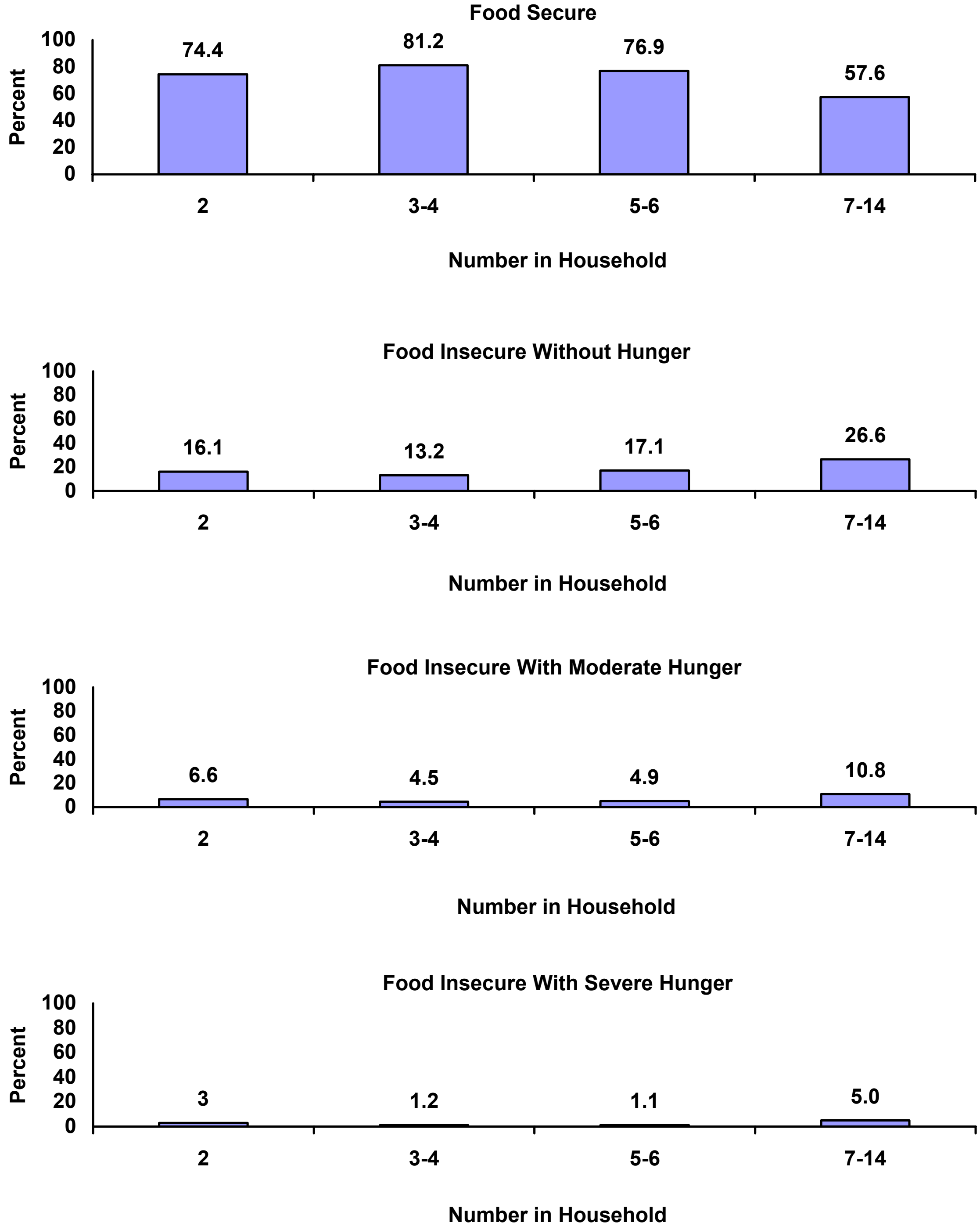
[1] Based on Body Mass Index (BMI) at or above the 95th percentile.

Note: Chi-square test for independence between BMI percentile and food security status is statistically significant, $p<.05$.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-39

Number in Household by Food Security Status



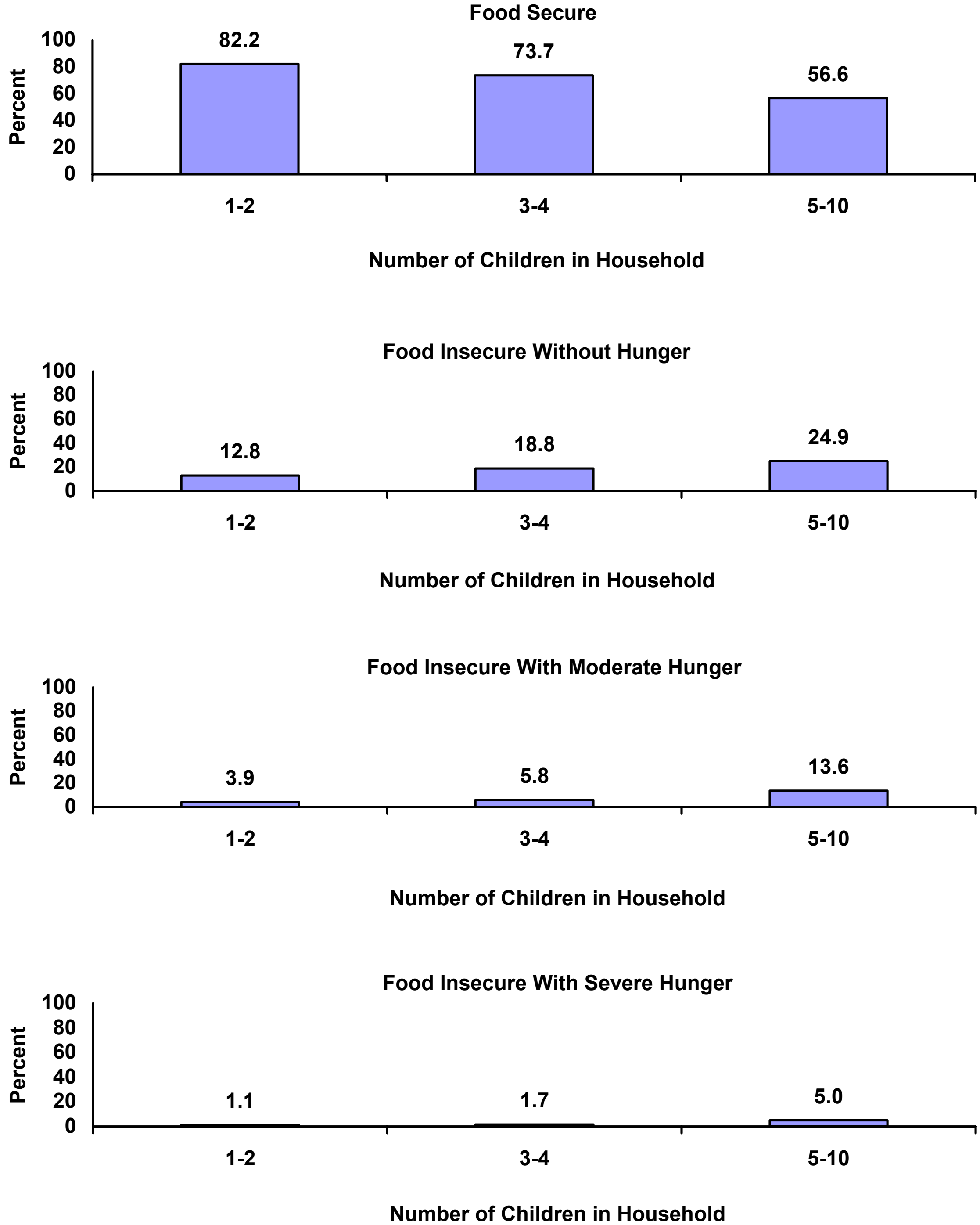
N = 3,375

Note: Chi-square test for independence between number in household and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-40

Number of Children in Household by Food Security Status



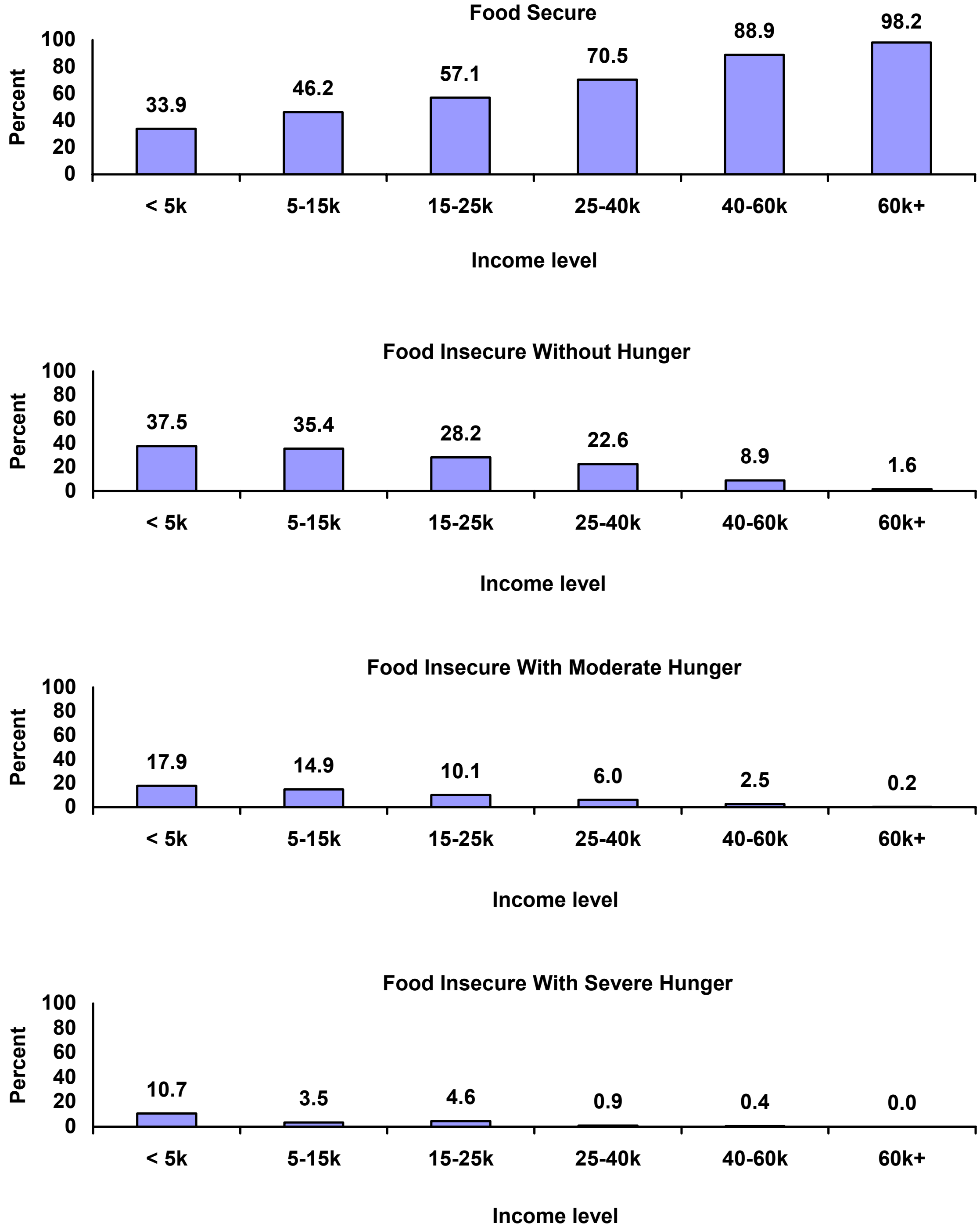
N = 3,375

Note: Chi-square test for independence between number of children in household and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-41

Income Level by Food Security Status



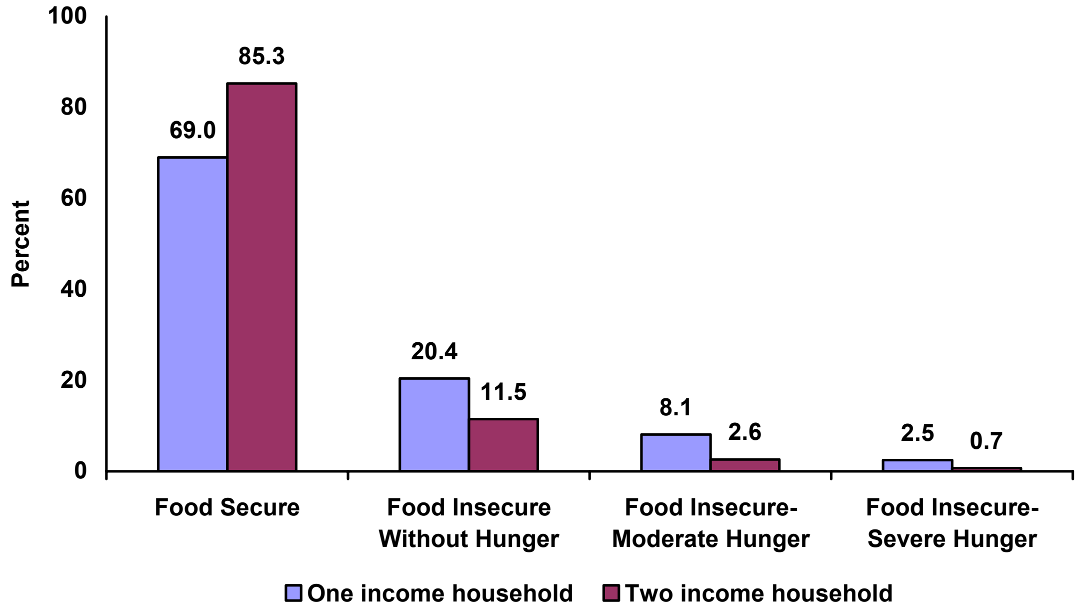
N = 3,375

Note: Chi-square test for independence between income level and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-42

Number of Incomes in Household by Food Security Status



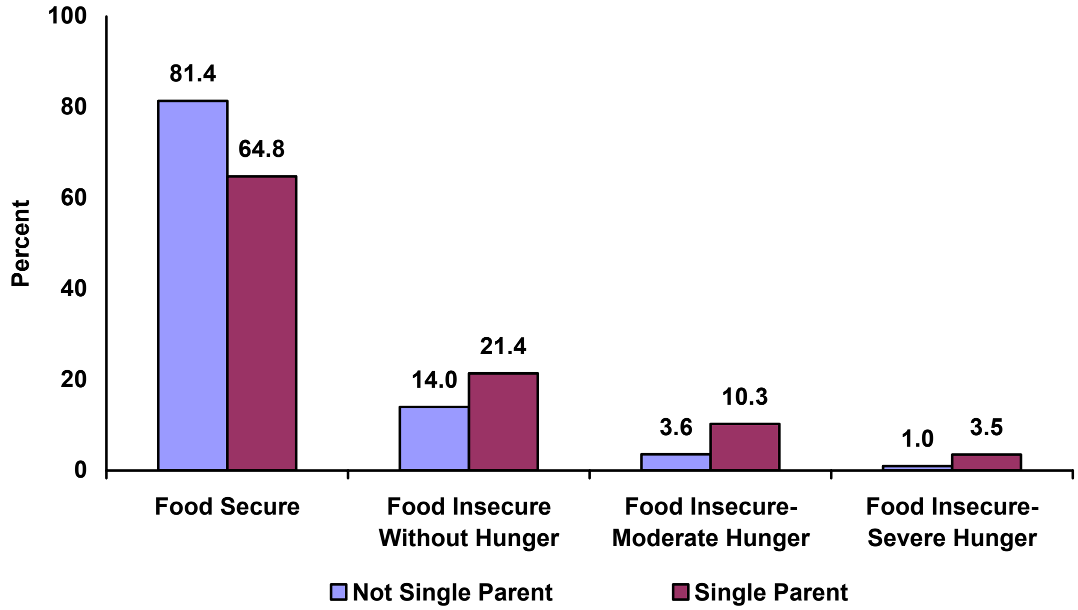
N = 3,375

Note: Chi-square test for independence between number of incomes and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-43

Single Parent Status by Food Security Status



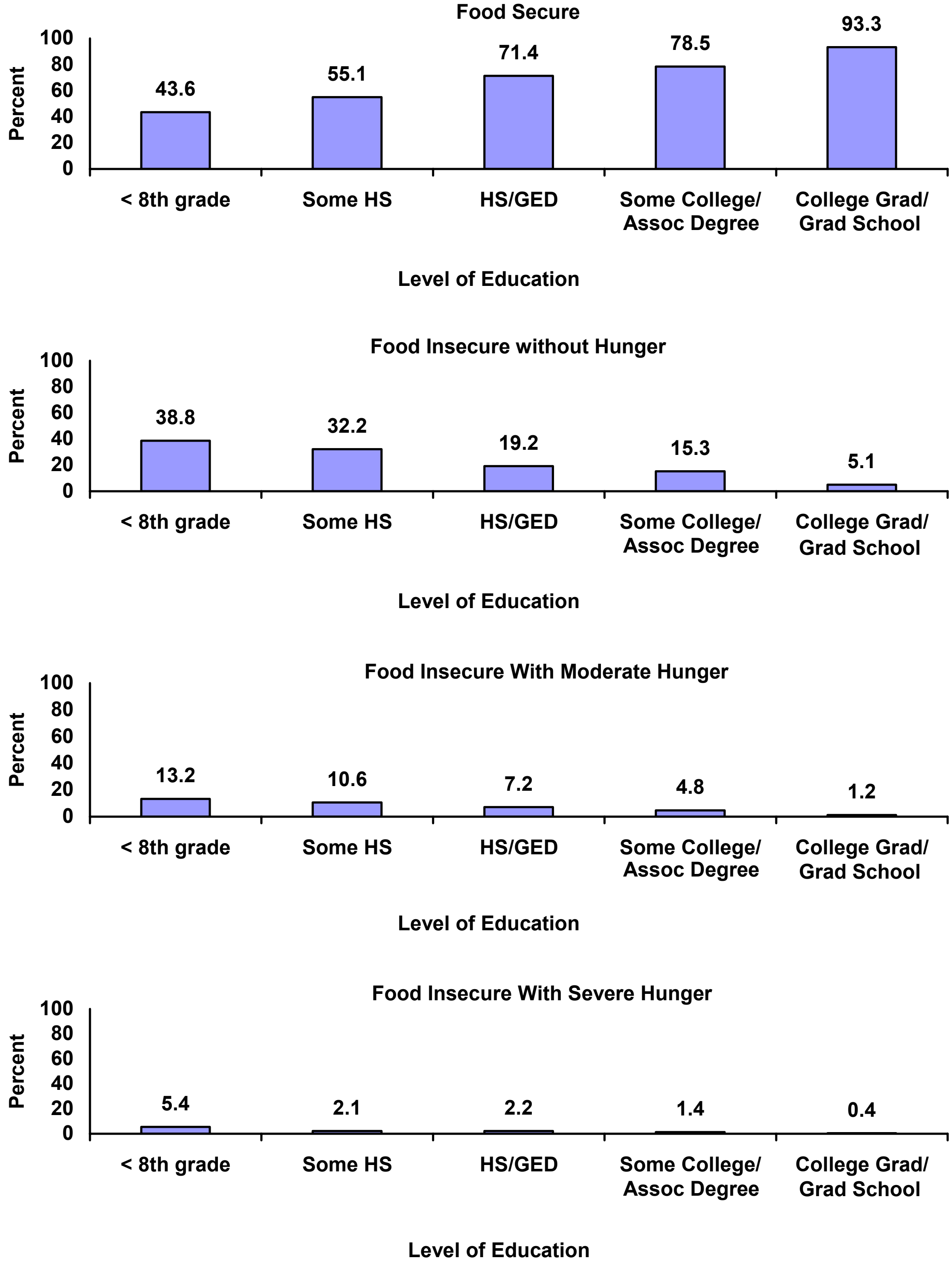
N = 3,375

Note: Chi-square test for independence between single parent status and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

Exhibit G-44

Level of Parent Education by Food Security Status



N = 3,375

Note: Chi-square test for independence between level of education and food security status is statistically significant, $p < .0001$.

Source: Impact Study – Parent Survey, Spring 2001

MODEL RESULTS FOR NON-EXPERIMENTAL ANALYSES

Exhibit G-45

Adjusted Differences, Effect Sizes, and Odds Ratios for Exhibits G-2a and G-2b—Demographic Characteristics: Substantive vs. Non-Substantive Breakfast Eaters[1]

Variable	Definition 2		Definition 3		Definition 4	
	Adjusted Difference	Effect Size/ (*Odds Ratio)*	Adjusted Difference	Effect Size/ (*Odds Ratio)*	Adjusted Difference	Effect Size/ (*Odds Ratio)*
School Meals Eligibility Status						
Percent free/reduced price eligible	-0.82	*(0.97)*	-0.14	*(0.99)*	4.16*	*(1.18)*
Ethnicity						
Percent minority	-0.29	*(0.99)*	0.60	*(1.03)*	5.27*	*(1.25)*
Gender						
Percent female	-4.52*	*(0.83)*	-6.20*	*(0.78)*	-9.04*	*(0.70)*
Age						
Average age	-0.14*	-0.11	-0.14*	-0.11	-0.24*	-0.19
Household Size						
Average number people in household	0.11	0.08	0.08	0.06	0.08	0.06
Average number children in household	0.08	0.06	0.06	0.05	0.05	0.04
Income						
Percent < $20,000 per year	-1.25	*(0.93)*	-0.75	*(0.95)*	2.18	*(1.14)*
Percent > $70,000 per year	-0.71	*(0.96)*	0.40	*(1.03)*	0.61	*(1.04)*
Percent two-income households	-2.19	*(0.92)*	-0.68	*(0.97)*	-1.58	*(0.94)*
Family Structure						
Percent single-parent families	-1.41	*(0.93)*	0.02	*(1.00)*	-0.95	*(0.95)*
Education of Parent/Guardian						
Percent without a high school degree	0.99	*(1.10)*	1.02	*(1.10)*	2.73*	*(1.27)*
Percent college degree or above	-0.43	*(0.98)*	-1.67	*(0.91)*	-2.45	*(0.87)*
Number of Students						
Substantive	2,602		2,032		582	
Non-Substantive	712		1,282		2,732	

[1] Substantive breakfast eaters consumed a Definition 2, Definition 3, or Definition 4 breakfast on a typical school day.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-46

Adjusted Differences and Effect Sizes for Exhibits 6.2 and G-3—Mean Food Energy and Nutrient Intake at Breakfast: Substantive vs. Non-Substantive Breakfast Eaters[1]

Dietary Component	Definition 2 Adjusted Difference	Definition 2 Effect Size	Definition 3 Adjusted Difference	Definition 3 Effect Size
Food energy (as % 1989 RDA)	14.19*	1.29	15.89*	1.63
Protein (as % 1989 RDA)	33.80*	1.28	34.03*	1.37
Percent of Food Energy from:				
Total fat	1.86*	0.15	4.60*	0.37
Saturated fat	1.09*	0.19	1.58*	0.28
Carbohydrate	-4.13*	-0.27	-5.27*	-0.35
Protein	1.94*	0.40	0.42*	0.09
Vitamins (as percent of RDA)[2]				
Vitamin A	44.77*	0.91	40.18*	0.83
Vitamin C	61.95*	0.58	57.83*	0.54
Vitamin B_6	61.06*	0.87	50.90*	0.73
Vitamin B_{12}	85.46*	0.86	72.82*	0.74
Niacin	43.01*	0.87	37.98*	0.77
Thiamin	56.09*	1.06	52.22*	1.01
Riboflavin	83.87*	1.15	74.62*	1.04
Folate	37.42*	0.96	33.29*	0.86
Minerals (as percent of RDA)[2]				
Calcium	30.27*	1.24	27.29*	1.14
Calcium (as percent of AI)	28.60*	1.22	25.81*	1.12
Iron	48.81*	0.88	42.71*	0.77
Magnesium	24.09*	1.02	23.24*	1.01
Phosphorous	28.69*	0.94	27.77*	0.93
Zinc	40.58*	0.82	33.21*	0.67
Other Dietary Components				
Cholesterol (mg)	39.81*	0.40	50.00*	0.51
Sodium (mg)	400.43*	0.98	433.17*	1.12
Fiber (gm)	1.75*	0.77	1.88*	0.85
Fiber (as percent of age-plus-5 gm)	12.21*	0.76	13.12*	0.84
Number of Students[3]				
Substantive	2,627		2,052	
Non-substantive	720		1,295	

RDA = Recommended Dietary Allowance

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.

[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[3] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-47

Adjusted Differences and Effect Sizes for Exhibit G-4—Mean Food Group Intake at Breakfast: Substantive vs. Non-Substantive Breakfast Eaters[1]

Food Group	Definition 2 Adjusted Difference	Definition 2 Effect Size	Definition 3 Adjusted Difference	Definition 3 Effect Size
	Number of Servings[2]			
Grain Products	**1.04***	**0.80**	**1.28***	**1.05**
Whole grains	0.34*	0.43	0.31*	0.40
Non-whole grains	0.70*	0.56	0.97*	0.81
Vegetables	**0.02**	**0.08**	**0.03***	**0.11**
Dark green vegetables	0.00	0.02	0.00	0.03
Deep yellow vegetables	0.00	0.00	0.00	0.01
White potatoes	0.01	0.05	0.02*	0.09
Other starchy vegetables	0.00	0.02	0.00	0.00
Tomatoes	0.01*	0.09	0.01*	0.09
Cooked dry beans and peas	0.00	0.04	0.00	0.05
Other vegetables	0.00	0.04	0.00	0.05
Fruits	**0.40***	**0.58**	**0.40***	**0.58**
Citrus fruits, melons, and berries	0.20*	0.39	0.21*	0.40
Other fruits	0.19*	0.41	0.18*	0.40
Dairy Products	**0.71***	**1.14**	**0.60***	**0.96**
Milk	0.67*	1.10	0.56*	0.91
Yogurt	0.01*	0.11	0.01*	0.11
Cheese	0.03*	0.20	0.03*	0.21
Meat and Meat Substitutes	**0.09***	**0.34**	**0.11***	**0.42**
Red meat (beef, pork, veal, lamb, game)	0.01*	0.16	0.01	0.18
Organ meats	0.00	na[3]	0.00	na[3]
Frankfurters, sausage, luncheon meats	0.02*	0.21	0.03*	0.24
Poultry (chicken, turkey, other)	0.00	0.05	0.00	0.06
Fish and shellfish	0.00	0.03	0.00	0.04
Eggs	0.04*	0.24	0.06*	0.32
Soybean products (tofu, meat analogues)	0.00	0.07	0.00	0.02
Nuts and seeds	0.01	0.07	0.01*	0.11
Other				
Discretionary fat (gm)	6.55*	0.73	8.33*	0.99
Added sugars (tsp)	2.71*	0.56	3.41*	0.73
Number of Students[4]				
Substantive	2,627		2,052	
Nonsubstantive	720		1,295	

na = not applicable

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.

[2] Based mainly on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[3] An effect size could not be computed because no foods were consumed from the food group by either substantive or non-substantive breakfast eaters.

[4] Includes students who skipped breakfast.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-48

Adjusted Differences and Odds Ratios for Exhibit 6.3—Percent of Students Whose Breakfast Intake on a Typical School Day Met Standard: Substantive vs. Non-Substantive Breakfast Eaters[1]

Standard/Dietary Component	Definition 2 Substantive vs. Non-Substantive Adjusted Difference	 Odds Ratio
At least 25 percent of RDA:[2]		
Food energy	29.76%*	9.69
Protein	66.02*	23.93
Vitamin A	44.52*	7.60
Vitamin C	36.55*	4.64
Vitamin B_6	43.91*	7.55
Vitamin B_{12}	52.91*	13.08
Niacin	44.76*	7.87
Thiamin	45.65*	26.20
Riboflavin	42.61*	29.63
Folate	45.57*	7.82
Calcium	58.22*	14.98
Iron	48.53*	10.05
Magnesium	52.82*	14.18
Phosphorous	50.11*	9.75
Zinc	46.33*	7.44
Percent of Food Energy:		
30% or less from total fat	-3.51	0.83
Less than 10% from saturated fat	-11.33*	0.61
Other		
No more than 75 mg cholesterol	-10.43*	0.23
No more than 600 mg sodium	-31.10*	0.13
Age plus 5 gm or more dietary fiber	19.76*	5.14
Number of Students[3]		
Substantive	2,627	
Non-Substantive	720	

RDA=Recommended Dietary Allowance

[1] Substantive breakfast eaters consumed a Definition 2 breakfast on a typical school day.
[2] The RDAs, except for calcium, were based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, the 1989 RDA was used.
[3] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001.

Exhibit G-49

Adjusted Differences and Effect Sizes for Exhibits 6.4 and G-6—Mean Food Energy and Nutrient Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 2		Definition 3	
Dietary Component	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
Food energy (as % 1989 RDA)	14.13*	0.49	17.05*	0.60
Protein (as % 1989 RDA)	43.16*	0.47	44.28*	0.49
Percent of Food Energy from:				
Total fat	-1.16*	-0.18	-0.54*	-0.08
Saturated fat	-0.46*	-0.14	-0.17	-0.05
Carbohydrate	0.82*	0.11	0.53	0.07
Protein	0.37*	0.10	0.04	0.01
Vitamins (as percent of RDA)[2]				
Vitamin A	51.61*	0.54	48.00*	0.51
Vitamin C	65.62*	0.31	67.04*	0.32
Vitamin B_6	63.63*	0.55	58.80*	0.51
Vitamin B_{12}	93.85*	0.43	86.12*	0.40
Niacin	45.65*	0.48	43.81*	0.47
Thiamin	58.78*	0.57	59.81*	0.59
Riboflavin	90.68*	0.70	85.06*	0.67
Folate	40.24*	0.57	38.61*	0.55
Minerals (as percent of RDA)[2]				
Calcium	35.34*	0.57	34.04*	0.55
Calcium (as percent of AI)	33.05*	0.55	31.91*	0.54
Iron	52.64*	0.62	50.04*	0.59
Magnesium	24.67*	0.40	26.17*	0.42
Phosphorous	28.58*	0.30	29.71*	0.32
Zinc	40.76*	0.48	37.23*	0.44
Other Dietary Components				
Cholesterol (mg)	43.21*	0.29	55.64*	0.37
Sodium (mg)	394.13*	0.32	497.76*	0.41
Fiber (gm)	1.84*	0.29	2.29*	0.37
Fiber (as percent of age-plus-5 gm)	12.92*	0.29	15.82*	0.36
Number of Students[3]				
Substantive	2,627		2,052	
Non-substantive	720		1,295	

RDA = Recommended Dietary Allowance

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.

[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[3] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-50

Adjusted Differences and Effect Sizes for Exhibits 6.5 and G-7—Mean Food Group Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

Food Group	Definition 2 Adjusted Difference	Definition 2 Effect Size	Definition 3 Adjusted Difference	Definition 3 Effect Size
	Number of Servings[2]			
Grain Products	**1.13***	**0.34**	**1.48***	**0.46**
Whole grains	0.41*	0.31	0.36*	0.27
Non-whole grains	0.72*	0.23	1.12*	0.36
Vegetables	**-0.04**	**-0.02**	**0.05**	**0.03**
Dark green vegetables	0.00	0.00	0.01	0.03
Deep yellow vegetables	0.03	0.08	0.02	0.06
White potatoes	-0.09	-0.07	-0.02	-0.01
Other starchy vegetables	0.01	0.03	0.01	0.03
Tomatoes	-0.01	-0.02	-0.00	-0.00
Cooked dry beans and peas	-0.01	-0.03	-0.01	-0.02
Other vegetables	0.01	0.02	0.02	0.03
Fruits	**0.49***	**0.30**	**0.50***	**0.31**
Citrus fruits, melons, and berries	0.24*	0.22	0.27*	0.25
Other fruits	0.25*	0.21	0.23*	0.20
Dairy Products	**0.84***	**0.60**	**0.74***	**0.53**
Milk	0.82*	0.68	0.69*	0.57
Yogurt	0.02*	0.11	0.01	0.07
Cheese	0.00	0.01	0.04	0.06
Meat and Meat Substitutes	**0.13***	**0.13**	**0.16***	**0.16**
Red meat (beef, pork, veal, lamb, game)	0.03	0.05	0.03	0.04
Organ meats	-0.00	-0.05	-0.00	-0.02
Frankfurters, sausage, luncheon meats	0.01	0.03	0.02	0.05
Poultry (chicken, turkey, other)	0.02	0.04	0.02	0.04
Fish and shellfish	0.00	0.01	0.01	0.04
Eggs	0.05*	0.19	0.06*	0.25
Soybean products (tofu, meat analogues)	0.00	0.07	-0.00	-0.02
Nuts and seeds	0.01	0.05	0.01*	0.07
Other				
Discretionary fat (gm)	5.18*	0.20	8.51*	0.34
Added sugars (tsp)	1.33*	0.10	2.18*	0.17
Number of Students[3]				
Substantive	2,627		2,052	
Nonsubstantive	720		1,295	

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.

[2] Based mainly on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[3] Includes students who skipped breakfast.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-51

Adjusted Differences and Effect Sizes for Exhibit G-8—Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

Dietary Component	Definition 2 Adjusted Difference	Definition 2 Effect Size	Definition 3 Adjusted Difference	Definition 3 Effect Size
Food energy	12.67%*	1.43	13.04%*	1.61
Macronutrients				
Protein	12.39*	1.30	11.57*	1.26
Total fat	10.44*	0.91	12.42*	1.16
Saturated fat	11.54*	0.92	12.80*	1.08
Carbohydrate	13.97*	1.35	13.57*	1.38
Vitamins				
Vitamin A	20.94*	1.00	15.40*	0.72
Vitamin C	19.67*	0.79	14.24*	0.56
Vitamin B_6	20.95*	1.14	14.53*	0.76
Vitamin B_{12}	22.14*	1.09	16.42*	0.79
Niacin	16.56*	1.09	12.80*	0.83
Thiamin	18.55*	1.33	14.99*	1.06
Riboflavin	20.88*	1.42	16.00*	1.05
Folate	19.31*	1.17	14.68*	0.87
Minerals				
Calcium	19.24*	1.27	15.23*	0.99
Iron	19.48*	1.17	14.50*	0.85
Magnesium	15.71*	1.43	13.40*	1.22
Phosphorous	16.05*	1.42	13.85*	1.23
Zinc	18.35*	1.10	13.09*	0.76
Other Dietary Components				
Cholesterol	12.77*	0.67	14.18*	0.77
Sodium	11.25*	1.08	11.15*	1.11
Fiber	11.04*	0.90	10.60*	0.88
Number of Students[2]				
Substantive	2,627		2,052	
Non-substantive	720		1,295	

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.
[2] Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-52

Adjusted Differences and Effect Sizes for Exhibit 6.6—Food Energy Intake Over 24 Hours: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 4 Substantive vs. Non-Substantive	
Standard/Dietary Component	**Adjusted Difference**	**Effect Size**
Mean food energy (as % 1989 RDA)	19.31*	1.92
Percent contribution of breakfast to 24-hour food energy intake	13.32*	1.48
Number of Students[2]		
Substantive	591	
Non-Substantive	2,756	

RDA = Recommended Dietary Allowance

1 Substantive breakfast eaters consumed food from at least three major food groups and more than 25 percent of the RDA for food energy on a typical school day.

2 Includes students who skipped breakfast.

* Difference between substantive and non-substantive breakfast eaters is statistically significant at the .05 level.

Source: Impact Study–24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-53

Adjusted Differences, Effect Sizes, and Odds Ratios for Exhibit G-9—Weight Status: Substantive vs. Non-Substantive Breakfast Eaters[1]

	Definition 4	
	Substantive[2] vs Non-substantive	
Variable	**Adjusted Difference**	**Effect Size/ (*Odds Ratio*)**
BMI percentile	0.12	0.00[3]
At risk of overweight	-0.08	*(1.00)*
Overweight	1.09	*(1.08)*
Number of Students		
Substantive	591	
Non-Substantive	2,756	

[1] BMI percentiles, based on students' age and gender, were determined using methods and growth curves published by the Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (NCHS), 2000. A BMI at or above the 95th percentile identifies students who are overweight; and a BMI at or above the 85th percentile identifies those at risk for overweight (which includes overweight students).

[2] Substantive breakfast eaters consumed food from at least three major food groups and more than 25 percent of the RDA for food energy on a typical school day.

[3] Effect size was rounded. Value is less than 0.005.

None of the differences between substantive and non-substantive breakfast eaters is statistically significant.

Source: Impact Study–Height and Weight Measurements, Spring 2001

Exhibit G-54

Adjusted Differences, Effect Sizes, and Odds Ratios for Exhibit G-11—Demographic Characteristics: Breakfast Skippers vs. Breakfast Non-Skippers[1]

	Breakfast Skippers vs. Non-Skippers	
Variable	**Adjusted Difference**	**Effect Size/ (*Odds Ratio)***
School Meals Eligibility Status		
Percent free/reduced price eligible	-3.22	*(0.88)*
Ethnicity		
Percent minority	10.30*	*(1.53)*
Gender		
Percent female	-0.68	*(0.97)*
Age		
Average age	0.21	0.17
Household Size		
Average number people in household	-0.02	-0.01
Average number children in household	-0.05	-0.05
Income		
Percent < $20,000 per year	2.59	*(1.17)*
Percent > $70,000 per year	-1.22	*(0.92)*
Percent two-income households	2.89	*(1.12)*
Family Structure		
Percent single-parent families	-0.00	*(1.00)*
Education of Parent/Guardian		
Percent without a high school degree	0.98	*(1.09)*
Percent college degree or above	-3.51	*(0.81)*
Number of Students		
Breakfast skippers	172	
Breakfast non-skippers	3,249	

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

* Difference between breakfast skippers and non-breakfast skippers is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Spring 2001

Exhibit G-55

Adjusted Differences and Effect Sizes for Exhibit 6.7—Mean Food Energy and Nutrient Intake over 24 Hours: Breakfast Skippers vs. Breakfast Non-Skippers[1]

	Breakfast Skippers vs. Non-Skippers	
Dietary Component	**Adjusted Difference**	**Effect Size**
Food energy (as % 1989 RDA)	-22.08*	-0.75
Protein (as % 1989 RDA)	-44.20*	-0.47
Percent of Food Energy from:		
Total fat	2.40*	0.37
Saturated fat	0.63*	0.20
Carbohydrate	-3.11*	-0.40
Protein	0.50	0.14
Vitamins (as percent of RDA)[2]		
Vitamin A	-62.09*	-0.64
Vitamin C	-101.86*	-0.48
Vitamin B_6	-79.18*	-0.67
Vitamin B_{12}	-116.99*	-0.53
Niacin	-58.04*	-0.60
Thiamin	-77.93*	-0.75
Riboflavin	-112.20*	-0.84
Folate	-55.17*	-0.76
Minerals (as percent of RDA)[2]		
Calcium	-40.87*	-0.64
Calcium (as percent of AI)	-38.53*	-0.63
Iron	-68.20*	-0.79
Magnesium	-37.66*	-0.60
Phosphorous	-40.21*	-0.42
Zinc	-56.57*	-0.66
Other Dietary Components		
Cholesterol (mg)	-32.01*	-0.21
Sodium (mg)	-429.60*	-0.35
Fiber (gm)	-3.75*	-0.60
Fiber (as percent of age-plus-5 gm)	-26.05*	-0.58
Number of Students		
Breakfast skippers	122	
Breakfast non-skippers	3,225	

RDA = Recommended Dietary Allowance

[1] Breakfast skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on a typical school day.

[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-56

Adjusted Differences and Effect Sizes for Exhibit 6.8—Mean Food Group Intake Over 24 Hours: Breakfast Skippers vs. Breakfast Non-Skippers[1]

	Breakfast Skippers vs. Non-Skippers	
Food Group	**Adjusted Difference**	**Effect Size**
	Number of Servings[2]	
Grain Products	**-1.69***	**-0.52**
Whole grains	-0.53*	-0.40
Non-whole grains	-1.17*	-0.37
Vegetables	**-0.39**	**-0.22**
Dark green vegetables	-0.03	-0.08
Deep yellow vegetables	0.01	0.02
White potatoes	-0.18	-0.13
Other starchy vegetables	-0.02	-0.06
Tomatoes	-0.10	-0.20
Cooked dry beans and peas	-0.04	-0.11
Other vegetables	-0.06	-0.10
Fruits	**-0.71***	**-0.44**
Citrus fruits, melons, and berries	-0.28*	-0.26
Other fruits	-0.42*	-0.36
Dairy Products	**-1.02***	**-0.71**
Milk	-0.98*	-0.79
Yogurt	-0.02	-0.13
Cheese	-0.02	-0.03
Meat and Meat Substitutes	**0.01**	**0.01**
Red meat (beef, pork, veal, lamb, game)	-0.04	-0.05
Organ meats	-0.00	-0.03
Frankfurters, sausage, luncheon meats	0.02	0.06
Poultry (chicken, turkey, other)	0.10*	0.16
Fish and shellfish	-0.02	-0.07
Eggs	-0.02	-0.08
Soybean products (tofu, meat analogues)	-0.01	-0.07
Nuts and seeds	-0.02	-0.13
Other		
Discretionary fat (gm)	-9.23*	-0.36
Added sugars (tsp)	-5.20*	-0.40
Number of Students		
Breakfast skippers	122	
Breakfast non-skippers	3,225	

[1] Breakfast skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on a typical school day.

[2] Based mainly on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-57

Adjusted Differences and Effect Sizes for Exhibit 6.9—Percent of Students Whose Usual 24-Hour Food Energy and Nutrient Intakes Met Standard for Dietary Adequacy: Breakfast Skippers vs. Breakfast Non-Skippers[1,2]

	Breakfast Skippers vs. Non-Skippers	
Dietary Component	**Adjusted Difference**	**Odds Ratio**
Food energy	-19.28%	0.15
Protein	0.00	1.00
Vitamins		
Vitamin A	-23.56*	0.03
Vitamin C	0.67	1.00
Vitamin B_6	-1.99	0.48
Vitamin B_{12}	-1.81	0.55
Niacin	0.00	1.00
Thiamin	0.00	1.00
Riboflavin	-0.60	1.00
Folate	-19.06*	0.04
Minerals		
Calcium	-12.81	0.22
Iron	-0.58	1.00
Magnesium	-16.84	0.21
Phosphorous	-16.96*	0.21
Zinc	-7.70	0.11
Number of Students		
Breakfast skippers	169	
Breakfast non-skippers	3,143	

[1] For vitamins and minerals, except calcium, the Estimated Average Requirements (EARs) based on DRIs are used as standards. There is no EAR for total food energy, protein, or calcium. For energy, protein, and calcium, 80 percent of the 1989 RDA was used as an approximation of the estimated average requirements.

[2] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-58

Adjusted Differences and Effect Sizes for Exhibit 6.10—24-Hour Usual Intake Distributions for Food Energy, Protein, and Calcium: Breakfast Skippers vs. Breakfast Non-Skippers[1]

Dietary Component	Breakfast Skippers vs. Non-Skippers: Adjusted Difference	Effect Size
Food Energy (as percent of RDA)		
Mean	-6*	-0.14
Percentile:		
5th	-17*	-0.14
10th	-16*	-0.15
25th	-12*	-0.21
50th	-7*	-0.25
75th	-1	-0.01
90th	5	0.04
95th	9	0.05
Protein (as percent of RDA)		
Mean	-21*	-0.56
Percentile:		
5th	-13	-0.04
10th	-14	-0.05
25th	-17	-0.10
50th	-20*	-0.24
75th	-24	-0.12
90th	-29	-0.07
95th	-34	-0.06
Calcium (as percent of AI)		
Mean	-18*	-0.46
Percentile:		
5th	-27*	-0.13
10th	-25*	-0.14
25th	-23*	-0.21
50th	-20*	-0.36
75th	-15*	-0.11
90th	-9	-0.03
95th	-6	-0.02
Number of Students		
Breakfast skippers	169	
Breakfast non-skippers	3,143	

RDA = Recommended Dietary Allowance
AI = Adequate Intake

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-59

Adjusted Differences and Odds Ratios for Exhibit G-12—Percent of Students Whose Usual 24-Hour Intake Met Dietary Recommendations: Breakfast Skippers vs. Breakfast Non-Skippers[1]

	Breakfast Skippers vs. Non-Skippers	
Dietary Component	**Adjusted Difference**	**Odds Ratio**
Percent of Food Energy		
No more than 30% from total fat	-3.49%	0.82
Less than 10% from saturated fat	1.38	1.45
More than 55% from carbohydrate	-14.81	0.55
No more than twice the 1989 RDA for protein	-3.65	0.78
Other Dietary Components		
No more than 300 mg cholesterol	-6.69	0.44
No more than 2,400 mg sodium	1.19	1.26
Age plus 5 gm or more dietary fiber	13.90	0.56
Number of Students		
Breakfast skippers	169	
Breakfast non-skippers	3,143	

RDA = Recommended Dietary Allowance

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-60

Adjusted Differences and Effect Sizes for Exhibit G-13—Cognitive Outcomes: Breakfast Skippers vs. Non-Breakfast Skippers[1]

Outcome	Breakfast Skippers vs. Non-Skippers	
	Adjusted Difference	Effect Size
Stimulus Discrimination		
Number of trials completed	0.27	0.14
Trial time (sec)	0.11	0.08
Decision time (sec)	0.10	0.07
Digit Span		
Scaled scores	-0.03	-0.01
Verbal Fluency		
Animals	-0.40	-0.08
Things to eat	-0.14	-0.03
Total score	-0.54	-0.06
Number of Students		
Breakfast skippers	177	
Breakfast non-skippers	4,181	

[1] Breakfast-skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on the day of cognitive testing.

None of the differences is statistically significant.

Source: Impact Study—Cognitive Measures and 24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-61

Adjusted Differences, Effect Sizes, and Odds Ratios for Exhibit 6.11—Behavioral, Psychosocial, and Health Outcomes: Breakfast Skippers vs. Breakfast Non-Skippers[1]

Variable	Breakfast Skippers vs Non-Skippers: Adjusted Difference	Breakfast Skippers vs Non-Skippers: Effect Size/ (*Odds Ratio)*
Conners' Teachers Rating Scale[2]		
Opposition index	0.79	0.08
Cognitive problems/inattention score	1.17	0.11
Hyperactivity	-0.08	-0.01
ADHD index	0.10	0.01
Effortful Control[3]		
Ability to focus	-0.10	-0.07
Ability to follow instructions	-0.14	-0.10
Pediatric Symptom Checklist		
Total score[2]	0.48	0.09
Percent students reported to have psychosocial impairment	2.00	*(1.40)*
Weight Status		
BMI percentile	4.74*	0.17
Percent students at risk of overweight	3.88	*(1.68)*
Percent students overweight	4.07	*(2.76)*
Child Health Status		
Percent students reported to be in excellent health	-1.08	*(0.96)*
Food Security		
Percent of food secure households	0.10	*(1.01)*
Child food insecurity scale score[4]	0.17	0.09
Household food insecurity scale score[4]	0.13	0.07
Number of Students		
Breakfast skippers	172	
Breakfast non-skippers	3,249	

ADHD = Attention Deficit/Hyperactivity Disorder

BMI = Body Mass Index

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.
[2] Higher scores indicate tendency to exhibit problem behavior/impairment.
[3] Scored on 7-point Likert scale. Higher scores indicate better effortful control.
[4] Scale is from 0 to 10, from food secure (score of 0) to food insecure with hunger (score of 10).

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Child Behavioral Measures and Height and Weight Measurements, Spring 2001

Exhibit G-62

Adjusted Differences and Effect Sizes for Exhibit 6.12—Gains in Student Level Outcomes: Breakfast Skippers vs. Breakfast Non-Skippers[1]

	Breakfast Skippers vs. Non-Skippers	
Outcome	**Adjusted Difference**	**Effect Size**
School breakfast participation (as a percent of school days)	-7.60*	-0.27
Attendance[2]	-0.23	-0.06
Days tardy (as a percent of school days enrolled)[3]	0.27	0.08
Math achievement[4]	1.74	0.06
Reading achievement[4]	4.52	0.12
Number of Students		
Breakfast skippers	170	
Breakfast non-skippers	3,203	

[1] Breakfast skippers include students whose parents reported their children eating breakfast fewer than three days a week.
[2] Based on average percent of days present.
[3] Data were not available for Districts B and E.
[4] All test scores have been converted to Stanford-9 scale scores, using the equipercentile equating method.

Notes: Pre = pre-implementation or baseline year of SBPP
Gain = change from pre-implementation (baseline) year to first year of SBPP implementation.

* Difference between breakfast skippers and breakfast non-skippers is statistically significant at the .05 level.

Source: Impact Study—Parent Survey, Spring 2001, and Student-Level School Breakfast Participation Data, Attendance Data, Academic Achievement Test Scores, 1999-2000 and 2000-2001.

Exhibit G-63

Adjusted Differences and Odds Ratios for Exhibit G-14—Percent of Students Eating a Substantive Breakfast on a Typical School Day, by Source of Breakfast

	Home vs. School		Home vs. Home and School		School vs. Home and School	
Breakfast Type[1]	Adjusted Difference	Odds Ratio	Adjusted Difference	Odds Ratio	Adjusted Difference	Odds Ratio
Food from at least two main food groups[2] and >10% RDA for food energy (Definition 2)	-9.78%*	0.54	-21.35%*	0.11	-11.77%*	0.20
Food from at least two main food groups[2] and >15% RDA for food energy (Definition 3)	0.39	1.02	-33.65*	0.13	-33.83*	0.13
Number of Students[3]						
Home only	1,835					
School only	768					
Home and school	452					

RDA = Recommended Dietary Allowance

[1] Both definitions of breakfast are based on all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

[2] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

[3] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-64

Adjusted Differences and Effect Sizes for Exhibit 6.13—Mean Food Energy and Nutrient Intake at Breakfast, by Source of Breakfast

Dietary Component	Home vs. School		Home vs. Home and School		School vs. Home and School	
	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size
Food energy (as % 1989 RDA)	3.30*	0.31	-9.95*	-0.82	-13.22*	-1.34
Protein (as % 1989 RDA)	4.68*	0.17	-20.50*	-0.68	-25.04*	-0.99
Percent of Food Energy from:						
Total fat	0.30	0.02	-0.02	-0.00	-0.52	-0.05
Saturated fat	1.43*	0.25	0.55	0.09	-0.96*	-0.22
Carbohydrate	1.04	0.07	0.47	0.03	-0.40	-0.03
Protein	-0.81*	-0.16	-0.15	-0.03	0.69	0.16
Vitamins (as percent of RDA)[1]						
Vitamin A	9.46*	0.19	-25.35*	-0.47	-34.11*	-0.73
Vitamin C	14.57*	0.14	-26.68*	-0.23	-41.52*	-0.48
Vitamin B_6	18.62*	0.26	-27.06*	-0.34	-44.76*	-0.70
Vitamin B_{12}	25.99*	0.25	-29.79*	-0.26	-54.56*	-0.63
Niacin	15.47*	0.30	-16.78*	-0.30	-31.53*	-0.73
Thiamin	16.37*	0.30	-27.19*	-0.45	-42.74*	-0.90
Riboflavin	20.81*	0.28	-45.33*	-0.54	-64.85*	-0.96
Folate	14.57*	0.37	-15.01*	-0.33	-29.11*	-0.87
Minerals (as percent of RDA)[1]						
Calcium	2.40	0.10	-20.10*	-0.72	-22.21*	-0.93
Calcium (as percent of AI)	2.24	0.09	-19.15*	-0.72	-21.11*	-0.92
Iron	19.02*	0.33	-15.25*	-0.24	-33.63*	-0.75
Magnesium	5.47*	0.23	-15.15*	-0.57	-20.46*	-1.00
Phosphorous	2.00	0.07	-20.61*	-0.62	-22.26*	-0.70
Zinc	11.80*	0.23	-16.91*	-0.30	-28.19*	-0.66
Other Dietary Components						
Cholesterol (mg)	28.10*	0.27	-0.73	-0.01	-29.18*	-0.40
Sodium (mg)	101.41*	0.24	-179.65*	-0.39	-279.78*	-0.81
Fiber (gm)	0.70*	0.30	-0.95*	-0.37	-1.65*	-0.90
Fiber (as percent of age-plus-5 gm)	4.96*	0.30	-6.68*	-0.37	-11.66*	-0.91
Number of Students[2]						
Home only	1,835					
School only	768					
Home and school	452					

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-65

Adjusted Differences and Effect Sizes for Exhibit 6.14—Mean Food Group Intake at Breakfast, by Source of Breakfast

Food Group	Home vs. School Adjusted Difference	Home vs. School Effect Size	Home vs. Home and School Adjusted Difference	Home vs. Home and School Effect Size	School vs. Home and School Adjusted Difference	School vs. Home and School Effect Size
			Number of Servings[1]			
Grain Products	**0.28***	**0.22**	**-0.73***	**-0.51**	**-1.00***	**-0.85**
Whole grains	0.17*	0.21	-0.16*	-0.18	-0.32*	-0.47
Non-whole grains	0.11	0.09	-0.57*	-0.42	-0.68*	-0.60
Vegetables	**0.03**	**0.11**	**0.01**	**0.03**	**-0.02**	**-0.12**
Dark green vegetables	0.00	0.03	0.00	0.03	0.00	na[2]
Deep yellow vegetables	0.00	0.05	-0.00	-0.06	-0.00	-0.07
White potatoes	0.02	0.08	0.00	0.02	-0.01	-0.08
Other starchy vegetables	0.00	0.05	0.00	0.05	-0.00	-0.08
Tomatoes	0.00	0.05	0.00	0.04	-0.00	-0.01
Cooked dry beans and peas	0.00	0.05	0.00	0.04	-0.00	-0.08
Other vegetables	0.01	0.09	0.00	0.02	-0.01	-0.17
Fruits	**-0.09***	**-0.13**	**-0.44***	**-0.58**	**-0.36***	**-0.58**
Citrus fruits, melons, and berries	0.04	0.08	-0.10*	-0.17	-0.14*	-0.32
Other fruits	-0.13*	-0.30	-0.34*	-0.71	-0.22*	-0.43
Dairy Products	**0.06***	**0.10**	**-0.48***	**-0.66**	**-0.53***	**-0.91**
Milk	0.08*	0.13	-0.43*	-0.61	-0.50*	-0.89
Yogurt	-0.01	-0.12	-0.04*	-0.41	-0.03*	-0.25
Cheese	-0.01	-0.05	-0.01	-0.06	-0.00	-0.02
Meat and Meat Substitutes	**0.03**	**0.11**	**-0.00**	**-0.00**	**-0.03**	**-0.15**
Red meat (beef, pork, veal, lamb, game)	0.01	0.09	-0.00	-0.05	-0.01	-0.13
Organ meats	0.00	na[2]	0.00	na[2]	0.00	na[2]
Frankfurters, sausage, luncheon meats	-0.02*	-0.20	-0.01	-0.08	0.01	0.10
Poultry (chicken, turkey, other)	0.00	0.01	-0.00	-0.04	-0.00	-0.09
Fish and shellfish	0.00	0.03	0.00	0.03	0.00	.
Eggs	0.04*	0.20	0.01	0.07	-0.02	-0.17
Soybean products (tofu, meat analogues)	-0.00	-0.01	-0.00	-0.06	-0.00	-0.05
Nuts and seeds	0.01*	0.13	-0.00	-0.01	-0.01*	-0.33
Other						
Discretionary fat (gm)	2.15*	0.25	-4.38*	-0.46	-6.55*	-0.88
Added sugars (tsp)	1.41*	0.30	-1.98*	-0.38	-3.37*	-0.83
Number of Students[3]						
Home only	1,835					
School only	968					
Home and school	452					

na = not applicable

[1] Based mainly on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[2] An effect size could not be computed because no foods were consumed from the food group by either substantive or non-substantive breakfast eaters.

[3] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-66

Adjusted Differences and Effect Sizes for Exhibit 6.15—Mean Food Energy and Nutrient Intake over 24 Hours, by Source of Breakfast

Dietary Component	Home vs. School Adjusted Difference	Home vs. School Effect Size	Home vs. Home and School Adjusted Difference	Home vs. Home and School Effect Size	School vs. Home and School Adjusted Difference	School vs. Home and School Effect Size
Food energy (as % 1989 RDA)	4.58*	0.16	-8.50*	-0.29	-13.01*	-0.46
Protein (as % 1989 RDA)	2.09	0.02	-19.71*	-0.21	-21.95*	-0.24
Percent of Food Energy from:						
Total fat	-0.29	-0.04	0.95*	0.15	1.20*	0.19
Saturated fat	0.33*	0.10	0.55*	0.17	0.21	0.07
Carbohydrate	1.00*	0.13	-0.95	-0.12	-1.90*	-0.25
Protein	-0.49*	-0.14	0.08	0.02	0.56*	0.16
Vitamins (as percent of RDA)[1]						
Vitamin A	12.77*	0.13	-25.74*	-0.26	-37.65*	-0.40
Vitamin C	29.23*	0.14	-20.96*	-0.09	-50.74*	-0.25
Vitamin B_6	18.49*	0.16	-30.33*	-0.25	-47.82*	-0.40
Vitamin B_{12}	29.51*	0.13	-17.49	-0.07	-47.28*	-0.27
Niacin	16.62*	0.18	-16.51*	-0.17	-32.28*	-0.34
Thiamin	15.79*	0.16	-31.46*	-0.30	-45.87*	-0.44
Riboflavin	19.99*	0.16	-47.45*	-0.35	-65.88*	-0.50
Folate	13.60*	0.20	-17.67*	-0.24	-30.50*	-0.41
Minerals (as percent of RDA)[1]						
Calcium	2.76	0.04	-21.39*	-0.33	-23.89*	-0.39
Calcium (as percent of AI)	2.59	0.04	-20.15*	-0.32	-22.50*	-0.38
Iron	18.35*	0.21	-18.18*	-0.19	-36.07*	-0.47
Magnesium	9.52*	0.15	-11.83*	-0.19	-20.99*	-0.34
Phosphorous	3.84	0.04	-16.94*	-0.18	-20.46*	-0.21
Zinc	11.88*	0.14	-16.73*	-0.18	-28.45*	-0.34
Other Dietary Components						
Cholesterol (mg)	24.28*	0.16	1.07	0.01	-24.25*	-0.18
Sodium (mg)	49.57	0.04	-103.49	-0.08	-155.20	-0.13
Fiber (gm)	1.16*	0.19	-0.72	-0.11	-1.86*	-0.30
Fiber (as percent of age-plus-5 gm)	8.15*	0.19	-5.00*	-0.11	-13.06*	-0.30
Number of Students[2]						
Home only	1,835					
School only	768					
Home and school	452					

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-67

Adjusted Differences and Effect Sizes for Exhibit 6.16—Mean Food Group Intake Over 24 Hours, by Source of Breakfast

	Home vs. School		Home vs. Home and School		School vs. Home and School	
Food Group	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
			Number of Servings[1]			
Grain Products	**0.40***	**0.12**	**-0.73***	**-0.22**	**-1.11***	**-0.36**
Whole grains	0.30*	0.23	-0.12	-0.09	-0.41*	-0.33
Non-whole grains	0.10	0.03	-0.61*	-0.19	-0.70*	-0.23
Vegetables	**0.06**	**0.03**	**0.08**	**0.05**	**0.02**	**0.01**
Dark green vegetables	0.04	0.11	-0.01	-0.04	-0.05	-0.15
Deep yellow vegetables	0.02	0.07	0.01	0.03	-0.01	-0.04
White potatoes	0.06	0.04	0.11	0.09	0.05	0.04
Other starchy vegetables	-0.03	-0.08	0.00	0.01	0.04	0.08
Tomatoes	-0.03	-0.06	-0.01	-0.03	0.02	0.04
Cooked dry beans and peas	-0.02	-0.04	0.00	0.00	0.02	0.04
Other vegetables	0.00	0.00	-0.02	-0.03	-0.02	-0.03
Fruits	**-0.00**	**-0.00**	**-0.50***	**-0.30**	**-0.50***	**-0.32**
Citrus fruits, melons, and berries	0.13*	0.12	-0.10	-0.09	-0.23*	-0.24
Other fruits	-0.13*	-0.12	-0.40*	-0.33	-0.27*	-0.22
Dairy Products	**0.13***	**0.09**	**-0.45***	**-0.30**	**-0.56***	**-0.41**
Milk	0.13*	0.11	-0.44*	-0.34	-0.56*	-0.48
Yogurt	0.01	0.03	-0.03*	-0.14	-0.03*	-0.16
Cheese	-0.01	-0.01	0.02	0.03	0.03	0.04
Meat and Meat Substitutes	**-0.01**	**-0.01**	**0.02**	**0.02**	**0.02**	**0.02**
Red meat (beef, pork, veal, lamb, game)	0.00	0.00	0.05	0.06	0.04	0.05
Organ meats	0.00	0.04	-0.00	-0.04	-0.00	-0.08
Frankfurters, sausage, luncheon meats	-0.04	-0.10	-0.01	-0.03	0.03	0.07
Poultry (chicken, turkey, other)	-0.04	-0.07	-0.05	-0.08	-0.01	-0.01
Fish and shellfish	0.00	0.01	0.01	0.04	0.01	0.02
Eggs	0.03*	0.14	0.02	0.07	-0.02	-0.08
Soybean products (tofu, meat analogues)	0.00	0.03	-0.01	-0.10	-0.01	-0.14
Nuts and seeds	0.03*	0.15	0.01	0.07	-0.01	-0.09
Other						
Discretionary fat (gm)	2.99*	0.12	-3.10	-0.12	-6.11*	-0.25
Added sugars (tsp)	2.22*	0.17	-1.15	-0.09	-3.35*	-0.26
Number of Students[2]						
Home only	1,835					
School only	768					
Home and school	452					

[1] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[2] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-68

Adjusted Differences and Effect Sizes for Exhibit G-15—Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours, by Source of Breakfast

	Home vs. School		Home vs. Home and School		School vs. Home and School	
Dietary Component	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
Food energy	1.81%*	0.20	-7.72%*	-0.80	-9.54%*	-1.10
Macronutrients						
Protein	1.20*	0.12	-6.85*	-0.65	-8.04*	-0.85
Total fat	1.51*	0.13	-6.66*	-0.55	-8.31*	-0.74
Saturated fat	3.28*	0.27	-6.37*	-0.47	-9.79*	-0.83
Carbohydrate	1.75*	0.16	-8.58*	-0.77	-10.30*	-1.03
Vitamins						
Vitamin A	0.73	0.03	-9.54*	-0.43	-10.11*	-0.50
Vitamin C	-3.85*	-0.15	-11.34*	-0.43	-7.56*	-0.31
Vitamin B_6	2.52*	0.13	-7.76*	-0.38	-10.04*	-0.58
Vitamin B_{12}	2.51*	0.11	-8.21*	-0.36	-10.50*	-0.55
Niacin	3.32*	0.21	-5.76*	-0.34	-8.90*	-0.62
Thiamin	2.75*	0.18	-6.89*	-0.45	-9.52*	-0.70
Riboflavin	2.35*	0.15	-8.52*	-0.51	-10.67*	-0.76
Folate	4.11*	0.23	-6.58*	-0.36	-10.54*	-0.67
Minerals						
Calcium	-0.03	-0.00	-9.75*	-0.58	-9.59*	-0.63
Iron	3.69*	0.21	-6.27*	-0.34	-9.75*	-0.63
Magnesium	1.15	0.10	-8.79*	-0.71	-9.91*	-0.93
Phosphorous	0.08	0.01	-9.09*	-0.71	-9.10*	-0.81
Zinc	2.00*	0.11	-7.33*	-0.39	-9.13*	-0.58
Other Dietary Components						
Cholesterol	5.96*	0.31	-3.77*	-0.18	-9.86*	-0.58
Sodium	2.29*	0.21	-5.01*	-0.44	-7.30*	-0.74
Fiber	2.03*	0.16	-6.41*	-0.48	-8.43*	-0.72
Number of Students[1]						
Home only	1,835					
School only	768					
Home and school	452					

[1] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-69

Adjusted Differences and Effect Sizes for Exhibit 6.17—Percent of Students Eating Breakfast on a Typical Day, by Availability of Breakfast at School

Breakfast Type[2]	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
	Adjusted Difference	Odds Ratio	Adjusted Difference	Odds Ratio	Adjusted Difference	Odds Ratio
Any food or beverage (Definition 1)	1.61%	1.94	1.72%	1.91	0.14%	1.04
Food from at least two main food groups[3] and >10% RDA for food energy (Definition 2)	5.02	1.43	10.25*	1.95	5.01*	1.34
Food from at least two main food groups[3] and >15% RDA for food energy (Definition 3)	9.99*	1.57	12.62*	1.75	2.65	1.12
Number of Students[4]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.

[2] All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

[3] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

[4] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-70

Adjusted Differences and Odds Ratios for Exhibit 6.18—Percent of Students Eating More Than One Breakfast, by Availability of Breakfast at School

	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
Breakfast Type[2]	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**
Any food or beverage (Definition 1)	15.03%*	2.35	20.39%*	3.71	5.34%*	1.58
Food from at least two main food groups[3] and >10% RDA for food energy (Definition 2)	7.41*	2.60	8.83*	3.70	1.50	1.41
Food from at least two main food groups[3] and >15% RDA for food energy (Definition 3)	4.72*	2.96	4.80*	3.18	0.11	1.05
Number of Students[4]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.
[2] All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.
[3] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.
[4] Includes students who skipped breakfast.

Note: Percentages include only those students for whom one source of breakfast food was the school breakfast. Almost all of these students consumed additional breakfast foods at home versus some other source.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-71

Adjusted Differences and Effect Sizes for Exhibit G-16—Mean Food Energy and Nutrient Intake at Breakfast, by Availability of Breakfast at School

Dietary Component	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size
Food energy (as % 1989 RDA)	2.08*	0.17	2.22*	0.18	0.26	0.02
Protein (as % 1989 RDA)	2.43	0.08	3.52	0.12	1.18	0.04
Percent of Food Energy from:						
Total fat	2.82*	0.23	2.43*	0.19	-0.42	-0.03
Saturated fat	0.69	0.13	0.48	0.08	-0.22	-0.04
Carbohydrate	-2.76*	-0.19	-2.88*	-0.18	-0.05	-0.00
Protein	-0.76*	-0.16	-0.26	-0.05	0.47*	0.10
Vitamins (as percent of RDA)[2]						
Vitamin A	-5.24	-0.10	-2.32	-0.04	3.22	0.06
Vitamin C	-12.30*	-0.12	-10.64*	-0.10	2.21	0.02
Vitamin B_6	-11.08	-0.15	-9.34	-0.13	2.33	0.03
Vitamin B_{12}	-7.25	-0.07	-8.05	-0.07	-0.70	-0.01
Niacin	-6.56*	-0.13	-5.64	-0.11	1.43	0.03
Thiamin	-4.41	-0.08	-3.38	-0.06	1.49	0.03
Riboflavin	-7.48	-0.09	-4.69	-0.06	3.24	0.04
Folate	-7.41*	-0.18	-6.01*	-0.14	1.62	0.04
Minerals (as percent of RDA)[2]						
Calcium	0.24	0.01	2.65	0.10	2.55*	0.09
Calcium (as percent of AI)	0.07	0.00	2.44	0.09	2.51*	0.10
Iron	-8.54	-0.15	-7.28	-0.12	1.36	0.02
Magnesium	-3.42*	-0.13	-1.48	-0.06	2.11	0.08
Phosphorous	0.61	0.02	3.08	0.09	2.67*	0.08
Zinc	-7.49*	-0.15	-5.05	-0.10	2.63	0.05
Other Dietary Components						
Cholesterol (mg)	-3.98	-0.05	-11.55	-0.11	-8.04	-0.08
Sodium (mg)	64.71*	0.16	49.79	0.11	-11.69	-0.03
Fiber (gm)	-0.43*	-0.19	-0.32	-0.14	0.12	0.05
Fiber (as percent of age-plus-5 gm)	-3.01*	-0.18	-2.22*	-0.14	0.91	0.05
Number of Students[3]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.

[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[3] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-72

Adjusted Differences and Effect Sizes for Exhibit G-17—Mean Food Group Intake at Breakfast, by Availability of Breakfast at School

Food Group	Treatment Classroom vs. Treatment Non-classroom[1] Adjusted Difference	Effect Size	Treatment Classroom vs. Control Non-classroom[1] Adjusted Difference	Effect Size	Treatment Non-Classroom vs. Control Non-classroom[1] Adjusted Difference	Effect Size
			Number of Servings[2]			
Grain Products	**0.30***	**0.22**	**0.32***	**0.24**	**0.03**	**0.02**
Whole grains	-0.23*	-0.29	-0.18*	-0.23	0.05	0.06
Non-whole grains	0.52*	0.40	0.50*	0.40	-0.02	-0.01
Vegetables	**-0.01**	**-0.02**	**-0.01**	**-0.02**	**0.00**	**0.01**
Dark green vegetables	-0.00	-0.03	-0.00	-0.03	-0.00	-0.03
Deep yellow vegetables	-0.00	-0.06	-0.00	-0.03	-0.00	-0.00
White potatoes	-0.01	-0.05	-0.01	-0.07	-0.00	-0.00
Other starchy vegetables	0.00	0.05	-0.00	-0.03	-0.00	-0.04
Tomatoes	0.01	0.10	0.01*	0.22	0.00	0.06
Cooked dry beans and peas	-0.00	-0.05	-0.00	-0.04	-0.00	-0.03
Other vegetables	-0.00	-0.03	-0.00	-0.03	-0.00	-0.00
Fruits	**0.05**	**0.07**	**0.07**	**0.09**	**0.02**	**0.03**
Citrus fruits, melons, and berries	-0.01	-0.02	-0.01	-0.03	-0.00	-0.00
Other fruits	0.06	0.13	0.08*	0.17	0.02	0.04
Dairy Products	**-0.01**	**-0.01**	**0.06**	**0.09**	**0.07***	**0.10**
Milk	-0.02	-0.04	0.03	0.04	0.05	0.07
Yogurt	0.01	0.11	0.02*	0.21	0.01	0.08
Cheese	0.01	0.05	0.01	0.11	0.01	0.06
Meat and Meat Substitutes	**0.02**	**0.08**	**0.00**	**0.00**	**-0.02**	**-0.07**
Red meat (beef, pork, veal, lamb, game)	0.00	0.05	-0.00	-0.00	-0.00	-0.04
Organ meats	0.00	na[3]	0.00	na[3]	0.00	na[3]
Frankfurters, sausage, luncheon meats	0.03*	0.23	0.03*	0.25	-0.00	-0.00
Poultry (chicken, turkey, other)	0.00	0.02	-0.00	-0.03	-0.00	-0.05
Fish and shellfish	-0.00	-0.03	-0.00	-0.02	0.00	0.03
Eggs	-0.01	-0.08	-0.03*	-0.14	-0.02	-0.08
Soybean products (tofu, meat analogues)	0.00	0.09	0.00*	0.15	0.00	0.03
Nuts and seeds	-0.00	-0.04	-0.00	-0.06	0.00	0.02
Other						
Discretionary fat (gm)	0.78	0.08	0.96	0.11	0.25	0.03
Added sugars (tsp)	0.61	0.13	0.46	0.09	-0.08	-0.02
Number of Students[4]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

na = not applicable

[1] Non-classroom locations are primarily school cafeterias.

[2] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[3] An effect size could not be computed because no foods were consumed from the food group by either substantive or non-substantive breakfast eaters.

[4] Includes students who skipped breakfast.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-73

Adjusted Differences and Effect Sizes for Exhibit G-19—Mean Food Energy and Nutrient Intake over 24 Hours, by Availability of Breakfast at School

	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
Dietary Component	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
Food energy (as % 1989 RDA)	1.87	0.06	-0.07	-0.00	-1.86	-0.06
Protein (as % 1989 RDA)	3.52	0.04	-2.40	-0.02	-6.14	-0.07
Percent of Food Energy from:						
Total fat	0.86	0.13	0.26	0.04	-0.61*	-0.09
Saturated fat	0.16	0.05	-0.09	-0.03	-0.26	-0.08
Carbohydrate	-0.92	-0.12	-0.36	-0.05	0.61	0.08
Protein	-0.20	-0.06	-0.12	-0.03	0.04	0.01
Vitamins (as percent of RDA)[2]						
Vitamin A	-18.11*	-0.19	-12.65*	-0.13	5.53	0.06
Vitamin C	-38.15*	-0.18	-34.13*	-0.16	5.32	0.02
Vitamin B_6	-14.17*	-0.12	-12.93*	-0.11	1.63	0.01
Vitamin B_{12}	-22.73	-0.13	-30.34*	-0.12	-7.85	-0.03
Niacin	-12.49*	-0.13	-11.01*	-0.12	1.78	0.02
Thiamin	-11.89*	-0.11	-10.19	-0.10	2.56	0.02
Riboflavin	-20.93*	-0.16	-16.56*	-0.12	4.66	0.03
Folate	-14.19*	-0.19	-10.33*	-0.15	4.80	0.07
Minerals (as percent of RDA)[2]						
Calcium	-7.15	-0.11	-6.57	-0.10	0.72	0.01
Calcium (as percent of AI)	-7.27*	-0.12	-6.50*	-0.10	0.91	0.01
Iron	-11.82	-0.14	-10.23	-0.12	1.97	0.02
Magnesium	-11.32*	-0.17	-9.26*	-0.15	2.13	0.03
Phosphorous	-8.09*	-0.08	-6.10*	-0.06	1.84	0.02
Zinc	-8.51*	-0.10	-8.51*	-0.10	0.23	0.00
Other Dietary Components						
Cholesterol (mg)	1.68	0.01	-8.50	-0.05	-11.92	-0.08
Sodium (mg)	-7.32	-0.01	-45.86	-0.04	-31.17	-0.02
Fiber (gm)	-0.85	-0.14	-0.79	-0.13	0.09	0.01
Fiber (as percent of age-plus-5 gm)	-6.35*	-0.14	-5.72*	-0.13	0.87	0.02
Number of Students[3]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.

[2] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[3] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-74

Adjusted Differences and Effect Sizes for Exhibit G-18—Mean Food Group Intake Over 24 Hours, by Availability of Breakfast at School

Food Group	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size
			Number of Servings[2]			
Grain Products	**-0.08**	**-0.02**	**-0.19**	**-0.06**	**-0.08**	**-0.02**
Whole grains	-0.20*	-0.15	-0.15	-0.11	0.05	0.04
Non-whole grains	0.13	0.04	-0.04	-0.01	-0.13	-0.04
Vegetables	**0.01**	**0.00**	**-0.05**	**-0.03**	**-0.06**	**-0.03**
Dark green vegetables	-0.05	-0.14	-0.05	-0.15	0.00	0.00
Deep yellow vegetables	-0.05*	-0.16	-0.05*	-0.14	0.00	0.01
White potatoes	0.13	0.10	-0.00	-0.00	-0.14*	-0.10
Other starchy vegetables	0.03	0.08	0.04	0.10	0.01	0.02
Tomatoes	-0.01	-0.03	0.01	0.03	0.03	0.06
Cooked dry beans and peas	0.00	0.00	0.00	0.00	0.00	0.01
Other vegetables	-0.04	-0.06	-0.00	-0.00	0.04	0.06
Fruits	**-0.05**	**-0.03**	**0.00**	**0.00**	**0.05**	**0.03**
Citrus fruits, melons, and berries	-0.10	-0.09	-0.10	-0.09	-0.00	-0.00
Other fruits	0.05	0.04	0.10	0.09	0.05	0.04
Dairy Products	**-0.19**	**-0.13**	**-0.15**	**-0.10**	**0.04**	**0.02**
Milk	-0.16	-0.13	-0.12	-0.09	0.03	0.03
Yogurt	-0.01	-0.04	0.01	0.05	0.02	0.09
Cheese	-0.02	-0.03	-0.04	-0.06	-0.02	-0.02
Meat and Meat Substitutes	**0.14***	**0.14**	**0.08**	**0.08**	**-0.07**	**-0.07**
Red meat (beef, pork, veal, lamb, game)	0.09	0.12	0.05	0.06	-0.05	-0.06
Organ meats	0.00	.	-0.00	-0.03	-0.00	-0.05
Frankfurters, sausage, luncheon meats	0.01	0.02	0.02	0.05	0.01	0.03
Poultry (chicken, turkey, other)	0.04	0.07	0.05	0.08	-0.00	-0.00
Fish and shellfish	0.02	0.06	0.01	0.02	-0.02	-0.05
Eggs	-0.02	-0.07	-0.03*	-0.12	-0.02	-0.07
Soybean products (tofu, meat analogues)	0.01	0.06	0.01	0.15	0.00	0.06
Nuts and seeds	-0.01	-0.07	-0.02	-0.10	-0.00	-0.02
Other						
Discretionary fat (gm)	1.22	0.05	-0.09	-0.00	-1.28	-0.05
Added sugars (tsp)	0.70	0.05	0.55	0.04	-0.12	-0.01
Number of Students[3]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

[1] Non-classroom locations are primarily school cafeterias.

[2] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[3] Includes students who skipped breakfast.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-75

Adjusted Differences and Effect Sizes for Exhibit G-19—Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours, by Availability of Breakfast at School

Dietary Component	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size	Adjusted Difference	Effect Size
Food energy	1.77%*	0.17	2.30%*	0.22	0.60%	0.06
Macronutrients						
Protein	0.75	0.07	1.89*	0.18	1.16*	0.11
Total fat	2.71*	0.22	2.96*	0.24	0.31	0.03
Saturated fat	2.43*	0.18	2.76*	0.21	0.39	0.03
Carbohydrate	1.40	0.12	1.85*	0.16	0.55	0.05
Vitamins						
Vitamin A	0.20	0.01	1.44	0.06	1.39	0.06
Vitamin C	-0.57	-0.02	1.13	0.04	1.73	0.07
Vitamin B_6	-3.11*	-0.15	-1.50	-0.07	1.74	0.09
Vitamin B_{12}	-0.64	-0.03	0.82	0.04	1.48	0.07
Niacin	-1.65	-0.10	-0.66	-0.04	1.13	0.07
Thiamin	-0.38	-0.02	0.41	0.03	0.87	0.05
Riboflavin	-0.42	-0.02	0.84	0.05	1.37	0.08
Folate	-2.36	-0.13	-1.54	-0.08	0.82	0.04
Minerals						
Calcium	1.27	0.07	3.23*	0.19	2.03*	0.12
Iron	-1.96	-0.11	-1.08	-0.06	0.92	0.05
Magnesium	-0.36	-0.03	1.04	0.08	1.48*	0.12
Phosphorous	1.49	0.11	3.05*	0.23	1.65*	0.13
Zinc	-2.90*	-0.16	-0.69	-0.04	2.28*	0.12
Other Dietary Components						
Cholesterol	-0.27	-0.01	-0.65	-0.03	-0.37	-0.02
Sodium	1.80*	0.16	1.89*	0.16	0.15	0.01
Fiber	-0.95	-0.07	-0.26	-0.02	0.75	0.06
Number of Students[2]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

[1] Non-classroom locations are primarily school cafeterias.
[2] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-76

Adjusted Differences and Effect Sizes for Exhibit G-20—Percent of Students Whose Usual 24-Hour Food Energy and Nutrient Intakes Met Standard for Dietary Adequacy, by Availability of Breakfast at School[1]

	Treatment Classroom vs. Treatment Non-classroom[2]		Treatment Classroom vs. Control Non-classroom[2]		Treatment Non-Classroom vs. Control Non-classroom[2]	
Dietary Component	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**
Food energy	-2.72%	0.69	-3.73%	0.58	-1.01%	0.84
Protein	-0.00	1.00	-0.01	1.00	-0.01	1.00
Vitamins						
Vitamin A	-3.23	0.26	-1.53	0.59	1.70	2.28
Vitamin C	-4.33	0.18	-5.03	0.18	-0.70	1.00
Vitamin B_6	0.12	1.00	0.15	1.00	0.03	1.00
Vitamin B_{12}	0.12	1.00	0.00	1.00	-0.12	1.00
Niacin	0.00	1.00	0.00	1.00	0.00	1.00
Thiamin	0.00	1.00	0.00	1.00	0.00	1.00
Riboflavin	0.00	1.00	0.00	1.00	0.00	1.00
Folate	-3.65	0.23	-1.74	0.57	1.91	2.42
Minerals						
Calcium	-10.34	0.21	-10.37	0.21	-0.03	0.99
Iron	-0.09	1.00	-0.09	1.00	0.00	1.00
Magnesium	-3.26	0.65	-4.45	0.53	-1.19	0.82
Phosphorous	-6.25	0.44	-6.17	0.45	0.08	1.02
Zinc	2.05	2.51	0.25	1.00	-1.81	0.40
Number of Students[3]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

[1] For vitamins and minerals, except calcium, the Estimated Average Requirements (EARs) based on DRIs are used as standards. There is no EAR for total food energy, protein, or calcium. For energy, protein, and calcium, 80 percent of the 1989 RDA was used as an approximation of the estimated average requirements.
[2] Non-classroom locations are primarily school cafeterias.
[3] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-77

Adjusted Differences and Effect Sizes for Exhibit G-21—24-Hour Usual Intake Distributions for Food Energy, Protein, and Calcium, by Availability of Breakfast at School

	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
Dietary Component	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
Food Energy (as % RDA)						
Mean	1	0.05	-1	-0.04	-2*	-0.08
Percentile:						
5th	-1	-0.01	-2	-0.02	-1	-0.01
10th	-2	-0.02	-3	-0.03	-1	-0.01
25th	0	-0.01	-2	-0.04	-2	-0.03
50th	0	0.01	-2	-0.06	-2*	-0.07
75th	3	0.04	0	0.00	-3	-0.04
90th	4	0.03	1	0.01	-3	-0.02
95th	6	0.03	2	0.01	-3	-0.02
Protein (as percent of RDA)						
Mean	-2	-0.08	-8*	-0.27	-6*	-0.22
Percentile:						
5th	6	0.02	-10	-0.03	-16	-0.05
10th	4	0.02	-10	-0.03	-14	-0.05
25th	2	0.01	-9	-0.05	-11	-0.07
50th	-1	-0.01	-8	-0.09	-7*	-0.08
75th	-4	-0.02	-7	-0.03	-3	-0.01
90th	-8	-0.02	-5	-0.01	3	0.01
95th	-12	-0.02	-3	-0.01	9	0.02
Calcium (as percent of AI)						
Mean	-9*	-0.42	-9*	-0.31	0	0.02
Percentile:						
5th	-24*	-0.13	-28*	-0.13	-4	-0.02
10th	-22	-0.14	-26	-0.15	-4	-0.02
25th	-19	-0.19	-21	-0.19	-2	-0.02
50th	-12*	-0.22	-12*	-0.22	0	0.00
75th	-3	-0.02	-1	-0.01	2	0.01
90th	8	0.03	12	0.04	4	0.01
95th	14	0.04	20	0.06	6	0.02
Number of Students[2]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

RDA = Recommended Dietary Allowance
AI = Adequate Intake

[1] Non-classroom locations are primarily school cafeterias.
[2] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

Differences between means and the 5th, 50th and 95th percentile values were tested for statistical significance.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-78

Adjusted Differences and Effect Sizes for Exhibit G-22—Percent of Students Whose Usual 24-Hour Intake Met Dietary Recommendations, by Availability of Breakfast at School

	Treatment Classroom vs. Treatment Non-classroom[1]		Treatment Classroom vs. Control Non-classroom[1]		Treatment Non-Classroom vs. Control Non-classroom[1]	
Dietary Component	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**
Percent of Food Energy						
No more than 30% from total fat	-19.02%	0.13	-25.38%	0.09	-6.36%	0.72
Less than 10% from saturated fat	2.56	4.41	-1.38	0.70	-3.93	0.16
More than 55% from carbohydrate	-12.58	0.60	-6.91	0.76	5.67	1.26
No more than twice the 1989 RDA for protein	-2.11	0.88	0.25	1.02	2.37	1.15
Other Dietary Components						
No more than 300 mg cholesterol	-2.40	0.67	0.75	1.11	3.15	1.65
No more than 2,400 mg sodium	0.03	1.00	2.89	1.97	2.86	1.96
Age plus 5 gm or more dietary fiber	-14.39	0.55	-14.07	0.56	0.32	1.01
Number of Students[2]						
Treatment classroom	420					
Treatment non-classroom	1,279					
Control non-classroom	1,648					

RDA = Recommended Dietary Allowance

[1] Non-classroom locations are primarily school cafeterias.
[2] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-79

Adjusted Differences and Odds Ratios for Exhibit 6.23—Percent of Students Eating Breakfast on the Target Day, by Household Income, Relative to the Federal Poverty Level

	<130% vs. 130-185%		<130% vs. >185%		130-185% vs. >185%	
Breakfast Type[1]	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**
Any food or beverage (Definition 1)	-1.77%	0.50	-0.43%	0.87	1.27%	1.66
Food from at least two main food groups[2] and >10% RDA for food energy (Definition 2)	-1.54	0.91	0.83	1.05	2.35	1.16
Food from at least two main food groups[2] and >15% RDA for food energy (Definition 3)	0.60	1.03	0.71	1.03	0.29	1.01
Number of Students[3]						
Income <130% of poverty	893					
Income 130-185% of poverty	511					
Income >185% of poverty	1,866					

RDA = Recommended Dietary Allowance

[1] All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

[2] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

[3] Includes students who skipped breakfast.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-80

Adjusted Differences and Odds Ratios for Exhibit 6.20—Percent of Students Eating More Than One Breakfast, by Household Income, Relative to the Federal Poverty Level

	<130% vs. 130-185%		<130% vs. >185%		130-185% vs. >185%	
Breakfast Type[1]	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**	**Adjusted Difference**	**Odds Ratio**
Any food or beverage (Definition 1)	1.31	1.09	7.03*	1.67	5.40*	1.49
Food from at least two main food groups[2] and >10% RDA for food energy (Definition 2)	-1.04	0.84	1.09	1.23	1.93	1.40
Food from at least two main food groups[2] and >15% RDA for food energy (Definition 3)	0.02	1.01	1.66*	1.81	1.35	1.62
Number of Students[3]						
Income <130% of poverty	893					
Income 130-185% of poverty	511					
Income >185% of poverty	1,866					

RDA = Recommended Dietary Allowance

[1] All three definitions of breakfast include all food and beverages, excluding water, reported consumed between 5:00 a.m. and 45 minutes after the start of school, and foods consumed up to 10:30 a.m. that the student/parent reported as being part of breakfast.

[2] The five main food groups are milk and milk products, meat and meat alternates, grain products, fruit and fruit juices, and vegetables and vegetable juices.

[3] Includes students who skipped breakfast.

Note: Percentages include only those students for whom one source of breakfast food was the school breakfast. Almost all of these students consumed additional breakfast foods at home versus some other source.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-81

Adjusted Differences and Effect Sizes for Exhibit 6.21—Mean Food Energy and Nutrient Intake at Breakfast, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130% vs. 130-185% Adjusted Difference	<130% vs. 130-185% Effect Size	<130% vs. >185% Adjusted Difference	<130% vs. >185% Effect Size	130-185% vs. >185% Adjusted Difference	130-185% vs. >185% Effect Size
Food energy (as % 1989 RDA)	-0.75	-0.06	0.06	0.00	0.67	0.05
Protein (as % 1989 RDA)	-2.71	-0.09	-0.83	-0.03	1.76	0.06
Percent of Food Energy from:						
Total fat	-0.62	-0.05	0.71	0.06	1.44*	0.12
Saturated fat	-0.20	-0.04	0.37	0.07	0.62*	0.11
Carbohydrate	0.85	0.06	-0.86	-0.06	-1.83*	-0.12
Protein	-0.22	-0.05	-0.02	-0.00	0.20	0.04
Vitamins (as percent of RDA)[1]						
Vitamin A	-7.29*	-0.14	-4.21	-0.08	2.81	0.05
Vitamin C	-2.71	-0.02	-0.68	-0.01	0.44	0.00
Vitamin B_6	-6.71	-0.09	-2.85	-0.04	3.52	0.04
Vitamin B_{12}	-10.91	-0.11	-5.35	-0.05	5.81	0.05
Niacin	-4.36	-0.08	-3.45	-0.06	0.75	0.01
Thiamin	-4.24	-0.07	-2.98	-0.05	0.98	0.02
Riboflavin	-7.69	-0.09	-4.26	-0.05	3.12	0.04
Folate	-3.61	-0.09	-3.49	-0.08	-0.20	-0.00
Minerals (as percent of RDA)[1]						
Calcium	-0.93	-0.03	-0.31	-0.01	0.65	0.02
Calcium (as percent of AI)	-0.85	-0.03	-0.34	-0.01	0.54	0.02
Iron	-6.84	-0.12	-5.68*	-0.09	1.03	0.02
Magnesium	-0.76	-0.03	-0.65	-0.02	-0.04	-0.00
Phosphorous	-1.73	-0.05	-1.09	-0.03	0.52	0.02
Zinc	-7.71*	-0.15	-4.63*	-0.09	2.69	0.05
Other Dietary Components						
Cholesterol (mg)	-14.73*	-0.15	-4.52	-0.05	9.39	0.09
Sodium (mg)	-65.03*	-0.16	-44.71*	-0.10	15.64	0.03
Fiber (gm)	-0.11	-0.04	-0.07	-0.03	0.01	0.01
Fiber (as percent of age-plus-5 gm)	-0.80	-0.05	-0.57	-0.03	0.09	0.01
Number of Students[2]						
Income <130% of poverty	893					
Income 130-185% of poverty	511					
Income >185% of poverty	1,866					

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-82

Adjusted Differences and Effect Sizes for Exhibit G-25—Mean Food Group Intake at Breakfast, by Household Income, Relative to the Federal Poverty Level

Food Group	<130% vs. 130-185% Adjusted Difference	<130% vs. 130-185% Effect Size	<130% vs. >185% Adjusted Difference	<130% vs. >185% Effect Size	130-185% vs. >185% Adjusted Difference	130-185% vs. >185% Effect Size
			Number of Servings[1]			
Grain Products	**-0.04**	**-0.03**	**-0.04**	**-0.03**	**-0.01**	**-0.01**
Whole grains	-0.07	-0.09	-0.05	-0.07	0.01	0.01
Non-whole grains	0.03	0.02	0.01	0.01	-0.02	-0.01
Vegetables	**-0.03**	**-0.10**	**-0.01**	**-0.06**	**0.01**	**0.06**
Dark green vegetables	-0.00	-0.07	0.00	0.03	0.00	0.10
Deep yellow vegetables	-0.00	-0.03	-0.00	-0.05	-0.00	-0.03
White potatoes	-0.02	-0.11	-0.01	-0.04	0.02	0.11
Other starchy vegetables	0.00	na[2]	-0.00	-0.07	-0.00	-0.05
Tomatoes	0.00	0.01	-0.00	-0.02	-0.00	-0.03
Cooked dry beans and peas	-0.00	-0.10	-0.00	-0.06	0.00	0.03
Other vegetables	-0.00	-0.01	-0.00	-0.04	-0.00	-0.04
Fruits	**0.08***	**0.11**	**0.08***	**0.12**	**0.00**	**0.00**
Citrus fruits, melons, and berries	0.02	0.05	0.01	0.01	-0.02	-0.04
Other fruits	0.06*	0.11	0.08*	0.16	0.02	0.05
Dairy Products	**-0.02**	**-0.03**	**-0.00**	**-0.00**	**0.02**	**0.03**
Milk	-0.03	-0.04	-0.01	-0.02	0.02	0.03
Yogurt	0.01	0.08	0.01	0.06	-0.00	-0.03
Cheese	-0.00	-0.01	0.00	0.03	0.01	0.05
Meat and Meat Substitutes	**-0.04***	**-0.16**	**-0.02**	**-0.07**	**0.02**	**0.08**
Red meat (beef, pork, veal, lamb, game)	-0.00	-0.05	-0.01	-0.08	-0.00	-0.03
Organ meats	0.00	na[2]	0.00	na[2]	0.00	na[2]
Frankfurters, sausage, luncheon meats	-0.01	-0.08	0.00	0.03	0.01	0.12
Poultry (chicken, turkey, other)	0.00	0.00	-0.00	-0.03	-0.00	-0.02
Fish and shellfish	0.00	na[2]	-0.00	-0.03	-0.00	-0.03
Eggs	-0.03*	-0.16	-0.01	-0.07	0.01	0.07
Soybean products (tofu, meat analogues)	-0.00	-0.11	-0.00	-0.09	0.00	0.07
Nuts and seeds	0.00	0.04	0.00	0.01	-0.00	-0.02
Other						
Discretionary fat (gm)	-0.46	-0.05	0.29	0.03	0.67	0.07
Added sugars (tsp)	-0.46	-0.09	-0.32	-0.06	0.09	0.02
Number of Students[3]						
Income <130% of poverty	893					
Income 130-185% of poverty	511					
Income >185% of poverty	1,866					

na = not applicable

[1] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[2] An effect size could not be computed because no foods were consumed from the food group by either substantive or non-substantive breakfast eaters.

[3] Includes students who skipped breakfast.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-83

Adjusted Differences and Effect Sizes for Exhibit G-26—Mean Food Energy and Nutrient Intake over 24 Hours, by Household Income, Relative to the Federal Poverty Level

	<130% vs. 130-185%		<130% vs. >185%		130-185% vs. >185%	
Dietary Component	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
Food energy (as % 1989 RDA)	-1.79	-0.06	-1.98	-0.07	-0.13	-0.00
Protein (as % 1989 RDA)	0.93	0.01	3.99	0.04	3.27	0.03
Percent of Food Energy from:						
Total fat	-0.62	-0.09	-0.21	-0.03	0.48	0.07
Saturated fat	0.03	0.01	0.13	0.04	0.13	0.04
Carbohydrate	0.21	0.03	-0.38	-0.05	-0.68	-0.09
Protein	0.35	0.10	0.51*	0.14	0.16	0.05
Vitamins (as percent of RDA)[1]						
Vitamin A	-6.57	-0.07	-4.26	-0.04	1.04	0.01
Vitamin C	10.67	0.05	-0.51	-0.00	-13.06	-0.06
Vitamin B_6	-0.96	-0.01	4.31	0.04	4.63	0.04
Vitamin B_{12}	4.87	0.02	16.80	0.07	12.82	0.07
Niacin	2.10	0.02	-2.65	-0.03	-4.63	-0.05
Thiamin	-3.21	-0.03	-4.05	-0.04	-0.52	-0.00
Riboflavin	-3.94	-0.03	-1.10	-0.01	2.28	0.02
Folate	0.68	0.01	1.81	0.02	0.93	0.01
Minerals (as percent of RDA)[1]						
Calcium	2.85	0.05	2.36	0.04	-0.63	-0.01
Calcium (as percent of AI)	2.67	0.04	1.98	0.03	-0.81	-0.01
Iron	-5.46	-0.06	0.08	0.00	5.08	0.06
Magnesium	-0.16	-0.00	-1.47	-0.02	-1.29	-0.02
Phosphorous	-0.74	-0.01	-1.93	-0.02	-1.13	-0.01
Zinc	-7.68	-0.09	-0.53	-0.01	6.07	0.07
Other Dietary Components						
Cholesterol (mg)	-17.74	-0.11	3.04	0.02	20.67*	0.14
Sodium (mg)	-98.54	-0.08	-89.48	-0.07	6.96	0.01
Fiber (gm)	0.09	0.01	0.14	0.02	0.02	0.00
Fiber (as percent of age-plus-5 gm)	0.68	0.01	0.99	0.02	0.15	0.00
Number of Students[2]						
Income <130% of poverty	872					
Income 130-185% of poverty	508					
Income >185% of poverty	1,837					

RDA = Recommended Dietary Allowance

[1] Mean intakes of vitamins and minerals, except for calcium, are presented as a percent of the RDAs based on the Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, mean intake is presented both as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-84

Adjusted Differences and Effect Sizes for Exhibit G-27—Mean Food Group Intake Over 24 Hours, by Household Income, Relative to the Federal Poverty Level

Food Group	<130% vs. 130-185% Adjusted Difference	<130% vs. 130-185% Effect Size	<130% vs. >185% Adjusted Difference	<130% vs. >185% Effect Size	130-185% vs. >185% Adjusted Difference	130-185% vs. >185% Effect Size
			Number of Servings[1]			
Grain Products	**0.09**	**0.03**	**-0.15**	**-0.04**	**-0.23**	**-0.07**
Whole grains	-0.15	-0.12	-0.15*	-0.11	-0.02	-0.01
Non-whole grains	0.25	0.08	0.01	0.00	-0.22	-0.07
Vegetables	**-0.14**	**-0.08**	**-0.12**	**-0.07**	**0.05**	**0.03**
Dark green vegetables	0.00	0.01	-0.03	-0.08	-0.03	-0.08
Deep yellow vegetables	0.00	0.01	-0.02	-0.05	-0.02	-0.06
White potatoes	-0.09	-0.07	-0.09	-0.07	0.02	0.02
Other starchy vegetables	0.01	0.02	0.01	0.03	0.00	0.01
Tomatoes	-0.02	-0.04	0.02	0.04	0.04	0.08
Cooked dry beans and peas	0.01	0.01	0.05*	0.12	0.04	0.12
Other vegetables	-0.04	-0.06	-0.01	-0.01	0.03	0.05
Fruits	**0.08**	**0.05**	**0.07**	**0.04**	**-0.02**	**-0.01**
Citrus fruits, melons, and berries	0.10	0.08	0.02	0.02	-0.07	-0.07
Other fruits	-0.01	-0.01	0.05	0.04	0.06	0.05
Dairy Products	**0.02**	**0.02**	**0.06**	**0.04**	**0.03**	**0.02**
Milk	0.04	0.03	0.04	0.04	0.00	0.00
Yogurt	0.02	0.09	-0.00	-0.01	-0.02	-0.10
Cheese	-0.03	-0.05	0.02	0.03	0.05	0.08
Meat and Meat Substitutes	**-0.06**	**-0.06**	**0.02**	**0.03**	**0.08**	**0.08**
Red meat (beef, pork, veal, lamb, game)	-0.03	-0.04	0.03	0.04	0.06	0.08
Organ meats	0.00	0.04	0.00	0.05	-0.00	-0.02
Frankfurters, sausage, luncheon meats	-0.01	-0.02	0.00	0.01	0.01	0.02
Poultry (chicken, turkey, other)	0.04	0.07	0.01	0.02	-0.03	-0.04
Fish and shellfish	-0.02	-0.04	-0.00	-0.00	0.02	0.05
Eggs	-0.03	-0.14	-0.00	-0.01	0.03*	0.13
Soybean products (tofu, meat analogues)	-0.00	-0.10	-0.00	-0.06	-0.00	-0.01
Nuts and seeds	-0.01	-0.10	-0.02*	-0.12	-0.00	-0.03
Other						
Discretionary fat (gm)	-1.99	-0.08	-1.58	-0.06	0.53	0.02
Added sugars (tsp)	-0.97	-0.08	-1.44*	-0.11	-0.51	-0.04
Number of Students[2]						
Income <130% of poverty	872					
Income 130-185% of poverty	508					
Income >185% of poverty	1,837					

[1] Based on the serving size definitions for the Pyramid Servings Database for USDA Survey Food Codes, 2000; servings of meat/meat substitutes are based on the Healthy Eating Index definition of 2.5 ounces per serving (Kennedy et al., 1995). USDA food codes from the 1994-96, 1998 Continuing Survey of Food Intakes by Individuals (CSFII) were assigned to food and ingredient/component codes from the Nutrition Data System (NDS-R) database before computing the number of servings for each food group.

[2] Includes students who skipped breakfast.

Note: Due to rounding, differences of 0.0 represent less than 0.05 of a serving.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-85

Adjusted Differences and Effect Sizes for Exhibit 6.22—Percent Contribution of Breakfast to Nutrient Intake Over 24 Hours, by Household Income, Relative to the Federal Poverty Level

	<130% vs. 130-185%		<130% vs. >185%		130-185% vs. >185%	
Dietary Component	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**	**Adjusted Difference**	**Effect Size**
Food energy	-0.70%	-0.07	0.52%	0.05	1.02%	0.10
Macronutrients						
Protein	-1.45	-0.14	-0.59	-0.06	0.75	0.07
Total fat	-0.47	-0.04	0.96	0.08	1.26	0.11
Saturated fat	-0.77	-0.06	0.77	0.06	1.38	0.10
Carbohydrate	-0.60	-0.05	0.70	0.06	1.06	0.09
Vitamins						
Vitamin A	-4.37*	-0.20	-1.55	-0.07	2.63	0.11
Vitamin C	-2.57	-0.10	1.47	0.06	3.49*	0.13
Vitamin B_6	-3.31*	-0.16	-0.81	-0.04	2.28	0.11
Vitamin B_{12}	-2.80	-0.13	-1.53	-0.07	1.24	0.05
Niacin	-2.55*	-0.15	-0.74	-0.04	1.64	0.10
Thiamin	-1.90	-0.12	-0.30	-0.02	1.35	0.09
Riboflavin	-2.30	-0.13	-0.50	-0.03	1.62	0.09
Folate	-2.45*	-0.13	-1.30*	-0.07	0.92	0.05
Minerals						
Calcium	-1.47	-0.09	0.13	0.01	1.43	0.08
Iron	-2.63*	-0.14	-1.31*	-0.07	1.08	0.06
Magnesium	-0.87	-0.07	0.10	0.01	0.80	0.06
Phosphorous	-1.64	-0.13	-0.40	-0.03	1.08	0.08
Zinc	-2.72*	-0.15	-1.40*	-0.08	1.13	0.06
Other Dietary Components						
Cholesterol	-2.04	-0.10	-1.13	-0.06	0.79	0.04
Sodium	-1.64	-0.14	-0.68	-0.06	0.74	0.06
Fiber	-0.93	-0.07	-0.30	-0.02	0.44	0.03
Number of Students[1]						
Income <130% of poverty	872					
Income 130-185% of poverty	508					
Income >185% of poverty	1,837					

[1] Includes students who skipped breakfast.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-86

Adjusted Differences and Odds Ratios for Exhibit G-28—Percent of Students Whose Usual 24-Hour Food Energy and Nutrient Intakes Met Standard for Dietary Adequacy, by Household Income, Relative to the Federal Poverty Level[1]

Dietary Component	<130% vs. 130-185% Adjusted Difference	<130% vs. 130-185% Odds Ratio	<130% vs. >185% Adjusted Difference	<130% vs. >185% Odds Ratio	130-185% vs. >185% Adjusted Difference	130-185% vs. >185% Odds Ratio
Food energy	1.18%	1.26	1.25%	1.28	0.07%	1.01
Protein	0.01	1.00	0.00	1.00	-0.01	1.00
Vitamins						
Vitamin A	-4.65	0.20	-2.72	0.43	1.93	2.22
Vitamin C	0.76	1.01	0.50	1.00	-0.26	0.99
Vitamin B_6	-0.09	1.00	0.16	1.00	0.25	1.00
Vitamin B_{12}	0.00	1.00	0.00	1.00	0.00	1.00
Niacin	0.03	1.00	0.00	1.00	-0.03	1.00
Thiamin	0.00	1.00	0.00	1.00	0.00	1.00
Riboflavin	0.00	1.00	0.00	1.00	0.00	1.00
Folate	0.96	1.54	0.92	1.49	-0.04	0.97
Minerals						
Calcium	4.77	3.85	4.57	3.73	-0.19	0.97
Iron	0.00	1.00	0.00	1.00	0.00	1.00
Magnesium	-0.03	0.99	1.48	1.27	1.51	1.28
Phosphorous	4.11	3.05	6.16	4.14	2.05	1.36
Zinc	0.43	1.12	-0.10	1.00	-0.53	0.89
Number of Students[2]						
Income <130% of poverty	872					
Income 130-185% of poverty	508					
Income >185% of poverty	1,837					

[1] For vitamins and minerals, except for calcium, the Estimated Average Requirements (EARs) based on the Dietary Reference Intakes (DRIs) are used as standards. There is no EAR for total food energy, protein, or calcium. For energy, protein, and calcium, 80 percent of the 1989 Recommended Dietary Allowance (RDA) was used as an approximation of the estimated average requirements.

[2] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-87

Adjusted Differences and Effect Sizes for Exhibit G-29—24-Hour Usual Intake Distributions for Food Energy, Protein, and Calcium, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130% vs. 130-185% Adjusted Difference	<130% vs. 130-185% Effect Size	<130% vs. >185% Adjusted Difference	<130% vs. >185% Effect Size	130-185% vs. >185% Adjusted Difference	130-185% vs. >185% Effect Size
Food Energy (as % RDA)						
Mean	-2*	-0.09	-2*	-0.07	0	0.00
Percentile:						
5th	4	0.03	3	0.03	-1	-0.01
10th	3	0.03	2	0.02	-1	-0.01
25th	1	0.01	1	0.01	0	0.00
50th	-1	-0.05	-1	-0.05	0	0.00
75th	-4	-0.06	-4	-0.06	0	0.00
90th	-7	-0.06	-6	-0.05	1	0.01
95th	-9	-0.05	-9	-0.05	0	0.00
Protein (as percent of RDA)						
Mean	0	0.01	6*	0.21	6*	0.19
Percentile:						
5th	11	0.04	0	0.00	-11	-0.03
10th	9	0.04	1	0.00	-8	-0.03
25th	6	0.04	2	0.01	-4	-0.02
50th	2	0.02	6	0.07	4	0.05
75th	-4	-0.02	8	0.04	12	0.06
90th	-11	-0.03	10	0.02	21	0.05
95th	-15	-0.03	12	0.02	27	0.05
Calcium (as percent of AI)						
Mean	3	0.13	2*	0.09	0	-0.01
Percentile:						
5th	16	0.07	15	0.07	-1	-0.01
10th	14	0.08	13	0.07	-1	-0.01
25th	10	0.09	9	0.08	-1	-0.01
50th	4	0.07	3	0.05	-1	-0.02
75th	-3	-0.02	-3	-0.02	0	0.00
90th	-11	-0.04	-9	-0.03	2	0.01
95th	-16	-0.05	-14	-0.04	2	0.01
Number of Students[1]						
Income <130% of poverty	872					
Income 130-185% of poverty	508					
Income >185% of poverty	1,837					

RDA = Recommended Dietary Allowance
AI = Adequate Intake

[1] Includes students who skipped breakfast.

Notes: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

Differences between means and the 5th, 50th and 95th percentile values were tested for statistical significance.

* Difference is statistically significant at the .05 level.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit G-88

Adjusted Differences and Odds Ratios for Exhibit G-30—Percent of Students Whose Usual 24-Hour Intake Met Dietary Recommendations, by Household Income, Relative to the Federal Poverty Level

Dietary Component	<130% vs. 130-185%		<130% vs. >185%		130-185% vs. >185%	
	Adjusted Difference	Odds Ratio	Adjusted Difference	Odds Ratio	Adjusted Difference	Odds Ratio
Percent of Food Energy						
No more than 30% from total fat	16.41%	3.03	1.85%	1.10	-14.56%	0.36
Less than 10% from saturated fat	-2.56	0.00	-6.10	0.00	-3.54	0.40
More than 55% from carbohydrate	4.50	1.20	-7.20	0.75	-11.70	0.62
No more than twice the 1989 RDA for protein	0.80	1.05	-2.76	0.85	-3.57	0.81
Other Dietary Components						
No more than 300 mg cholesterol	5.99	1.92	-4.50	0.39	-10.49	0.20
No more than 2,400 mg sodium	-0.90	0.89	5.83	4.35	6.72	4.91
Age plus 5 gm or more dietary fiber	2.67	1.11	4.79	1.21	2.12	1.09
Number of Students[1]						
Income <130% of poverty	872					
Income 130-185% of poverty	508					
Income >185% of poverty	1,837					

RDA = Recommended Dietary Allowance

[1] Includes students who skipped breakfast.

Note: Students' usual intake distribution was determined based on two days of intake data for 12 percent of the sample, and one day of intake data for the remaining sample, using the Software for Intake Distribution Estimation, Iowa State University, 1996.

None of the differences is statistically significant.

Source: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

APPENDIX H

ASSESSING THE POTENTIAL FOR SELECTION BIAS

List of Exhibits

Appendix H

Assessing the Potential for Selection Bias

As noted at the outset, the non-experimental comparisons presented in Chapter Six may be subject to selection bias. That is, the two groups being compared—for example, breakfast skippers and non-skippers—may differ systematically in ways other than the fact that on a given day they did or did not eat breakfast. Suppose, for example, that students who eat breakfast have better eating habits more generally than students who skip breakfast. If so, the difference in outcomes between these two groups will be a combination of the effects of eating breakfast and this pre-existing difference in eating habits between the two groups. If one is interested in the effect of policies designed to induce more students to eat breakfast—without changing their eating habits otherwise—the differences presented here would be biased upward as measures of the effects of such policies.

As in any non-experimental analysis, it is difficult to determine whether the groups compared are well-matched on unobserved characteristics like eating habits. In this case, however, it is possible to test for differences in eating habits between the two groups. Consider the effects of eating breakfast on food and nutrient intake during the rest of the day. One can imagine that eating breakfast might *reduce* food intake during the rest of the day—for example, students who ate breakfast might not be as hungry at lunch and might therefore eat less than if they had skipped breakfast. But there is no reason to expect that eating breakfast would cause students to eat more during the rest of the day than they would have had they skipped breakfast. Therefore, if we find that those who eat breakfast have greater food and nutrient intakes during the rest of the day, it seems likely that this reflects a difference in eating habits between the two groups, not the direct effect of eating breakfast that day.

Following this logic, we assessed the potential for selection bias in the non-experimental comparisons analyzed here by examining the impacts on food energy and nutrient intake during the rest of the day (i.e., excluding breakfast), using the same samples and non-experimental estimation techniques used in the estimates presented in Chapter Six. Detailed results are shown in Exhibits H-2 through H-7, which follow the text in this appendix.

Thus, for example, as shown in Exhibit H-4, the difference in total food energy intake at breakfast between breakfast skippers and non-skippers was 21 percent of the RDA[1], whereas the difference in total food energy intake between these two groups over the rest of the day was a statistically insignificant *reduction* of 1 percent of the RDA. This result supports the assumption that the two groups are comparable in terms of their eating habits, at least with respect to this outcome.

A contrasting example is provided by our estimates of differences in food energy and nutrient intake between schools where breakfast was consumed in the classroom and those that provided it elsewhere (school cafeterias, primarily). These estimates imply that, among students in the control group (Exhibit H-5), provision in the classroom reduced the intake of vitamin C at breakfast by 12 percent of the RDA and by 26 percent during the rest of the day. It does not seem plausible that the location in which breakfast was consumed would have more than twice the impact on vitamin C intake during

[1] This difference is essentially equal to the mean food energy intake of breakfast non-skippers, since breakfast skippers consumed almost nothing (less than 2.5 percent of the food energy RDA) by definition.

the rest of the day as at breakfast. Rather, it seems highly likely that these estimates are affected by selection bias.

In Exhibit H-1, we summarize the patterns of impact during the rest of the day relative to the impact at breakfast for each of the non-experimental comparisons analyzed in Chapter Six. For each comparison, the exhibit shows:

- The number of outcomes (out of 24) for which the impacts on intake at breakfast and during the rest of the day are opposite in sign. This is a measure of the extent to which the estimates show the expected pattern of substitution between breakfast and the rest of the day—that is, a difference in sign shows that an increase (reduction) in intake at breakfast was offset to some extent by decreased (increased) intake during the rest of the day. In viewing these results, it is important to note that the impact estimates are subject to some sampling error. Thus, if the true impact on intake during the rest of the day is zero or very close to zero, we would expect about half the estimates to be positive and about half to be negative because of sampling error. In that case, about half of the rest-of-day estimates would be opposite in sign to the breakfast impacts due to sampling error alone. Therefore, only if the number of estimates that are opposite in sign is either very large or very small does this count provide evidence of substitution (or lack of substitution) between breakfast and the rest of the day.
- The number of outcomes (out of 24) for which the estimated impact on intake during the rest of the day was of the same sign, statistically significant at the .10 level (two-tailed test), and more than 30 percent as large as the impact at breakfast. We take impacts during the rest of the day that do not exceed this threshold to be too small relative to the impact at breakfast to provide strong evidence of bias. Differences that exceed this threshold are treated as "large" relative to the breakfast impact and, therefore, suggestive of selection bias.
- The number of outcomes (out of 24) for which the estimated impact on intake during the rest of the day was of the same sign, statistically significant at the .10 level (two-tailed test), and greater than the impact at breakfast. We take impacts during the rest of the day that exceed the impact on intake at breakfast to be "very large" relative to the impact at breakfast. Very large impacts during the rest of the day are likely to reflect pre-existing differences in eating habits between the two groups, rather than true impacts of eating breakfast (or the location of breakfast) on a given day.

The first row of the exhibit shows these measures for an experimental comparison, the impacts on participants in the SBPP. As can be seen in the exhibit, the experimental estimates are consistent with the hypothesis of substitution between intake at breakfast and intake during the rest of the day—for 18 of the 24 outcomes, impacts at breakfast and during the rest of the day are offsetting. Moreover, none of the estimated impacts during the rest of the day that were of the same sign as the impact at breakfast were both statistically significant and larger than 30 percent of the impact at breakfast. This pattern of results, in a comparison that is known to be free of selection bias, strongly supports the substitution hypothesis underlying the test to be applied to the non-experimental methods used here.

The non-experimental comparisons based on eating a substantive breakfast (by either of two definitions) show a much lower rate of substitution of intake at breakfast for intake during the rest of the day than the experimental comparison, but among the 41 outcomes[2] for which the rest-of-day

[2] Represents 41 out of 48 outcomes from Exhibit H-1: rows 2 and 3 combined.

Exhibit H-1

Impacts on Food and Nutrient Intake During the Rest of the Day, Relative to Impacts at Breakfast—Alternative Non-experimental Comparisons

		Number of Outcomes (out of 24) for which Impact during Rest of Day is:		
			Same Sign as Breakfast Impact, Statistically Significant, and:	
		Opposite Sign to Breakfast Impact	>30% of Impact at Breakfast	> Impact at Breakfast
1.	Participants vs. Nonparticipants (Experimental Estimates)[1]	18	0	0
2.	Substantive Breakfast Eaters vs. Non-substantive Breakfast Eaters (Definition 2)	5	2	1
3.	Substantive Breakfast Eaters vs. Non-substantive Breakfast Eaters (Definition 3)	2	2	2
4.	Breakfast Skippers vs. Non-Skippers	4	3	1
5.	Breakfast Eaten at Home vs. at School	9	6	1
6.	Breakfast Eaten at Home vs. at School and Home	14	0	0
7.	Breakfast Eaten in Classroom (Treatment Schools) vs. Eaten Elsewhere (Treatment Schools)	7	7	6
8.	Breakfast Eaten in Classroom (Treatment Schools) vs. Eaten Elsewhere (Control Schools)	9	7	6
9.	Household Income <130% of Poverty vs. Income 130-185% of Poverty	18	1	1
10.	Household Income <130% of Poverty vs. Income >185% of Poverty	15	0	0
11.	Household Income 130-185% of Poverty vs. Income >185% of Poverty	12	2	1

[1] As described in McLaughlin et al., 2002 (Appendix F), and re-estimated here for the non-experimental analysis sample of n=3,347.

impact was in the same direction as the impact at breakfast, only 4 were both statistically significant and more than 30 percent as large as the breakfast impact. Therefore, while this test cannot prove that these comparisons are unbiased, there is little evidence here that they are biased.

The findings for breakfast skippers versus non-skippers (row 4 of Exhibit H-1) show a similar pattern. There is little evidence of substitution between breakfast and the rest of the day—the estimated impacts are of the opposite sign for only 4 of 24 outcomes (see column 1 of Exhibit H-1). Nevertheless, the statistically significant impacts show only weak evidence of selection bias; only 3 of the 24 estimates for the rest of the day are statistically significant, in the “wrong” direction, and greater than 30 percent as large as the estimated impact at breakfast. Only one of these is actually larger than the breakfast estimate.

The comparison of students who ate breakfast at home with those who ate breakfast at school (row 5 of Exhibit H-1) shows somewhat stronger evidence of selection bias. There is little evidence of substitution between breakfast and the rest of the day, and for 6 of the 24 outcomes, the rest-of-day estimates are statistically significant, in the same direction as the breakfast estimates, and at least 30 percent as large. However, the group of students who ate breakfast both at home and at school does appear to be comparable to those who ate breakfast only at home (row 6). In that comparison, there is somewhat more evidence of substitution,[3] none of the impact estimates are statistically significant, in the same direction as, and greater than 30 percent as large as, the impacts at breakfast. On the basis of these tests, we conclude that comparisons between the group of students who ate breakfast both at school and at home and those who ate only at home are much less likely to be biased than comparisons between those who ate breakfast at home and those who ate breakfast only at school.

Rows 7 and 8 of Exhibit H-1 show the results for comparisons of schools in which breakfast was consumed in the classroom and those in which it was consumed elsewhere, separately for treatment and control schools. Here the pattern is of concern in terms of potential selection bias. In both cases, more than a quarter of the outcomes show large, statistically significant impacts during the rest of the day in the same direction as the impact at breakfast; in virtually all of those cases the rest-of-day estimate is actually larger than the breakfast estimate. We find it implausible that the location in which breakfast is made available would have a larger impact on food energy and nutrient intake during the rest of the day than it had at breakfast. We conclude that these estimates are probably affected by selection bias and should not be relied upon for policy purposes. The bias creates a misleading impression of larger impacts on food energy and nutrient intake in the schools that served breakfast outside the classroom (relative to those in schools that served breakfast in the classroom.) In fact, these differences may be due to differences in overall eating habits between the students in the two sets of schools.

The last three rows of Exhibit H-1 show comparisons of food energy and nutrient intakes among students at different income levels. In the first of these three rows, the intakes of students from households with incomes below 130 percent of the federal poverty level are compared with those of students from households with incomes between 130 and 185 percent of the poverty level. The second row compares the students in the lowest income category with those from households with incomes above 185 percent of the poverty level, and the third compares the middle-income category with the highest. The degree of substitution of intake at breakfast for intake during the rest of the day varies, depending on the comparison, but in each comparison, at most one or two outcomes show differences in food energy and nutrient intake during the rest of the day that are large, significant, and in the same direction as those at breakfast. These results are consistent with the hypothesis that these groups are relatively similar in their overall eating habits, the assumption underlying these non-experimental comparisons.

It is important to recognize that the test employed here is not a definitive test for selection bias. In particular, this test may be better at detecting bias at the student level, where the outcomes are

[3] Recall that if the true rest-of-day impact is zero we would expect about half the estimates to be of the opposite sign from the breakfast impact because of sampling error.

measured, than at the school level.[4] Nevertheless, we believe that it provides valuable information. Specifically, on the basis of this evidence, it appears that the comparisons in Chapter Six based on consuming breakfast exclusively at home versus at school, and on the location in which school breakfast is eaten (i.e., classroom vs. non-classroom), should not be regarded as unbiased estimates of their effects on the nutrition outcomes assessed. The results for the other comparisons are much more reassuring. Nevertheless, they are only suggestive; as with all non-experimental estimates, one can never prove that the groups being compared are in fact comparable and, therefore, estimates based on all of these comparisons should be viewed with caution.

[4] If so, these results will understate the bias present in these nonexperimental comparisons unless the biases at the school and student levels are offsetting.

Exhibit H-2

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day: Experimental Estimates, SBP Participants

	Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**
Food energy (as % 1989 RDA)	3.73	(2.36)	-10.98♦	(4.56)
Protein (as % 1989 RDA)	8.67	(5.73)	-35.96♦	(15.88)
Percent of Food Energy from:				
Total fat	0.24	(2.58)	-1.85	(1.40)
Saturated fat	-0.63	(1.22)	-0.91	(0.63)
Carbohydrate	-2.42	(3.13)	2.05	(1.52)
Protein	1.40	(1.10)	-0.15	(0.80)
Vitamins (as percent of RDA)[1]				
Vitamin A	13.70	(10.38)	-1.48	(12.86)
Vitamin C	-1.79	(18.26)	-18.56	(32.11)
Vitamin B_6	3.73	(13.62)	-7.92	(14.91)
Vitamin B_{12}	-5.76	(20.84)	-46.60	(30.91)
Niacin	2.18	(9.31)	-7.37	(14.03)
Thiamin	4.65	(9.81)	-5.44	(14.49)
Riboflavin	11.42	(14.07)	-8.39	(16.22)
Folate	1.31	(6.89)	5.38	(10.63)
Minerals (as percent of RDA)[1]				
Calcium	13.70♦	(5.49)	-14.60	(11.04)
Calcium (as percent of AI)	13.26	(9.97)	-3.03	(10.73)
Iron	-0.53	(4.28)	-8.09	(7.99)
Magnesium	6.73♦	(5.49)	-12.70	(10.77)
Phosphorous	13.46	(8.50)	-13.88	(10.56)
Zinc	6.05♦	(16.94)	-12.87	(19.07)
Other Dietary Components				
Cholesterol (mg)	-45.90	(77.46)	-223.98	(206.35)
Sodium (mg)	5.95	(0.44)	-0.73	(1.05)
Fiber (gm)	0.15	(3.12)	-4.70	(7.44)
Fiber (as percent of age-plus-5 gm)	1.11♦	(5.19)	-13.48	(10.44)

Number of Students[2]

Treatment schools: 1699

Control schools: 1648

RDA = Recommended Dietary Allowance.

[1] RDAs for vitamins and minerals based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, intake measured as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

♦ Difference is statistically significant at the .10 level.

Sources: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit H-3

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day: Substantive vs. Non-substantive Breakfast Eaters[1]

	Definition 2				Definition 3			
	Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**
Food energy (as % 1989 RDA)	14.19♦	(0.46)	-0.06	(1.08)	15.89♦	(0.35)	1.15	(0.91)
Protein (as % 1989 RDA)	33.80♦	(1.09)	9.37♦	(3.44)	34.03♦	(0.86)	10.25♦	(2.90)
Percent of Food Energy from:								
Total fat	1.86♦	(0.56)	-0.20	(0.32)	4.60♦	(0.45)	-0.17	(0.26)
Saturated fat	1.09♦	(0.25)	-0.28♦	(0.16)	1.58♦	(0.21)	-0.10	(0.13)
Carbohydrate	-4.13♦	(0.68)	-0.52	(0.39)	-5.27♦	(0.55)	-0.32	(0.31)
Protein	1.94♦	(0.22)	0.67♦	(0.19)	0.42♦	(0.18)	0.48♦	(0.15)
Vitamins (as percent of RDA)[2]								
Vitamin A	44.77♦	(2.03)	6.85	(3.13)	40.18♦	(1.70)	7.83♦	(2.64)
Vitamin C	61.95♦	(4.46)	3.67	(6.97)	57.83♦	(3.74)	9.21	(5.89)
Vitamin B_6	61.06♦	(2.89)	2.57	(3.37)	50.90♦	(2.45)	7.90♦	(2.84)
Vitamin B_{12}	85.46♦	(4.13)	8.39	(7.87)	72.82♦	(3.49)	13.30♦	(6.65)
Niacin	43.01♦	(2.07)	2.64	(3.05)	37.98♦	(1.74)	5.83♦	(2.58)
Thiamin	56.09♦	(2.19)	2.69	(3.23)	52.22♦	(1.81)	7.59♦	(2.73)
Riboflavin	83.87♦	(3.00)	6.81♦	(3.81)	74.62♦	(2.50)	10.44♦	(3.21)
Folate	37.42♦	(1.62)	2.82	(2.26)	33.29♦	(1.36)	5.33♦	(1.91)
Minerals (as percent of RDA)[2]								
Calcium	30.27♦	(1.02)	5.07♦	(2.19)	27.29♦	(0.84)	6.74♦	(1.85)
Calcium (as percent of AI)	28.60♦	(0.97)	4.45♦	(2.08)	25.81♦	(0.80)	6.10♦	(1.75)
Iron	48.81♦	(2.33)	3.82	(2.40)	42.71♦	(1.96)	7.33♦	(2.03)
Magnesium	24.09♦	(0.95)	0.58	(1.93)	23.24♦	(0.78)	2.94♦	(1.63)
Phosphorous	28.69♦	(1.17)	-0.11	(2.73)	27.77♦	(0.96)	1.95	(2.31)
Zinc	40.58♦	(2.04)	0.18	(2.57)	33.21♦	(1.73)	4.02♦	(2.17)
Other Dietary Components								
Cholesterol (mg)	39.81♦	(4.23)	3.40	(4.60)	50.00♦	(3.51)	5.64	(3.89)
Sodium (mg)	400.43♦	(17.16)	-6.30	(46.87)	433.17♦	(13.72)	64.60	(39.60)
Fiber (gm)	1.75♦	(0.10)	0.09	(0.24)	1.88♦	(0.08)	0.42♦	(0.20)
Fiber (as percent of age-plus-5 gm)	12.21♦	(0.68)	0.70	(1.66)	13.12♦	(0.56)	2.70♦	(1.40)

Exhibit H-3 (continued)

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day: Substantive vs. Non-substantive Breakfast Eaters

	Definition 2				Definition 3			
	Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	Impact	SE	Impact	SE	Impact	SE	Impact	SE
Number of Students[3]								
Substantive—Definition 2:	2627							
Non-substantive—Definition 2:	720							
Substantive—Definition 3:	2052							
Non-substantive—Definition 3:	1295							

RDA = Recommended Dietary Allowance.

[1] Substantive breakfast eaters consumed a Definition 2/Definition 3 breakfast on a typical school day.
[2] RDAs for vitamins and minerals based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, intake measured as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).
[3] Includes students who skipped breakfast.

♦ Difference is statistically significant at the .10 level.

Sources: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit H-4

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day: Breakfast Skippers versus Breakfast Non-skippers[1]

	Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**
Food energy (as % 1989 RDA)	-20.98♦	(1.09)	-1.10	(2.38)
Protein (as % 1989 RDA)	-41.46♦	(2.63)	-2.74	(7.58)
Percent of Food Energy from:				
Total fat	-8.92♦	(3.05)	3.22♦	(1.72)
Saturated fat	-4.28♦	(1.38)	-0.38	(0.85)
Carbohydrate	19.11♦	(3.70)	-1.53	(2.09)
Protein	-1.78	(1.19)	-1.90♦	(1.02)
Vitamins (as percent of RDA)[2]				
Vitamin A	-58.73♦	(4.68)	-3.36	(6.90)
Vitamin C	-79.05♦	(10.01)	-22.81	(15.36)
Vitamin B_6	-73.95♦	(6.66)	-5.22	(7.42)
Vitamin B_{12}	-93.29♦	(9.53)	-23.70	(17.35)
Niacin	-57.23♦	(4.74)	-0.81	(6.73)
Thiamin	-75.31♦	(5.12)	-2.63	(7.12)
Riboflavin	-105.22♦	(7.12)	-6.98	(8.39)
Folate	-49.02♦	(3.75)	-6.15	(4.98)
Minerals (as percent of RDA)[2]				
Calcium	-35.79♦	(2.44)	-5.08	(4.83)
Calcium (as percent of AI)	-33.66♦	(2.32)	-4.87	(4.58)
Iron	-65.85♦	(5.35)	-2.35	(5.30)
Magnesium	-30.06♦	(2.23)	-7.59♦	(4.24)
Phosphorous	-33.79♦	(2.73)	-6.42	(6.02)
Zinc	-48.41♦	(4.68)	-8.16	(5.67)
Other Dietary Components				
Cholesterol (mg)	-48.87♦	(9.40)	16.86♦	(10.14)
Sodium (mg)	-553.18♦	(39.65)	123.58	(103.26)
Fiber (gm)	-2.60♦	(0.22)	-1.15♦	(0.52)
Fiber (as percent of age-plus-5 gm)	-17.78♦	(1.54)	-8.26♦	(3.66)

Number of Students

Breakfast skippers:	122
Breakfast non-skippers:	3225

RDA = Recommended Dietary Allowance.

[1] Breakfast skippers include students who reported consuming little (less than 2.5 percent of the RDA for food energy) or nothing between 5:00 a.m. and 45 minutes after the start of school on a typical school day.

[2] RDAs for vitamins and minerals based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, intake measured as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

♦ Difference is statistically significant at the .10 level.

Sources: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit H-5

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day, by Source of Breakfast

	Home vs. School				Home vs. Home and School			
	Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**
Food energy (as % 1989 RDA)	3.30♦	(0.47)	1.28	(1.10)	-9.96♦	(0.64)	1.39	(1.36)
Protein (as % 1989 RDA)	4.68♦	(1.15)	-2.59	(3.48)	-20.55♦	(1.56)	0.79	(4.35)
Percent of Food Energy from:								
Total fat	0.30	(0.54)	-0.23	(0.31)	-0.02	(0.66)	0.36	(0.37)
Saturated fat	1.43♦	(0.25)	0.08	(0.15)	0.55♦	(0.31)	0.31	(0.19)
Carbohydrate	1.04	(0.67)	0.84♦	(0.37)	0.47	(0.82)	-0.12	(0.45)
Protein	-0.81♦	(0.22)	-0.44♦	(0.18)	-0.16	(0.27)	-0.17	(0.22)
Vitamins (as percent of RDA)[1]								
Vitamin A	9.46♦	(2.09)	3.31	(3.23)	-25.40♦	(2.81)	-0.36	(4.00)
Vitamin C	14.57♦	(4.53)	14.65♦	(7.19)	-26.75♦	(6.13)	5.85	(9.06)
Vitamin B_6	18.62♦	(3.02)	-0.13	(3.42)	-27.06♦	(4.11)	-3.17	(4.11)
Vitamin B_{12}	25.99♦	(4.43)	3.52	(8.72)	-29.81♦	(5.97)	12.57	(10.81)
Niacin	15.47♦	(2.18)	1.15	(3.09)	-16.75♦	(2.96)	0.26	(3.74)
Thiamin	16.37♦	(2.31)	-0.58	(3.28)	-27.15♦	(3.15)	-4.36	(3.98)
Riboflavin	20.81♦	(3.17)	-0.82	(3.91)	-45.33♦	(4.36)	-2.09	(4.71)
Folate	14.57♦	(1.71)	-0.97	(2.23)	-15.00♦	(2.34)	-2.72	(2.82)
Minerals (as percent of RDA)[1]								
Calcium	2.40♦	(1.06)	0.36	(2.24)	-20.16♦	(1.46)	-1.30	(2.77)
Calcium (as percent of AI)	2.24♦	(1.01)	0.35	(2.13)	-19.20♦	(1.38)	-1.01	(2.62)
Iron	19.02♦	(2.50)	-0.67	(2.40)	-15.27♦	(3.41)	-3.00	(3.08)
Magnesium	5.47♦	(0.99)	4.06♦	(1.98)	-15.15♦	(1.36)	3.34	(2.40)
Phosphorous	2.00♦	(1.17)	1.84	(2.84)	-20.60♦	(1.61)	3.76	(3.42)
Zinc	11.80♦	(2.17)	0.09	(2.60)	-16.90♦	(2.99)	0.29	(3.28)
Other Dietary Components								
Cholesterol (mg)	28.10♦	(4.51)	-3.82	(4.66)	-0.69	(5.95)	1.85	(5.54)
Sodium (mg)	101.42♦	(18.05)	-51.84	(47.85)	-179.28♦	(24.12)	76.71	(57.88)
Fiber (gm)	0.70♦	(0.10)	0.46♦	(0.24)	-0.95♦	(0.14)	0.22	(0.30)
Fiber (as percent of age-plus-5 gm)	4.96♦	(0.71)	3.19♦	(1.66)	-6.69♦	(0.96)	1.65	(2.08)

Exhibit H-5 (continued)

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day, by Source of Breakfast

	Home vs. School				Home vs. Home and School			
	Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	Impact	SE	Impact	SE	Impact	SE	Impact	SE
Number of Students[2]								
Home only: 1835								
School only: 768								
Home and school: 452								

RDA = Recommended Dietary Allowance.

[1] RDAs for vitamins and minerals based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, intake measured as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Excludes students who skipped breakfast or reported eating breakfast from a source other than home or school (e.g., restaurant).

♦ Difference is statistically significant at the .10 level.

Sources: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit H-6

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day, by Location of Breakfast at School

	Classroom vs. Non-Classroom[1] (Treatment Schools)				Treatment Classroom versus Control Non-Classroom[1]			
	Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**
Food energy (as % 1989 RDA)	2.08♦	(0.70)	-0.21	(1.43)	2.22♦	(0.68)	-2.29	(1.41)
Protein (as % 1989 RDA)	2.43	(1.64)	1.09	(4.49)	3.52♦	(1.64)	-5.92	(4.52)
Percent of Food Energy from:								
Total fat	2.82♦	(0.69)	0.59	(0.40)	2.43♦	(0.70)	0.05	(0.39)
Saturated fat	0.69♦	(0.31)	0.05	(0.20)	0.48	(0.32)	-0.15	(0.19)
Carbohydrate	-2.76♦	(0.82)	-0.82♦	(0.49)	-2.88♦	(0.87)	-0.24	(0.47)
Protein	-0.76♦	(0.27)	0.09	(0.24)	-0.26	(0.27)	0.07	(0.23)
Vitamins (as percent of RDA)[2]								
Vitamin A	-5.24♦	(2.93)	-12.86♦	(4.15)	-2.32	(2.79)	-10.33♦	(4.02)
Vitamin C	-12.30♦	(5.86)	-25.85♦	(9.48)	-10.64♦	(5.99)	-23.50♦	(8.59)
Vitamin B_6	-11.08♦	(4.05)	-3.08	(4.77)	-9.34♦	(3.99)	-3.60	(4.14)
Vitamin B_{12}	-7.25	(5.56)	-15.48♦	(7.29)	-8.05	(5.87)	-22.30♦	(11.65)
Niacin	-6.56♦	(2.89)	-5.93	(4.25)	-5.64♦	(2.82)	-5.37	(3.78)
Thiamin	-4.41	(3.10)	-7.48♦	(4.40)	-3.38	(3.16)	-6.81♦	(4.13)
Riboflavin	-7.48♦	(4.33)	-13.45♦	(5.21)	-4.69	(4.42)	-11.87♦	(4.84)
Folate	-7.41♦	(2.26)	-6.78♦	(3.15)	-6.01♦	(2.27)	-4.32	(2.77)
Minerals (as percent of RDA)[2]								
Calcium	0.24	(1.53)	-7.39♦	(2.86)	2.65♦	(1.50)	-9.22♦	(2.87)
Calcium (as percent of AI)	0.07	(1.45)	-7.34♦	(2.71)	2.44♦	(1.42)	-8.93♦	(2.71)
Iron	-8.54♦	(3.18)	-3.28	(3.21)	-7.28♦	(3.22)	-2.95	(3.04)
Magnesium	-3.42♦	(1.41)	-7.90♦	(2.64)	-1.48	(1.29)	-7.78♦	(2.40)
Phosphorous	0.61	(1.72)	-8.70♦	(3.61)	3.08♦	(1.64)	-9.18♦	(3.51)
Zinc	-7.49♦	(2.82)	-1.03	(3.45)	-5.05♦	(2.82)	-3.46	(3.34)
Other Dietary Components								
Cholesterol (mg)	-3.98	(4.85)	5.66	(6.07)	-11.55♦	(6.01)	3.05	(6.15)
Sodium (mg)	64.71♦	(22.76)	-72.03	(62.23)	49.79♦	(25.32)	-95.65	(60.35)
Fiber (gm)	-0.43♦	(0.13)	-0.42	(0.31)	-0.32♦	(0.13)	-0.46	(0.30)
Fiber (as percent of age-plus-5 gm)	-3.01♦	(0.92)	-3.34	(2.22)	-2.22♦	(0.89)	-3.49♦	(2.11)

Exhibit H-6 (continued)

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day, by Availability Breakfast at School

	Classroom vs. Non-Classroom[1] (Treatment Schools)				Classroom vs. Non-Classroom[1] (Control Schools)			
	Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	Impact	SE	Impact	SE	Impact	SE	Impact	SE
Number of Students[3]								
Treatment classroom: 420								
Treatment non-classroom: 1279								
Control non-classroom: 1648								

RDA = Recommended Dietary Allowance.

[1] Non-classroom locations are primarily school cafeterias.

[2] RDAs for vitamins and minerals based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, intake measured as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[3] Includes students who skipped breakfast.

♦ Difference is statistically significant at the .10 level.

Sources: Impact Study—24-Hour Dietary Recall Interview, Spring 2001

Exhibit H-7

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day, by Household Income (Percent of Poverty Level)

	< 130% vs. 130-185%				< 130% vs. > 185%				130-185% vs. > 185%			
	Breakfast		Rest of Day		Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**
Food energy (as % 1989 RDA)	-0.91	(0.70)	-0.88	(1.43)	0.16	(0.53)	-2.14♦	(1.10)	0.87	(0.62)	-1.00	(1.30)
Protein (as % 1989 RDA)	-3.08♦	(1.61)	4.02	(4.58)	-0.89	(1.26)	4.87	(3.48)	2.01	(1.52)	1.27	(4.10)
Percent of Food Energy from:												
Total fat	-0.35	(0.73)	-0.69♦	(0.41)	0.57	(0.54)	-0.31	(0.31)	1.02	(0.64)	0.45	(0.36)
Saturated fat	0.01	(0.33)	0.10	(0.20)	0.40	(0.25)	0.14	(0.16)	0.42	(0.29)	0.06	(0.18)
Carbohydrate	0.49	(0.87)	0.14	(0.50)	-0.64	(0.67)	-0.54	(0.38)	-1.27	(0.79)	-0.73♦	(0.43)
Protein	-0.14	(0.27)	0.47♦	(0.24)	-0.10	(0.22)	0.74♦	(0.18)	0.08	(0.25)	0.25	(0.22)
Vitamins (as percent of RDA)[1]												
Vitamin A	-8.73♦	(2.84)	2.16	(4.07)	-3.02	(2.18)	-1.24	(3.16)	5.05♦	(2.67)	-4.01	(3.81)
Vitamin C	-6.44	(5.89)	17.11♦	(9.61)	-1.09	(4.70)	0.58	(7.19)	2.28	(5.65)	-15.34♦	(8.22)
Vitamin B_6	-7.56♦	(4.05)	6.60	(4.69)	-0.84	(3.14)	5.14	(3.45)	5.79	(3.73)	-1.16	(3.88)
Vitamin B_{12}	-10.07♦	(5.55)	14.94	(13.01)	-1.96	(4.47)	18.76♦	(8.43)	7.82	(5.46)	5.00	(7.33)
Niacin	-4.78♦	(2.80)	6.88♦	(4.11)	-2.73	(2.25)	0.08	(3.10)	1.64	(2.69)	-6.27♦	(3.54)
Thiamin	-4.77	(3.16)	1.56	(4.51)	-2.32	(2.45)	-1.74	(3.31)	1.84	(2.89)	-2.36	(3.79)
Riboflavin	-7.64♦	(4.39)	3.70	(5.22)	-2.37	(3.40)	1.27	(3.86)	4.46	(4.03)	-2.18	(4.52)
Folate	-3.66♦	(2.15)	4.34	(3.41)	-2.85	(1.79)	4.66♦	(2.29)	0.20	(2.16)	0.72	(2.45)
Minerals (as percent of RDA)[1]												
Calcium	-0.75	(1.46)	3.61	(2.89)	0.41	(1.17)	1.95	(2.22)	1.06	(1.41)	-1.69	(2.64)
Calcium (as percent of AI)	-0.71	(1.38)	3.38	(2.74)	0.34	(1.11)	1.65	(2.10)	0.94	(1.34)	-1.75	(2.50)
Iron	-7.01♦	(3.05)	1.54	(3.42)	-4.52♦	(2.55)	4.61♦	(2.48)	2.12	(3.11)	2.97	(2.71)
Magnesium	-1.28	(1.32)	1.12	(2.63)	-0.67	(1.07)	-0.80	(1.94)	0.35	(1.28)	-1.64	(2.28)
Phosphorous	-2.19	(1.65)	1.45	(3.63)	-1.02	(1.28)	-0.91	(2.74)	0.88	(1.54)	-2.01	(3.30)
Zinc	-7.68♦	(2.66)	0.00	(3.42)	-3.74♦	(2.19)	3.21	(2.63)	3.15	(2.72)	2.93	(3.07)
Other Dietary Components												
Cholesterol (mg)	-15.04♦	(5.75)	-2.71	(6.70)	-5.28	(4.14)	8.32♦	(4.54)	8.71	(5.35)	11.96♦	(5.31)
Sodium (mg)	-68.02♦	(23.33)	-30.52	(62.17)	-43.53♦	(18.79)	-45.95	(47.53)	17.96	(22.83)	-11.00	(55.93)
Fiber (gm)	-0.14	(0.13)	0.23	(0.34)	-0.11	(0.10)	0.25	(0.24)	0.01	(0.12)	0.01	(0.26)
Fiber (as percent of age-plus-5 gm)	-1.06	(0.94)	1.74	(2.42)	-0.85	(0.72)	1.84	(1.69)	0.07	(0.87)	0.08	(1.83)

Exhibit H-7 (continued)

Impacts on Food Energy and Nutrient Intake at Breakfast and During the Rest of the Day, by Household Income (Percent of Poverty Level)

	< 130% vs. 130-185%				< 130% vs. > 185%				130-185% vs. > 185%			
	Breakfast		Rest of Day		Breakfast		Rest of Day		Breakfast		Rest of Day	
Dietary Component	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**	**Impact**	**SE**
Number of Students[2]												
Household income <130% of poverty:			872									
Household income between 130 and 185% of poverty:			508									
Household income above 185% of poverty:			1837									

RDA = Recommended Dietary Allowance.

[1] RDAs for vitamins and minerals based on Dietary Reference Intakes (DRIs), Recommended Intakes for Individuals. For calcium, intake measured as a percent of the 1989 RDA and the DRI-based Adequate Intake (AI).

[2] Includes students who skipped breakfast.

♦ Difference is statistically significant at the .10 level.

Sources: Impact Study—24-Hour Dietary Recall Interview, Spring 2001