

Wausau Youth:
A contrast between SCHOOL'03 vs. SCHOOL'09 Data and
Footprints vs. Control Schools

Prepared by

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UW Community Academic Partnership Fund- School of Medicine and Public Health

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Method:

SCHOOL'03

During the 2002-2003 school year, 715 students from second, fifth, eighth, and eleven grades consented to participate in a large investigation of childhood eating and exercise habits and obesity. The initial data collection took place in January through May of 2003, and will be referred to as the SCHOOL'03 data. In the present report, the dataset was limited to students in grades 2 and 5. There were 207 students from grade 2 and 216 from grade 5. This included 217 males (51.8%) and 202 females (48.2%), and 4 unspecified. Most of the students were white (366, 86.5%), with 40 Asians (9.5%), 5 black (1.2%), 5 Hispanic (1.2%), and 7 Indian (1.7%).

SCHOOL'09

The second data collection took place in November and December of 2009, and will be referred to as SCHOOL'09 data. There were 67 students from grade 2 and 58 from grade 5. There were 61 males (48.8%) and 64 females (51.2%). Again, most of the students were white (107; 86.3%), with 12 Asians (9.7%), 3 black (2.4%), and 2 Hispanic (1.6%).

An attempt was made to randomly select students for both samples, but any student, or the family could elect to not participate. Thus, sampling was restricted to voluntary participants. It was particularly difficult to recruit minority members, which are under-represented in both samples.

It should be noted that the students in the SCHOOL'03 sample were roughly 5.5 months older than comparable students in the SCHOOL'09 sample (mean age for SCHOOL'03 sample = 115.1 months; mean age for SCHOOL'09 sample = 109.7 months). This was purely a consequence of when the data collection occurred. For measures which reflect a maturational process, e.g., height and weight, this is an important bias to consider in interpreting the results.

Footprints

The purpose of *Footprints to Health* is to attack obesity and physical inactivity in Marathon County through pro-active, population-focused, integrated, and evidence-based strategies. The program targeted 6 school neighborhoods and community-wide action to increase physical activity and consumption of fruits and vegetables. Activities were planned in partnership with school wellness teams and were unique to each school. Interventions took place from 2006-2009. Within the 2009 data, three schools in the district (Stettin, South Mountain, and Lincoln) were selected for the Footprints

program. Three comparison schools were Marshall, Hawthorne, and Maine. Later in this report, the Footprint schools are contrasted with the Control schools.

Data Collection

The data collection procedures, for the most part, paralleled each other in the two investigations. Differences will be noted where appropriate.

Participating students were surveyed about their health information and demographics. The following data were collected:

- Age
- Sex
- Family Size
- Contact Information
- Race/Ethnic Identity
- Socioeconomic Status
- Name of Primary Care Doctor

Each student submitted to a physical exam that included the following measurements:

- Height
- Weight
- Blood pressure, pulse, and respiration
- Waist and hip circumference

Also, each student completed three scales::

1. Diet Recall adapted from Murphy, et al and Kristal, et al.
2. Activity Recall adapted from the Self-Administered Physical Checklist
3. Health and Behavior Questionnaire (HBQ) adapted from the Child and Adolescent Trial for Cardiovascular Health

Parent(s) or guardian(s) of the participating students were asked to complete a basic health history document. The emphasis was on family and personal risk factors for cardiovascular disease with questions pertaining to heart disease in first and second degree relatives, personal history of heart problems, smoking and other tobacco use of individuals in the home, alcohol consumption, caffeine consumption, time estimates for television and computer use, approximate number of meals eaten out weekly, and other medical history of the subject.

Students in the SCHOOL'03 sample were also asked for a blood sample which was used to explore various lipid measures. Blood samples were not collected for the SCHOOL'09 sample and thus will not be discussed in this report.

Data Cleaning & Data Analysis

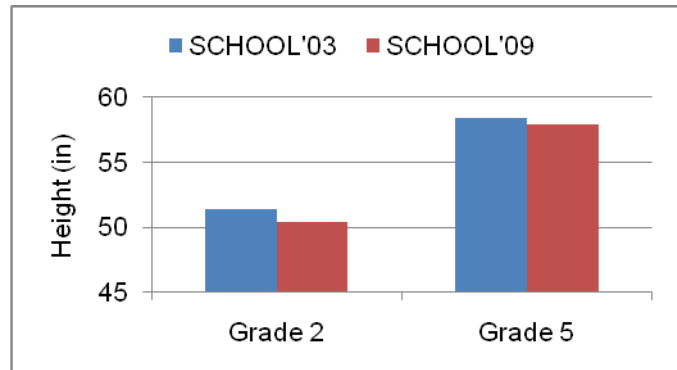
The data were initially scanned to identify any data entry errors or other outliers. Some weight and height errors were corrected. Outliers which were beyond 3 standard deviations from the mean were identified, especially for the diet and activity data. To preserve similar standards, extreme scores were corrected utilizing the same procedures used on the data from 2003. Basically scores beyond 3 standard deviations were pulled back to the third standard deviation from the mean. Technically these might not have been the precise value for the current data, but it was important to use the same standards that were used previously.

Two clusters of analyses were conducted. The first analyses were designed to explore any differences which emerged between the SCHOOL'03 and SCHOOL'09 samples and also to highlight differences between grades 2 and 5. As such, the primary data analysis involved a 2 (grade 2 vs. 5) x 2 ('03 vs. '09 data) ANOVA (Analysis of Variance). This tactic permits us to test for significance between the two samples as well as to explore differences between the two grade levels. Means and bar graphs will be used to portray the differences which were found. When results are reported as "non-significant" that means that any differences between means are best interpreted as trivial and due to chance factors. The second set of analyses were designed to contrast the outcomes for the Footprint vs. Control schools. These analyses were solely conducted on the SCHOOL'09 data. Again 2 (grade 2 vs. 5) x 2 (Footprint vs. Control) ANOVAs were utilized, but here the contrast permits an evaluation of the impact of the Footprint program.

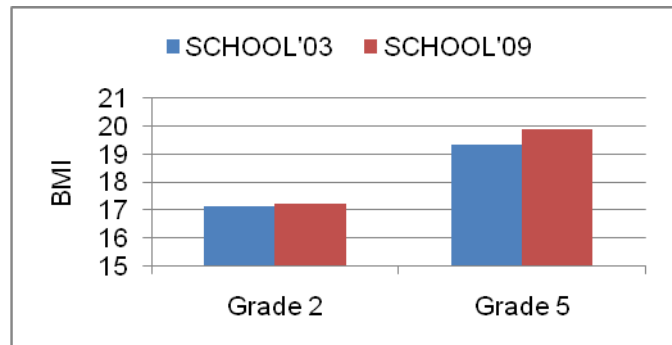
SCHOOL'03 vs. SCHOOL'09 Analyses

Physical Measures

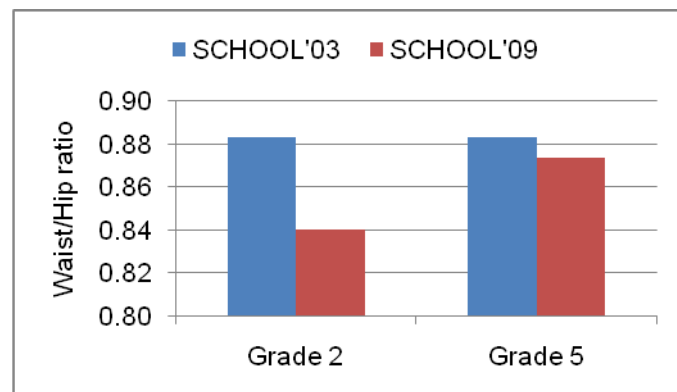
Several body size measures were taken, and these will be reviewed here. There were significant differences in height for students in second and fifth grades (not surprising) and between the students from SCHOOL'03 and SCHOOL'09. This is probably simply a reflection of the fact that the sample from 2003 was over 5 months older (on average) than the sample from 2009.



For weight, there were significant differences between the students in grades 2 and 5, but not between the two samples. BMI (body mass index) was calculated for each child. BMI is calculated by taking weight (in pounds) divided by height squared (in inches) and multiplied by 703. [BMI = weight / height² x 703]. BMI was significantly higher for fifth graders (M=19.5) than for second graders (M=17.2). There were no significant differences between the two samples.



The waist/hip ratio was also calculated. On average, second graders had slightly lower W/H ratios (M=.872) than did fifth graders (M=.881). Likewise, there was a reduction from 2003 (M=.883) to 2009 (M=.856). There was also a significant interaction, with a much larger reduction in W/H ratio for second graders than for fifth graders. The reason for this difference is not known at present.



Although blood samples were not drawn several cardiovascular measures were taken. Pulse rates averaged 81.6 for all students and revealed no differences by grade level or by sample. Systolic blood pressure showed no difference between years, but did show a significant elevation across grade levels (M=97.5 for second graders; M=103.8 for fifth graders). Diastolic blood pressure showed a similar pattern, with a significant increase for fifth graders (M=66.5) compared with second graders (M=62.7)

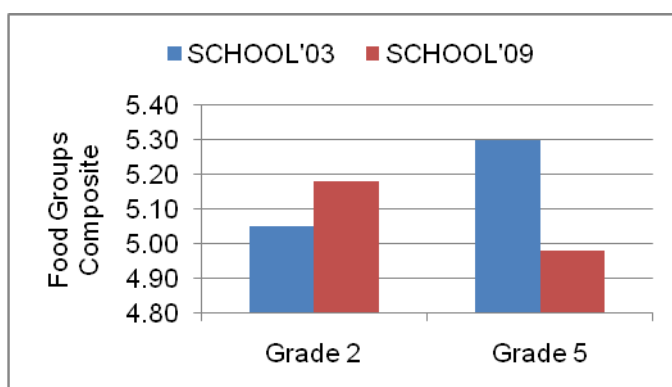
Diet

The diet recall questionnaire surveyed students about the number of servings of the various food groups consumed on a typical school day and on a weekend day. Fruit, vegetables, protein, and milk consumption was a straightforward counting of the number of servings consumed daily. The starch questions were based on a cup serving size, but a half of a cup is the recommended serving size. The starch consumption was doubled to correct for the recommendation. In our analysis, the amount reported by the student was weighted based on the Food Pyramid recommendations.

FOOD PYRAMID RECOMMENDATIONS AND WEIGHTING SCHEME

		LOW		NORM		HIGH	
		Servings	Weight	Servings	Weight	Servings	Weight
Food Group	Fruit	<2	0	2-4	1	>4	2
	Vegetables	<3	0	3-5	1	>5	2
	Milk	<2	0	2-4	2	>4	1
	Starches	<6	0	6-11	2	>11	1
	Protein	<2	0	2-3	2	>3	1

Each student was assigned a weighted value for each food group based on their reported number of servings consumed. The sum of the student's weighted values (range 0-10) was labeled the Food Group Composite. None of the differences were significant (either between grade level or year).

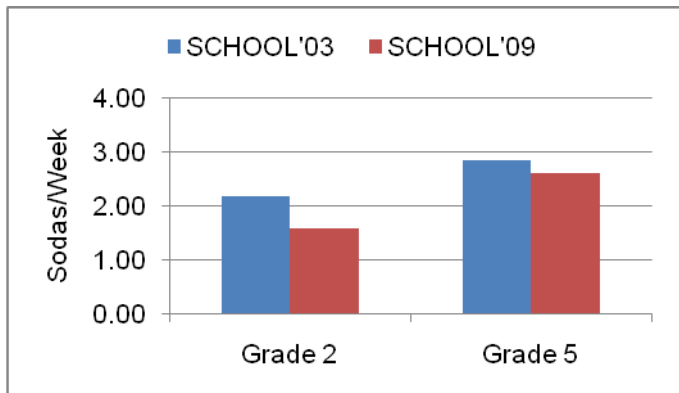
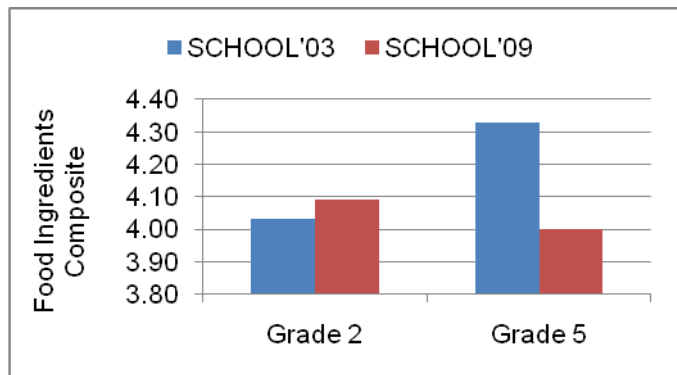


The consumption of the food ingredients like sodium (salt), sugar, fat, and cholesterol was estimated from the reported amounts of sweets (i.e. donuts, soda), salty foods (i.e. lunchmeats, potato chips), fatty foods (i.e. hamburger, deep fried foods), and cholesterol-laden foods (i.e. eggs, liver) consumed. Since there are no recommendations for the number of servings consumed for these ingredients, we assigned weighting values based on the student's average consumption of these food ingredients. A score in the bottom third meant the student consumed less than the average student, a score in the upper third meant that their consumption of that ingredient was high compared to their peers. None of the differences shown in this figure were significant.

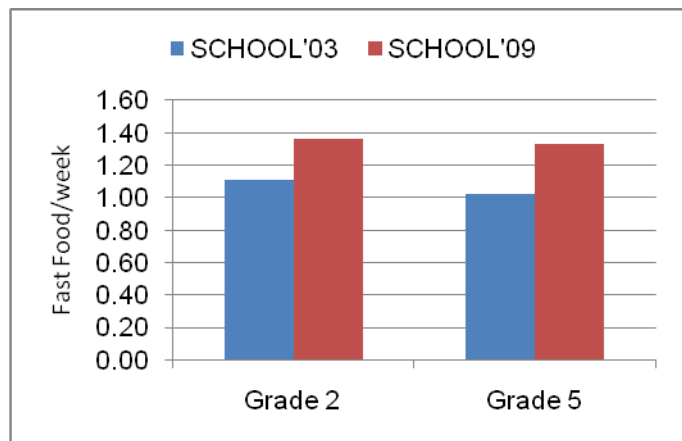
A Grand Food Composite was also calculated by combining the Food Groups Composite and the Food Ingredients Composite. Here, again, there were no significant differences.

Students were asked to indicate the number of sodas consumed per week. Student in fifth grade reported consuming significantly more sodas (M=2.80) than did second graders (M=1.95). There was no change from 2003 to 2009.

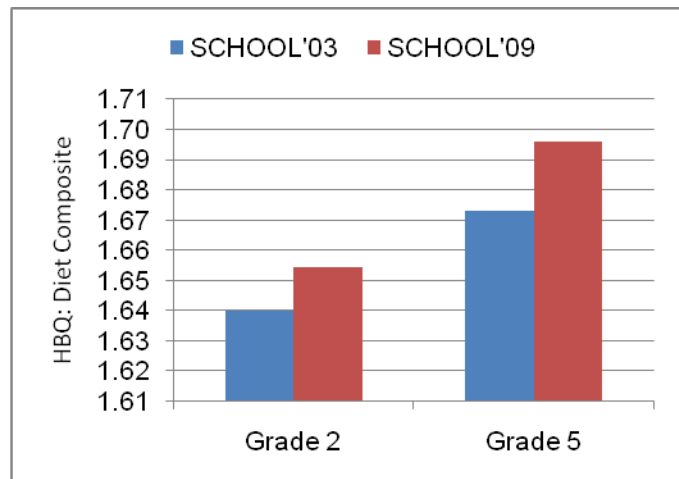
Weighting Scheme for Food Ingredients				
		Weight		
		Bottom Third	Middle Third	Upper Third
Food Ingredients	Sugar	2	1	0
	Sodium	2	1	0
	Fat	2	1	0
	Cholesterol	2	1	0



Students were also asked about eating habits – eating as a family, eating at fast food facilities and total frequency of eating out. There were no differences in fast food consumption between grade levels, but there was a significant increase in fast food consumption between 2003 (M=1.05) and 2009 (M=1.35). Using a similar test to evaluate changes in restaurant meals revealed no significant differences between grade levels or over the time interval. A similar finding occurred when testing the total number of meals eaten outside the home. Students also indicated the number of meals which were eaten together as a family. Again there were no significant differences between the years or grade levels examined.



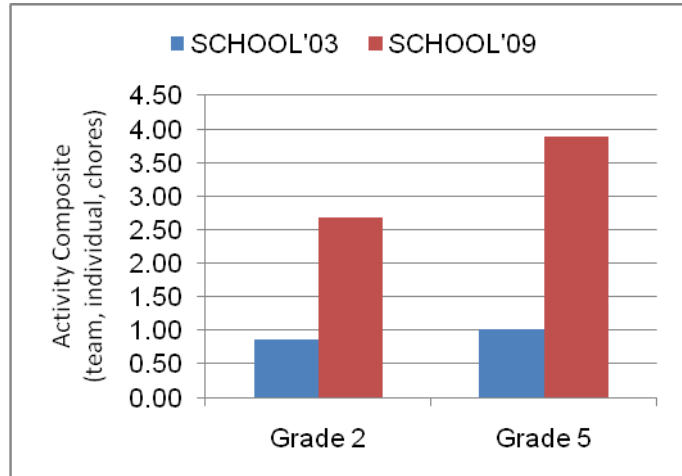
Dietary choices were also examined using the Health Behavior Questionnaire (HBQ). Here there were pictorial representation of various food choices and students were instructed to make various choices (which they would pick, which is better, which choice receives the most support, etc.) To develop a composite dietary index, these various components were combined to create a composite which reflected more positive dietary choices or influences. Examining this composite index revealed a significant effect for grade level, but no significant effect for year. Students in grade 5 (M=1.68) gave significantly more positive food choices than those in grade 2 (M=1.64). Notice that the effect appears to be rather trivial, but was nonetheless significant.



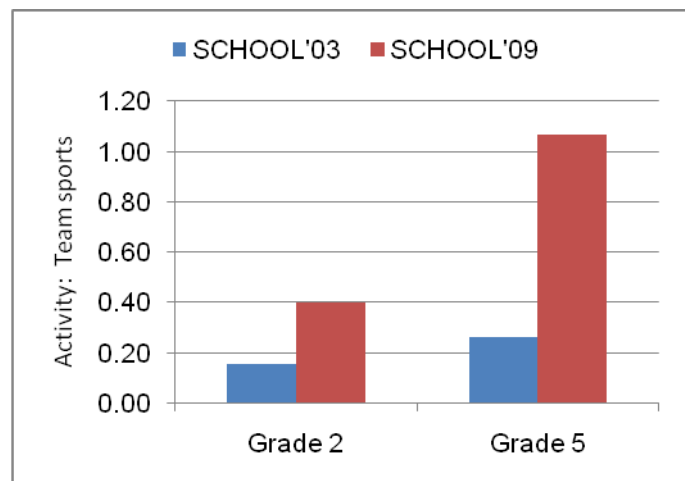
Exercise

Students were asked about various activities they engaged in. Questions itemized the amount of physical activity in various organized and individual exercise events both as part of the school day as well as weekend and out of school events.

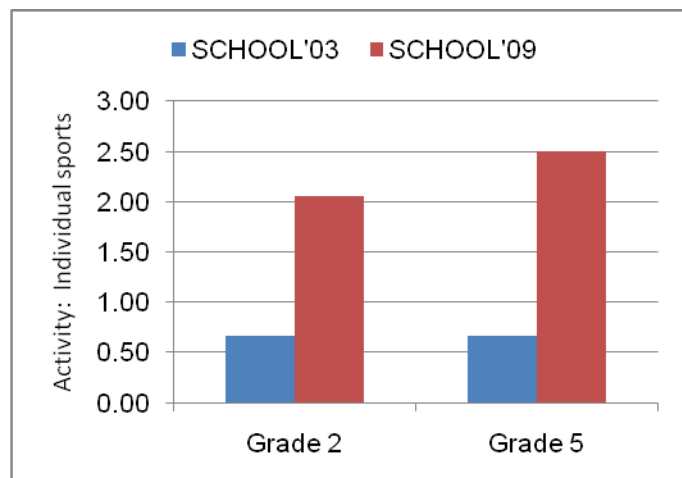
An aggregate was calculated for various types of events as well as all exercise events combined. Using this grand composite, there were significant differences between grades ($M=1.57$ for second grade and 1.67 for fifth grade) and between years ($M=.96$ for 2003 and $M=3.23$ for 2009). There was also a significant interaction, where the increase was greater for fifth graders than for second graders.



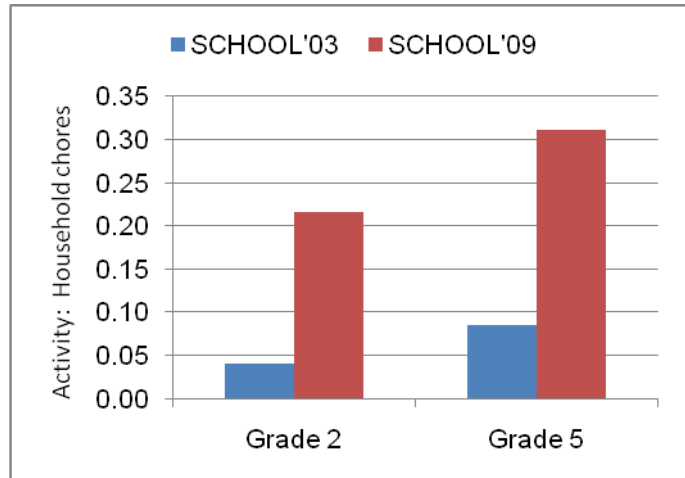
A similar analysis was conducted for team sports (baseball, football, soccer, and volleyball). Again, there was a significant effect for grade level ($M=.25$ for second grade and $.45$ for fifth grade) and between years ($M=.22$ for 2003 and $M=.71$ for 2009). There was also a significant interaction, where the increase was greater for fifth graders than for second graders.



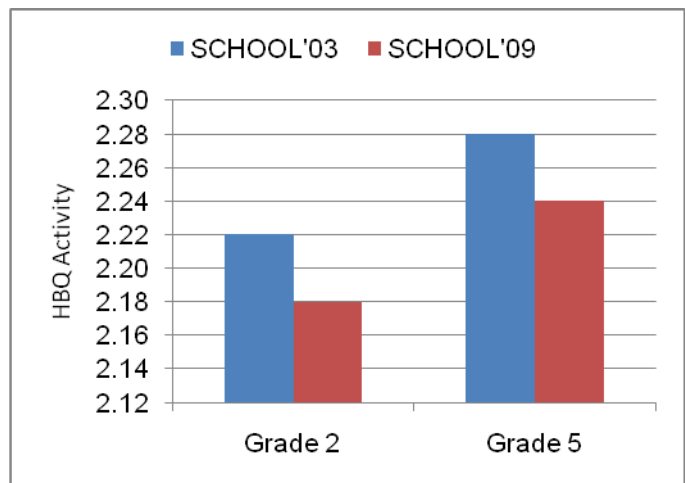
For individual exercise events (e.g., biking, swimming, gym activities, water sports, dancing, walking, running, sneaker activities, and others), there was again a significant main effect for grade level ($M=1.21$ for second grade and 1.08 for fifth grade) and between years ($M=.67$ for 2003 and $M=2.26$ for 2009). There was also a significant interaction, where the increase was greater for fifth graders than for second graders.



As has been noted previously, students engage in very few chores around the house. Three were slight increases, but the actual amount of time spent in chores is trivial compared to any other activities. There was a significant main effect for grade level ($M=.11$ for second grade and $.14$ for fifth grade) and between years ($M=.07$ for 2003 and $M=.26$ for 2009). There was no significant interaction.

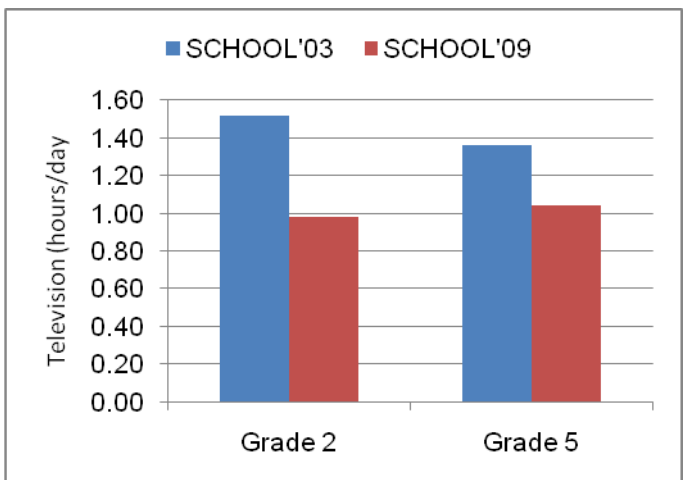


The HBQ also contained sections that addressed activity level, specifically appraising how confident individual were that they could make good exercise choices and how much social support they received for physical activity. Here there was a significant effect for grade level ($M=2.21$ for second grade and $M=2.27$ for fifth grade), but no significant effect for year, nor any significant interaction between year and grade.

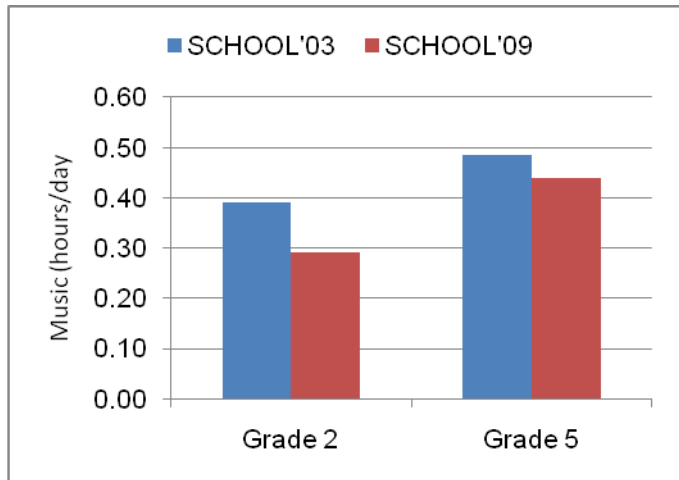


Other Habits & Activities

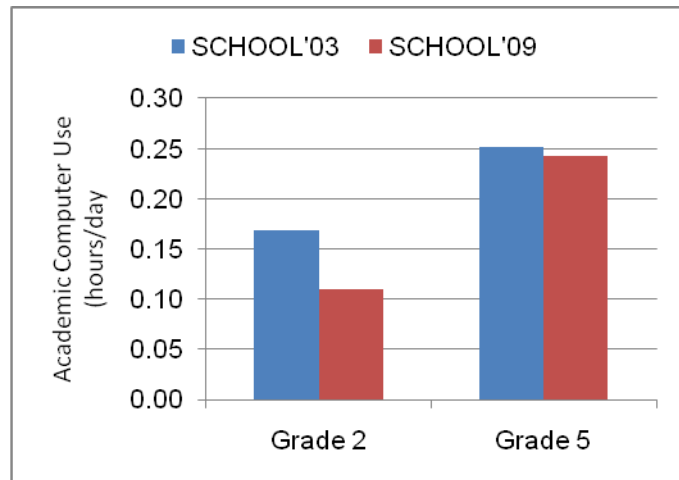
Other sections of the data collection explored various forms of more sedentary activities, e.g., television watching, music, computer and other game activities. These activities are explored individually first, and then in the aggregate. The number of hours spent watching television significantly decreased ($M=1.42$ in 2003 to $M=1.01$ in 2009). There were no significant differences between grade levels, nor any interaction.



The amount of time spent in listening to music significantly increased from grade 2 (M=.35 hours) to grade 5 (M=.47 hours), but there were no significant differences over the 6 year time span.

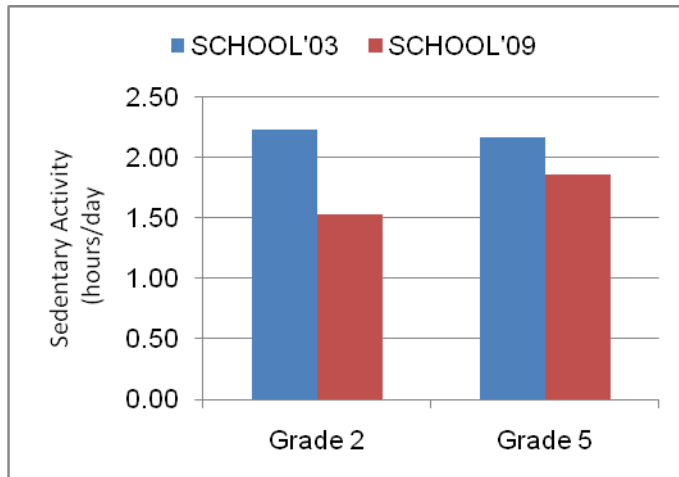


The amount of time spent in the academic use of computers was also explored. Here there was a significant grade effect, with fifth graders spending significantly more time (M=.25 hours/day) than second graders (M=.15 hours/day). There were no significant differences over the years explored here, nor any interaction.



There were no significant changes in electronic game-playing between grade levels, nor between the years explored here.

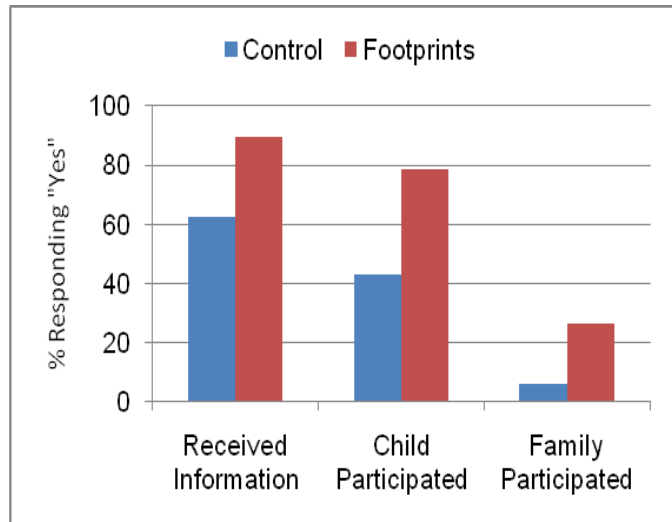
All of these components were combined to form an aggregate for sedentary activities. Here there was a significant effect for the year. Students in 2003 spent significantly more time in sedentary activities (M=2.19 hours/day) than did the students in 2009 (M=1.68 hours/day). There were no significant differences between grade levels, nor any significant interaction.



Footprints vs. Control Analyses ('09 data only)

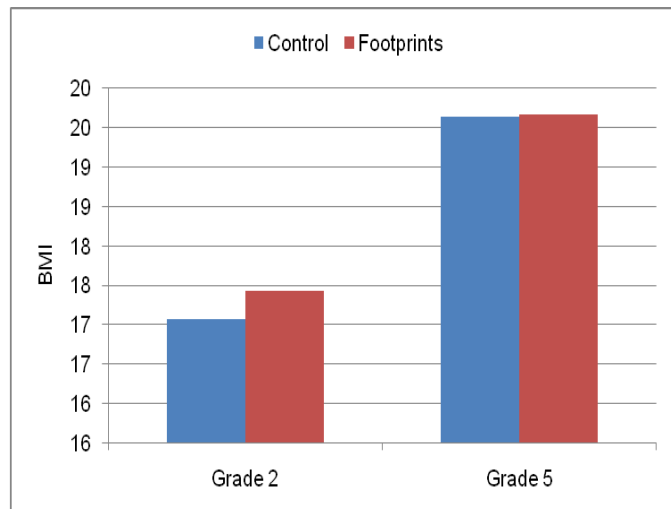
Program Participation

Three questions explored the degree to which the child and/or families participated in the Footprints program. Of the families in the Footprint schools, 89.5% indicated they received information vs. 62.3% of those in the control group. Since the control group did not receive information, this high percentage is probably attributable to social desirability. In the Footprint schools, 78.6% indicated that the child participated, and 42.9% in the Control schools, again indicating a high degree of social desirability. Finally, only 26.3% of the families in the Footprint schools indicated that they participated, compared with 6% in the Control schools. These data seem to suggest a pervasive social desirability influence, one which may very well permeate other sections of the data collection instruments.

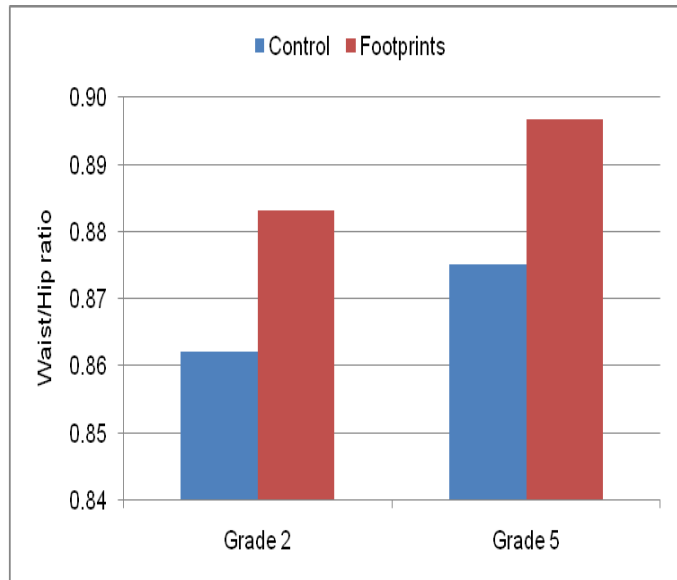


Physical Measures

Several body size measures were taken. BMI (body mass index) was calculated for each child and was significantly higher for fifth graders ($M=19.7$) than for second graders ($M=17.3$). There were no significant differences between the Footprint and Control schools and no interaction between grade level and program participation.



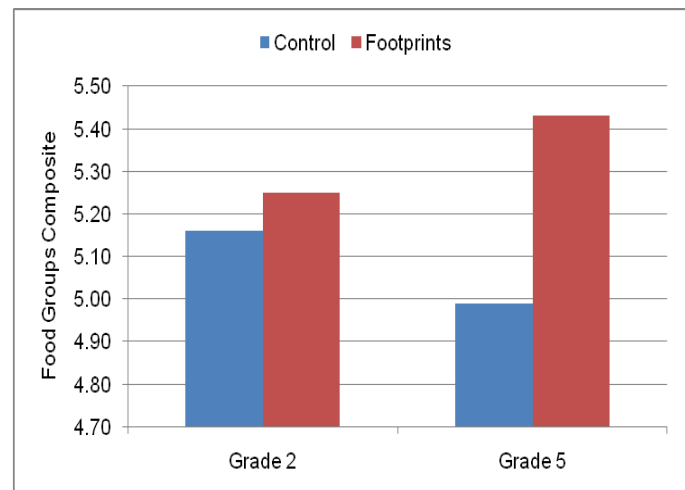
The waist/hip ratio was also calculated. There was not a significant grade level difference, but those in the Footprint schools had significantly higher W/H ratios (M=.890) than did those in the Control schools (M=.868). There was no significant grade impact nor interaction. This increase in W/H ratio for the Footprint schools is puzzling and was not anticipated.



Pulse rates revealed no differences by grade level or by program. Systolic blood pressure was significantly higher for the Footprint students (103.2) than the Control students (98.0), and did show a significant elevation across grade levels (M=98.0 for second graders; M=103.6 for fifth graders). Diastolic blood pressure showed a reversed pattern, with a significant elevation for fifth graders (M=66.3) compared with second graders (M=62.5), and Control students being significantly higher (M=65.4) than Footprint students (M=63.2).

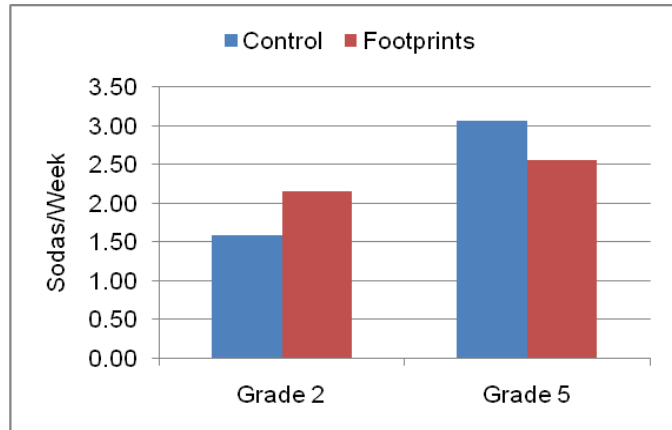
Diet

As suggested previously, each student was assigned a weighted value for each food group based on their reported number of servings consumed. The sum of the student's weighted values (range 0-10) was labeled the Food Group Composite. None of the differences were significant (either between grade level or by program).

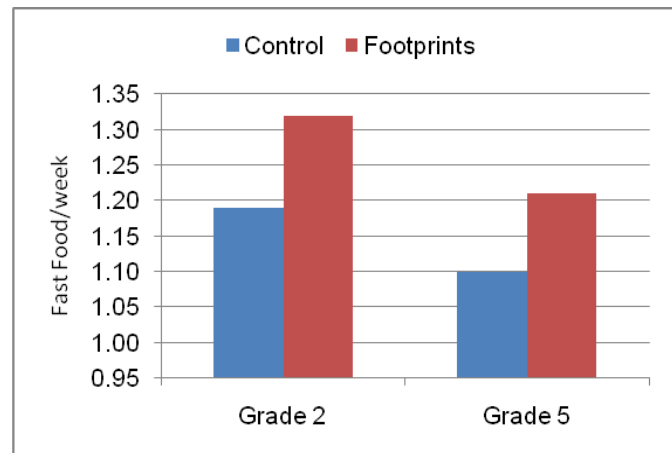


A Grand Food Composite was also calculated by combining the Food Groups Composite and the Food Ingredients Composite. Here, again, there were no significant differences.

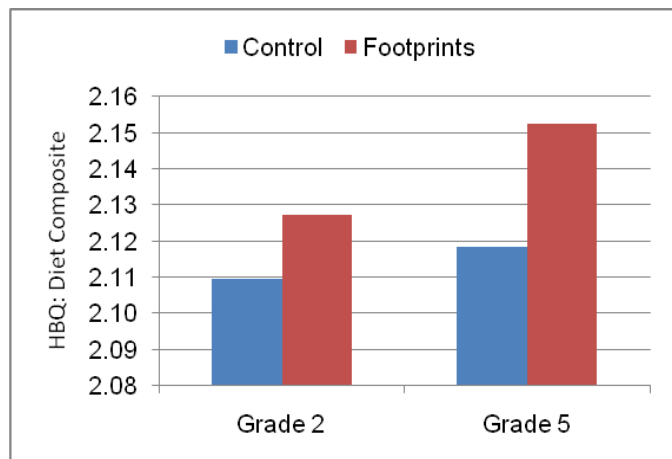
Students were asked to indicate the number of sodas consumed per week. Student in fifth grade reported consuming significantly more sodas (M=2.80) than did second graders (M=1.88). There was no significant difference between Footprint and Control schools, nor any significant interaction.



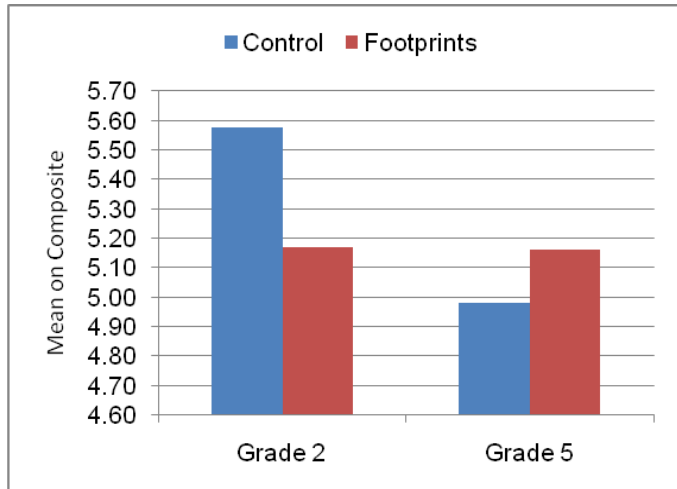
Students were also asked about eating habits – eating as a family, eating at fast food facilities and total frequency of eating out. There were no differences in fast food consumption between grade levels, nor between Footprint and Control schools. Using a similar test to evaluate changes in restaurant meals revealed no significant differences between grade levels or across groups. A similar finding occurred when testing the total number of meals eaten outside the home. Students also indicated the number of meals which were eaten together as a family. Again there were no significant differences between the grade levels or the groups examined.



Dietary choices were also examined using the Health Behavior Questionnaire (HBQ). Here there were pictorial representation of various food choices and students were instructed to make various choices (which they would pick, which is better, which choice receives the most support, etc.) To develop a composite dietary index, these various components were combined to create a composite which reflected more positive dietary choices or influences. Examining this composite index revealed no significant effect for grade level and no significant difference between Footprint and Control schools.

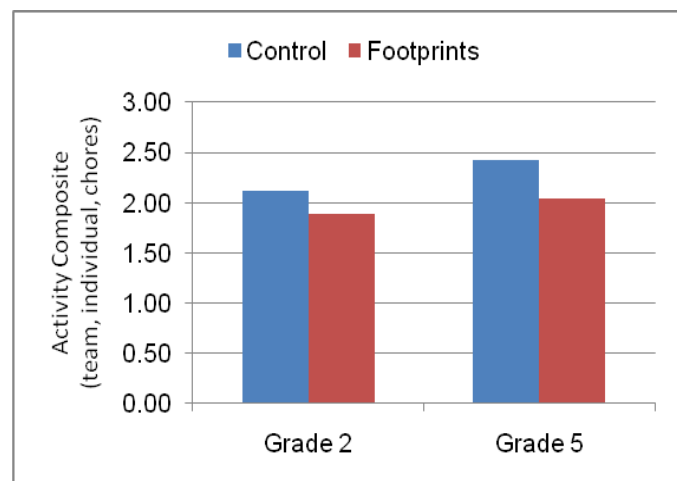


Eleven additional questions were added to the data collection instrument in SCHOOL'09 targeting nutritional issues that were emphasized in the Footprints program (e.g., the food pyramid, reading packaging labels, shopping for healthier products, and eating out less). A composite of these items was created where high scores indicated healthier nutritional choices. An analysis of this composite revealed no differences between Footprint and control schools, no grade differences and no significant interaction.

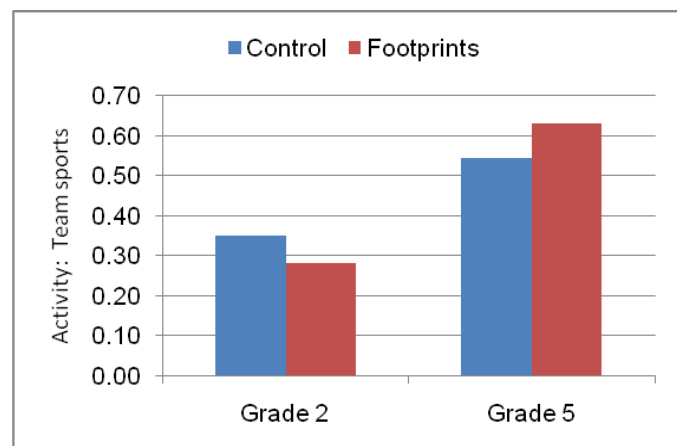


Exercise

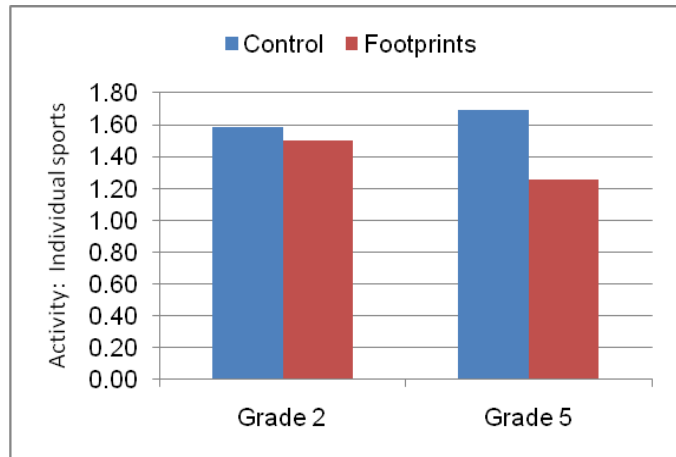
Students were asked about various activities they engaged in. Questions itemized the amount of physical activity in various organized and individual exercise events both as part of the school day as well as weekend and out of school events. An aggregate was calculated for various types of events as well as all exercise events combined. Using this grand composite, there were no significant differences between grades and no significant differences between Footprint and Control schools. Neither was there any interaction.



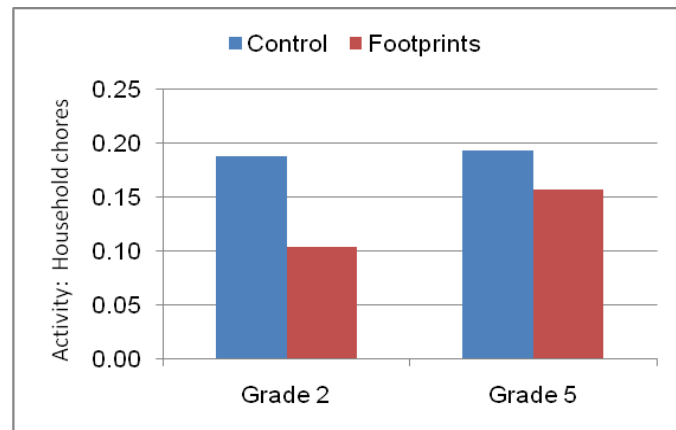
A similar analysis was conducted for team sports (baseball, football, soccer, and volleyball). Here there was a significant effect for grade level ($M=.32$ for second grade and $.59$ for fifth grade) but not between Footprint and Control schools. In addition, the interaction was not significant.



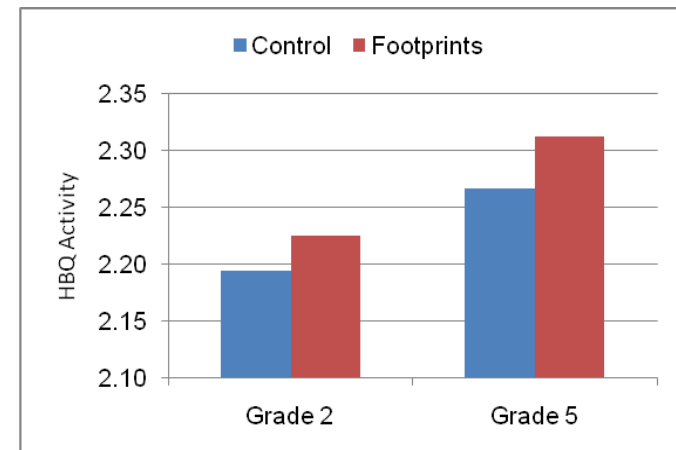
For individual exercise events (e.g., biking, swimming, gym activities, water sports, dancing, walking, running, sneaker activities, and others), there was no significant main effect for grade level or between Footprint and Control schools. In addition, the interaction was not significant.



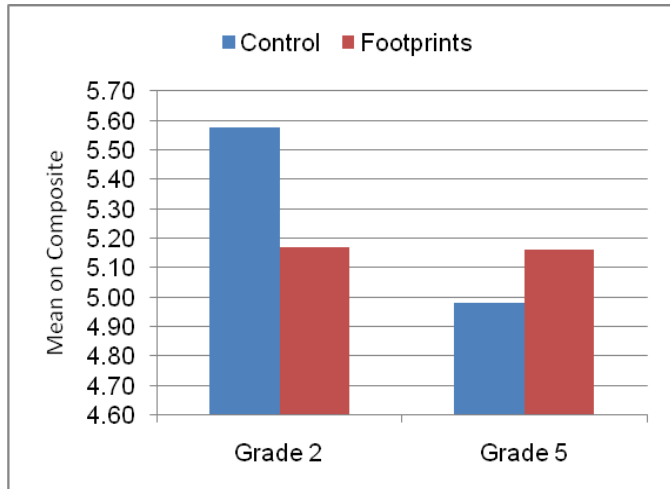
As has been noted previously, students engage in very few chores around the house, with the actual amount of time spent in chores being trivial compared to any other activities. There was a significant main effect indicating that Footprint schools did fewer chores ($M=.13$) than did Control schools ($M=.19$). There was no significant interaction.



The HBQ also contained sections that addressed activity level, specifically appraising how confident individual were that they could make good exercise choices and how much social support they received for physical activity. Here there was a significant effect for grade level ($M=2.21$ for second grade and $M=2.29$ for fifth grade), but no significant effect for Footprint vs. Control schools, nor any significant interaction.

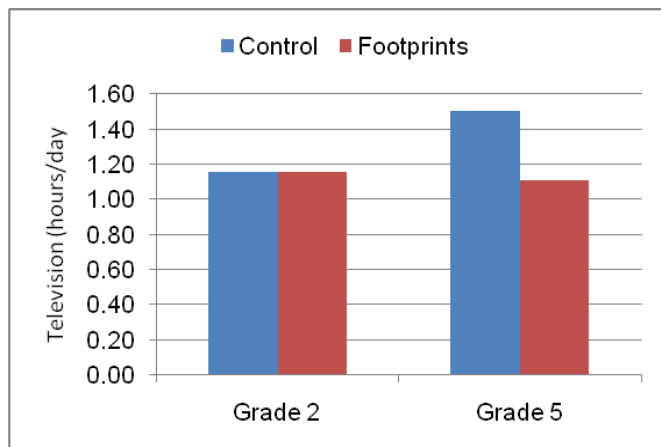


Seven additional questions were added to the data collection instrument in SCHOOL'09 targeting physical activity issues that were emphasized in the Footprints program (e.g., encouraging physical activity, limiting electronic game time, and family activities involving exercise). A composite of these items was created where high scores indicated healthier activity choices. An analysis of this composite revealed no differences between Footprint and control schools, no grade differences and no significant interaction.

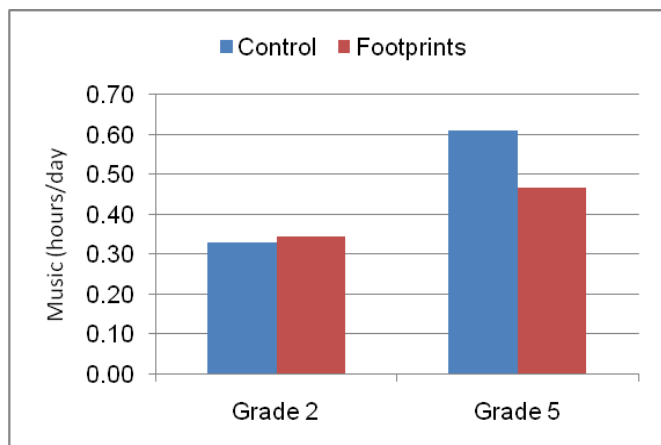


Other Habits & Activities

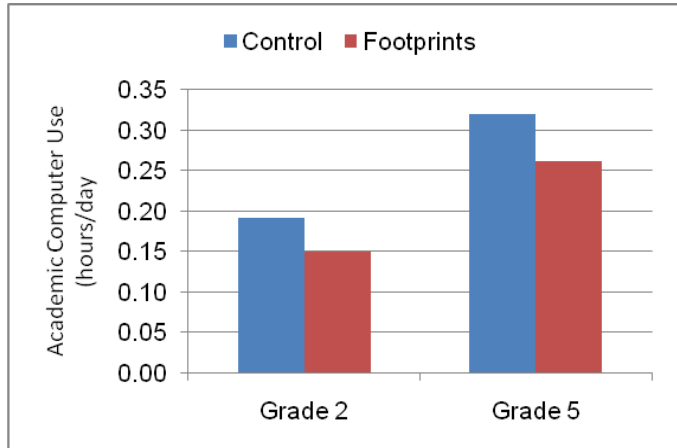
Other sections of the data collection explored various forms of more sedentary activities, e.g., television watching, music, computer and other game activities. These activities are explored individually first, and then in the aggregate. The number of hours spent watching television was significantly more for Control schools ($M=1.36$) than for Footprint schools ($M=1.13$). There were no significant differences between grade levels nor any interaction.



The amount of time spent in listening to music significantly increased from grade 2 ($M=.34$ hours) to grade 5 ($M=.54$ hours), but there were no significant differences between Footprint and Control schools, nor any interaction.

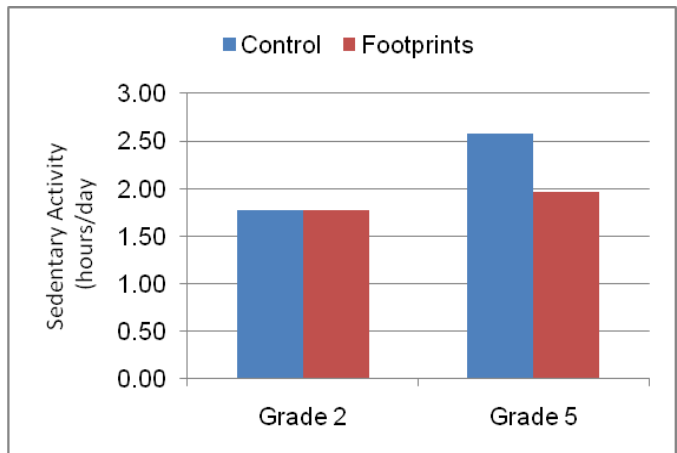


The amount of time spent in the academic use of computers was also explored. Here there was a significant grade effect, with fifth graders spending significantly more time ($M=.29$ hours/day) than second graders ($M=.17$ hours/day). There were no significant differences between Footprint and Control schools, nor any interaction.



There was a significant increase in electronic game-playing between grade levels ($M=.42$ hours/day for 5th graders and $M=.28$ hours/day for 2nd graders), but the difference between Footprint and Control schools was not significant, nor was the interaction significant.

All of these components were combined to form an aggregate for sedentary activities. Here there was a significant effect for grade level, with fifth graders spending more time in sedentary activity ($M=2.26$ hours/day) than did the second graders ($M=1.77$ hours/day). There were no significant differences between Footprint and Control schools, nor any significant interaction.



Synopsis

Based on these analyses, several conclusions can tentatively be offered:

- There is some indication of response distortion based on social desirability. Large numbers of families in the Control schools indicated receiving information and participating in Footprint programs. That did not occur, and indicates that families want to be seen as active and healthy. The extent to which these response tendencies pervasively affected other self-report data is unknown at present.
- The family participation rate in Footprint activities was low. Despite social desirability tendencies, only 26% of the families in the Footprint schools indicated that they had participated as families in Footprint activities. It is difficult to anticipate beneficial effects with such a low base rate of participation.
- The impact of the Footprints program on outcomes that involved physical measurements were negligible or even adverse. There were no changes in BMI, but the waist/hip ratio and systolic blood pressure both increased for Footprint schools. Diastolic blood pressure decreased.
- The attempts of the Footprints program to foster nutritional dietary responses did not succeed. Whether we examined eating out or diverse dietary choices, composites from the HBQ or questions specifically addressing issues raised in the Footprints program, no significant differences were found between the Footprint and Control schools.
- The impact of the Footprints program on enhanced physical activities also did not succeed. There were no significant differences in team sports, individual sports, activity composites, HBQ aggregates, nor questions designed to address Footprint emphases. The only significant difference indicated that students in Footprint schools actually engaged in fewer household chores.
- Other activities (music listening, computer use, and sedentary activities) did not differ between Footprint and Control schools. Television viewing did significantly decrease for the Footprint schools.
- Analyses which focused on the contrast between students in '03 and '09, on the other hand, did show a few positive trends.
- For the physical measures, there were no significant differences in BMI between '03 and '09, but the waist/hip ratio did decline across those years. Other physical measures did not indicate changes.
- Most dietary patterns did not change from '03 to '09. There was a significant increase in the consumption of fast food, but other differences on the HBQ and other dietary components indicated no significant differences.
- Measures of physical activity are more encouraging. There were significant increases in participation in team sports and individual exercise events as well as an increase in house hold chores from '03 to '09, yielding a significant increase in our activity composite across those years. On the other hand the HBQ showed no significant differences in exercise attitudes and choices.

- There was a significant decline in the amount of television viewing from '03 to '09, and no significant shifts in music listening and computer use. In general there was a significant decline in our sedentary composite index between '03 and '09.
- Perhaps the change in physical activity between '03 and '09 reflect a more pervasive cultural shift, with enhanced media emphasis on a physically active lifestyle. While the particular interventions of the Footprints program did not seem successful, there is room for optimism in a more active lifestyle in '09 than was present in '03.
- Dietary changes have not been as successful between '03 and '09, with an actual increase in fast food consumption during that interval, and the absence of any optimistic trends.
- Thus, while changes in lifestyle cannot be attributed to the Footprints program, there are some broad cultural shifts to a slightly more active lifestyle that are encouraging. Unfortunately, changes in physique have not paralleled those changes, with the exception of a slight improvement in waist/hip ratios. Dietary changes have been more resistant to change.