Family Walking: Season, Age and Body Mass Index Correlations

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Citation

D Damore, M Mazumdar. *Family Walking: Season, Age and Body Mass Index Correlations*. The Internet Journal of Family Practice. 2006 Volume 5 Number 2.

Abstract

Objective: To identify the amount time families walk together, how to promote this and whether family walking correlates with their children's body mass index.

Methods: For children 5 to 18 years, caregivers completed a questionnaire about family walking.

Results: Three hundred and seventeen families completed questionnaires. Forty-seven percent walked 3 or more times per month during the summer, 42% during the spring, 37% during the fall and 12% during the winter. Children 10 years of age or younger walked more with their families, 70% vs. 41%. Also, children with non-private insurance walked more with their families, 66% vs. 49%.

Conclusions: Walking in families varies by season and occurs more often when children are younger and when children have non-private insurance. Family walking was not associated with lower BMI in their children since a reduction in BMI most likely requires walking more than 3 times per month.

INTRODUCTION

Childhood obesity has increased in the past 20 years in all ages and ethnicities.[1,2,3] Exercise and a healthy diet are needed to combat this.[4,5,6,7,8] Exercise alone has been shown to reduce body fat in children.[9,10,11] Multiple ten minute periods of exercise have lead to weight loss in adults[12,13,14,15] and may be helpful in children. Walking is one type of exercise that can be done in multiple short episodes daily.

Surveys have found walking to be common after school and have addressed walking to school.[16] In Australia, 31-35% of children walk to school while in North Carolina only 9.4% of middle school students and 4.9% of high school students walk to school.[17,18]

Adult and childhood walking have been linked to improved health outcomes. Greater amounts of walking in adults have lead to decreased hospitalization and medical costs for cardiovascular disease.[19,20] In women, walking was associated with significant reductions in coronary artery disease[21] and in children with decreased body mass index (BMI).[22]

Since overweight and sedentary parents have been associated with overweight children,[23] it is important to encourage exercise for caregivers and children. Greater parental activity often leads to increased childhood sports participation.[24,25] Greater maternal physical activity was linked with 2.0 times greater childhood activity, greater paternal physical activity with 3.5 times greater activity and greater physical activity in both parents with 5.8 times greater activity.[26]

No studies were found in the literature about family walking. Since walking is inexpensive, can often be done close to home and since parents, as well as children, need to increase their activity levels, we chose to study the walking done as a family. Utilizing a questionnaire, our study sought to determine the location and amount of time families, caregivers and children, walk together during different seasons, as well as how to promote family walking, and to assess whether the amount of time spent walking as a family correlates with the child's BMI.

METHODS

A cross-sectional survey using a convenience sample from April to June 2005 was conducted at a large pediatric office in Dutchess County, New York with over 56,000 annual visits. Families were predominantly from suburban and urban areas. Caregivers of children 5 to 18 years of age were asked by the principal investigator to complete a two page questionnaire about the walking or hiking that they do with their children. The survey was developed by the main author with input from colleagues, and a copy appears in the appendix. The questionnaire asked if walking was done as a family during different seasons of the year, the amount of time and location of the walking, if their street or nearby streets had sidewalks, if their street had infrequent traffic, why they walked together, what things could be done to promote walking in families, ethnicity, parental level of education, type of insurance, child's gender, and child's age. Height and weight data were obtained from the child's chart within the previous year to calculate the child's BMI. Each family completed only one questionnaire for one of their children. If the family had multiple eligible children, the caregiver answered the questionnaire for the child visiting the office. The institutional review board of Cornell Medical University, New York, New York, approved this project. Consent and assent forms were completed by caregivers and children, respectively.

Two binary dependent variables, walking 3 or more times per month and walking more than 30 minutes at a time, and five independent variables of age, BMI, education, insurance and frequency of sidewalks and traffic were considered. Pearson Chi-Square Tests and Fisher's Exact Tests were used to test for a relationship between frequency and time spent walking and the five independent variables. Since each participant reported their walking frequency of each season, there is a correlation between each participant's responses. Therefore, a Generalized Estimating Equations model with binary outcome, a type of logistic regression, was used for the multivariable regression analysis to assess for individual contribution of the independent variables adjusting for the others.[27,28] SAS version 9.1 was used for data analysis. Walking frequency was used to compare seasonal walking while adjusting for all the independent variables.

RESULTS

Three hundred and seventeen questionnaires were completed. Eighteen caregivers (5%, 18/335) refused to complete a questionnaire. Fifty-six percent of the children were female. The mean age of the children was 11.1 years (S.D. 4.2 years) and the median age was 11 years. Fifty-seven percent were Caucasian, 23% African-American, 15% Hispanic, and 5% Asian. Sixty-four percent had private insurance while 31% non-private insurance. This is similar to office visits with 66% private insurance and 34% non-private insurance. Measured height and weight data were available from the child's chart from the previous year for 68% of the children and was used to calculate BMI.

Children walked the most with their families in the summer, spring, and fall. Forty-seven percent walked 3 or more times per month during the summer, 42% during the spring, 37% during the fall and 12% during the winter. Families walked significantly less in the winter than any other season (Table 2). Over half, 51%, reported that they walk 10 to 30 minutes at a time, and 30% walk more than 30 minutes at a time.

Figure 1

Table 1: Demographic and Questionnaire Frequencies

Characteristic	Number	%
Child's Gender		
Female	176	56
Male	141	44
Child's Race		
Caucasian	180	57
African-American	72	23
Hispanic	49	15
Asian	15	5
Other	10	3
Child's Age		
10 or younger	148	47
11 or older	169	53
Parental Education		
High school or less	90	28
Some undergraduate coursework or more	218	69
Missing	9	3
Child's Insurance		
Private Insurance	202	64
Medicaid	49	15
Child Health Plus	45	14
Wellcare	5	2
Self Pay	1	0.3
Other	4	1
Missing	11	3
Walking location		
Neighborhood	247	78
Local hikes	84	27
School track	44	14
Neighborhood Characteristics		
Live on streets with sidewalks or near streets with sidewalks or infrequent traffic	276	87
Live on streets with no nearby sidewalks and frequent traffic	34	11
Missing	7	2
Reasons for walking with children		
Spending time with children	225	71
Exercise	206	65
Enjoyable	194	61
What would make walking easier		
Well marked hikes or walks	119	38
Closer locations	93	29
Free internet information	41	13
Reasons for not walking with children		
Too busy	172	54
No walks or hikes nearby	48	15
Don't know of any walks or hikes nearby	42	13
Child's BMI		
< 85%	126	40
≥ 85%	88	28
Missing	103	32
Walking by season		
Walking in Spring		
Rarely	111	35
1 or 2 times per month	72	23
3 or more times per month	134	42
Walking in Summer		
Rarely	88	28
1 or 2 times per month	81	26
3 or more times per month	148	47
Walking in Fall		
Rarely	110	35
1 or 2 times per month	91	29
3 or more times per month	116	37
Walking in Winter		
Rarely	230	73
1 or 2 times per month	49	15
3 or more times per month	38	12
Length of time spent walking		
Less than 10 minutes	60	19
10 to 30 minutes	161	51
More than 30 minutes	94	30

Figure 2

Table 2: Seasonal Walking

	% Difference	OR (95% CI)*	P-value*†
Summer vs. Spring	47 vs. 42	1.25 (0.9 - 1.7)	0.163
Summer vs. Fall	47 vs. 37	1.5 (1.0 - 2.1)	0.054
Summer vs. Winter	47 vs. 12	9.2 (4.6 - 18.1)	<.001
Spring vs. Fall	42 vs. 37	1.1 (0.8 - 1.5)	1.00
Spring vs. Winter	42 vs. 12	7.0 (3.6 - 13.6)	<.001
Fall vs. Winter	37 vs. 12	6.3 (3.3 - 12.0)	<.001

* Adjusted for child's age and BMI, parental education, insurance and neighborhood.
† Bonferroni adjustment used for multiple comparisons.

Children 10 years of age or younger (n=148) walked significantly more, 3 or more times per month, with their families than older children (n=169, 70% vs. 41%).

Children with non-private insurance (n=104) walked 3 or more times per month significantly more with their families than children with private insurance (n=202, 66% vs. 49%, Table 3).

Figure 3

Table 3: Walking Comparisons by Demographic Variables

	Walking 3 or more times a month			Walking more than 30 minutes in length	
	Percent	OR(95%CI)	P-value	OR(95%CI)	P-value
Age					
11 or older	41	1.0		1.0	
10 or younger	70	4.0 (2.2 -7.3)	<0.0001	0.8 (0.4 -1.5)	0.46
BMI					
85% or higher	52	1.0		1.0	
Less than 85%	54	1.2 (0.6 –2.1)	0.66	1.0 (0.5 -1.9)	0.99
Parental Education					
High school or less	56	1.0		1.0	
Some undergraduate work or more	54	1.5 (0.7 –3.2)	0.27	1.3 (0.6 -2.8)	0.46
Insurance					
Private	49	1.0		1.0	
Other	66	2.1 (1.0 - 4.5)	0.048	1.5 (0.7 -3.0)	0.31
Neighborhood					
Sidewalks or no traffic	56	1.0		1.0	
No sidewalks and traffic	50	2.5 (0.8 –0.4)	0.10	1.0 (0.4 -2.9)	0.94

Neighborhood characteristics, traffic and sidewalks, did not seem to affect family walking. Families that lived on streets with frequent traffic and without nearby sidewalks (n=34) did not vary in their walking versus families that lived on streets with infrequent traffic or nearby sidewalks (n=276, Table 3).

Family walking did not correlate with lower childhood BMI but parental education did. The amount of time spent walking was similar among children with BMI less than the 85th percentile (n=126) and children with greater BMI (n=88, Table 3). Children whose parents had completed some undergraduate coursework (n=152) were more likely to have BMI less than the 85th percentile than those whose parents completed high school or less (n=59), 64% vs. 46% (OR 2.0, 95% CI 1.0-3.3).

Most, 78%, walk in the neighborhood where they live. Seventy-one percent liked walking with their children as a means of spending time with them, 65% use it as a means of exercise, and 61% find it enjoyable (Table 1).

Fifty-four percent were too busy to walk with their children. Forty-five percent stated that a closer location would promote walking and 38% that well marked trails would encourage walking (Table1).

DISCUSSION

Our study found a seasonal variation in walking with more walking done by families during the warmer months. Warmer weather encourages walking, and families may have more free time to walk during their children's summer vacations. Large adult studies have also found greater physical activity during warmer months.[29]

Children 10 years of age and younger walked more with their families than older children. As children get older, they may do fewer activities with their caregivers.

Our study found that children with non-private insurance walked more with their families. These families may not own cars and walk as a means of transportation. Non-private insurance can be used as marker for lower socioeconomic status. Other studies have found lower socioeconomic status to be associated with greater walking.[17,30]

Our study did not find neighborhood characteristics, traffic and sidewalks, to affect the walking done by families. This may be due to our small sample size of families who live in neighborhoods with frequent traffic and without nearby sidewalks (n=34). Studies have found less walking and physical activity in children who live in neighborhoods without nearby parks or recreation areas.[31,32] Also, parental

concern about heavy traffic or decreased road safety has been associated with decreased neighborhood walking and obesity in their children.[33,34]

In adults, other factors of the built environment besides frequent traffic and no nearby sidewalks affect their rates of walking. In adults, low socioeconomic status, pedestrian friendly neighborhoods and living within walking distances to businesses have been associated with greater walking.[35,36] The built environment may favor walking in urban areas as opposed to suburban areas while urban citizens may have greater rates of obesity. In these communities, other factors may be significant.[37] Research is needed to determine whether walkable neighborhoods, streets suitable for pedestrians, cyclists and motorists and active commuting to school are health promoting for youth.[38]

In our study, family walking did not correlate with childhood BMI. Greater walking in families, more than 3 times per month, is probably needed to affect childhood BMI. Studies have found associations with walking and BMI in certain populations of children and not in others. One study found a positive association with walking to school and the BMI in overweight children but not in normal weight children.[39] Another study found that an increase in middle school students walking to school but not high school students was associated with BMI less than the 85th percentile.[17]

Higher parental education, some undergraduate coursework or more, was associated with lower childhood BMI but not with increased family walking. These parents may better understand the health benefits of lower BMI or be better able to encourage lower BMI in their children through exercise, other than family walking, and diet. Even with greater parental education, there is still room for improvement since 36% of their children had BMI greater than or equal to the 85th percentile. Other studies have found greater adult education to be linked with lower BMI in their children.[40,41]

Non-private insurance is connected with lower parental education. Our study found that non-private insurance was associated with greater family walking while lower parental education was associated with greater childhood BMI. Walking 3 times per month is probably not enough to affect BMI.

Since most (78%) walk in the neighborhoods where they live and many (45%) felt that a closer location would promote walking, it may be important to support safe neighborhoods for walking and develop local walks and hikes.

Limitations to this study include small sample size, convenience sample, recall bias, socially desirable responses, childhood BMI for 68% and no parental BMI . A larger sample would be more representative and more generalizable to other populations. Families who were not surveyed due to unavailability or refusal may be different from those who were surveyed. Data collection was done during the day. Families that use the office in the evenings and weekends may be more involved in sports, walk less, and have lower BMI. Families may not have accurately recalled the amount of time spent walking. A prospective study with families keeping track of their time spent walking or sampling each season would be more accurate. Families may have responded to some questions with the answers they felt they should give rather than what was correct. Childhood BMI data was available for only 68%. Greater childhood BMI would help determine associations between family walking and childhood BMI. Parental BMI was not collected but would be useful for assessing its effects on childhood BMI.

Future work could include studying a larger population, possibly internet based. More frequent walking, 3 or more times per week, and expanded characteristics of the built environment could be studied. Physicians can encourage patients to walk and hike several times per week, and develop and publicize local walks and hikes. Physicians can then see if walking and hiking increase and whether this affects the BMI of the children.

The walking done by families, caregivers and children, varies depending on the season, is greater with children 10 years of age or younger and is greater in children with non-private insurance. Family walking was not associated with lower BMI in their children because walking more than 3 times per month is probably needed to affect BMI.

ACKNOWLEDGEMENTS

The authors would like to thank the physicians and staff at Children's Medical Group, Poughkeepsie, NY, for their help with this study and Ms. Kylie Bryant for her assistance with data analysis.

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APPENDIX

WALKING OR HIKING QUESTIONNAIRE

Name: _____
Date: _____
Gender (circle): Male / Female
Height: _____
Weight: _____

1. Do you walk or hike with your child in the spring?
a. rarely
b. 1 / month
c. 2 / month
d. 3 - 4 / month
e. > 2 / week

2. Do you walk or hike with your child in the summer?
a. rarely
b. 1 / month
c. 2 / month
d. 3 - 4 / month
e. > 2 / week

3. Do you walk or hike with your child in the fall?
a. rarely
b. 1 / month
c. 2 / month
d. 3 - 4 / month
e. > 2 / week

4. Do you walk or hike with your child in the winter?
a. rarely
b. 1 / month
c. 2 / month
d. 3 - 4 / month
e. > 2 / week

5. On average, how long do you walk or hike with your child?
a. < 10 minutes
b. 10 - 30 minutes
c. 31 - 60 minutes
d. > 1 hour

6. Where do you walk or hike with your child (choose all that apply)?
a. neighborhood where you live
b. school track
c. local hikes
d. other _____

7. Do you live on a street with (choose all that apply):
a. sidewalks
b. near streets with sidewalks
c. infrequent car traffic
d. a lot of car traffic

8. Why do you walk or hike with your child (choose all that apply)?
a. enjoyable
b. spend time with your child
c. exercise
d. other _____

9. What would make walking or hiking easier to do with your child (choose all that apply)?
a. closer location
b. well marked walks or hikes
c. free internet information about local walks or hikes
d. other _____

10. What makes walking or hiking with your child difficult (choose all that apply)?
a. no walks or hikes nearby
b. too busy
c. don't know of any walks or hikes nearby
d. other _____

11. What is your child's ethnicity (circle all that apply)?
a. African-American
b. Hispanic
c. Asian
d. Caucasian
e. other _____

12. What is the parent's / caregiver's highest level of education?
a. < 8th grade
b. completed 8th grade
c. some high school
d. completed high school

e. some undergraduate coursework

f. Associate's degree

g. Bachelor's degree

h. some graduate coursework

i. Master's degree

j. JD

k. MD

l. PhD

13. What insurance do you have for your child?

a. private

b. Medicaid

c. child health plus

d. self pay

e. other _____

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