Using family-based experiential learning to improve nutrition knowledge, dietary intake, physical activity, and food purchasing behaviors among Northern Virginia Latina WIC participants and their children: A pilot study.

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ABSTRACT

Objective: To examine the impact of a family-based nutrition education program on nutrition knowledge, diet, physical activity, and food purchasing behaviors of Latina mothers and children participating in Northern Virginia Women, Infant, Children (WIC) programs.

Methods: Surveys were administered to mothers (n=15) using a pre-test/post-test design. The family-based nutrition intervention included 1) Discussion and lecture on food labels, food purchasing, portion sizes, and healthy meals, 2) Experiential learning focused on preparation and storage of low-cost, healthy meals incorporating WIC foods, and 3) A Zumba class and discussion on physical activity.

Results: The data revealed improved diet such that mothers reported increased fruit and vegetable consumption, decreased juice consumption among their children. Mothers reported their children were more physically active. Further, mothers prepared more meals at home using raw ingredients.

Conclusions: The findings are significant in that they support growing literature of the success of family based interventions. Further, these data show the importance of integrating experiential learning activities such as cooking and physical activity with the more traditional didactic methods.

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PURPOSE:

Causes related to childhood obesity involve interactions among multiple factors that can shape daily diet and physical activity behaviors. Such factors include personal (e.g., beliefs, attitudes, cultural experiences, taste preferences, and dietary composition), environmental (e.g., schools, community, healthcare, food access and availability), societal (e.g., cultural norms, foodways, social networks, economics, public policy) and as well as physiological (e.g. genetics and epigenetics) " (Schonfeld-Warden & Warden, 1997).

Childhood obesity has become a serious public health problem in the United States. The most recent data show that 31.7% of youth are overweight (Ogden, Carroll, Kit, & Flegal, 2014). Further, obesity rates have climbed in many states in the south including, the Commonwealth of Virginia, where childhood obesity 15.5% of children are overweight (National Conference of State Legislators, 2014). Those of particular risk include immigrant families and those of low socioeconomic status (Singh, Yu, & Kogan, 2013).

Researchers on childhood obesity suggest that prevention of overweight in the pre-school years should focus on parents, because parental beliefs, attitudes, perceptions and behaviors appear to contribute to children's development of excessive weight gain, *(Polfus and Fern, 2012).*

There is significant evidence that parental variables are instrumental in the development of obesity (Holland et al., 2014) and family-based behavioral interventions are the most widely studied type of intervention, with evidence of long-term success among 2 to 12 year- old children (Holland et al., 2014) (Davis et al., 2013). As such interventions have shown to be successful, this study aims to examine the effects of a family-based experiential learning on nutrition knowledge, dietary intake, physical activity, and food purchasing behaviors among Latina WIC participants and their children in the Fairfax Health District, Fairfax, County, Virginia.

Women Infants and Children (WIC) program in Fairfax Health District

The Fairfax County Health Department cares for the residents of Fairfax County, Fairfax City and the City of Falls Church with a total population of approximately 1.2 million people distributed over 395 square miles. There are nine Women Infants and Children (WIC) service delivery sites in The Fairfax Health District serving over 19,000 women infant and children, (54% children, 21% infants, 12% pregnant women, 9% breast feeding women, 4% postpartum women.). Fairfax County is one of the most diverse counties in the Commonwealth of Virginia and among the all the Fairfax County WIC clients, 50% speak Spanish, 43% speak English and 7% speak other languages such as Arabic, Urdu, Vietnamese, Farsi, Korean, and Amharic.

The prevalence of obese children (95th percentile) among the WIC population in Fairfax is

22%. The percent of children who are at risk for becoming overweight (85th to 95th percentile) is 11%, which is second highest in the state. Dietary assessments of WIC children suggest that the large consumption of sweetened fruit juices by 25% children between two to five years of age and inadequate intake of fruits and vegetables by 30 % of the children (USDA, n.d.) contribute to the above obesity statistics.

In 1998, the U.S. Department of Agriculture (USDA) funded a childhood obesity prevention initiative called **Fit** WIC. The purpose of this initiative was to examine how the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) could better respond to the issue of childhood obesity. The Fairfax Health District was selected as a pilot site for this study. Lessons learned from this study are as follows:

> Parents did not perceive being overweight as problem for their preschool children.
> Parents were knowledgeable about WIC's health messages, but they struggled with how to put that knowledge into practice.
> WIC families receive conflicting health messages from health care providers related to children's weight.
> Parents lacked information about desirable activity levels for their families.
> WIC staff had concerns about addressing childhood obesity with their participants.
> Staff expressed a need for additional training on topics related to childhood obesity.

The FitWIC program spurred the need to develop a program which involved family and parents and was targeted at pre-school children. The findings described here are based on a pilot project nutrition intervention which addresses such a need.

METHODS

Participants:

The target population included Latina WIC mothers and their children between two years to five years of age.

A total of 93 WIC clients were invited to participate in the study and given preliminary interviews. The pilot study used pre-test/post-test design. A total of 13 participants responded to the pre-tests and post-tests, and attended both interventions from eight WIC delivery sites of Fairfax County WIC Program. Human Subjects approval was given by George Mason University.

Nutrition Intervention Program:

The family-based nutrition interventions included 1) Discussion and lecture on food labels, food purchasing, portion sizes, and healthy meals, 2) Experiential learning focused on preparation and storage of low-cost, healthy meals incorporating WIC foods, and 3) A Zumba class and discussion on physical activity. Two day-long nutrition intervention programs were held at the George Mason University Department of Nutrition & Food Studies Nutrition Kitchen located in Fairfax City, Virginia. The educational materials were developed and implemented by WIC nutrition staff and Faculty and students from the Department of Nutrition and Food Studies at George Mason University. Study participants continued to receive their WIC benefits as scheduled.

Data Collected:

Questionnaires were developed to assess nutrition knowledge and behaviors concerning dietary intake, food preparation, and physical activity. As part of the knowledge assessment, parents were asked to identify (i) general recommended intake levels (consume more, same or less) across food choices, (ii) added sugar content levels (high or low) across food choices, (iii) fiber content levels (high or low) across food choices and healthy food options across food choices provided. Parents were also asked to identify how strongly they agreed or disagreed with statements aimed at identifying perceived barriers to fruit and vegetable consumption among children. Pre-intervention questionnaires were administered between February and March 2013 while the post-intervention questionnaires were administered between May and July 2013.

Program Intervention Activities:

- Distribute pre-test questionnaires in the first intervention to establish baseline data.
- Provide education on food labels, food purchasing, food safety and preparation, portion sizes, and making healthy, culturally appropriate meals using WIC foods for the WIC families.
- Distribute a "Ready to Get Healthy" mini-kit. The kit included a cookbook using WIC foods, a CD for physical activity, and fresh fruits and vegetables.
- Conduct experiential learning and hands-on cooking activities to prepare WIC food-based recipes using the cookbook.

- Team up with Fairfax Parks and Recreation Department to highlight existing discount opportunities at the Fairfax REC centers and encourage program participant enrollment to the Fairfax Parks and Recreation facilities.
- Distribute post-test questionnaires to determine effectiveness of the program.

RESULTS

Study participants were predominantly of Hispanic White ethnicity and 73% of the interviews were conducted in the Spanish language. Over 90% of the parents who attended the education sessions were female (Table 1).

Table 1 Study participants' socio-demographic and health characteristics at pre-intervention[1]

	Parents	Children
Age, years	34.31 ± 6.20	3.10 ± 0.71
Sex (%)		
Male	7	60
Female	93	40
Race/Ethnicity (%)		
Non-Hispanic White	0	0
Hispanic White	87	87
Black/African-American	13	13
Asian	0	0
Body weight categories* (%)		
Healthy	20	0
Overweight	27	27
Obese	53	73
Perceived body size# (%)		
Thin	0	0
Normal	40	67
Overweight	47	33
Extremely overweight	13	0

[1]n=15 at pre-intervention

*Body weight categories based on BMI for the parents and BMI-for-age percentiles for the children.

#Parents' perception of own body size and parents' perception of their child's body size

Forty percent of the target children were female. Approximately 80% of the parents were either overweight or obese based on their BMI while 73% of the children were obese. However only 50% of the parents perceived themselves as being overweight or extremely overweight and only 33% of the children were perceived as being overweight by their parents. All study participants had received WIC benefits for at least 2 years. Parents' knowledge of the general recommended food intake levels, added sugar content and fiber content increased over time (Table 2).

Table 2 Parent's knowledge levels at pre- and post-intervention[1,2]

	Pre-intervention		Post-intervention	
	Mean ± SD	Median	Mean ± SD	Median
Recommended intake: more, same vs less	68 ± 34	83	84 ± 15	83
Added sugar content: low vs high	53 ± 36	50	71 ± 13	66
Fiber content: high vs low	49 ± 22	63	61 ± 14	63
Healthy food choices	54 ± 22	58	51 ± 12	50

[1]n=15 at pre-intervention, n=13 at post-intervention

[2]Reported values presented are percent of correctly answered questions

Percent of children who consumed fruits at least 3 times per day increased from 47% at pre-intervention to 77% at post-baseline (Table 3).

Table 3 Dietary and physical activity-related practices among children[1]

	Children		Parents	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Daily fruit intake (%):				
At least 3 times	47	77	33	31
At least 2 times	93	100	80	77
Daily vegetable intake (%):				
At least 3 times	20	23	13	15
At least 2 times	60	77	40	62
Daily fruit juice intake (%):				
At least 16 fl. oz.	20	8	7	0
At least 8 fl. oz.	60	46	53	62
Daily water intake (%):				
At least 16 fl. oz.	53	46	73	62
At least 8 fl. oz.	100	92	93	85
Daily milk intake (%):				
At least 16 fl. oz.	47	31	-	-
At least 8 fl. oz.	100	100	-	-
Type of milk consumed (%):				
Whole milk	0	0	7	0
2% fat or whole milk	87	54	80	62
1% milk or other milk	20	38	20	39
Restaurant food intake (%)				
At least 3 times per week	13	8	-	-

At least 1 time per week	73	77	-	-
None	27	23	-	-
Home-cooked meals (%)				
At least 7 times per week	80	85	-	-
At least 3 times per week	86	92	-	-
None	7	8	-	-
Screen time (%):				
At most 2 hours per day	87	85	67	77
None	7	0	7	15
Play time (%)				
At least 5 hours per week	53	69	7	8
At least 4 hours per week	53	85	27	46
None	0	0	13	15
Enrolled in Fairfax Partakes[#] (%)	0	31[*]	-	-

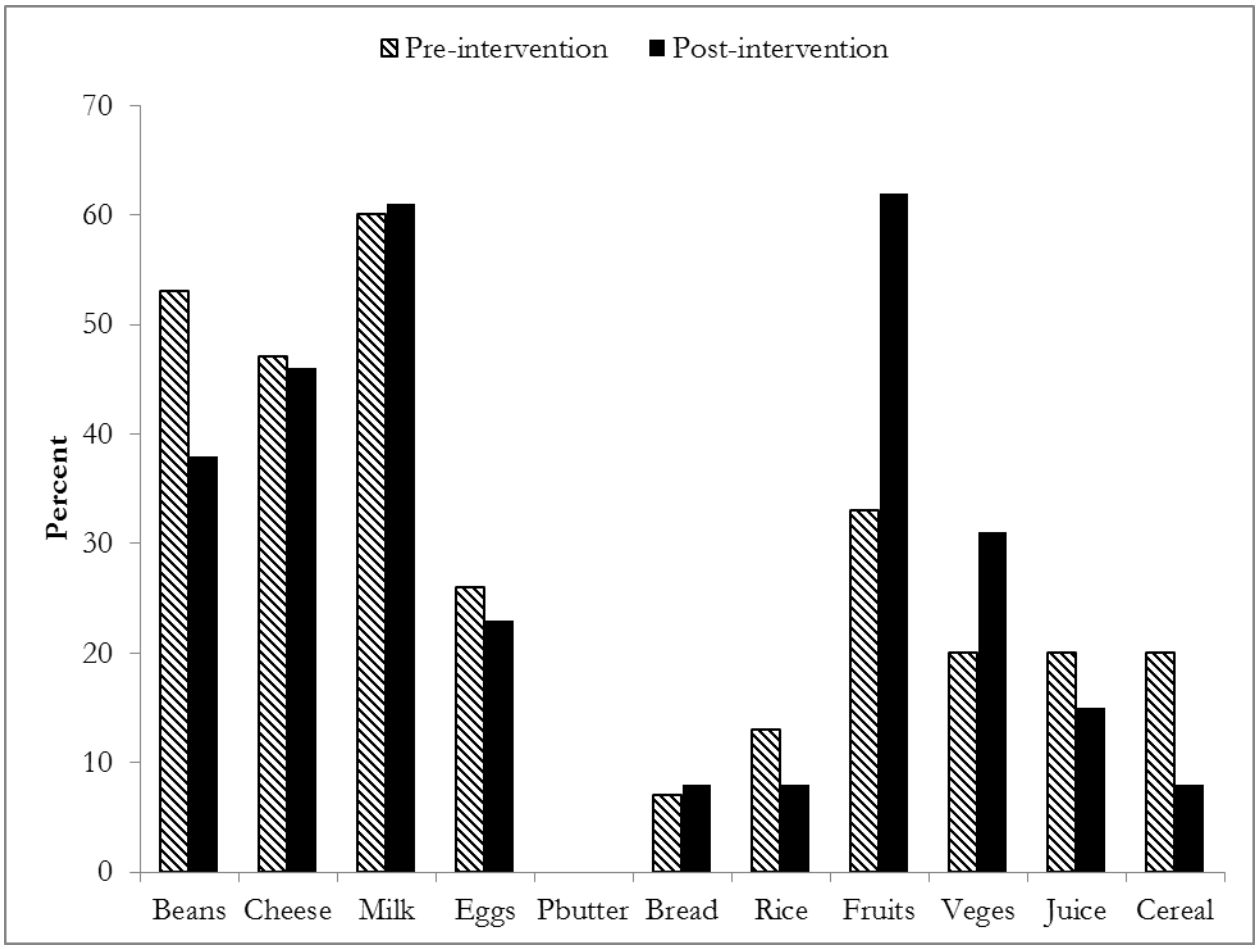
[1]n=15 at pre-intervention, n=13 at post-intervention

[#]Fairfax Department of Parks and Recreation classes/activities

[*]Post-intervention estimate significantly different from pre-intervention estimate ($p < 0.05$)

Percent of children who consumed fruits at least 2 times per day increased from 60% at pre-intervention to 77% at post-baseline. Percent of children who consumed at least 8 fluid ounces of fruit juice decreased from 60% at pre-intervention to 46% at post-intervention. Percent of children who consumed 2-percent milk decreased from 87% to 54% while those that consumed 1-percent milk or plant-source milk (soy or almond milk) increased from 20 to 38%. Percent of children who consumed home-cooked meals at least 3 times a week increased from 36% to 92%. Prior to the intervention, a majority of parents had identified milk, beans and cheese as the three most frequently consumed foods by their children (Figure 1). Fruits, milk and cheese were identified as the most frequently consumed foods at post-intervention. The largest increase was noted in fruit and vegetables at post-baseline. About 30% and 20% of the parents had identified fruits and vegetables, respectively, as being most frequently consumed by the children at pre-intervention. These percentages increased to over 60% and 30% for fruits and vegetables respectively (Figure 1).

Figure 1 Most commonly-consumed WIC foods by the children enrolled in the Fairfax County WIC program



In terms of physical activity, there was no decrease in screen time. However, the percent of parents who reported at least 5 hours per week of children's play time increased from 53% to 69%. Additionally, the percent of children who were enrolled for the Fairfax County Parks and Recreation activities increased from 0% to 31% at post intervention (Table 3). Amongst the parents, there was an increase in consumption of vegetables, decreased consumption of 2-percent or full-fat milk accompanied by an increased consumption of 1-percent or plant-source milk (soy, almond). In terms of physical activity, there was an increase in percent of parents who reported zero hours or at most 2 hours of screen. And, percent of parents who reported at least 4 hours per week of physical activity time increased from 27% to 46% (Table 3). The percentage of parents who identified financial cost and short shelf-life as barriers to fruit and vegetable consumption among children was lower at post-intervention (Table 4).

Table 4 Perceived barriers to fruit and vegetable consumption among children[1,2,3]

	Pre-intervention	Post-intervention
Cost too much (%):		
Agree	36	27
Disagree	36	60
Spoil Easily (%):		
Agree	55	20
Disagree	27	33
Too much time to prepare (%):		
Agree	9	27
Disagree	64	60
They are too messy (%):		
Agree	0	13
Disagree	80	73
Not filling enough (%):		
Agree	10	13
Disagree	60	47
Child does not like them (%):		
Agree	10	40
Disagree	70	47
Child has trouble digesting them (%):		
Agree	0	20
Disagree	70	73
Restaurants do not serve them (%):		

Agree	10	33
Disagree	60	40

[1]n=15 at pre-intervention, n=13 at post-intervention

[2]Reported values presented are percent of correctly answered questions

[3]Percentages do not add up to 100 because some participants selected "neutral" option in their responses

However, the percentage of parents who identified long preparation time, "messy handling", child's dislike of fruits and vegetables and "unavailability of fruits and vegetables at frequently-visited restaurants" increased at post-intervention.

DISCUSSION/CONCLUSION

Overall the WIC clients and children who participated in the WIC interventions improved their diets, shopping behaviors, cooking home-prepared foods, and physical activity. Mothers appeared to understand that eating and preparing foods at home is a healthier and less expensive option.

The interventions stressed nutrition knowledge particularly focused on obesity prevention and shopping tips which incorporated purchasing healthy, low-cost, WIC foods. The experiential component also allowed participants to prepare and taste foods which were consisted of WIC foods, were low cost, and high in nutrient density.

The findings are significant in that they support growing literature of the potential success of family-based interventions. Further, these data show the importance of integrating experiential learning activities such as cooking and physical activity with the more traditional didactic methods. We believe this program has great implications for continued interventions within the WIC program and other such communities with high rates of obesity and few resources. As cooking and preparing foods are not a typical part of the WIC nutrition education programs, such an intervention might provide a beneficial model for additional educational components.

This study also revealed that there might be a need within immigrant populations to provide education on how to purchase and prepare foods. For example, one anecdotal report involved a discussion on the purchasing and consumption of frozen vegetables. In this discussion, participants noted that in their home countries, frozen vegetables were very expensive and were never purchased. The intervention stressed the unit costs and showed that these kinds of vegetables can be cheaper in many cases and just as nutritious as fresh.

Limitations:

While, the findings suggested that the intervention program was effective, there were two major limitations to this pilot study. The first limitation concerned a low participation rate. Only 13 participants came to both interventions and completed the pre-tests and post-tests questionnaires. Participants were provided transportation and childcare, but the location of the interventions required many of the participants to spend an hour traveling to the site each way. Further, many participants worked on the weekends so were unable to attend. We also learned that there were some clients who were fearful to participate due to their immigration status.

The second limitation concerned language barriers. Most of the participants spoke Spanish and we were able to translate forms and interpret the information sessions into Spanish, however, with these extra steps, there may have been some fear or misunderstanding about the program.

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BIBLIOGRAPHY

Davis, A. M., Daldalian, M. C., Mayfield, C. A., Dean, K., Black, W. R., Sampilo, M. L., … Suminski, R. (2013). Outcomes from an urban pediatric obesity program targeting minority youth: the healthy hawks program. *Childhood Obesity (Print)*, *9*(6), 492–500. doi:10.1089/chi.2013.0053

Holland, J. C., Kolko, R. P., Stein, R. I., Welch, R. R., Perri, M. G., Schechtman, K. B., … Wilfley, D. E. (2014). Modifications in parent feeding practices and child diet during family-based behavioral treatment improve child zBMI. *Obesity (Silver Spring, Md.)*.

National Conference of State Legislators. (2014). *Childhood Overweight and Obesity Trends*. Retrieved from http://www.ncsl.org/research/health/childhood-obesity-trends-state-rates.aspx

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA: The Journal Of The American Medical Association*, *311*(8), 806–814. doi:10.1001/jama.2014.732

Schonfeld-Warden, N., & Warden, C. H. (1997). Pediatric obesity. An overview of etiology and treatment. *Pediatric Clinics Of North America*, *44*(2), 339–361.

Singh, G. K., Yu, S. M., & Kogan, M. D. (2013). Health, chronic conditions, and behavioral risk disparities among U.S. immigrant children and adolescents. *Public Health Reports (Washington, D.C.: 1974)*, *128*(6), 463–479.

USDA. (n.d.). *Women, Infants, and Children*.