



Food Insecurity and Healthy Behavior Counseling in Primary Care

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## Food Insecurity and Healthy Behavior Counseling in Primary Care

### Abstract

**Objective:** While food insecurity (FI) has been associated with obesity in some studies, few have examined the relationship between FI and health attitudes and behaviors. We hypothesized that families who experienced FI would report lower importance of discussing health-related behavior change, report lower physical activity (PA) and have children who were more likely to be obese.

**Design/Methods:** We conducted a cross-sectional analysis of data collected from 2012 - 2015 from three clinics serving primarily low-income, Latino patients. Parents of 6 to 12 year old children presenting for well child care were surveyed about their experience of food insecurity, the importance of discussing behavior change with a health care provider and their children's physical activity. We calculated children's BMI z scores from the height and weight measured at that visit. We used path analysis to test our hypotheses.

**Results:** Among 1048 families in the study sample, 610 reported experiencing FI (56%). Experiencing FI was positively related to importance of discussing health behavior ( $p < 0.001$ ) and negatively related to PA ( $p=0.008$ ). The relationship between FI and BMI was not significant.

**Conclusion:** We found FI was associated with greater perceived importance of discussing health related behavior change, but lower amounts of PA, indicating contrasting attitudes and behaviors. Families facing food insecurity are likely experiencing financial and other barriers to PA, as evidenced by lower reported PA. Providers counseling low-income populations should not presume that food insecure families are unwilling to discuss weight related health behavior changes.

### Keywords

Food Insecurity; Obesity; Physical Activity; Behavior counseling

### Cover Page Footnote

We wish to acknowledge the contributions to this work of Medical Director Sarah Winbourn MD, and the staff and patients of Kids First Health Care in Commerce City and Westminster, Colorado who enabled the data presented to be collected.

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### **ABSTRACT**

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## INTRODUCTION

Poor health outcomes and decreased engagement in health promoting-behaviors are common in people with lower income and other socioeconomic stressors (Gundersen & Ziliak, 2015). Food insecurity, defined as lack of consistent access to adequate food due to a lack of money or other resources, is one such stressor (USDA, 2016). In 2015, approximately 13% of households in the United States reported food insecurity; the percentage in households with children was 17%. Food insecurity was higher in African American households at 22% and Latino households at 19% during the same time period (USDA, 2016). Food insecurity has been associated with lower amounts of physical activity (To, Frongillo, Gallegos, & Moore, 2014; Asfour et al, 2015) and higher rates of obesity in some populations (Cheung et al, 2015; Speirs & Fiese, 2015; Metallinos-Katsaras, Must, & Gorman, 2012; Eisenmann, Gundersen, Lohman, Garasky, & Stewart, 2011). The relationship between obesity and food insecurity has been inconsistent, particularly in pediatric populations and requires more investigation.

Health care providers are in a unique position to discuss both health-related behaviors and food insecurity with patients. Past research has shown that providers have implicit biases towards patients in poverty and are less likely to engage in health-related behavioral counseling with them (Lorts & Ohri-Vachaspati, 2016; Willems, 2005). However, little research has examined whether low-income patients and families, and more specifically those who face food insecurity, are interested in health-related behavioral counseling. Research on patient and family interest in discussing health behavior with providers has implications for health care providers who serve these populations and may increase provider understanding of patient and family needs. Such information may also inform interventions to improve nutrition and physical activity behaviors in low-income and food-insecure families.

We used self-reported information on food insecurity, physical activity, and interest in discussing behavior change with a health care provider to explore these questions. We hypothesized that food insecurity would be associated with lower reported importance of discussing nutrition and physical activity behaviors. Based on existing research, we secondarily hypothesized that food insecurity would be associated with lower reported levels of physical activity. Lastly, we hypothesized that food insecurity would be associated with higher BMI z score, further exploring the possible relationship between food insecurity and obesity.

## METHODS

*Study Design:* This study was a cross-sectional analysis of a parent survey and children's biometric data collected over a three year period from 2012 through 2015. The study was exempted by the Colorado Multiple Institutional Review Board.

*Study Setting and Population:* Patient responses from three Metropolitan Denver primary care clinics in low-income settings were included in this analysis. There were no exclusion criteria. 75% percent of the patient population in these clinics is Latino, of whom two thirds are native Spanish speakers. 55% of the population is covered by Medicaid, 25% percent are uninsured, approximately 10% have private insurance and the remaining 10% have other coverage such as Children's Health Insurance Program.

*Data Source:* Data were collected using an automated lifestyle screening platform called "Heart Smart Kids". Heart Smart Kids was designed by one of the investigators and the medical

director of the clinic network to assess self-reported health-promoting behaviors regarding diet, physical activity and family dynamics. The survey contains 15 questions and takes about five minutes to complete ([Gance-Cleveland, Gilbert, Kopanos, & Gilbert, 2016](#)). The tool is used to provide a platform for discussion of lifestyle related behaviors in the context of health maintenance visits. The data reported here represent baseline data for an ongoing longitudinal study examining self-reported lifestyle and readiness to change predictors of BMI change. Age, preferred language, height, weight and gender were entered by clinic staff.

Our data include responses from parents of children between the ages of six and 12 presenting for well-child visits between 2012 and 2015. The questionnaire was completed at 99% of well visits during this time period. Children older than age 12 completed the questionnaire independently; we therefore included only children aged six to 12 in this analysis to ensure uniformity in the respondents.

We analyzed responses to these three questions: “Are you ever concerned that food will run out?” with response options of “never, rarely, sometimes and often” (food insecurity) “How many hours of active play or sports do you do each day?” with response options of “0, 30 minutes, 1 hour, 2 hours, 3+ hours” (physical activity), and “How important is it for you to discuss eating and physical activity with your provider today?” on a 1-10 Likert scale with 1 meaning not important at all and 10 very important (importance of discussion). The question assessing food insecurity is a shortened version of one of two questions contained in the “Hunger Vital Sign™” validated screener “within the past 12 months we worried whether our food would run out before we got money to buy more” (Hager et al, 2010). The Hunger Vital Sign is positive if patients answer positively to either question; therefore this question was used alone in the interest of feasibility and brevity of use in this clinical setting. Using one question decreases the sensitivity and would likely underestimate the prevalence of food insecurity. We dichotomized this variable into “never”, indicating a response of never and “ever”, including responses of rarely, sometimes and often. This decision was made based on evidence that families with marginal food security, defined as anxiety about where food will come from and whether there will be enough, have more in common with families with food insecurity than those that are food secure (Cook et al, 2013).

### Analyses

Descriptive statistics were used to summarize demographic information and relevant independent and dependent variables. Independent variables include language (English as referent group vs. Spanish), gender (female as referent), food insecurity (never as referent vs ever), and age (continuous in months). Dependent variables include BMI z score (a standard deviation measure of BMI for age and gender based on clinic weight and height measurements), physical activity (0, 30 minutes, 1 hour, 2 hours, 3+ hours), and importance of discussing eating and physical activity (1-10 Likert Scale). Both physical activity and importance of discussing eating and physical activity were analyzed as ordered categorical variables in all respective models. Intraclass correlations (ICCs) from random effects multilevel models and ANOVAs comparing the random effects multilevel models to regular OLS regression models, were used to assess for the effect of clinic on each of the outcome variables. For each of the three dependent variables, ICCs were less than .01 and all ANOVAs were non-significant, indicating that there was no effect of clinic on the outcome variables and that multilevel models are not needed.

To test the hypotheses, path analysis (a form of structural equation modeling (Hoyle, 2012)) was used to analyze the data. This method was chosen for two reasons, the first being that

path analysis can include all dependent variables in the same model and account for the correlation between these variables as opposed to including non-relevant dependent variables as covariates in regression equations, which would be counter to the hypothesized theory. Second, despite multiple types of transformations, several of the dependent variables were found to violate assumptions of normality for typical OLS, Poisson, and ordered logistic regression. Path analysis can make use of the diagonally weighted least squares estimator with robust standard errors (DWLS) which has been shown to be robust to violations of normality (Mindrila, 2015). To ensure accurate standard errors, nonparametric bootstrapped standard errors with 10,000 replications were compared to the DWLS standard error estimates.

## **RESULTS**

### Sample population

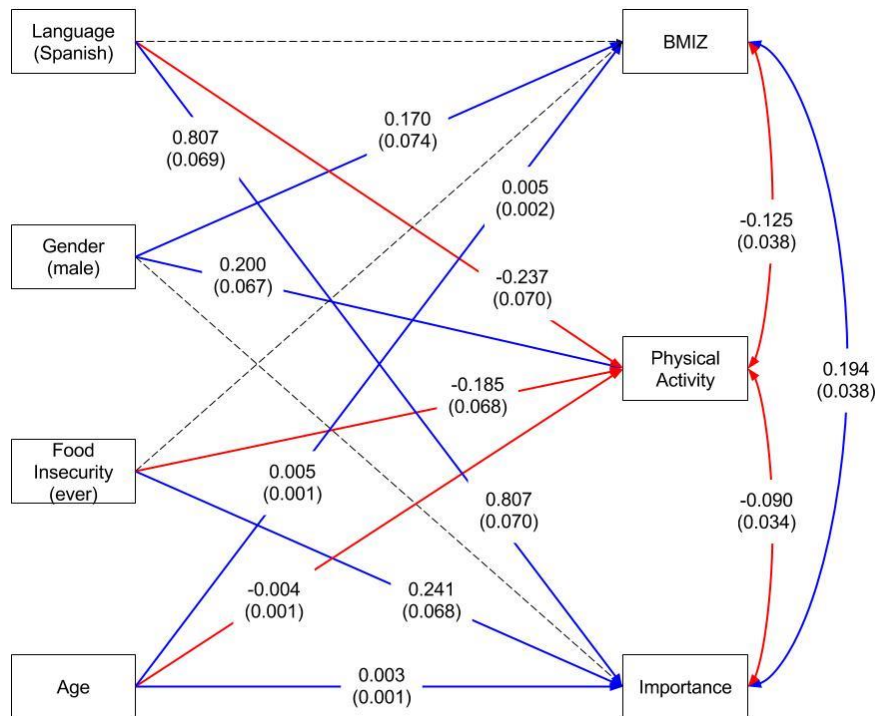
Data from 1048 records were analyzed. There were no missing data for any of the records. However, participants with BMI measurements of greater than 60 or less than seven were excluded due to presumed erroneous measurements (eight records). Baseline demographic characteristics of the sample are presented in Table 1. In summary, 45.7 % of the population was female, 47.9 % of parents selected Spanish as their preferred language to complete the questionnaire, and the mean age was 9.5 years. 56.4 % reported some level of food insecurity. The mean importance of discussing behavior change on a 1-10 Likert scale was 5.7 and the median value was 5. The median number of physical activity hours was 1 hour and the mean BMI percentile was 66.8.

Table 1: Demographic characteristics of study subjects and mean variable results by clinic

Clinic	Clinic 1	Clinic 2	Clinic 3	Combined
N (% of total)	387 (36.9)	271 (25.9)	390 (37.2)	1048 (100)
Female (%)	185 (47.8)	126 (46.5)	169 (43.3)	489 (45.7)
Spanish (%)	132 (34.1)	116 (42.8)	206 (52.8)	513 (47.9)
Mean Age	113.8 months (9.5 years)	117 months (9.8 years)	111.9 months (9.3 years)	114 months (9.5 years)
Food Insecurity (%)	Yes = 231 (59.7)	Yes = 149 (55.0)	Yes=214 (54.9)	Yes=603 (56.4)
Mean Importance	6.0	5.3	5.9	5.7
Activity hours (mean/median)	1.6/1	1.7/1	1.7/2	1.6/1
Mean BMI percentile	67.8%	63.0%	68.4%	66.8%

Results from the path analysis are presented in Figure 1. Independent variables are presented on the left of the figure and dependent variables are presented on the right. A comparison of standard errors with the DWLS with robust standard errors to the nonparametric bootstrapped standard errors showed an average deviation of -0.002 indicating little variation between the two methods. This suggests that the standard errors were reliably estimated. Because all paths were explicated in the model, there were zero degrees of freedom, leading to a just identified model which precludes any sort of model fit assessment.

Figure 1: Path analysis with unstandardized beta coefficients and standard errors



Note: Single arrowed paths represent unstandardized beta coefficients and standard errors. Double arrowed paths represent co-variances and standard errors among dependent variables. Solid paths represent paths that are significant at  $p < .05$  and dotted paths represent non-significant paths.

The following relationships account for the effects of all other relationships in the model.

*Food insecurity and importance of discussing behavior change:* The relationship between food insecurity and importance was positive and significant ( $B = 0.241$ ,  $SE = .068$ ,  $p < .001$ ), indicating that those who were food insecure thought discussing health behavior was more important than those who did not report food insecurity.

*Food insecurity and physical activity:* The relationship between food insecurity and physical activity was negative and significant ( $B = -0.185$ ,  $SE = .068$ ,  $p = .008$ ) indicating that those who were food insecure had lower reported levels of physical activity.

*Food insecurity and BMI z score:* The relationship between food insecurity and BMI was non-significant ( $p = .803$ ), indicating no relationship in this data between food insecurity and obesity.

#### Other findings

Spanish language ( $B = 0.807$  SE 0.069) and age ( $B = 0.003$  SE 0.001) were associated with increased importance of discussing healthy behaviors, whereas there was no such association with gender. Our results also revealed decreased physical activity with older age, less physical activity among girls and less physical activity among Spanish speaking respondents. Finally, there was no



association between BMI z score and language, but BMI z score was higher in males and with increased age.

## DISCUSSION

In this nearly universally low-income population with more than half of families reporting food insecurity, we found that families who reported food insecurity rated the importance of discussing healthy eating and physical activity with their health care provider higher than families who did not report food insecurity. This is contrary to our original hypothesis and is inconsistent with theories such as Maslow's Hierarchy (Maslow, 1943), which posits that people who have difficulty meeting basic needs would not have the interest or ability to address health related behaviors affecting long-term development of chronic disease. In addition, reporting food insecurity was associated with less reported daily physical activity and did not have a clear relationship with BMI z score.

Previous research results are inconsistent with regards to the relationship between food insecurity and obesity (Cheung et al, 2015; Speirs & Fiese, 2015; Metallinos-Katsaras, Must, & Gorman, 2012; Eisenmann, Gundersen, Lohman, Garasky, & Stewart, 2011), but an association between household food insecurity and decreased physical activity in children and adults has been demonstrated (To, Frongillo, Gallegos, & Moore, 2014; Asfour et al, 2015). Our results are also consistent with previous studies that have revealed an inverse relationship between physical activity and age in pediatric populations, decreased physical activity among girls compared with boys, and decreased physical activity among Spanish speakers compared with their English speaking peers (Kaczynski, Stanis, Hastmann, & Besenyi, 2011; Watson, Harris, Carlson, Dorn, & Fulton, 2016). The strong relationship between completing the screening tool in Spanish and higher reported importance for discussing health related behavior is consistent with previous research finding better treatment outcomes among Spanish speakers compared with English speakers when controlled for other factors. This may indicate that acculturation affects motivation to improve health related behaviors (Haemer, Ranade, Barón, & Krebs, 2013).

Although the results regarding the importance of discussing healthy behavior are contrary to our hypothesis, an explanation may be that families with food insecurity feel these discussions are important *because* they are food insecure. Perhaps families with food insecurity are aware of having to sacrifice food quality for cost and want to discuss strategies for improving their nutrition with providers. Regarding lower reported physical activity, food insecure families may want information about increasing physical activity despite living in neighborhoods that seem less safe or budgetary constraints that may prevent involvement in organized sports or activities.

Our finding that food insecure families are ready to discuss health-related behaviors underscores the importance of additional research to design healthy lifestyle interventions that can overcome the challenges food insecure families face in healthful eating and physical activity. Studies evaluating behavioral interventions in populations with and without food insecurity found better adherence among those who are food secure (Grilo et al, 2015; Jortberg et al, 2016). However, a weight-management program offered to families with overweight or obese children from this study population was designed to specifically address the challenges of low-income families through hands-on skill building for meal planning, cooking, and shopping. This program purposefully linked primary care providers to community-resources to combat food insecurity and

also reported high attendance and satisfaction among food insecure families (Cason-Wilkerson, Goldberg, Albright, Allison, & Haemer, 2015).

A primary limitation of our study is that it relies on cross-sectional data; therefore we cannot make any assumption of causality. In addition, only one question was used to screen for food insecurity and consequently, sensitivity for detecting food insecurity may be less than optimal. However, 56% of our population reported food insecurity, a much higher level than generally found nationally or in Colorado. This is likely due to clinic location in economically disadvantaged areas and a higher than state or national average percentage of Spanish-speaking patients, as prevalence of food insecurity is higher in Latino populations (USDA, 2016). Self-report of physical activity could have resulted in biased or inaccurate measurements; longitudinal studies to validate parent-reported measures of physical activity and other lifestyle factors are ongoing. BMI z score is based on clinic measurements, which may contain errors of measurement or transcription but is likely to be more accurate than self-report.

## CONCLUSION

Primary care medicine often involves educating patients regarding prevention of health problems related to personal and family behaviors in the areas of nutrition and physical activity. These exchanges are crucial for addressing and preventing health problems such as obesity, which continues to affect a significant proportion of American children and adults. Our findings reinforce the importance of having discussions about healthy lifestyles with all families, regardless of other challenges they face as this study indicates that families with food insecurity do recognize the importance of discussing health related behavior with their providers. However, they appear to have less health-promoting behaviors based on report of daily physical activity. This should encourage clinicians to probe for reasons that families are not able to make healthy choices rather than just providing advice. Clearly, food insecurity is an issue that has wide reaching implications in the lives of people affected by it. It is important to develop health education programs that consider social determinants of health at the outset and are specifically targeted towards populations that face difficulties such as food insecurity.

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