

Concordance in reports of food insecurity associated with environmental factors among Latino fathers and mothers

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Abstract

Background: Food assistance and nutrition education are strategies used to address the high prevalence of food insecurity among U.S. Latino households. Assessment of food security status is necessary to implement these strategies. However, similarities and differences in perceptions of food security status have not been reported among Latino fathers and mothers who may have different home food acquisition and preparation responsibilities. This study aimed to 1) determine demographic characteristics and/or food-related factors associated with perceptions of food security status among Latino fathers and mothers, and 2) identify those factors correlated with concordance in perceptions of food insecurity between fathers and mothers.

Methods: Baseline data were used from a Latino-family, community-based program to improve paternal parenting practices and youth energy balance-related behaviors (Padres Preparados, Jóvenes Saludables), including 106 father and mother couples. Food security was assessed with two questions from the U.S. Department of Agriculture 18-item Household Food Security Survey. Logistic regression models were used to evaluate associations between food security and predictor variables in fathers or mothers and between couple discordant responses in food security status and predictor variables.

Results: The prevalence of household food insecurity was reported by 39% of fathers and 55% of mothers. Food security status was associated with neighborhood safety (odds ratio (OR): 3.7, $p < 0.05$) and household income (OR: 3.2, $p < 0.05$) in fathers, and with neighborhood safety (OR: 4.1, $p < 0.01$) and home fruit and vegetable availability (OR: 5.5, $p < 0.01$) in mothers. Couple discordance in reporting food security status occurred in 24% of the couples and was related to higher discordance among couples where fathers reported a lower frequency of participation in nutrition education than mothers (OR: 3.4, $p < 0.05$) and different perceptions of home fruit and vegetable accessibility (OR: 3.1, $p < 0.05$).

Conclusions: Among Latino fathers and/or mothers, factors associated with perceptions of food insecurity differed, possibly related to fathers versus mothers having access to information about different household aspects related to food insecurity. Nutrition education for fathers may support an improvement in couple discordance in assessment of food security.

Background

The reported prevalence of food insecurity among Hispanic households in the U.S. based on 2011–2014 data from the Current Population Survey's Food Security Supplement was 22.4%, which was higher than the 14% prevalence reported for U.S. households overall [1] and significantly increased from 1999–2000 to 2015–2016 based on National Health and Nutrition Examination Survey (NHANES) data [2]. Food insecurity is an important issue for Latino youth and adults, because of associations with inadequate nutrient intake [3–6], under-consumption of healthy foods [6], and a high prevalence of obesity [7–9]. Latinos play a significant role in the U.S. economy accounting for 17% of the labor force [10], often working several jobs to attain financial gains. Income and other social determinants of health such as

lack of access to jobs, inadequate transportation and wages, and inequities in assets and wealth may contribute to the disproportionately high rates of food insecurity among Latinos. Eligible immigrant families, in particular, may not access food assistance to address food insecurity because of immigration policy changes and enforcement activities. Community-driven strategies including food assistance and nutrition education have been used to address food insecurity leading to positive outcomes regarding food security status [11–13].

Previous studies with Latino youth and adults as well as those of other racial/ethnic groups have identified a variety of factors influencing household food insecurity. These include demographic characteristics such as sex, marital status, education attainment, and acculturation [1, 14], economic characteristics such as household income and employment status [1, 14], home food environment factors including social support from family members, home food availability, and home food accessibility [15–17], and environmental factors such as neighborhood safety and geographic location [1, 7, 18]. In addition to clarifying factors associated with food security status among Latino families, accurate assessment of food security status, including the measurement of individual food security status [19, 20] is also key for planning food assistance and nutrition education.

Food security status, defined as access to enough food for an active, healthy life [19], has frequently been assessed for households and treated as a representative score for the household [21]. However, some studies indicated that females reported higher food insecurity than males [22–24]. Higher food insecurity in female-led versus male-led households was attributed to women’s socio-economic disadvantages in female-led households, such as lower income or more dependents [23]. Differences in measurement of food insecurity between mother and father pairs in a qualitative study were based on different interpretations of terms such as “household”, “balanced meal”, and “worry” used in questions to assess food insecurity [14]. Within male and female couples in the same household in Bangladesh, discordant responses to food security questionnaires were observed in 19% of couples [25]. In other studies, couple discordance has also been reported for additional diverse household and individual characteristics such as income, marital length, risk preference, and social preferences [26, 27]. To assess food security status of Latino households, differences in responses between fathers and mothers should be examined along with factors associated with these differences. To date, sex differences and couple discordance in reporting food security status have not been reported among Latino fathers and mothers.

The purpose of this study was to 1) determine demographic characteristics and/or food-related factors associated with perceptions of food insecurity status among Latino fathers and mothers, and 2) identify those factors correlated with concordance in perceptions of food insecurity between fathers and mothers.

Methods

Design and Setting

The current study used cross-sectional baseline data from a community-based intervention program to improve paternal parenting practices and youth energy balance-related behaviors (Padres Preparados,

Jóvenes Saludables) [28]. Latino fathers or male caregivers (hereafter referred to as fathers) and early adolescents (10-14 years) were the primary research participants, however mothers or female caregivers (hereafter referred to as mothers) were also invited to attend educational sessions and complete evaluation data collection procedures as part of the intervention. Baseline data collection occurred from 2017 to 2020 at three churches and two Latino-serving non-profit community centers in the Minneapolis/St. Paul metropolitan area.

Participants

Participants were recruited using flyers, word of mouth, and announcements at community events. Eligibility criteria for fathers included self-identifying as Latino, speaking Spanish, and having meals with their early adolescent child at least three times in a week. Mothers self-identified as speaking Spanish and as spouses/partners of fathers who were parents of the youth participants. Three hundred sixty-nine families were interested in the Padres Preparados, Jóvenes Saludables study, and 277 families remained after screening for eligibility. Baseline data were analyzed in the current study from 106 father and mother couples who completed food security questions. All questionnaires were completed in Spanish. Fathers received cash compensation (\$35) for participating in baseline data collection procedures. Fathers and mothers provided consent prior to participation. The study was approved by the University of Minnesota Institutional Review Board.

Measures

Anthropometric measures

Trained researchers measured body weight and height of fathers and mothers using a digital scale (BWB-800 Scale, Tanita) and a stadiometer based on standard procedures [29]. Measurements were completed twice to the nearest 0.1 kg weight and 0.1 cm for height. Body mass index (BMI) was calculated using the average weight and height (kg/m^2).

Sociodemographic characteristics

Fathers and mothers individually reported their age, educational attainment, employment status, household income, number of years in the U.S., language spoken at home, and marital status. Age, educational attainment, employment status, and household income were dichotomized as < median age vs. \geq median age, < high school vs. \geq high school, full-time/self-employed vs. part-time/not-employed, household income < \$25,000 vs. \geq \$25,000. Acculturation level was based on the number of years in the U.S. (<10 years, \geq 10 and <20, \geq 20 and <30, \geq 30) and language spoken at home (only native, more native language than English, English equal to native language, only English, or more English than native language), which were combined and categorized as low, middle, or high acculturation levels [30].

Food security

Food security was assessed based on two questions in Spanish from the US Department of Agriculture 18-item Household Food Security Survey. The two questions were “Within the past 12 months, we worried about whether our food would run out before we got money to buy more” and “Within the past 12 months, the food we bought just didn’t last and we didn’t have money to get more”, with response options of often true or sometimes true vs. never true. Hager *et al.* reported that an affirmative response (often true or sometimes true) to at least one of these two questions showed 97% sensitivity and 83% specificity for detection of household food insecurity [31].

Participation in food assistance programs

Participation in any of the following food or financial assistance programs was assessed (yes/no): Special Supplemental Nutrition Program for Women, Infants & Children (WIC), Supplemental Nutrition Assistance Program-Education (SNAP-Ed), free or reduced-price meals at school, and the Minnesota Family Investment Program. Participation in any of the following nutrition education program was assessed (yes/no): SNAP-Ed, Expanded Food and Nutrition Education Program (EFNEP), WIC, and Cooking Matters.

Physical home food environment

Questions about home food availability and accessibility were adapted from a previous cross-sectional study of adolescents (Project EAT - Eating Among Teens) [32]. Home food availability was assessed by summing coded responses to six questions regarding availability of fruits, vegetables, junk foods, soda pop, sweets, and potato chips (never = 1, sometimes = 2, usually = 3, always = 4) [32,33]. Scores for fruit and vegetable (FV) availability were the sum of the coded responses to the questions about availability of fruits and vegetables. Home FV accessibility was assessed by summing coded responses for three questions regarding accessibility of FV (never = 0, sometimes = 1, usually = 2, always = 3) [32,34]. Summed coded responses were dichotomized as < median value vs. ≥ median value.

Food-related activities and responsibilities

A variable regarding frequency of food-related activities with their child was based on four questions with coded response options; one assessed family meal frequency adapted from Project EAT [35] and the other three assessed frequency of food-related activities with their child adapted from Musher-Eizenman and Holub (2007) [36]. These included family meal frequency (never = 0, 1-2 times = 1, 3-4 times = 2, 5-6 times = 3, 7 times = 4, >7 times = 5) [35] and frequency of three food-related activities with their child (planning meals, buying foods, preparing foods - almost never or never = 1, rarely = 2, sometimes = 3, most of time = 4, almost always or always = 5) [36]. Questions assessing parents’ responsibilities for feeding their child were adapted from Mallan et al. (2013) [37]. Five questions addressed feeding responsibilities, including responsibilities for planning meals, buying foods, preparing meals, making decisions about, and controlling what the child eats. Coded response options were almost never or never = 1, rarely = 2, half of the time = 3, most of the time = 4 and almost always or always = 5. The sum of the

coded response options for food-related activities with the child and feeding responsibilities were dichotomized as < median value vs. ≥ median value.

Environmental factors

Neighborhood safety was assessed based on agreement with two questions adapted from Bennett et al. (2007) [38] regarding perceptions of whether the crime rate makes walking in their neighborhood unsafe during the day and at night (strongly disagree = 1 to strongly agree = 4). Family stress was assessed using three questions about the importance of family relations, conflict between personal and family goals, and individualism among family members (not at all worried = 1 to extremely worried = 5) [39]. These variables were represented by the sums of the coded responses, dichotomized as < median value vs. ≥ median value.

Statistical Analysis

Demographic data were described using means and standard deviations (mean ± SD) or frequencies for categories for fathers and mothers. To determine the differences in demographic characteristics between fathers and mothers, *t*-test or Fisher's exact tests were conducted.

Associations between food security and predictor variables were examined among fathers and mothers separately using three logistic regression models. Preliminary analyses were conducted to assess appropriateness of variables for inclusion in regression models, including Fisher's exact tests to determine differences in sociodemographic characteristics, participation in food assistance programs, physical home food environment, food-related activities and responsibilities, and environmental factors by food security status. In the logistic regression models, food security status served as the dependent variable and appropriate covariates were included as independent variables based on the preliminary analyses and tests for multicollinearity. Neighborhood safety was included in model 1 for both fathers and mothers. Household income and participation in food assistance programs were additionally entered into model 2 for fathers, while home FV availability and family stress were entered into model 2 for mothers. All these five variables were entered in model 3 for both fathers and mothers.

A cross-tabulation of household food security, as reported by fathers and mothers, was examined to evaluate concordance within couples using Fisher's exact test. Father and mother couples were dichotomized into perceived concordance or discordance in food security status. Concordance was defined as couples where both the father and mother reported food security status or both the father and mother reported food insecurity status. The predictors for couple concordance in reports of food security status were determined using concordance or discordance with distinct characteristics of the variables within couples. Logistic regression analysis was used to evaluate the predictors for discordance in reports of food security within couples. Fisher's exact tests were used to determine appropriateness of covariates for inclusion in the logistic regression model.

The level of significance was set at $p < 0.05$. Statistical analysis was performed using R version 3.5.1 and SPSS for Windows, version 26.

Results

Participant characteristics

Similarities among fathers and mothers were observed regarding education level and household income (Table 1). About one-third had less than a high school education and about one-half had a household income less than \$25,000. Significant differences were observed between fathers and mothers in age (fathers were slightly older than mothers), BMI (mothers had slightly higher BMIs than fathers), employment status (more fathers were employed full time than mothers), and acculturation (more mothers had lower acculturation levels than fathers) (all $p < 0.01$) (Table 1). Of participants, 93% of fathers and 91% of mothers reported being married.

Approximately half of participants reported being food insecure (39% for fathers and 55% for mothers) with significantly more mothers than fathers reporting food insecurity ($p < 0.05$) (Table 1). The majority of couples reported concordant food security or insecurity status (76% of couples, $n = 81$), while reports from 25 couples were discordant. In the couples who reported concordant food security status, 44 couples reported food security, and 37 couples reported insecurity. In the couples who reported discordant food security status, 21 mothers reported food insecurity status while fathers did not and four fathers reported food insecurity status while mothers did not.

Table 1
Participants' demographic characteristics and food security status

		Father	Mother	<i>p</i>
n		106	106	
Age, mean ± SD		43.0 ± 7.6	40.1 ± 6.4	< 0.01
BMI, mean ± SD		29.5 ± 3.4	31.2 ± 5.2	0.01
Educational attainment, n (%)	< High school	36 (34)	38 (37)	0.77
	≥ High school	69 (65)	66 (63)	
Employment status, n (%)	not full/self-employed	12 (12)	56 (55)	< 0.01
	full/self-employed	90 (88)	46 (45)	
Household income, n (%)	< \$25,000	41 (41)	41 (45)	0.66
	≥ \$25,000	59 (59)	50 (55)	
Acculturation, n (%)	Low	42 (41)	71 (69)	< 0.01
	Middle	44 (43)	23 (22)	
	High	17 (16)	9 (8)	
Marital status, n (%)	Married	96 (93)	95 (91)	0.80
	Not married	7 (7)	9 (9)	
Food security, n (%)	Food insecure	41 (39)	58 (55)	0.03

p-value derived by *t*-test for age, BMI, years in the U.S. and Fisher's exact test for educational attainment, household income, employment status, acculturation, and food security

SD Standard deviation, *BMI* Body mass index

Factors associated with reporting food insecurity by fathers and mothers

The number of both mothers and fathers perceiving their neighborhood to be safe vs. unsafe differed by reports of food security or insecurity status (Table 2). Household income, participation in food assistance programs, and responsibilities for feeding activities differed significantly between fathers who reported food security and food insecurity ($p < 0.05$). Home FV availability and family stress differed between mothers who reported food security vs. food insecurity (Table 2). After assessment for multicollinearity, neighborhood safety, household income, participation in food assistance programs, home FV availability, and family stress were included as covariates in the logistic regression models (Table 3). Among fathers and mothers, logistic regression models showed that food insecurity was associated with perceptions that the neighborhood was unsafe (Table 3). Food insecurity was associated with less household income

in models 2 and 3 among fathers. Compared with fathers who reported food security, fathers who perceived an unsafe neighborhood and lower household income were 3.7 and 3.2 times more likely to report food insecurity after controlling for covariates in model 3, respectively (odds ratio (OR): 3.7 [95% confidence interval (CI): 1.3–10.3]; $p < 0.05$ for neighborhood safety, OR: 3.2 [95% CI: 1.2–8.2]; $p < 0.05$ for household income). Logistic regression analyses for mothers also showed that food insecurity status was associated with home FV availability in models 2 and 3. Compared with mothers who reported food security, mothers reporting food insecurity were 4.1 times more likely to report an unsafe neighborhood and 5.5 times more likely to report lower home availability of FV in model 3 after controlling for the other covariates (OR: 4.1 [95% CI: 1.5–11.4]; $p < 0.01$ for neighborhood safety, OR: 5.5 [95% CI: 2.0-15.4]; $p < 0.01$ for home FV availability) (Table 3).

Table 2
 Frequency of food security status by predictor variables (106 Latino fathers and mothers)

Predictor variables		Fathers			Mothers		
		Food secure (n = 65) n (%)	Food insecure (n = 41) n (%)	<i>p</i>	Food secure (n = 48) n (%)	Food insecure (n = 58) n (%)	<i>p</i>
Age	Younger	24 (37)	16 (39)	1.00	24 (50)	25 (43)	0.56
	Older	40 (62)	25 (60)		24 (50)	33 (56)	
Educational attainment	< High school	20 (31)	16 (39)	0.53	19 (39)	19 (33)	0.68
	≥ High school	44 (68)	25 (60)		29 (60)	37 (66)	
Employment status	Not full-time	6 (9)	6 (16)	0.35	23 (48)	33 (60)	0.32
	Full-time	59 (90)	31 (83)		24 (51)	22 (40)	
Household income	< \$25,000	17 (28)	24 (60)	0.00	17 (40)	24 (48)	0.53
	≥ \$25,000	43 (71)	16 (40)		25 (59)	25 (51)	
Acculturation	Low	26 (26)	16 (25)	0.86	33 (33)	38 (79)	0.37
	Middle	25 (25)	19 (30)		9 (9)	14 (29)	
	High	11 (11)	6 (9)		6 (6)	3 (6)	

p-value derived by Fisher's exact test

^a WIC, SNAP-Ed, free or reduced-price meals at school, and the Minnesota Family Investment Program; ^b SNAP-Ed, EFNEP, WIC, and Cooking Matters; ^c Food included fruits, vegetables, junk foods, soda pop, sweets, and potato chips

FV fruit and vegetable, *WIC* Special Supplemental Nutrition Program for Women, Infants & Children, *SNAP-Ed* Supplemental Nutrition Assistance Program-Education, *EFNEP* Expanded Food and Nutrition Education Program.

Predictor variables		Fathers			Mothers		
		Food secure (n = 65) n (%)	Food insecure (n = 41) n (%)	<i>p</i>	Food secure (n = 48) n (%)	Food insecure (n = 58) n (%)	<i>p</i>
Participation in food assistance programs ^a	Never	42 (64)	17 (41)	0.03	25 (52)	25 (44)	0.56
	≥ 1 time	23 (35)	24 (58)		23 (47)	31 (55)	
Participation in nutrition education ^b	Never	32 (49)	13 (33)	0.15	16 (34)	13 (23)	0.27
	≥ 1 time	33 (50)	26 (66)		30 (65)	43 (76)	
Home FV availability	Lower availability	27 (41)	18 (46)	0.69	15 (31)	36 (64)	0.00
	Higher availability	38 (58)	21 (53)		33 (68)	20 (35)	
Home food availability ^c	Lower availability	27 (42)	21 (56)	0.22	12 (26)	20 (36)	0.29
	Higher availability	37 (57)	16 (43)		34 (73)	35 (63)	
Home FV accessibility	Lower accessibility	20 (31)	12 (30)	1.00	12 (26)	23 (40)	0.15
	Higher accessibility	43 (68)	27 (69)		34 (73)	34 (59)	
Food-related activities with child	Less frequent	28 (43)	17 (43)	1.00	24 (51)	27 (48)	0.84
	More frequent	36 (56)	22 (56)		23 (48)	29 (51)	

p-value derived by Fisher's exact test

^a WIC, SNAP-Ed, free or reduced-price meals at school, and the Minnesota Family Investment Program; ^b SNAP-Ed, EFNEP, WIC, and Cooking Matters; ^c Food included fruits, vegetables, junk foods, soda pop, sweets, and potato chips

FV fruit and vegetable, *WIC* Special Supplemental Nutrition Program for Women, Infants & Children, *SNAP-Ed* Supplemental Nutrition Assistance Program-Education, *EFNEP* Expanded Food and Nutrition Education Program.

Predictor variables		Fathers			Mothers		
		Food secure (n = 65) n (%)	Food insecure (n = 41) n (%)	<i>p</i>	Food secure (n = 48) n (%)	Food insecure (n = 58) n (%)	<i>p</i>
Responsibility for feeding activities	Less responsibility	32 (52)	12 (30)	0.04	17 (37)	26 (48)	0.32
	More responsibility	29 (47)	27 (69)		28 (62)	28 (51)	
Neighborhood safety	Safe	34 (53)	10 (26)	0.01	27 (56)	18 (31)	0.02
	Unsafe	29 (46)	28 (73)		21 (43)	39 (68)	
Family stress	Less stress	35 (54)	16 (39)	0.16	25 (52)	16 (28)	0.02
	More stress	29 (45)	25 (60)		23 (47)	41 (71)	
<i>p</i> -value derived by Fisher's exact test							
^a WIC, SNAP-Ed, free or reduced-price meals at school, and the Minnesota Family Investment Program; ^b SNAP-Ed, EFNEP, WIC, and Cooking Matters; ^c Food included fruits, vegetables, junk foods, soda pop, sweets, and potato chips							
<i>FV</i> fruit and vegetable, <i>WIC</i> Special Supplemental Nutrition Program for Women, Infants & Children, <i>SNAP-Ed</i> Supplemental Nutrition Assistance Program-Education, <i>EFNEP</i> Expanded Food and Nutrition Education Program.							

Table 3
Associations between food insecurity status and household environmental factors (106 Latino fathers and mothers)

Predictors of food insecurity	Adjusted odds ratio [95% confidence interval]					
	Fathers (n = 92)			Mothers (n = 88)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Neighborhood safety (ref; safer)	4.0** [1.6, 10.4]	4.1** [1.5, 11.1]	3.7* [1.3, 10.3]	3.4** [1.4, 8.1]	3.8** [1.4, 10.4]	4.1** [1.5, 11.4]
Household income (ref; >=\$25000)		3.4** [1.3, 8.7]	3.2* [1.2, 8.2]			1.6 [0.6, 4.2]
Participation in food assistance programs ^a (ref; at least 1 program)		2.3 [0.9, 5.9]	2.1 [0.8, 5.5]			1.9 [0.7, 5.2]
Home FV availability (ref; higher)			1.1 [0.4, 3.0]		5.0** [1.8, 13.3]	5.5** [2.0, 15.4]
Family stress (ref; less stress)			2.0 [0.7, 5.2]		2.3 [0.9, 6.3]	2.4 [0.9, 6.5]
Cox-Snell R ²	0.10	0.19	0.21	0.08	0.22	0.25
^a SNAP-Ed, EFNEP, WIC, and Cooking Matters; * $p < 0.05$, ** $p < 0.01$						
<i>FV</i> fruit and vegetable, <i>SNAP-Ed</i> Supplemental Nutrition Assistance Program-Education, <i>EFNEP</i> Expanded Food and Nutrition Education Program, <i>WIC</i> Special Supplemental Nutrition Program for Women, Infants & Children						

Table 2 Frequency of food security status by predictor variables (106 Latino fathers and mothers)

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Table 3 Associations between food insecurity status and household environmental factors (106 Latino fathers and mothers)

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Factors associated with couple discordance in reporting food security status

Differences within couples in reported acculturation level, participation in nutrition education, home food availability, and home FV accessibility tended to be associated with couple discordance in reporting food security status compared with other variables ($p < 0.1$) (Table 4). After assessment for multicollinearity, couple discordances in reported acculturation level, participation in nutrition education, and home FV accessibility were included in logistic regression models as covariates. Compared with couples who reported concordant responses regarding food security status, couples who had discordance in nutrition education and home FV accessibility were 3.4 and 3.1 time more likely to be discordant regarding household food security status (OR: 3.4 [CI: 1.1–10.0]; $p < 0.05$ for participation in nutrition education, OR: 3.1 [95% CI: 1.0-9.4]; $p < 0.05$ for home FV accessibility) (Table 5).

Table 4

Frequency of concordance/discordance in couple-reported food security by concordance/discordance in predictor variables (106 Latino couples)

Predictor variables: categories	Concordance in predictor variables	Couples reported food security status ^a		
		Discordant (n = 25) n (%)	Concordant (n = 81) n (%)	<i>p</i>
Age:	Discordant	4 (16)	21 (25)	0.42
Younger or older	Concordant	20 (83)	60 (74)	
Educational attainment:	Discordant	7 (29)	32 (40)	0.35
< high school or ≥ high school	Concordant	17 (70)	47 (59)	
Employment status:	Discordant	12 (52)	39 (51)	1.00
Not full-time or full-time	Concordant	11 (47)	37 (48)	
Household income:	Discordant	7 (35)	16 (23)	0.39
< \$25,00 or ≥ \$25,000	Concordant	13 (65)	51 (76)	
Acculturation:	Discordant	13 (56)	26 (33)	0.06
Low, Middle, or High	Concordant	10 (43)	51 (66)	
Participation in food assistance programs ^b :	Discordant	9 (37)	18 (22)	0.18
Never or ≥ 1 time	Concordant	15 (62)	62 (77)	
Participation in nutrition education ^c :	Discordant	11 (44)	17 (22)	0.07
Never or ≥ 1 time	Concordant	14 (56)	58 (77)	
Home FV availability:	Discordant	8 (33)	23 (29)	0.80

p-value derived by Fisher's exact test

^a Concordance was defined as couples where both the father and mother reported food security status or both the father and mother reported food insecurity status; ^b WIC, SNAP-Ed, free or reduced-price meals at school, and the Minnesota Family Investment Program; ^c SNAP-Ed, EFNEP, WIC, and Cooking Matters; ^d Food included fruits, vegetables, junk foods, soda pop, sweets, and potato chips

FV fruit and vegetable, *WIC* Special Supplemental Nutrition Program for Women, Infants & Children, *SNAP-Ed* Supplemental Nutrition Assistance Program-Education, *EFNEP* Expanded Food and Nutrition Education Program

Predictor variables: categories	Concordance in predictor variables	Couples reported food security status ^a		
		Discordant (n = 25) n (%)	Concordant (n = 81) n (%)	<i>p</i>
Lower or higher availability	Concordant	16 (66)	55 (70)	
Home food availability ^d :	Discordant	14 (58)	25 (34)	0.06
Lower or higher availability	Concordant	10 (41)	47 (65)	
Home FV accessibility:	Discordant	9 (39)	15 (19)	0.09
Lower or higher accessibility	Concordant	14 (60)	61 (80)	
Food-related activities with their child:	Discordant	11 (45)	24 (31)	0.22
Less or more frequent	Concordant	13 (54)	53 (68)	
Responsibilities for planning meals:	Discordant	11 (55)	39 (53)	1.00
Less or more responsibility	Concordant	9 (45)	34 (46)	
Neighborhood safety:	Discordant	7 (28)	25 (32)	0.81
Safe or unsafe	Concordant	18 (72)	51 (67)	
Family stress:	Discordant	10 (43)	33 (40)	0.82
Less or more stress	Concordant	13 (56)	48 (59)	
<i>p</i> -value derived by Fisher's exact test				
^a Concordance was defined as couples where both the father and mother reported food security status or both the father and mother reported food insecurity status; ^b WIC, SNAP-Ed, free or reduced-price meals at school, and the Minnesota Family Investment Program; ^c SNAP-Ed, EFNEP, WIC, and Cooking Matters; ^d Food included fruits, vegetables, junk foods, soda pop, sweets, and potato chips				
<i>FV</i> fruit and vegetable, <i>WIC</i> Special Supplemental Nutrition Program for Women, Infants & Children, <i>SNAP-Ed</i> Supplemental Nutrition Assistance Program-Education, <i>EFNEP</i> Expanded Food and Nutrition Education Program				

Table 4 Frequency of concordance/discordance in couple-reported food security by concordance/discordance in predictor variables (106 Latino couples)

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Table 5

Associations between discordance in couple-reported food security status and household environmental factors (88 Latino couples)

	Odds ratio [95% confidence interval]
Acculturation (ref; concordant)	2.4 [0.8, 7.0]
Participation in nutrition education ^a (ref; concordant)	3.4* [1.1, 10.0]
Home FV accessibility (ref; concordant)	3.1* [1.0, 9.4]
Cox-Snell R ²	0.13
^a SNAP-Ed, EFNEP, WIC, and Cooking Matters; * $p < 0.05$	
<i>FV</i> fruit and vegetable, <i>SNAP-Ed</i> Supplemental Nutrition Assistance Program-Education, <i>EFNEP</i> Expanded Food and Nutrition Education Program, <i>WIC</i> Special Supplemental Nutrition Program for Women, Infants & Children	

Discussion

The prevalence of household food insecurity was reported more often by Latina mothers compared with Latino fathers. Food security status was associated with neighborhood safety in both fathers and mothers, and with household income and home FV availability in fathers and mothers, respectively. Couple discordance in reporting food security status occurred in 24% of the couples and was related to couple differences in reported frequencies of participation in nutrition education and perceived home FV accessibility.

The association between neighborhood safety and food insecurity was observed in mothers and fathers, providing evidence that the previous relationship observed between neighborhood safety and food insecurity among females [18] was also observed among males. Beliefs about neighborhood safety based on threats of crime or violence may increase perceptions of the difficulty of accessing resources [40], including those that influence food security such as community gardens, food pantries, or discount grocery stores. Therefore, in the current study, a perceived lack of neighborhood safety among both fathers and mothers may have been considered a barrier to accessing food resources, which contributed to assessment of food insecurity.

Household income is a well-known variable associated with food security status among both males and females [4, 23, 41]. The current study showed that low household income was related to food insecurity reported only by fathers within couples, therefore fathers may have more responsibility for household income as a primary earner or mothers may have less income information to consider [23, 42].

Low home FV availability was related to food insecurity only in mothers. This finding is consistent with two prior studies, one which observed a significant association between food insecurity and healthy food

availability among a study population which was 86% female [16], and another which reported that food insecurity was associated with home FV availability among females [43]. Compared with fathers, mothers may be more aware of FV prices, which are generally more expensive than foods of lower nutritional value [44]. Mothers may also be more aware of the supply of FV at home based on meal planning and food preparation responsibilities, therefore more aware of how household food security status is related to home food availability than fathers. While fathers and mothers would share information about neighborhood safety, they might have different information related to foods, resulting in different factors associated with food security status.

Couple discordance in reporting food security status was associated with discordance in reporting two variables, participation in nutrition education and home FV accessibility. Discordance in reporting participation in nutrition education may be based on a disproportionate participation ratio in the programs among fathers and mothers. Of fathers, 45 participants had never participated in nutrition education compared to 29 mothers (Table 2). Participation in SNAP and SNAP education were related to improvement in recipients' food security status in other studies [12, 13]. Therefore, participation among fathers in such programs may provide fathers with resource management skills to stretch food dollars and reduce concerns for financial issues, resulting in an increased number of couples concordant in reported food security status as well as improvement in food security.

Concordance in reporting home FV accessibility was associated with concordance in food security status. Accessibility may provide visible reminders of FV availability to both fathers and mothers and support their common recognition of food security. Previous studies involving primarily White women and [45] and Black, White and Hispanic women [17] reported an association between home food accessibility and food security, while the current study did not show an association between FV accessibility and food security among Latino fathers or mothers. The relationship between home food security and home food accessibility needs to be studied further by sex, healthfulness of foods being assessed for accessibility, and locations at home.

This study contained four main limitations. First, low-income participants were recruited in a limited geographic area, which may not represent the Latino population in the U.S. Because the current participants were interested in a community-based intervention program to improve energy balance-related behaviors of their child, they may have experienced difficulty feeding their child healthy foods based on food availability. Therefore, the prevalence of food insecurity in participants may have been higher than in other Latino populations. Second, participation in food assistance programs reflected self-reported attendance of fathers and mothers and did not consider eligibility for these programs. Third, this cross-sectional study did not show causal relationships. Further studies are needed to clarify whether associated factors affect food security status. Finally, the length of marriage was not considered, although there was some discordance regarding responses to this variable among couples in another study [26]. This characteristic might influence how the concept of household food security is shared and agreed upon within couples.

Conclusions

Among Latino fathers and mothers, three factors were associated with food security including neighborhood safety in both fathers and mothers, household income only in fathers, and home FV availability only in mothers. Differences in associated factors may be dependent on fathers vs. mothers having access to information about different household aspects related to food insecurity. Couple discordance in reporting food security status was related to couple differences in frequencies of participation in nutrition education and perceptions of home FV accessibility. Nutrition education for fathers may support an improvement in couple discordance in assessment of food security.

Abbreviations

BMI: body mass index; FV: fruit and vegetable; SD: standard deviations; OR: odds ratio; CI: confidence interval; NHANES: National Health and Nutrition Examination Survey; WIC: Special Supplemental Nutrition Program for Women, Infants & Children; SNAP-Ed: Supplemental Nutrition Assistance Program-Education; EFNEP: Expanded Food and Nutrition Education Program

Declarations

Ethics approval and consent to participate

The Padres Preparados, Jóvenes Saludables study was approved by the University of Minnesota Institutional Review Board Human Subjects Protection Committee (ID Number: 511S80707). All participants provided written consent prior to participation. This clinical study is retrospectively registered in the ClinicalTrials.gov Identifier: NCT03469752.

Consent for publication

Not applicable

Availability of data and materials

The data used in the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Author contributions

MR, GAH, SD and YZ were responsible for study design and implementation. MR, AB, YZ, SD and AORP collected the data. SNS analyzed the data and wrote the first draft with contributions from MR. All authors reviewed and commented on subsequent drafts of the manuscript.

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