

Article

Influence of Latinx Fathers' Behaviors, Cognitions, and Family Congruence on Youth Energy Balance-Related Health Outcomes

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Abstract

Obesity is a critical public health issue in the United States, which disproportionately affects Latinx youth compared to youth in other racial/ethnic groups. While research suggests fathers can influence their children's dietary intake and physical activity behaviors, few studies have included fathers in pediatric obesity studies and examined what mechanisms shape youth health outcomes. A greater understanding about fathers' role modeling and expectations for their youth can provide critical evidence in addressing Latinx youth health outcomes. This research examined the extent to which fathers' role modeling, expectations, family congruence, and warmth relate to youth energy balance-related behaviors. This study used cross-sectional data collected at baseline before Latinx fathers and children entered an obesity prevention program ($n = 193$). Latent moderation structural analyses tested the theorized pathways based on Palkovitz's conceptual framework of father involvement, including youth age and sex as covariates. Fathers' physical activity role modeling significantly predicted youth moderate-to-vigorous physical activity, $p = 0.002$. Fathers' warmth significantly moderated vegetable role modeling, $\beta = 0.263$, $p = 0.019$. By testing Palkovitz's conceptual framework of father involvement, this study increases the understanding about the theorized pathways between fathers' role modeling/expectations and youth health outcomes.

Keywords: father-child involvement; paternal warmth; role modeling; expectations; family congruence; nutrition; energy balance-related behaviors; obesity; Latinx



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1. Introduction

Obesity is a critical public health issue in the United States. Healthy People 2030 has identified reducing child obesity as a top priority given the linkage to chronic health conditions [1] and long-term adverse health consequences [2]. Hispanic youth aged 2–19 have a higher prevalence of obesity (23.6%) compared to other racial and ethnic groups, such as non-Hispanic Black children (20.4%), non-Hispanic White children (14.7%), and non-Hispanic Asian children (9.8%) [3]. Prevention of overweight and obesity, as opposed to treatment, is universally understood as the optimal strategy for addressing the global prevalence of obesity [4]. When seeking to address child adiposity, prevention efforts can help parents in providing healthy food portions and opportunities for physical activity [4].

Latinx families are estimated to comprise 29% of the U.S. population by 2060 [5]. Latinx families, like all other families, live within certain cultural contexts that influence the

health of Latinx children and their families. For example, Latinx families often emphasize *familismo* as a prioritization of the family above the individual members [6], with fathers and mothers playing a prominent role in ensuring the health and wellbeing of families. While research has focused on the role Latinx mothers play in the health of children, researchers have called for more obesity studies to include fathers [7].

More research is also needed to understand Latinx father involvement with *cultural sensitivity*. Despite stereotypical myths about Latinx fathers exhibiting “machismo” (i.e., being excessively macho) [8], fathers’ engaged in more physical play with children when mothers attained more than a high school education, if fathers were not married to their partner, and when fathers were younger [9]. For example, Latinx fathers may motivate their children to be physically active, such as through dancing and snowboarding [10].

While Latinx fathers play an important role in the wellbeing of their children, there is an opportunity to increase knowledge about Latinx father involvement with children [11]. Latinx fathers are becoming more involved in their children’s lives, such as caring for children while the mother of the child is working [12]. Since obesity disproportionately impacts Latinx children (ages 2–19) at higher percentages in the U.S. than all other ethnic/racial groups [13], Latinx fathers should be targeted for intervention given their prominent role within the family.

For example, one important role of Latinx fathers is that of a caretaker. In addition to spending time playing with children, Latinx fathers also perform household caretaking duties, such as supervision of children and more engagement in stereotypical “feminine” activities with children (i.e., shopping, reading, cooking, and indoor activities) [14]. Latinx fathers have been found to be significantly more likely to perform housework when the family encountered economic stress [14]. A national survey of U.S. households revealed 73% of Latinx fathers live with all of their children, 85% have children with only one partner, and 89% work full- or part-time [15]. Also, research has found that higher levels of Latinx family rituals were predictive of fathers monitoring children more compared to fathers with lower levels of family rituals [14].

Fathers prove to be critical contributors to the health and wellbeing of children. While researchers have examined the ways fathers engage with their youth [16–18], many have focused on direct care activities and affection in comparison to fathers’ indirect interactions, such as cognitions [19]. Fathers qualitatively influence their families in numerous ways that sometimes go unnoticed. Recent developments in fathering research have moved beyond quantifying engagement to investigating quality of engagement. Palkovitz describes father involvement as including three *domains*: (1) cognitive, (2) affective, and (3) behavioral [17,20]. Examples of the cognitive domain include fathers’ planning, praying, and hoping for the child’s wellbeing. The affective domain can include fathers’ loving, smiling, hugging, and friendship with his child. The behavioral domain can include role modeling, teaching responsibility, and encouraging hobbies, such as playing soccer or ballet. Palkovitz’s conceptualization of father involvement domains helps move the conversation toward quality of father–child engagement as opposed to quantifying the amount of dollars or hours fathers contribute to the family over time.

Few studies have looked at the specific ways fathers uniquely influence their child’s energy balance-related behaviors (EBRBs) [7,21]. When addressing youth overweight and obesity, researchers have an opportunity to increase the understanding of fathers’ cognitions (i.e., expectations), affect (i.e., emotions), and behaviors of consumption (i.e., role modeling), and the ways these domains of involvement contribute to children’s energy balance-related behaviors. By grounding father involvement research in the context of dietary intake and physical activity, community-based initiatives can provide more precision as regards how Latinx fathers influence child health outcomes within the family system. Palkovitz’s

conceptual model of father involvement has been found to be theoretically functional and statistically acceptable [22] (see Figure 1).

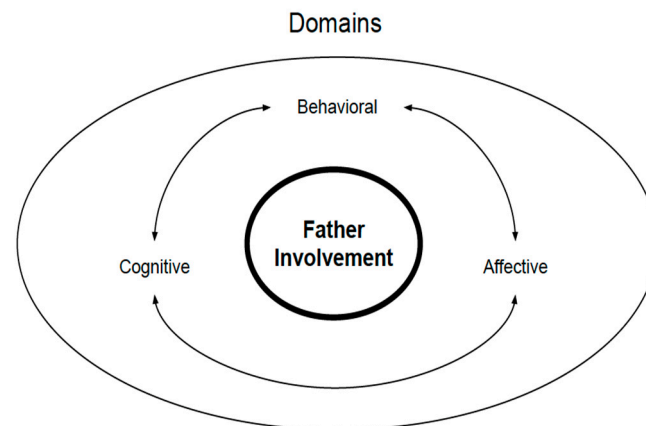


Figure 1. Domains of father involvement.

A program called *Padres Preparados, Jóvenes Saludables* (Prepared Parents, Healthy Youth) addressed this need for more culturally informed Latinx father involvement research [23–25]. The *Padres* parenting skills and youth obesity prevention program originated from feedback gained from the Latinx community in Minnesota through a father advisory group and focus group interviews [10]. With time, the team of community agencies and researchers co-developed a family skills and youth obesity prevention program that included both Latinx fathers and their adolescent children (aged 10–14) in an interactive session format that met consecutively for 8 weeks [26]. The program sessions included topics covering parenting habits, navigating cultures, healthy eating, reducing sedentary behaviors, healthy drinks, conflict management, physical activity, and family connection [26].

The *Padres* program collected baseline data from Latinx fathers ($n = 193$) and their families about energy balance-related behaviors, such as fruit and vegetable intake and moderate-to-vigorous physical activity. By collecting multiple perspectives from fathers, mothers, and adolescents, the data triangulated observations from multiple vantage points within the family system. Given the lack of research focusing on Latinx families, this *Padres* data offers critical information that we can leverage to test Palkovitz’s domains of father involvement within the context of Latinx fathers and their children.

The purpose of the present study is to understand the ways that Latinx fathers’ behaviors and cognitions relate to youth health outcomes. Guided by Palkovitz’s conceptual model of the domains of father involvement, this investigation assesses Latinx youth fruit and vegetable intake and moderate-to-vigorous physical activity using a community-based participatory research sample of Latinx fathers and adolescent youth (ages 10–14). The primary objective was to research two specific components: (1) To what extent is fathers’ EBRB role modeling related to youth fruit/vegetable intake and moderate-to-vigorous physical activity? (2) To what extent is fathers’ EBRB expectation for their youth’s EBRBs related to youth fruit/vegetable intake and moderate-to-vigorous physical activity? The secondary objective was to research: To what extent do (1) fathers’ warmth, (2) coparenting EBRB congruence, and (3) father–child EBRB congruence moderate the associations between fathers’ EBRB role modeling/expectations and youth fruit/vegetable intake and moderate-to-vigorous physical activity?

2. Materials and Methods

Padres Preparados was a community-based participatory research (CBPR) family skills program implemented in Minnesota between September 2017 to February 2020. The Padres program originated through a collaboration between researchers and community-based organizations and a father advisory group. The goals of the program were to: (1) increase parenting practices through healthy eating and physical activity, and (2) improve the eating and physical activity of youth. Prior studies have described the program [10,24,26]. This study used cross-sectional data collected from fathers, mothers, and youth at baseline before Latinx participants entered the program ($n = 193$).

The majority of fathers reported being born in Mexico (65%). Fathers were on average older (42 years) than mothers (40 years) and had been in the U.S. longer (19 years) than mothers (17 years). A lower percentage of fathers spoke only Spanish (75%) compared to mothers (86%). Fathers and mothers had very similar educational attainment, with 80% of fathers obtaining a high school or GED education compared to 79% of mothers obtaining a high school or GED education. Most of the fathers reported being married to their partner (85%). There were similar percentages of male children (49%) compared to female children (51%). Regarding employment, working full-time had the greatest percentage for both fathers (74%) and mothers (42%). The majority of the families (60%) had an annual household income of \$34,999 or lower and a third of the fathers (33%) reported having either a moderate or low level of food security (see Table 1).

Table 1. Baseline characteristics of the sample ($n = 193$).

	N (%)	M	SD
Sociocultural History			
Father's number of years in U.S.		19	6.49
Mother's number of years in U.S.		17	6.36
Father's Language			
Native only (e.g., only Spanish)	142 (75)		
More native than English	18 (9)		
Equal native and English	27 (14)		
More English than native	3 (2)		
English only	0 (0)		
Mother's Language			
Native only (e.g., only Spanish)	95 (86)		
More native than English	8 (7)		
Equal native and English	7 (6)		
More English than native	1 (1)		
English only	0 (0)		
Country of Birth ¹			
Mexico	79 (65)		
Ecuador	36 (30)		
El Salvador	3 (2)		
Columbia	1 (1)		
Nicaragua	1 (1)		
Venezuela	1 (1)		
United States	1 (1)		
Age			
Father's Age		42	7.36
Mother's Age		40	6.35
Child's Age		12	1.5
Child's Sex			
Male	94 (49)		
Female	96 (51)		

Table 1. *Cont.*

	N (%)	M	SD
Father's Educational Attainment			
No school	3 (2)		
Primary school	59 (31)		
Middle school	9 (5)		
High school	71 (37)		
GED	10 (5)		
Some college or technical school	31 (16)		
Bachelor's degree	5 (3)		
Advanced degree	2 (1)		
Mother's Educational Attainment			
No school	2 (2)		
Primary school	36 (33)		
Middle school	4 (4)		
High school	34 (31)		
GED	10 (9)		
Some college or technical school	18 (16)		
Bachelor's degree	6 (5)		
Advanced degree	0 (0)		
Father's Marital Status			
Single	12 (6)		
Married	160 (85)		
Separated	3 (2)		
Divorced	1 (1)		
Living with partner	13 (7)		
Father's Employment Status			
Student	1 (1)		
Self-employed	28 (15)		
Unemployed	6 (3)		
Part-time	12 (6)		
Full-time	138 (74)		
Homemaker	1 (1)		
Mother's Employment Status			
Student	3 (3)		
Self-employed	2 (2)		
Unemployed	4 (4)		
Part-time	18 (17)		
Full-time	46 (42)		
Homemaker	36 (33)		
Father's Report of Annual Household Income			
<\$15,000 per year	21 (11)		
\$15,000 to \$24,999	52 (28)		
\$25,000 to \$34,999	38 (21)		
\$35,000 to \$49,999	44 (24)		
\$50,000 to \$74,999	23 (12)		
\$75,000 to \$99,999	7 (4)		
Father's Report of Food Security			
Low security	9 (5)		
Moderate security	53 (28)		
High security	128 (67)		

¹ Country of birth percentages do not equal 100 due to rounding error.

Fathers completed a self-reported demographic questionnaire asking for their age, educational attainment, marital status, employment status, annual household income, language spoken at home, number of years in the U.S., and food security. The food

security measure had 2 items and was found to be valid among low-income families with children [27]. Youth reported their age and biological sex.

This study used the Nutrition Data System for Research (NDSR) 24 h dietary recall protocol to measure youth healthy food intake, which is well established as being the gold standard for capturing dietary consumption information [28,29]. The 24 h recalls have been found to be valid in measuring food intake among fourth-graders within 67% accuracy [29] and 12–14-year-olds within 85% accuracy [28]. Trained nutrition students recorded the youth's fruit and vegetable intake using the University of Minnesota's Nutrition Data System for Research 2016 (NDSR) software [30,31].

Youth physical activity was measured using two survey items assessing the number of hours spent in a normal week on vigorous and moderate exercises, with response options including 0, <30 min, 0.5 to 2 h, 2.5 to 4 h, 4.5 to 6 h, and >6 h [32,33]. The reliability coefficients of this measure ranged between 0.83 and 0.85 and the concurrent validity ranged between 66% to 69%, correctly classifying maximum oxygen intake and body fat [32].

Fathers' role modeling of fruit and vegetable intake and physical activity along with fathers' healthy expectations for their youth's dietary intake and physical activity were measured based on questions developed from validated scales [34–36] and based on feedback from Latinx father focus groups [10]. The survey was first created in English and then translated into Spanish. The Spanish version was then translated back into English to confirm the accuracy of the survey items across both languages [25]. A preliminary study assessed the psychometrics of the role modeling and expectation measures and found them to have acceptable criterion validity [25]. The role modeling questionnaire for food intake had two items: "How many times in a week does your child see you eating fruit/vegetables?" and "How many times in a week do you eat fruits/vegetables with your child?", with Likert responses ranging from 1 = Almost never or never to 5 = Once a day or more. The role modeling questionnaire for physical activity had two items: "How many times in a week does your child see you being physically active?" and "How many times in a week are you physically active with your child?", with Likert responses ranging from 1 = Almost never or never to 5 = Once a day or more. The expectations questionnaire for food intake had two items: "How many cups of fruit/vegetables do you want your child to eat in a day?", with responses ranging from 0 = As many as he/she wants to 3 = 3 cups or more.

Coparenting EBRB congruence was measured using 9 items that fathers, mothers, and youth individually rated. Questions were asked, such as "How often do you disagree with your child's father/mother about your child's fruit intake?" and "How often does your father disagree with your mother about your fruit intake?" Responses included a Likert scale ranging from 1 = Almost never or never to 5 = Almost always or always.

Father-child EBRB congruence was measured using 6 items that fathers and youth individually rated. Questions were asked, such as "How often do you disagree with your child about his or her fruit intake?" and "How often do you disagree with your father about your fruit intake?" Responses included a Likert scale ranging from 1 = Almost never or never to 5 = Almost always or always.

Fathers' warmth was measured using six father-reported items [37,38]. These questions measured different dimensions of fathers' warmth, such as affection, concern, intimacy, acceptance, and comfort. Questions were asked to fathers, including: (1) affection: "I physically express affection to my child (e.g., hugging, kissing, holding)", (2) interest: "I encourage my child to talk about his/her troubles," (3) acceptance: "I encourage my child to freely express him/herself even when disagreeing with parents," (4) interest: "I listen when my child has something to say," (5) intimacy: "I have warm and intimate times

together with my child,” and (6) comfort: “I give comfort and show understanding when my child is upset.” Responses included a Likert scale ranging from 1 = Almost never or never to 5 = Almost always or always. The psychometric properties of the fourth item was analyzed [38].

Youth’s sex and age were added as covariates given that one study found fathers’ parenting style differed significantly between boys and girls, as well as older and younger boys [39,40]. Given that an authoritative parenting style encompasses warmth, adding youth sex and age controls for differences in parenting style across youth sex and age. One study of first-generation Latinx parents and their youth (aged 4–9) found that parents’ expectations were different for boys compared to girls [37]. This decision to add youth sex and age as covariates is also supported by findings from another study that found younger 14–18 year old girls (primarily African American) to be more active compared to older girls, and biological fathers’ nurturance was significantly associated with physical activity [41]. Also, one study suggests that family EBRB disagreement regarding household rules and availability/accessibility regarding fruit intake, snack intake, and eating breakfast may possibly be influenced by a child’s age [42].

Data was assessed for normality and related assumptions. Missing data were assessed using Little’s test [43] to determine whether data were missing completely at random. In addition, analysis of the mechanisms for missingness was performed using the Kruskal–Wallis test for continuous data and chi-squared for discrete data. All descriptives and correlations were performed using the R Studio statistical software version 1.1.463.

The main analysis employed structural equation modeling (SEM), a theory-driven approach used to test hypothesized relationships among observed and latent variables [44]. Model fit was assessed using the root mean squared residual (SRMR), root mean square error of approximation (RMSEA), and comparative fit index (CFI). SRMR evaluates how well the model reproduces the observed relationships, whereas RMSEA assesses overall model fit and potential overparameterization [45,46]. CFI compares the target model with the null model with uncorrelated variables [47]. Adequate fit was indicated by $RMSEA \approx 0.06$, $SRMR \approx 0.08$, and $CFI \approx 0.95$ [48].

CFA models used maximum likelihood estimation with robust standard errors (MLR) to address multivariate non-normality [49]. Missing data were handled using full information maximum likelihood [50,51]. Predictor and outcome variables were treated as continuous due to their underlying ordinal continuum [46,52,53]. Analyses were conducted using Mplus 8 version 1.6 (1).

The confirmatory measurement model included just the predictors, moderators, outcomes, and covariates. Three latent predictors were imposed for fathers’ fruit and vegetable intake and physical activity role modeling. One latent factor was imposed for the youth physical activity outcome. Fathers’ expectations, youth fruit and vegetable intake, child age, and child sex were observed variables. Three latent moderators were imposed for fathers’ warmth, father–child EBRB congruence, and coparenting EBRB congruence. No moderation interactions were included in the measurement model.

When specifying the three models, residual covariances included: (1) outcomes with all other outcomes, (2) all covariates, predictors, and moderators with each other, and (3) EBRB congruence indicators as specified by the significant modification indices suggestions. After using the suggested significant modification indices, which were guided by theory, the three measurement models converged and had acceptable model fit (see Table 2).

Table 2. Measurement models' chi-squared, degrees of freedom, and fit indices.

Model	χ^2	df	RMSEA	CFI	SRMR
Warmth Measurement Model ¹	760.546	516	0.048	0.906	0.080
Coparenting Congruence Measurement Model ²	695.817	517	0.041	0.931	0.066
Father–Child Congruence Measurement Model ³	695.817	517	0.041	0.931	0.066

¹ A priori residual covariances were included for fathers', mothers', and youth's report of EBRB congruence.

^{2,3} Modification indices were included (instead of a priori) for fathers', mothers', and youth's report of EBRB congruence. Suggested residual covariances were only included if they were part of the a priori theorized list.

The first confirmatory structural analyses tested the theorized associations regarding the moderating effects of fathers' warmth on fathers' role modeling and expectations for their youth's EBRBs. Three regressions were performed simultaneously for each youth outcome. The first structural model for the fathers' warmth moderator included three regressions that were run simultaneously with the addition of six moderator interactions for fathers' warmth (2 interactions per regression model). The first regression added two interactions for fathers' warmth with fathers' fruit role modeling and fathers' warmth with fathers' expectation for youth fruit intake. The second regression added two interactions for fathers' warmth with fathers' vegetable role modeling and fathers' warmth with fathers' expectation for youth vegetable intake. The third regression added two interactions for fathers' warmth with fathers' physical activity role modeling and fathers' warmth with fathers' expectation for youth physical activity. Because there was missing data on the moderator's indicators, a Monte Carlo integration with 5000 integration points was performed when running the regressions.

The second confirmatory structural analyses tested the theorized associations regarding the moderating effects of coparenting EBRB congruence on fathers' role modeling and expectations for their youth's EBRBs. Three regression models were performed simultaneously for each youth outcome. The structural model for the coparenting EBRB congruence moderator included the same procedure outlined with the first structural model, but with six interactions for coparenting EBRB congruence.

The third confirmatory structural analyses tested the theorized associations regarding the moderating effects of father–child EBRB congruence on fathers' role modeling and expectations for their youth's EBRBs. Three regression models were performed simultaneously for each youth outcome. The structural model for the father–child EBRB congruence moderator included the same procedure outlined with the first structural model but with six interactions for father–child EBRB congruence.

3. Results

3.1. Confirmatory Structural Model Results (Fathers' Warmth)

The first regression revealed fathers' role modeling of fruit intake did not significantly predict youth fruit intake, $\beta = 0.140$, $p = 0.103$, and fathers' expectation for youth fruit intake did not significantly predict youth fruit intake, $\beta = 0.054$, $p = 0.394$. Fathers' warmth did not significantly moderate fruit role modeling, $\beta = 0.045$, $p = 0.505$, nor fathers' expectations for youth fruit intake, $\beta = 0.087$, $p = 0.199$ (see Figure 2).

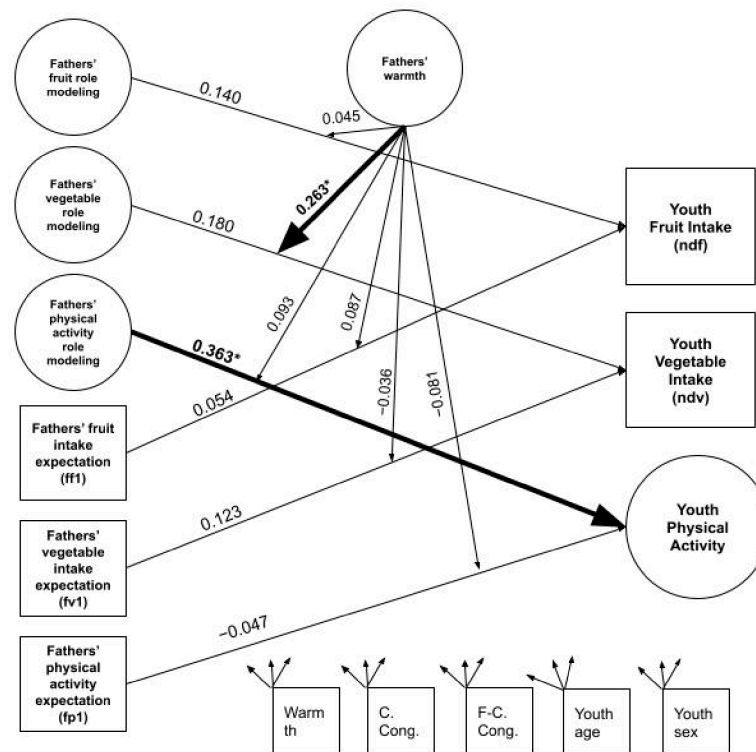


Figure 2. Structural model standardized factor loadings (fathers' warmth). * represents a statistically significant finding.

The second regression revealed fathers' role modeling of vegetable intake did not significantly predict youth vegetable intake, $\beta = 0.180$, $p = 0.059$, and fathers' expectation for youth vegetable intake did not significantly predict youth vegetable intake, $\beta = 0.123$, $p = 0.094$. Fathers' warmth significantly moderated vegetable role modeling, $\beta = 0.263$, $p = 0.019$, but did not significantly moderate fathers' expectations for youth vegetable intake, $\beta = -0.036$, $p = 0.753$.

The third regression revealed fathers' role modeling of physical activity significantly predicted youth moderate-to-vigorous physical activity, $\beta = 0.363$, $p = 0.009$, but fathers' expectation for youth physical activity did not significantly predict youth moderate-to-vigorous physical activity, $\beta = -0.047$, $p = 0.643$. Fathers' warmth did not significantly moderate fathers' physical activity role modeling, $\beta = 0.093$, $p = 0.446$, and did not significantly moderate fathers' expectations for youth physical activity, $\beta = -0.081$, $p = 0.446$. Youth biological sex significantly predicted youth moderate-to-vigorous physical activity, $\beta = -0.211$, $p = 0.005$.

3.2. Confirmatory Structural Model Results (Coparenting EBRB Congruence)

The first regression model revealed fathers' role modeling of fruit intake did not significantly predict youth fruit intake, $\beta = 0.142$, $p = 0.103$, and fathers' expectation for youth fruit intake did not significantly predict youth fruit intake, $\beta = 0.066$, $p = 0.286$. Coparenting EBRB congruence did not significantly moderate fruit role modeling, $\beta = -0.086$, $p = 0.568$, nor fathers' expectations for youth fruit intake, $\beta = -0.061$, $p = 0.446$ (see Figure 3).

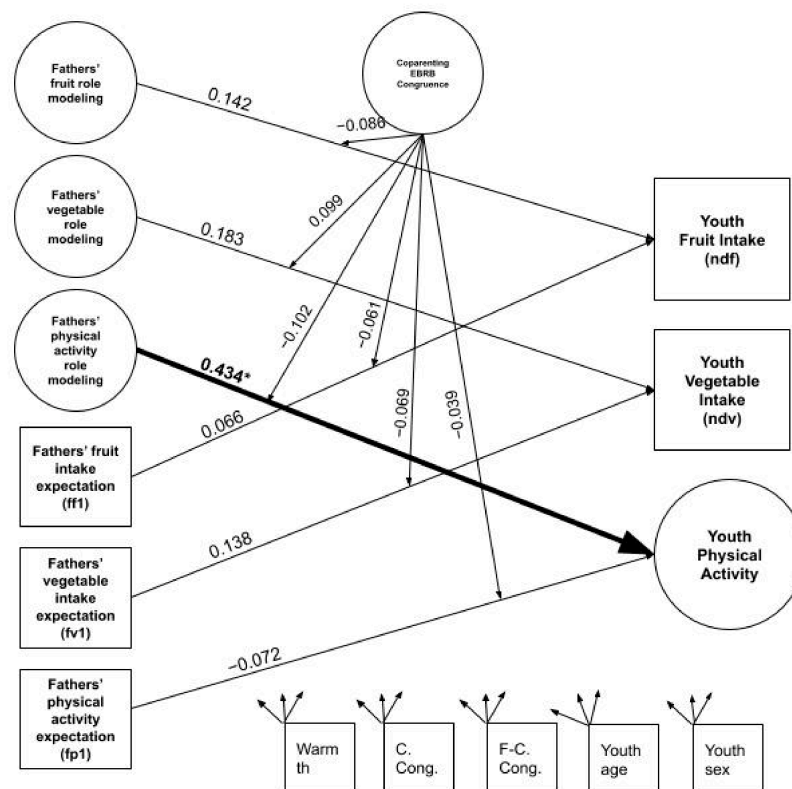


Figure 3. Structural model standardized factor loadings (coparenting EBRB congruence). * represents a statistically significant finding.

The second regression model revealed fathers' role modeling of vegetable intake did not significantly predict youth vegetable intake, $\beta = 0.183$, $p = 0.133$, and fathers' expectation for youth vegetable intake did not significantly predict youth vegetable intake, $\beta = 0.138$, $p = 0.099$. Coparenting EBRB congruence did not significantly moderate vegetable role modeling, $\beta = 0.099$, $p = 0.487$, and did not significantly moderate fathers' expectations for youth vegetable intake, $\beta = -0.069$, $p = 0.432$. Youth age did significantly predict youth vegetable intake, $\beta = 0.148$, $p = 0.037$.

The third regression model revealed fathers' role modeling of physical activity significantly predicted youth moderate-to-vigorous physical activity, $\beta = 0.434$, $p = 0.002$, but fathers' expectation for youth physical activity did not significantly predict youth moderate-to-vigorous physical activity, $\beta = -0.072$, $p = 0.467$. Coparenting EBRB congruence did not significantly moderate fathers' physical activity role modeling, $\beta = -0.102$, $p = 0.502$, and did not significantly moderate fathers' expectations for youth physical activity, $\beta = -0.039$, $p = 0.792$. Youth biological sex significantly predicted youth moderate-to-vigorous physical activity, $\beta = -0.189$, $p = 0.023$.

3.3. Confirmatory Structural Results (Father–Child EBRB Congruence)

The first regression model revealed fathers' role modeling of fruit intake did not significantly predict youth fruit intake, $\beta = 0.143$, $p = 0.103$, and fathers' expectation for youth fruit intake did not significantly predict youth fruit intake, $\beta = 0.063$, $p = 0.310$. Father–child EBRB congruence did not significantly moderate fruit role modeling, $\beta = -0.025$, $p = 0.798$, and did not significantly moderate fathers' expectations for youth fruit intake, $\beta = -0.062$, $p = 0.400$ (see Figure 4).

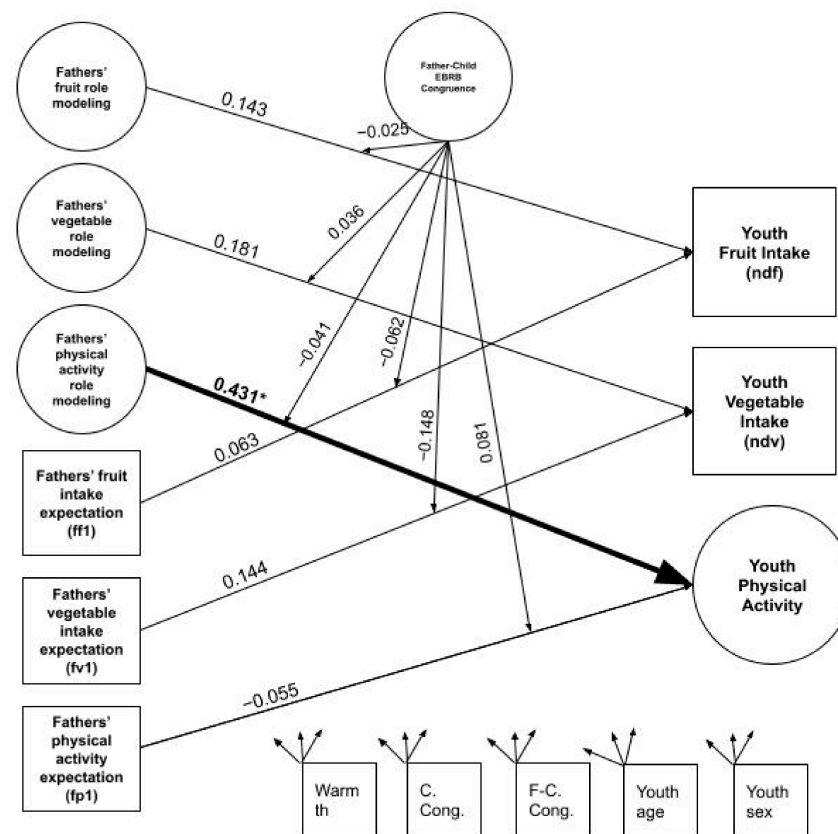


Figure 4. Structural model standardized factor loadings (father-child EBRB congruence). * represents a statistically significant finding.

The second regression model revealed fathers' role modeling of vegetable intake did not significantly predict youth vegetable intake, $\beta = 0.181$, $p = 0.084$, and fathers' expectation for youth vegetable intake did not significantly predict youth vegetable intake, $\beta = 0.144$, $p = 0.146$. Father-child EBRB congruence did not significantly moderate vegetable role modeling, $\beta = 0.036$, $p = 0.847$, and did not significantly moderate fathers' expectations for youth vegetable intake, $\beta = -0.148$, $p = 0.360$. Youth age did significantly predict youth vegetable intake, $\beta = 0.157$, $p = 0.029$.

The third regression model revealed fathers' role modeling of physical activity did significantly predict youth moderate-to-vigorous physical activity, $\beta = 0.431$, $p = 0.003$, but fathers' expectation for youth physical activity did not significantly predict youth moderate-to-vigorous physical activity, $\beta = -0.055$, $p = 0.574$. Father-child EBRB congruence did not significantly moderate fathers' physical activity role modeling, $\beta = -0.041$, $p = 0.713$, and did not significantly moderate fathers' expectations for youth physical activity, $\beta = 0.081$, $p = 0.392$. Youth biological sex did significantly predict youth moderate-to-vigorous physical activity, $\beta = -0.194$, $p = 0.020$.

4. Discussion

This study investigated the associations between Latinx fathers' healthy parenting involvement and youth energy-balance related behaviors. As was hypothesized, fathers' warmth provided a *context* that significantly moderated the associations between fathers' role modeling and youth physical activity. Fathers' warmth may be an important context in which role modeling has greater potential to positively influence youth physical activity. The results of this study show that fathers' warmth significantly moderated the associations between fathers' physical activity role modeling and youth moderate-to-vigorous physical activity. While previous research has highlighted fathers' hands-on caregiving role as

nurturer [54], this study compliments this study by providing evidence to suggest that warmth and nurturance may also be a context that can explain when children can expect to achieve positive health outcomes. Dowd writes, “Nurture. . . means more than simply doing; it also means the *manner* [emphasis added] in which things are done, and their results for children” [55]. If so, warmth and nurturance may be conceptualized as both a context and a hands-on caregiving behavior, which can expand our understanding of fathers’ involvement.

The significant findings from this study align with previous research suggesting that fathers’ warmth and caring may be a key variable for daughters’ fruit and vegetable intake [56]. In particular, prior research found that fathers with high emotional responsiveness and less home structure created conditions where daughters consumed more vegetable and fruits [56]. Prior research has also suggested the social–affective context surrounding the presentation of foods to children influences the creation of child food preferences [57]. Specifically, as children received food in the context of a reward, they were more likely to eat that particular food [57]. Children’s food intake patterns may partially stem from the social–affective context that fathers create within the family system. In short, fathers can foster an emotional context that supports the intake of certain foods. Along with fostering warm relationships, fathers’ role modeling is another important factor that can influence youth outcomes.

This study also found that fathers’ physical activity role modeling significantly predicted youth physical activity. The other role modeling predictors did not significantly predict youth outcomes. Several considerations may be pertinent to these findings. First, perhaps Latinx fathers’ prioritized physical activity role modeling over food-related role modeling due to cultural expectations for fathers to be involved in physical activities and mothers to be involved with food-related activities [58]. Second, perhaps role modeling does not perform consistently across all organisms as social cognitive theory appears to suggest [59].

Also, fathers’ expectations did not significantly predict youth outcomes. While previous Padres research had found fathers do have healthy expectations for their youth [10], the measurement of expectation included just one indicator. Prior research of Palkovitz’s domains of father involvement differentiates between *overt* and *covert* cognitions [60]. Overt cognitions include reasoning with youth and covert cognitions include thinking about youth’s needs [60]. The indicators used for this study measured covert cognition by asking, “How many cups of fruit/vegetables do you want your child to eat in a day?” or “How much time do you want your child to be physically active in a day?” Perhaps this study did not find cognitions to significantly predict youth outcomes due to a lack of indicators that measured overt and covert dimensions of cognitions.

Further, coparenting EBRB congruence and father–child EBRB congruence did not significantly moderate the associations between fathers’ involvement and youth outcomes. It should be noted that only one indicator was measured for each respondent per health outcome. For example, for father–child EBRB congruence, only two items were loaded onto the latent factor per health outcome (e.g., “How often do you disagree with your child about his or her fruit intake” and “How often do you disagree with your father about your fruit intake?”). Perhaps more indicators were needed to better measure the latent factors for coparenting and father–child EBRB congruence.

Regarding covariates, this study reveals the differential effects of youth biological sex within the family system. The results showed that youth who were biologically male reported significantly higher moderate-to-vigorous physical activity compared to females. Perhaps fathers’ involvement within the family system had differential effects on their youth based on cultural expectations for males and female. Recent research discovered

Latinx male youth engaged in more moderate-to-vigorous physical activity compared to females [61]. Additionally, previous Mexican-heritage research has found that fathers reported interacting in more activities with their sons than daughters [62].

Future studies may continue to include Latinx fathers so we can understand how they relate to positive youth outcomes. There are many community programs that support the needs of fathers that we can learn from [63]. Cooperative extension programming is another way we can support the needs of fathers in our communities.

Several limitations should be mentioned: (1) this study did not use a nationally representative sample and therefore it is not known how generalizable these results are; (2) cross-sectional data did not allow for assessing temporal changes in youth health outcomes and causality cannot be inferred; (3) self-report can be susceptible to social desirability bias; (4) data collection had issues with data missing at random; (5) this study did not measure factors that may have influenced moderate-to-vigorous physical activity, such as weather conditions; (6) two of the factors measuring fathers' expectations for youth's fruit and vegetable intake had four levels of ordinal data instead of five; and (7) convergence was not achieved for one comprehensive model; so, a step-approach was used for each moderator instead. Despite these limitations, this study provides important empirical understanding of Latinx father-child involvement.

5. Conclusions

This research examined the extent to which fathers' role modeling, expectations, family congruence, and warmth relate to youth energy balance-related behaviors. Using data from a community-based program called *Padres Preparados, Jóvenes Saludables* (Prepared Parents, Healthy Youth), this study discovered Latinx fathers' physical activity role modeling significantly predicted youth moderate-to-vigorous physical activity and fathers' warmth significantly moderated the relationship between fathers' vegetable role modeling and youth vegetable intake. By testing Palkovitz's conceptual framework of father involvement, this study increases understanding about the theorized pathways between fathers' role modeling/expectations and youth health outcomes.

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Abbreviations

The following abbreviations are used in this manuscript:

EBRBs	Energy balance-related behaviors
CFI	Comparative fit index
SRMR	Standardized root mean square residual
RMSEA	Root mean square error of approximation

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