

Title: Family Physical Activity and Employment Background as a Model for Child Physical Activity in Mexican-heritage Families

Haley Delgado^{1,2}, M. Renée Umstattd Meyer¹, Kelly R. Ylitalo¹, Cassandra M. Beattie^{1,3}, and Joseph R. Sharkey⁴

¹Baylor University, Department of Public Health, Texas, U.S.A.

²Heritage University, Department of Nursing, Washington, U.S.A.

³Texas A&M AgriLife Research, Department of Healthy Living, Dallas, Texas, U.S.A.

⁴Texas A&M University, Texas, U.S.A.

Abstract

The purpose of this study was to examine the relationship between family-engaged physical activity (PA), parental employment background, and children's PA among Mexican-heritage families residing in rural areas of the south-Texas Mexico border. *Promotoras* (community health workers trained in research methods) administered surveys to mothers (n=346) about family and child characteristics. Survey questions included frequency of participation in family-engaged PA, weekday and weekend maternal-reported hours of active play outside as reported by mothers, and parental employment background. Logistic regression analyses were used to examine the relationship between family-engaged PA frequency, parental employment, and maternal-reported hours of active play outside during weekdays and weekends. Mothers (n=346) were, on average, 36 years old (SD=10.0), married (65.3%), and born in Mexico (81.5%). Children (n=346) were either 8 (n=117), 9 (n=110), or 10 (n=119) years old. Maternal employment was suggestively inversely associated with maternal-reported hours of active play outside during weekdays and weekends (OR=0.47; 90% CI=0.24, 0.90; p=0.05). Frequent family PA was suggestively positively associated with weekday PA for children, even after adjusting for paternal job status (OR=1.84; 90% CI=1.06, 3.32; p=0.08). Children from families that participated in family PA more frequently (more than 3 times per week) showed higher weekday PA, even after adjusting for paternal days worked (OR=1.86; 90% CI=1.06, 3.34; p=0.07). Understanding the relationship between family PA and maternal-reported hours of active play may facilitate maintained engagement in PA programs. More work is needed to understand the impact, feasibility, and sustainability of family-focused PA interventions within diverse cultural and socioeconomic contexts.

Keywords: community health; rural health; active living; exercise; Hispanic; Latino/a; low-income

Obesity and healthy weight status are prioritized objectives for public health (Office of Disease Prevention and Health Promotion, 2018a). Obesity is identified as a risk factor for diabetes, cardiovascular disease, and other chronic diseases, which are leading causes of morbidity and health care costs in the United States (Office of Disease Prevention and Health Promotion, 2018b). Yet, understanding obesity and providing solutions for obesity within *underserved rural populations* requires a complex and innovative approach. Specifically, this paper examines the role of family physical activity (PA) and parental employment in children's PA among the underserved rural population of Mexican-heritage families residing on the south Texas-Mexico border.

Obesity and Rural Populations

As obesity steadily increases among rural underserved populations, so do diabetes and cardiovascular disease rates among rural underserved populations (J. Johnson & A. Johnson, 2015; Lundeen et al., 2018; O'Connor & Wellenius, 2012). Social determinants of health that facilitate obesogenic behaviors within underserved rural communities include poor dietary habits and physical inactivity (Patterson et al., 2004; Umstattd Meyer et al., 2016). For racial/ethnically diverse rural populations, additional factors such as lower socioeconomic status (SES) and high rates of smoking have been associated with obesity (Patterson et al., 2004). Rural areas also face unique systemic challenges such as lack of availability of healthy foods, PA resources, quality healthcare, and barriers such as transportation to engaging in healthy behaviors (Centers for Disease Control and Prevention, 2019b).

Physical Activity

PA is a critical behavior for preventing obesity and chronic disease. The Centers for Disease Control and Prevention recommends 60 minutes or more of PA per day for children ages 6-17 years old (Centers for Disease Control and Prevention, 2019a). Understanding PA behaviors during childhood is important as they are often carried through to adulthood (Piercy et al., 2018). Meeting PA guidelines has many benefits for weight management, cognitive functioning, and healthy aging (Piercy et al., 2018). However, in the United States, only 24% of children (ages 6-17) and 54% of adults meet PA guideline recommendations (Piercy et al., 2018; Data Resource Center for Child and Adolescent Health, 2016). Lack of meeting PA guidelines behaviors are also seen within rural populations (Baskin et al., 2016; Umstattd Meyer et al., 2013).

Low PA engagement among children is critical to understanding PA habits developed during childhood as they are typically sustained through adulthood (Piercy et al., 2018). Thus, developing healthy PA behaviors during childhood is critical to preventing obesity. Factors known to facilitate PA behaviors include social support, self-efficacy, and the availability of PA resources (Sallis et al., 2006). Whereas barriers to PA include the lack of PA resources, social support, and transportation (Lundeen et

al., 2018). Rural populations such as those in southern states may face barriers such as weather and lack of PA resources (Beighle & Morrow, 2014; Prochnow et al., 2019). However, one other factor that should be considered for children's PA is the family environment.

Family Environment

Child PA behaviors are influenced by the family (Sallis & Nader, 1998). The family environment affects various patterns of health-related behaviors. The family environment has been identified by multiple theoretical frameworks of the social cognitive theory, and family systems theory (Sallis et al., 2006; Bandura, 2004; Brown et al., 2016; Brown, 1998). Understanding PA from a family systems lens is necessary to understand how PA or support behaviors of PA within the family system can affect PA of others within the family (Boss, 1993; Bowen et al., 2016). Family Systems Theory emphasizes a multi-generational approach that describes how behaviors, habits, and emotions are influenced by multiple generations within the family system (Boss, 1993). For the purpose of this study, family PA is defined as the frequency that a family spends participating in physical activities together.

Based on these theories, it is expected that children's PA behaviors are influenced by the family environment. For example, some studies have identified family factors such as parental support and modeling facilitate child PA (Fuemmeler et al., 2011; Nolan et al., 2013; Schoeppe et al., 2017). Other studies have identified barriers such as parental employment that can make it difficult for the inclusion of entire families in PA interventions and can result in participant dropout (Brown et al., 2016; Taylor et al., 1994). Across the literature, populations for this area of research often lack representation of underrepresented or minority populations. Thus, more research is needed to fully understand the role of employment on child PA and in underserved populations.

South-Texas Colonia Populations

Although PA literature exists for Latino/a populations, family PA has not been examined in Mexican-heritage families. One study that has focused primarily on Mexican-heritage *colonia* populations identified that more than 40% of children were obese (Sharkey et al., 2012). Umstattd Meyer et al. (2013) identified several barriers to PA among these populations, such as unleashed dogs, traffic, and weather (Prochnow et al., 2019). Weather as a barrier to PA is specifically relevant to rural communities as rural areas often utilize outdoor space for PA (Seguin et al., 2014). However, influences of family-engaged PA have not been understood for under-resourced rural areas such as *colonias*.

Colonias are rural communities within 150 miles of the United States-Mexico border (Office of the Attorney General, n.d.). *Colonias* are usually characterized by low SES populations that lack basic sewage utilities and housing infrastructure and are medically underserved (Morgan, n.d.). In addition, the built environment

contributes to decreased PA levels for rural areas (Baskin et al., 2016). Under-resourced areas also face barriers to changing the built environment. These barriers highlight the importance of understanding interpersonal and intrapersonal factors that influence and can more feasibly promote healthy PA behaviors.

Mexican-heritage families often value collectivism (what is better collectively, for the group or family) and familism (the importance of relatives as referents and as providers of emotional support) (G. Marin & B. Marin, 1991; Yamauchi, 1998; Zambrana, 1995). Understanding family culture and values may be beneficial for understanding family influences of health behaviors and can be useful for the design and implementation of family-focused programs for diverse populations. However, little evidence exists on the importance of family influences that can affect behavior change in diverse cultural contexts.

The relationship between family PA as a support for child PA is not yet understood and therefore deserves further examination, particularly within Mexican-heritage populations. The purpose of this study was to examine the relationship between family PA and child PA among families residing on south Texas border *colonias*. Additionally, given the potential impact of employment status, a secondary aim of this study was to look at parental employment influences on child PA and the relationship between family PA and child PA.

Methods

Participant Selection and Recruitment

This study utilized a cross-sectional study design conducted in 2016 in the Hidalgo County, Texas area. *Promotoras* (research-trained community health workers) recruited participants (n=346) using a door-to-door interview methods. Participants were eligible for the study if they were of Mexican heritage, over the age of 21, and had a child that was between the ages of eight to ten years old. If a family had more than one child in the inclusion age range, a sample child was randomly selected for that family. After informed consent from mothers was received, *promotoras* administered an interviewer-led survey to collect information about child PA during weekdays and weekends, family PA, and parental employment background. All participants indicated informed consent prior to participating in this study, as approved by the referent institution's IRB.

Family Physical Activity

Family PA was measured using a single question: "How many times a week does your family do active things together?" Response options included never, once or less, 2-3 times, or more than 3 times. Participants who responded "never" and "once or less" were grouped into a single category, engaging in family PA "once or less," times a week.

Maternal-reported Child Physical Activity

Maternal-reported child PA was measured using two questions. Child weekday PA frequency was measured by asking, "How many hours of active play outside does your child get every day during the week?" Child weekend PA frequency was measured by asking, "How many hours of active play outside does your child get every day on the weekend?" Both questions used ordinal response options from none, less than 1 hour, 1-2 hours, and more than 2 hours. Child PA frequency variables were dichotomized into two groups, 2 hours or less and more than 2 hours to differentiate between children who were more active and less active.

Sociodemographics

Sociodemographic characteristics of the sample child, mother, and family were self-reported by the mother. Child age was measured in whole years (8, 9, or 10 years) and child sex was defined as male or female. Maternal age was open-ended and reported in years. Maternal nativity status was defined as born in Mexico or born in the United States. Marital status was defined as married or living with partner. Household monthly income from all sources was measured as none, \$499 or less, \$500-999, \$1000-1499, \$1500-1999, \$2000-2999, \$3000 or more, or don't know. Employment information was collected using 3-items and inquired about maternal and paternal employment background, by asking, "How many jobs do you have?" "What is your job status?" with response options none, part-time, and fulltime and "Which days of the week do you work?" with response options, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday and Sunday." Responses were grouped into "Weekdays" for those working Monday through Friday, "Weekends" for those working Saturday and/or Sunday, and "Both" for those working both weekdays and weekends.

Data Analysis

Frequencies and means were calculated for all demographic, family PA, and maternal-reported child PA variables. Logistic regression was used to model the bivariate association between each variable and child PA. Bivariate logistic regression models were used to determine the association of family PA and child PA. Bivariate logistic regression analyses were also used to determine the association between parental employment and child PA. Separate multivariate logistic regression models added additional variables such as parental employment background, child gender and age. These variables were selected a priori based on literature and theoretical relevance to family and child PA. Additionally, child age and gender were included because of previous associations with PA within this population (Umstadtd Meyer et al., 2013). Parental employment was included given the study's focus on family-level influences on maternal reported child PA. Because maternal and paternal employment status work schedules represent related but conceptually distinct dimensions of employment, four independent models were

estimated. The first model included family PA and maternal employment status. The second model included family PA and maternal days worked. The third model included family PA and paternal employment status and the fourth model included family PA and paternal days worked. Data were analyzed using SAS v9.3 (SAS Institute Inc., Cary, NC). As an exploratory study with a relatively small sample size, statistical significance was defined at the $\alpha = 0.10$ level (Cohen, 2013; Sterne & Smith, 2001).

Results

Mothers were, on average, 36 years old (SD=10.0), married (65%), born in Mexico (82%), and had a monthly income between \$1,000 and \$1,499. Children were 8 (34%), 9 (32%), and 10 (34%) years old, with 56% being male and 44% being female (Table 1).

Table 2 shows maternal reports of family physical activity (PA) frequency, maternal-reported hours of child PA time, and employment background (Table 2). Mothers reported that 48.8% (n=169) of families engaged in PA once or less per week, 33.2% (n=115) engaged in family PA 2-3 times per week, and 17.9% (n=62) engaged in family PA more than 3 times per week. For maternal-reported hours of child PA, 32.1% (n=111) of mothers reported their children engaging in less than 2 hours of PA, with 67.9% (n=235) of children engaging in 2 hours or more of PA per weekday. Mothers also reported that 24.6% (n=85) of children engaged in less than 2 hours of PA during the weekend and 75.4% (n=261) of children engaging in PA for more than 2 hours per day during the weekend. For maternal employment background, the majority of mothers (81.2%) were unemployed. Of those that were employed (18.8%), 11% (n=38) worked weekdays only, and 7.5% (n=26) worked both weekdays and weekends. For paternal figures, the majority of the sample were employed (n=88.4%). Of those that were

employed, 11.6% did not work, 54.9% (n=190) worked weekdays, and 33.5% (n=116) worked weekdays and weekends.

As shown in Table 3, children with mothers that worked both weekdays and weekend had lower odds to engage in PA when compared to children of mothers that were unemployed (OR=0.47; 90% CI=0.24, 0.90; p=0.05). Children of families that participated in physical activities more frequently (more than 3 times per week) had higher odds of being active during the weekends when compared to children of families that engaged in family PA less frequently (less than once per week) (OR=2.23; 90% CI=1.06, 5.06; p=0.04). Child gender and age were not significant predictors of maternal-reported hours of active play during the weekends. Confidence intervals were wide and in some cases included the null value, indicating limited precision.

In multivariate models examining family PA and maternal employment status (employed versus being unemployed) as predictors of maternal-reported hours of active play outside during weekdays, we did not observe either independent variables as having a statistically significant relationship with child PA. Models 3 and 4 identified elevated odds ratios between family PA and higher levels of maternal-reported hours of active play outside even when adjusting for paternal employment (OR=1.84; 90% CI=1.06, 3.32; p=0.08; OR=1.86; 90% CI=1.06, 3.34; p=0.07 respectively). Similarly, models for child weekend PA family PA was associated with higher odds of maternal-reported hours of active play on weekends even when adjusting for maternal employment (OR=2.23; 90% CI=1.06, 5.06; p=0.04) and paternal employment (OR=2.24; 90% CI=1.07, 5.09; p=0.04) (Table 4). Confidence intervals were wide and in some cases included the null value, indicating limited precision.

Table 1. Demographics of mothers and children

Characteristics	Mean (SD)	n	%
Child Characteristics			
Age			
8 years old		117	33.8
9 years old		110	31.8
10 years old		119	34.4
Sex			
Male		193	55.8
Female		153	44.2
Maternal Characteristics			
Age, years	35.6 (10.0)		
Born in Mexico		282	81.5
Marital Status			
Married		226	65.3
Living with Partner		120	34.7
Household Monthly Income			
No Income		5	1.5
\$499 or Less		4	1.2
\$500-\$999		89	25.7
\$1000-\$1,499		111	32.1
\$1500-\$1,999		75	21.7
\$2,000-\$2,999		27	7.8
\$3,000 or more		18	5.2
Don't know		16	4.6

Table 2. Family physical activity, child physical activity, and employment background

Variable	n	%
Family Physical Activity Time		
Number of times per week doing activities together		
1 or Less	169	48.8
2-3 Times	115	33.2
More than 3 Times	62	17.9
Child Weekday Physical Activity Time		
2 hours or Less	111	32.1
More than 2 hours	235	67.9
Child Weekend Physical Activity Time		
Less than 2 hours	85	24.6
2 hours or More	261	75.4
Maternal Employment		
Job Status		
Unemployed	281	81.2
Employed	65	18.8
Days Worked		
None	282	81.5
Weekdays	38	11.0
Weekdays and Weekends	26	7.5
Paternal Employment		
Job Status		
Unemployed	40	11.6
Employed	306	88.4
Days Worked		
None	40	11.6
Weekdays	190	54.9
Weekdays and Weekends	116	33.5

Table 3. Associations of family physical Activity and parental employment with child weekday physical activity

	Bivariate			Model 1 : Maternal Job Status			Model 2: Maternal Days Worked			Model 3: Paternal Job Status			Model 4: Paternal Days Worked		
	OR	90% CI	P	OR	90% CI	P	OR	90% CI	P	OR	90% CI	P	OR	90% CI	P
Family Physical Activity															
<1 per Week (Ref)	1.0														
	0	-		1.00	-		1.00	-		1.00	-		1.00	-	
2-3 Times per Week	1.2	0.79,									0.79,				
More than 3 Times per	1	1.85	.46	1.20	0.78, 1.86	.48	1.19	0.77, 1.84	.52	1.21	1.87	.47	1.21	0.79, 1.87	.47
Week	1.7	1.00,									1.06,	*0.0			
	2	3.06	.11	1.80	1.03, 3.23	.09	1.84	1.06, 3.32	.08	1.84	3.32	8	1.86	1.06, 3.34	*0.07
Maternal Days Worked															
None (Ref)	1.0														
	0	-					1.00	-							
Weekdays	0.9	0.50,													
	1	1.72	.80				0.88	0.48, 1.69	.75						
Weekday and Weekends	0.4	0.24,	.05												
	7	0.90	*				0.47	0.24, 0.91	.06						
Maternal Job Status															
Unemployed (Ref)	1.0														
	0	-		1.00	-										
Employed	0.6	0.42,													
	7	1.07	.16	0.66	0.41, 1.07	.15									
Paternal Days Worked															
None (Ref)	1.0												1.00	-	
	0	-													
Weekdays	1.8	1.01,											1.78	0.96, 3.27	.12
	3	3.31	.09												
Weekdays and Weekends	1.4	0.80,											1.39	0.74, 2.59	.39
	8	2.71	.29												
Paternal Job Status															
Unemployed (Ref)	1.0									1.00	-				
	0	-									0.89,				
Employed	1.6	0.94,								1.60	2.85	.18			
	7	2.92	.14												
Child Gender															
Male (Ref)	1	-		1	-		1	-		1	-		1	-	
	0.8	0.58,	.49	0.8	0.61,	.634	0.9	0.62,	.721	0.90	0.61,	.644	0.89	0.60,	0.86
Female	6	1.25	9	9	1.32		2	1.36			1.32			1.31	
Child Age, years															
8 years old (Ref)	1	-		1	-		1	-		1	-		1	-	

	1.1	0.70,	.66	1.1	0.71,	.637	1.1	0.70,	.669	1.14	0.70,	.652	1.15	0.71,	.628	1.13
9 years old	3	1.83	9	5	1.87		3	1.85			1.85			1.87		
	0.7	0.48,	.31	0.7	0.44,	.218	0.7	0.45,	.234	0.75	0.47,	.314	0.75	0.47,	.310	0.76
10 years old	6	1.19	4	1	1.12		2	1.14			1.20			1.19		

CI, confidence interval; OR,
odds ratio.

*Bivariate and multivariable logistic regression models estimated the odds of children engaging in at least 2 hours of physical activity per day (≥ 2 hours/day vs. < 2 hours/day) on weekdays. Multivariable models adjusted for the covariates included in each model. Odds ratios greater than 1 indicate increased odds of engaging in at least 2 hours of daily physical activity, whereas odds ratios less than 1 indicate decreased odds. Confidence intervals are based on $\alpha = 0.10$ (90% CI). $p < .10$; $p < .05$.

Table 4. Associations of family physical activity and parental employment background with child weekend physical activity

	Bivariate			Model 1: Maternal Job Status			Model 2: Maternal Days Worked			Model 3: Paternal Job Status			Model 4: Paternal Days Worked		
	OR	90% CI	P	OR	90% CI	P	OR	90% CI	P	OR	90% CI	P	OR	90% CI	P
Family Physical Activity															
< 1 per Week (Ref)	1.00	-		1.00	-		1.00	-		1.00	-		1.00	-	
2-3 Times per Week	1.3	0.73, 2.21	.41	1.26	0.77, 1.91	.41	1.26	0.73, 2.21	.42	1.25	0.72, 2.19	.43	1.25	0.72, 2.20	.43
>3 Times per Week	2.2	1.06, 5.06	*0.04	2.23	1.06, 5.06	*.04	2.25	1.07, 5.11	*.04	2.24	1.07, 5.09	*.04	2.27	1.08, 5.15	*.04
Maternal Days Worked															
None (Ref)	1.00	-					1.00	-			-				
Weekdays	1.07	0.49, 2.54	.87				1.07	0.49, 2.54	.87						
Weekday and Weekends	0.83	0.36, 2.10	.67				0.83	0.36, 2.10	.67						
Maternal Job Status															
Unemployed (Ref)	1.00	-		1.00	-										
Employed	0.96	0.52, 1.83	.89	0.96	0.52, 1.83	.89									
Paternal Days Worked															
None (Ref)	1.00	-											1.00	-	
Weekdays	1.53	0.68, 3.32	.29										1.53	0.68, 3.32	.29
Weekdays and Weekends	1.10	0.48, 2.41	.82										1.10	0.48, 2.41	.82
Paternal Job Status															
Unemployed (Ref)	1.00	-								1.00	-				
Employed	1.32	0.61, 2.73	.47							1.32	0.82, 2.73	.47			
Child Gender															
Male (Ref)	1.00	-		1.0	-		1.0	-		1.0	-		1.0	-	
Female	1.36	0.82, 2.28	.23	1.36	0.82, 2.28	.23	1.38	0.83, 2.31	.22	1.36	0.82, 2.27	.24	1.33	0.80, 2.23	.27
Child Age, years															
8 years old (Ref)	1.00	-		1.0	-		1.0	-		1.0	-		1.0	-	
9 years old	0.88	0.47, 1.64	.69	0.88	0.47, 1.64	.69	0.88	0.47, 1.63	.67	0.88	0.47, 1.63	.68	0.89	0.48, 1.67	.72
10 years old	0.72	0.39, 1.31	.28	0.72	0.39, 1.31	.28	0.72	0.39, 1.31	.29	0.74	0.40, 1.36	.33	0.74	0.40, 1.36	.33

CI, confidence interval; OR, odds ratio.

*Bivariate and multivariable logistic regression models estimated the odds of children engaging in at least 2 hours of physical activity per day (≥ 2 hours/day vs. < 2 hours/day) on weekends. Multivariable models adjusted for the covariates included in each model. Odds ratios greater than 1 indicate increased odds of engaging in at least 2 hours of daily physical activity, whereas odds ratios less than 1 indicate decreased odds. Confidence intervals are based on $\alpha = 0.10$ (90% CI). $p < .10$; $p < .05$.

Discussion

This study adds to the growing body of literature on family influences on maternal-reported child PA, particularly within Mexican-heritage families living in colonias. While prior research has primarily focused on general parental influence, our study examined how overall family PA correlates with maternal-reported children's PA during both weekdays and weekends (Taylor et al., 1994; Ayala et al., 2010; Benitez et al., 2020). Results suggest that higher levels of family PA are associated with higher levels of child PA on both weekdays and weekends, reinforcing earlier findings that demonstrate positive associations between parent and child PA (Fuemmeler et al., 2011; Nolan et al., 2012; Schoeppe et al., 2017). This suggests that promoting family-based PA may be a viable strategy to improve child PA in this population. However, findings should be interpreted cautiously given the exploratory analytic approach.

Importantly, this relationship persisted even when controlling for parental employment status. However, the influence of parental employment on maternal-reported hours of active play outside during the weekdays and weekends differed by parent gender and day of the week. Children whose mothers were employed showed lower odds of weekday PA, while those with employed fathers showed higher odds of weekday PA. However, findings should be interpreted cautiously given the exploratory approach. These findings are supported by previous work that found that mothers and fathers influence their children's PA differently (Schoeppe et al., 2017; Benitez et al., 2020). One possible explanation for the observed pattern could be that maternal employment reduces the time mothers can directly facilitate weekday PA. Yet, no significant associations were found between maternal employment and weekend PA. This may point to the involvement of extended family members or community structures during weekends, a dynamic deserving further exploration.

This study makes a unique contribution by applying a family-level lens to maternal-reported child PA behavior, grounded in social cognitive theory and family systems theory, both of which emphasize the importance of familial and interpersonal contexts in behavior development (Bandura, 1977; Bowen, 1974). To our knowledge, this is one of the first studies to examine the influence of both family PA and parental employment within Mexican-heritage families in colonias. Given the exploratory nature of findings, conclusions regarding parental employment should be considered preliminary. Given the association between family PA and child PA, future interventions should integrate family-based approaches. Moreover, gender roles in Mexican-heritage families are shaped by immigrant generation, family structure, and economic demands (Zambrana, 1995). These factors likely influence PA facilitation patterns and should be taken into account when designing culturally responsive PA programs.

In under-resourced areas such as *colonias*, where access to structured PA programs is often limited, community

mobilization may serve as a powerful alternative to support PA opportunities. Community-driven efforts such as adding culturally relevant PA to broader community events or neighborhood play opportunities (e.g., Play Streets)—can provide flexible, inclusive PA opportunities for children and their families, especially working parents (Baskin et al., 2016; Umstattd Meyer et al., 2013; Abildso et al., 2021). These programs not only offer safe space for PA but also foster social support networks and reinforce community identity and cohesion (Abildso et al., 2021; Umstattd Meyer et al., 2024).

Limitations

This study relied on self-reported data, primarily from mothers, which introduces potential reporting biases. Hispanic respondents have been shown to overuse the extremes of Likert scales, and cultural response styles may have influenced the accuracy of the PA estimates (G. Marin & B. Marin, 1991). Additionally, the PA items used were not validated, were maternal reported, and did not differentiate between whole-family versus individual child activities. This may obscure whether child PA occurred independently or as part of family PA. Therefore, these single-item measures may not fully capture the frequency, duration, or context of PA behaviors. Moreover, we did not control for whether children were in school or out of school, which is important as previous research shows that children's PA patterns differ between the school year and summer months in South Texas colonias (McClendon et al., 2017). Lastly, this study uses a cross-sectional design which limits causal inference.

This study offers several key strengths. It addresses a gap in the literature by examining child PA within the family context among Mexican-heritage families living in colonias, an underrepresented and high-priority population in public health research. The use of *promotoras* (i.e., research-trained community health workers) for door-to-door recruitment enhanced cultural relevance, built community trust and likely improved data quality by reducing common barriers to participation (e.g., language barriers, distrust of institutions, low health literacy, time constraints, etc.) (Otiniano et al., 2012). By distinguishing between weekday and weekend PA, the study captured important variation in children's activity patterns that may be influenced by family routines and employment schedules. Furthermore, the inclusion of both maternal and paternal employment data, as well as child age and gender, allowed for a more comprehensive analysis of the social and structural factors that shape child PA. This multifaceted approach strengthens the study's contribution to understanding how family dynamics and broader socioeconomic contexts influence health behaviors in Latino communities.

Overall, this study highlights the central role that family PA plays in shaping children's PA behaviors within Mexican-heritage families living in colonias. The findings suggest that both maternal and paternal roles, particularly in the context of employment, influence child PA in distinct ways, with implications that vary across weekdays and

weekends. These results underscore the need for culturally tailored, family-centered interventions that account for work schedules, parental roles, and extended family networks. As public health efforts continue to address disparities in PA among Latino children, future research and programming should prioritize inclusive approaches that strengthen family engagement, leverage community assets, and accommodate the unique structural challenges faced by families in under-resourced areas.

Implications for Practice

The findings of this study suggest several important implications for public health practitioners, community organizations, and program developers working to improve PA among children in Mexican-heritage communities. First, interventions should consider a family-centered approach that promotes joint PA between parents and children, recognizing that family engagement, particularly during weekdays, plays a critical role in shaping child PA behaviors. Practitioners should also consider the influence of parental employment, especially maternal work schedules, when designing intervention timing and delivery methods. Flexible program models, such as evening or weekend events, may help accommodate working parents.

Given the cultural importance of extended family in Mexican-heritage communities, strategies that engage grandparents, aunts, uncles, or older siblings could help sustain children's PA, particularly on weekends. Community-based programs should also leverage the trust and reach of promotoras to deliver culturally relevant messages and facilitate participation. In resource-limited settings like colonias, investment in safe, low-cost, and locally accessible PA opportunities, such as temporary PA interventions (e.g., Play Streets), walking groups, or informal neighborhood sports, can help overcome structural barriers. Ultimately, centering family structures and cultural values in PA promotion can lead to more equitable and sustainable health outcomes for Latino children and families.

Correspondence should be addressed to

M. Renée Umstattd Meyer, Ph.D.
Baylor University, Department of Public Health,
Waco, TX, USA
Renee_Umstattd@baylor.edu

- Haley Delgado: 0000-0002-1537-4836
- M. Renée Umstattd Meyer: 0000-0001-5525-943X
- Kelly R. Ylitalo: 0000-0002-1474-6781
- Cassandra Beattie: 00009-0002-6098-776X

Acknowledgements

We are grateful to the participants of this study and the promotora-researchers and other team members, whose willingness, time, and effort made this project possible. We also want to acknowledge the expertise and guidance of Dr.

Karen Melton, Associate Professor of Child and Family Studies at Baylor University (Waco, TX, USA) who served as a thesis committee member on this associated project.

Funding

This study was funded by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award #2015-68001-23224. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect that view of the U.S. Department of Agriculture. In addition, the funding body was not involved in the design of the study; the collection, analysis, and interpretation of data; or the writing in the manuscript.

Competing Interests

The authors have no relevant financial or non-financial completing interests to disclose.

Institutional Review Board approval

Recruitment commenced after obtaining Texas A&M University International Review Board approval, participants completed approved informed consent documents prior to enrolling in this study.

Authorship Contributions

Conceptualization: HD, JRS, MRUM; Methodology: JRS, MRUM; Formal analysis: HD, MRUM, KRY; Writing-original draft preparation: HD, MRUM; Writing – review and editing: HD, CMB, JRS, MRUM, KRY; Funding acquisition: JRS, MRUM; Supervision and Thesis chair: MRUM; Thesis committee member: KRY, KM (acknowledged).

Creative Commons License

This work is [licensed](#) under a [Creative Commons Attribution-Noncommercial 4.0 International License \(CC BY-NC 4.0\)](#).

References

- Abildso, C. G., Daily, S. M., Umstattd Meyer, M. R., Edwards, M. B., Jacobs, L., McClendon, M., Perry, C. K., & Roemmich, J. N. (2021). Environmental Factors Associated with Physical Activity in Rural U.S. Counties. *International Journal of Environmental Research and Public Health*, 18(14), 7688. <https://doi.org/10.3390/ijerph18147688>
- Ayala, G. X., Elder, J. P., Campbell, N. R., Arredondo, E., Baquero, B., Crespo, N. C., & Slymen, D. J. (2010). Longitudinal intervention effects on parenting of the Aventuras para Niños study. *American Journal of Preventive Medicine*, 38(2), 154–162. <https://doi.org/10.1016/j.amepre.2009.09.038>
- Bandura, A. (1977). *Social learning theory* (pp. viii, 247). Prentice-Hall.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior: The Official Publication of the Society for Public Health Education*, 31(2), 143–164. <https://doi.org/10.1177/1090198104263660>
- Baskin, M. L., Gamble, A., Edwards, M. B., Abildso, C., Moore, J. B., & Umstattd Meyer, M. R. (2016). Rural Active Living: A Call to Action. *Journal of Public Health Management & Practice*, 22(5), E11-E20. <https://doi.org/10.1097/PHH.0000000000000333>
- Beighle, A., & Morrow, J. R. (2014). Promoting Physical Activity: Addressing Barriers and Moving Forward. *Journal of Physical Education, Recreation & Dance*, 85(7), 23–26. <https://doi.org/10.1080/07303084.2014.937190>
- Benitez, T. J., Cano, M., Marquez, B., & Larsen, B. (2020). Assessing Maternal Support for Physical Activity in Latina Adolescents. *American Journal of Health Behavior*, 44(2), 146–158. <https://doi.org/10.5993/AJHB.44.2.3>
- Boss, P. (1993). *Sourcebook of family theories and methods: A contextual approach*. Plenum Press.
- Bowen, M. (1974). Alcoholism as Viewed Through Family Systems Theory and Family Psychotherapy. *Annals of the New York Academy of Sciences*, 233(1), 115–122. <https://doi.org/10.1111/j.1749-6632.1974.tb40288.x>
- Brown, H. E., Atkin, A. J., Panter, J., Wong, G., Chinapaw, M. J. M., & van Sluijs, E. M. F. (2016). Family-based interventions to increase physical activity in children: A systematic review, meta-analysis and realist synthesis. *Obesity Reviews*, 17(4), 345–360. <https://doi.org/10.1111/obr.12362>
- Brown, J. (1998). *Treating Addictive Behaviors* (2nd ed.). Plenum Press.
- Centers for Disease Control and Prevention. (2019a). Physical Activity Guidelines for School-Aged Children and Adolescents. *Division of Population Health, National Center for Chronic Disease Prevention and Health Promotion*. <https://www.cdc.gov/healthyschools/physicalactivity/guidelines.htm>
- Centers for Disease Control and Prevention. (2019b). Rural Health. *National Center for Chronic Disease Prevention and Health Promotion*. <https://www.cdc.gov/chronicdisease/resources/publications/factsheets/rural-health.htm>
- Cohen, J. (2013). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge. <https://doi.org/10.4324/9780203771587>

- Data Resource Center for Child and Adolescent Health. (2016). *National Survey of Children's Health*.
- Fuemmeler, B. F., Anderson, C. B., & Mâsse, L. C. (2011). Parent-child relationship of directly measured physical activity. *The International Journal Of Behavioral Nutrition And Physical Activity*, 8, 17–17. (21385455).
<https://doi.org/10.1186/1479-5868-8-17>
- Johnson, J. A., & Johnson, A. M. (2015). Urban-Rural Differences in Childhood and Adolescent Obesity in the United States: A Systematic Review and Meta-Analysis. *Childhood Obesity*, 11(3), 233–241. <https://doi.org/10.1089/chi.2014.0085>
- Lundeen, E. A., Parks, S., Pan, L., O'Toole, T., Matthews, K., & Blanck, H. (2018). Obesity Prevalence Among Adults Living in Metropolitan and Nonmetropolitan Counties—United States, 2016. *MMWR. Morbidity and Mortality Weekly Report*, 67. <https://doi.org/10.15585/mmwr.mm6723a1>
- Marin, G., & Marin, B. V. (1991). *Research with Hispanic populations*. SAGE Publications, Inc.,
<https://doi.org/10.4135/9781412985734>
- McClendon, M. E., Umstattd Meyer, M. R., Ylitalo, K. R., & Sharkey, J. R. (2017). Physical Activity of Mexican-Heritage Youth During the Summer and School-Year: The Role of Parenting Strategies. *Journal of Community Health*, 42(6), 1102–1110. <https://doi.org/10.1007/s10900-017-0358-z>
- Morgan, M. D. (n.d.). Colonias Overview. *Taking Stock*, 8.
- Nolan, J. A., Cottrell, L. A., & Dino, G. A. (2013). Parent health risk and support for child physical activity. *American Journal of Health Behavior*, 37(1), 32–42. (2012-23638-004). <https://doi.org/10.5993/AJHB.37.1.4>
- O'Connor, A., & Wellenius, G. (2012). Rural-urban disparities in the prevalence of diabetes and coronary heart disease. *Public Health*, 126(10), 813–820. <https://doi.org/10.1016/j.puhe.2012.05.029>
- Office of Disease Prevention and Health Promotion. (2018a). Nutrition and Weight Status. *U.S. Department of Health and Human Services*. <https://www.healthypeople.gov/2020/topics-objectives/topic/nutrition-and-weight-status/objectives>
- Office of Disease Prevention and Health Promotion. (2018b). Physical Activity Guidelines for Americans. *U.S. Department of Health and Human Services*. <https://www.hhs.gov/fitness/be-active/physical-activity-guidelines-for-americans/index.html>
- Office of the Attorney General. (n.d.). *Colonias Prevention*. Retrieved April 29, 2019, from
<https://www.texasattorneygeneral.gov/divisions/colonias-prevention>
- Otiniano, A. D., Carroll-Scott, A., Toy, P., & Wallace, S. P. (2012). Supporting Latino communities' natural helpers: A case study of promotoras in a research capacity building course. *Journal of Immigrant and Minority Health*, 14(4), 657–663.
<https://doi.org/10.1007/s10903-011-9519-9>

- Patterson, P. D., Moore, C. G., Probst, J. C., & Shinogle, J. A. (2004). Obesity and physical inactivity in rural America. *The Journal of Rural Health: Official Journal of the American Rural Health Association and the National Rural Health Care Association*, 20(2), 151–159. <https://doi.org/10.1111/j.1748-0361.2004.tb00022.x>
- Piercy, K. L., Troiano, R. P., Ballard, R. M., Carlson, S. A., Fulton, J. E., Galuska, D. A., George, S. M., & Olson, R. D. (2018). The Physical Activity Guidelines for Americans. *JAMA*, 320(19), 2020–2028. <https://doi.org/10.1001/jama.2018.14854>
- Prochnow, T., Ylitalo, K. R., Sharkey, J., & Umstattd Meyer, M. R. (2019). *Perceived Physical Activity Barriers of Mexican-Heritage Sibling Dyads*. <https://doi.org/info:doi/10.5993/AJHB.43.4.11>
- Sallis, J., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An Ecological Approach to Creating Active Living Communities. *Annual Review of Public Health*, 27(1), 297–322. <https://doi.org/10.1146/annurev.publhealth.27.021405.102100>
- Sallis, J. F., & Nader, P. R. (1988). Family determinants of health behaviors. In *Health behavior* (pp. 107–124). Springer.
- Schoeppe, S., Vandelandotte, C., Bere, E., Lien, N., Verloigne, M., Kovács, É., Manios, Y., Bjelland, M., Vik, F. N., & Van Lippevelde, W. (2017). The influence of parental modelling on children’s physical activity and screen time: Does it differ by gender? *European Journal of Public Health*, 27(1), 152–157. (2018-15866-031). <http://ezproxy.baylor.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2018-15866-031&site=ehost-live&scope=site>
- Seguin, R., Connor, L., Nelson, M., LaCroix, A., & Eldridge, G. (2014, December 11). *Understanding Barriers and Facilitators to Healthy Eating and Active Living in Rural Communities*. Hindawi. Journal of Nutrition and Metabolism. <https://doi.org/https://doi.org/10.1155/2014/146502>
- Sharkey, J. R., Nalty, C., Johnson, C. M., & Dean, W. R. (2012). Children’s very low food security is associated with increased dietary intakes in energy, fat, and added sugar among Mexican-origin children (6-11 y) in Texas border Colonias. *BMC Pediatrics*, 12, 16. <https://doi.org/10.1186/1471-2431-12-16>
- Sterne, J. A. C., & Smith, G. D. (2001). Sifting the evidence—What’s wrong with significance tests? *BMJ: British Medical Journal*, 322(7280), 226–231. <https://doi.org/10.1136/bmj.322.7280.226>
- Taylor, W. C., Baranowski, T., & Sallis, J. F. (1994). Family determinants of childhood physical activity: A social-cognitive model. In *Advances in exercise adherence* (pp. 319–342). Human Kinetics Publishers.
- Umstattd Meyer, M. R., Houghtaling, B., Wende, M. E., Kheshaifaty, K. H., Delgado, H., Eze, S. A., Mecate, C., Summerall Woodward, R., Morgan, R. L., & Krey, K. J. (2024). A scoping review of policies to encourage breastfeeding, healthy eating, and physical activity among rural people and places in the United States. *BMC Public Health*, 24(1), 2160. <https://doi.org/10.1186/s12889-024-19173-7>

- Umstattd Meyer, M. R., Sharkey, J. R., Patterson, M. S., & Dean, W. R. (2013). Understanding contextual barriers, supports, and opportunities for physical activity among Mexican-origin children in Texas border colonias: A descriptive study. *BMC Public Health*, 13(1), 14. <https://doi.org/10.1186/1471-2458-13-14>
- Yamauchi, L. A. (1998). Individualism, Collectivism, and Cultural Compatibility: Implications for Counselors and Teachers. *The Journal of Humanistic Education and Development*, 36(4), 189–198. <https://doi.org/10.1002/j.2164-4683.1998.tb00391.x>
- Zambrana, R. E. (1995). *Understanding Latino families: Scholarship, policy and practice*. Sage Publications.