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Perspectives of Mexican-origin smokers on healthy eating and physical activity

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Abstract

Key modifiable risk behaviors such as smoking, poor diet and physical inactivity often cluster and may have multiplicative adverse effects on health. This study investigated barriers and facilitators to healthy eating and physical activity (PA) in overweight Mexican-origin smokers to inform the adaptation of an evidence-based smoking cessation program into a multiple health behavior change intervention. Five focus groups were conducted with overweight Mexican-origin men ($n = 9$) and women ($n = 21$) who smoked. Barriers and facilitators of healthy eating and PA were identified, and gender differences were assessed. Participants expressed some motivation to eat healthfully and identified strategies for doing so, yet many women experienced difficulties related to personal, family and work-related circumstances. Barriers to healthy eating among men were related to food preferences and lack of familiarity with fruits and vegetables. Participants performed PA primarily within the context of work and domestic responsibilities. Stress/depressed mood, lack of motivation and concern for physical well-being limited further PA engagement. Routines involving eating, PA and smoking highlight how these behaviors may be intertwined. Findings emphasize the importance of social, structural and cultural contexts and call for additional investigation into how to integrate healthy eating and PA into smoking cessation interventions for overweight Mexican-origin smokers.

Introduction

Smoking, poor diet and physical inactivity account for approximately one-third of all deaths [1] and 60% of cancer-related deaths in the United States [2]. These behaviors frequently co-occur [3, 4]. For example, smokers tend to consume a less healthy diet and engage in less physical activity (PA) than non-smokers [5–10]. This co-occurrence is especially concerning given that combinations of risk behaviors may have multiplicative adverse effects on disease risk and mortality [11–14]. Thus, researchers have emphasized the need for interventions targeting multiple, rather than single, health risk behaviors and multiple health behavior change interventions have gained increasing empirical support [6, 15–17]. In particular, smoking cessation treatment may be an opportune time to target co-occurring physical inactivity and poor diet,

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especially among overweight smokers. Evidence from studies of energy balance and smoking suggest that positive change in one behavior may facilitate positive change in another [16, 18, 19].

Despite growing interest in multiple risk behavior research, little is known about the effectiveness of interventions addressing multiple health behavior change for underserved populations such as Latinos. Latinos, and those of Mexican origin in particular, represent an important yet understudied population at heightened risk for multiple health risk behaviors and related chronic disease morbidity and mortality. Approximately 80% of Mexican-origin adults in the United States are overweight or obese, compared with 68% of non-Latino Whites [20]. National data indicate that Mexican-origin adults are less likely than non-Latino Whites to engage in recommended levels of PA [21], and 78% of Latinos in general consume fewer than five servings of fruits and vegetables per day [22]. National data also show that Latino smokers are less likely than non-Latino White smokers to access or be provided smoking cessation treatment or counseling [23, 24]. Although data on multiple health risk behaviors are sparse, evidence suggests that Latinos are more likely than non-Latino Whites to engage in more than one health risk behavior [25]. In particular, Mexican-origin smokers have a higher prevalence of obesity relative to African American and non-Latino White smokers [26]. Given that Latinos are expected to comprise 30% of the total US population by 2050, and that individuals of Mexican origin account for nearly two-thirds of US Latino population [27], identifying effective strategies for addressing these co-occurring health risk behaviors in Mexican-origin smokers is critical to the nation's public health.

Numerous studies have investigated factors affecting PA and healthy eating in Latinos in general; however, the salient factors affecting these behaviors in overweight, Mexican-origin smokers are unclear. Studies of predominantly Mexican-origin Latinos suggest that social support, self-efficacy, attitudes toward PA, time constraints, motivation, safety and health concerns, social and cultural norms and access to PA resources affect PA engagement [28–37]. Factors influencing dietary behavior include nutrition knowledge and cooking skills, access to affordable healthy food, time constraints and transportation [32, 38, 39]. However, research suggests that these factors vary by overweight status [40, 41], and it is also possible that they differ for smokers versus non-smokers. Thus, research is needed to understand the most important factors to target to improve the effectiveness of multiple health behavior change interventions specifically for overweight Mexican-origin smokers.

This study involved formative research to inform the adaptation of an evidence-based smoking cessation intervention to concurrently address healthy eating and PA among overweight, Mexican-origin smokers. The original intervention, motivation and problem solving (MAPS), is a smoking cessation counseling program grounded in social cognitive theory [42] that utilizes a motivational interviewing approach [43]. MAPS has demonstrated positive outcomes for smoking cessation in diverse populations, including Mexican-origin smokers [44–46]; however, to date, MAPS has not been applied to other health risk behaviors. Additional research was therefore needed to modify the intervention to address multiple health risk behaviors. An in-depth description of the adaptation process is presented elsewhere [47]. The purpose of this qualitative research was to identify factors that facilitated or hindered healthy eating and PA in overweight Mexican-origin men and women who smoked. This information is necessary to adapt the original MAPS intervention and may also be applicable to other interventions targeting healthy eating and PA among Mexican-origin smokers.

Methods

Focus groups were conducted with Spanish-speaking Mexican-origin adult men and women in February and March 2012. Focus groups were conducted separately for men ($n = 2$ groups) and women ($n = 3$ groups) to ensure homogeneity and enable examination of potential differences by gender in barriers and facilitators. Eligibility criteria

included being at least 18 years of age, of Mexican origin, a current smoker and overweight or obese (i.e. self-reported height and weight that corresponded to a body mass index (BMI) $\geq 25\,kg/m^2$). Participants were recruited through community outreach and from an existing institutional cohort, the Mexican American Cohort Study (MACS), an ongoing study to assess genetic and non-genetic risk factors for cancer in Mexican-origin adults in the greater Houston area established by the Department of Epidemiology at the University of Texas MD Anderson Cancer Center (MDACC) [48]. Potential focus group participants were identified from the MACS database based on eligibility criteria and contacted by phone. Those determined to be eligible were invited to participate.

A trained female, bilingual staff member conducted the focus groups in Spanish using a semi-structured guide. Discussion topics concentrated on factors related to healthy eating and PA, as these were the areas in need of investigation to inform the adaptation of the intervention. The focus group guide drew from the social ecological model, which stipulates that multiple levels of influence (e.g. individual, interpersonal, environmental) interact to shape an individual's behavior [49]. The focus groups began with questions to assess participants' typical behaviors related to food purchasing, preparation and consumption and PA. Questions were intended to elicit information about the contexts in which these behaviors were performed, and participants were encouraged to share information about factors at any level of influence that were perceived to facilitate or inhibit healthy eating or PA. Focus group discussions lasted $\sim$1.5 h. Focus groups were audio recorded, transcribed verbatim in Spanish and translated by certified translators into English for analysis. Two bilingual investigators reviewed each translation for accuracy and made changes as needed. The Institutional Review Board at MDACC approved all aspects of the study.

Transcripts were managed and coded using Atlas.ti 7.0 (Scientific Software Development). A team of six coders analysed transcripts using both inductive and deductive approaches to identify conceptual linkages, or themes, within the data [50, 51]. The coding team first read each transcript independently, and then together developed a coding system to capture relevant concepts within the text. Codes were derived from the focus group guide and allowed to emerge from the data. Next, each transcript was coded and reviewed by two separate coders. The team of coders met regularly throughout the analysis process to refine the coding scheme. The method of constant comparison [52] was used to compare concepts within and across codes to examine relationships, identify salient themes and assess similarities and differences by gender. Inconsistencies in coding were resolved through discussions with the full coding team until consensus was achieved.

Results

Groups ranged in size from four to eight participants and included 21 women and 9 men. Per the study's eligibility criteria, all participants were of Mexican descent, reported a BMI $\geq 25\,kg/m^2$ and were current smokers. Additional demographic data were obtained for 23 of the 30 participants (Table I). Participants were on average 44 years of age, and over half reported less than a high school education. Nearly two-thirds were married, 70% were born in Mexico and immigrants had resided in the United States for an average of 19 years. Thematic results are discussed below for healthy eating and PA. Brief descriptions of participants' typical behaviors are presented first followed by themes pertaining to barriers and facilitators for each behavior. Table II lists the themes and indicates whether they apply to both men and women or were unique to women (no themes were unique to men).

Healthy eating

Participants described their typical diet as consisting of predominantly meat, tortillas, fish, beans and rice. Women generally reported a healthier diet than the men and described efforts to eat more chicken, fish and vegetables rather than red meat, cut back on tortillas, drink more water and eat healthy snacks (e.g. celery, apples, carrots). In response to questions

Table I. *Demographic characteristics of focus group participants*

	Total ($n = 23$) % or mean (range)	Women ($n = 15$)	Men ($n = 8$)
Age (years)	44 (27–64)	45 (27–55)	43 (36–64)
Education			
< High school	57%	53%	63%
High school graduate	22%	27%	13%
≥ High school	22%	20%	25%
Marital status (married)	65%	67%	65%
Country of birth			
Mexico	70%	73%	63%
United States	30%	27%	37%
Years in United States	19 (6–41)	16 (6–41)	25 (18–34)

Table II. *Themes related to barriers and facilitators of healthy eating and PA*

	Applies to both men and women	Unique to women
Healthy eating		
Barriers		
Individual food preferences	X	
Limited knowledge of fruits and vegetables and their preparation	X	
Unhealthy family influences		X
Lack of time or energy to prepare healthy meals		X
Facilitators		
Weight or health-related motivation	X	
Positive influences from family	X	
Strategies for preparing healthy meals and eating more healthfully	X	
Strategies for grocery shopping to facilitate healthy eating	X	
PA		
Barriers		
Little expectation for regular PA outside of routine activities	X	
Work and family commitments leave little time or energy for PA	X	
Lack of motivation to initiate or sustain regular PA	X	
Stress and depressed mood	X	
Concern for physical well-being	X	
Facilitators		
Engaging in PA that is fun and involves family or friends	X	
Experiencing positive effects of PA		X

about healthy and unhealthy foods, both men and women acknowledged that they should limit consumption of red meat and fried foods, consume more vegetables and drink water instead of soft drinks.

Barriers to healthy eating

Individual food preferences. Men and women described individual food preferences that interfered with healthy eating in general and fruit and vegetable consumption in particular. One female participant described, '. . .broccoli and the green stuff—I tell you, they make me sick, so I don't eat them and I never gave them to my children'. A male participant said, 'If it does not have fat, it does not taste good'. A female participant noted, 'As Hispanics, we are used to eating tortillas, meat, beans, rice, sauces and just eating'.

Limited knowledge of fruits and vegetables and their preparation. Some participants, particularly men, lacked basic knowledge about fruits and vegetables, and how to prepare them in a healthful way. Specifically, participants noted that Mexican immigrants are often unfamiliar with certain vegetables (e.g. broccoli, cauliflower) commonly seen in the United States, and are unwilling to try them. One male participant stated, 'Many times, we do not know how some vegetables taste. . .. Many people who come from Mexico now haven't tried many vegetables here and don't know the benefits they have for your body'. Similarly, some participants reported that they did not know how to prepare vegetables. One male participant reported that he enjoyed eating vegetables but rarely ate them because he did not like how they tasted raw, and '[his] wife does not know how to cook them'.

Unhealthy family influences. Female participants reported that family influences were a considerable barrier to healthful eating—especially to fruit and vegetable consumption. Women reported being

responsible for the majority of the grocery shopping and cooking and reported that fresh produce frequently went to waste because their families did not eat it. One female participant stated, 'When I buy groceries, since I have my little girls, I buy enough fruit for them. I tell my girls, 'there is fruit' and they do not eat it, so the next week I will not buy any fruit'. Women also described a general lack of support for healthy eating within the home. One woman stated,

> Now that I put myself on a diet, I am the one on a diet, not [my husband] or the kids. So I can't skip the tortilla, I can't skip the mayonnaise; they really like it in their sandwich. And the Coca-Cola, for my husband. The kids and I drink water. But there has to be Coke for my husband. And being in the house everyone has a bit, but there has to be Coke, even if I have to go out to buy it. He tells me I am the one on a diet, not him.

Further, the preparation of multiple meals was identified as a barrier to healthful eating by another participant who expressed, 'In my case, because I am tired of cooking one thing here and another thing there, I have to eat what my husband eats, and so that is the problem'.

Lack of time or energy to prepare healthy meals. Female participants reported that they often lacked the time and/or energy to prepare healthy meals. One woman stated,

> I don't feel like I have the energy [to cook a healthy dinner]. I get home from work and I am tired. I have to cook dinner, but I don't feel like I have the energy, and all I want to do is go to bed and sleep.

Facilitators of healthy eating

Weight or health-related motivation. Both men and women reported that the desire to lose weight and/or improve their or their family's health was an important factor in their efforts to eat healthfully. A male participant revealed, 'I could eat a steak every 2 months if I could, of course. I have to eat carefully, and I have to work out, because otherwise, [my health] can get worse'. Similarly, a female participant stated,

> My little boy has obesity problems . . . I know it has to do with what he eats . . . And I also think of him and I say, 'Okay, I have to make an effort and prepare healthy meals'.

Another female participant stated,

> I used to weigh around 185 pounds. I lost weight – now I weigh 165. I didn't lose it all at once – no, it has been gradually. . . I believe we have changed our way of eating and it has given us results.

Positive influences from family. Among both men and women, positive influence or support from family members encouraged healthy eating. A female participant reported that her son helped her to make more healthy food-related choices. She stated, 'Last summer, he asserted himself. He didn't say, 'It's a diet'. He said, 'It's going to be a change in our way of eating''. Similarly, one male participant noted, 'There are times when I make roast beef and there [my son] is [saying], 'You are not going to eat that''.

Some participants noted that their children preferred healthier foods to foods higher in fat or sugar, which affected the foods they prepared for their families. One woman stated,

> If I cook something that has fat on it, [my children] will not eat it and I will have to throw it out. Either I cook without fat so that they can eat it, or I do not cook.

Strategies for preparing healthy meals and eating more healthfully. In response to questions regarding facilitators of healthy eating, both men and women described strategies to prepare healthier meals. One female participant reported that preparing dinner the night before facilitated healthy eating because she frequently arrived home from work late. She stated,

> We always eat [leftovers] from the previous day because if I get home at 7:00pm or

> 8:00pm to cook, the girls will starve. I reheat and reheat. It finishes, we eat dinner, and then I cook for the following day. That is how we are accustomed, and I find it easier than getting home really tired and rushing to cook.

Some participants reported making an effort to avoid foods and drinks high in sugar or fat. One female participant noted, 'Before, I used to make lentils with bacon, with pork—with lots of it. Now I only make tomato, onions, coriander, plantains and these big raisins, and all that, but no bacon'. Another female participant stated, 'I eat a lot of oven-baked tortillas—the diet ones—instead of the regular ones'. Some participants also noted the importance of portion size. A male participant expressed, 'I try to eat healthy, healthy food and the amount that is also recommended'.

Strategies for grocery shopping to facilitate healthy eating. Participants indicated that healthier foods tend to cost more, and that comparing costs and looking for sales was crucial. One woman reported that she considered what was on sale when planning healthy meals for her family. 'Right now, I take advantage of the sales... And that's how I go about making the menu'. Some participants described that pre-washed and pre-packaged vegetables helped them to increase their vegetable consumption. For example, one male participant noted, 'I buy bags of vegetables at Wal-Mart, which are full of different kinds, and I try to also put it in my meal'.

Physical activity

Participants' typical PA was described in the context of routine activities. Both men and women indicated that their occupations (e.g. construction, housekeeping) were an important source of PA, and some men described biking as their primary mode of transportation. Other typical activities included caring for/playing with children and grandchildren. Although less frequent, leisure-time PA included walking, going to the gym, dancing, swimming and fitness classes. Participants were generally aware of the health benefits of being physically active, and many emphasized its importance for weight loss. At the same time, some participants, particularly those with existing health conditions, conveyed a lack of understanding of what constitutes PA and how to safely initiate exercise.

Barriers to PA

Little expectation for regular PA outside of routine activities. Overall, most participants did not aspire or plan to engage in PA beyond that which was a routine part of their job, domestic tasks or transportation. Even among participants who did not work and acknowledged having free time, there was little expectation of using that time to be physically active. At home in particular, women were accustomed to doing other domestic and leisurely tasks. One woman described needing a job that was physically demanding to get the activity she believed would help her to lose weight.

> If I were working I would be in shape. In the job I had I used to sweat a lot, and it was cold there, but I sweat a lot because it was so much work. I am telling you, that is what I am looking for in a job, because it is the only way for me to slim down and maintain my ideal weight. Because at home, you do your household chores, for sure, but you walk slowly, and you get tired or get bored and you sit down and play with the computer or go watch the soap opera.

Some participants also commented that excessive reliance on the car in the United States limited active transportation. One male participant contrasted norms around PA for active transportation in the United States with his experience in Mexico.

> You know what affects us here in the States? The car. In Mexico, when you go to the country, you walk—you go. And here a person doesn't walk even to the corner. Everything is done in the car; it is a bad custom.

Work and family commitments leave little time or energy for PA. Competing responsibilities and demands on participants' time presented practical barriers for PA. Both men and women described long days consumed by work and/or family

commitments. Men described long work hours and physically demanding jobs that left them exhausted at the end of the day. Women also described working long hours as well as domestic duties (i.e. caring for children or ailing parents) after work. As a result, participants described lacking energy to be active and felt that their remaining time should be devoted to rest. A male participant said,

> It's been a year that I have not had time to work out. I leave work at 8:00 in the evening. I leave the house at 6:30 [in the morning] and I get back home very late, so the time I have left is to rest.

Women in particular expressed feeling overwhelmed by multiple responsibilities, as adding PA to their already busy lives was viewed as an additional burden, nuisance or source of stress.

Lack of motivation to initiate or sustain regular PA. Men and women expressed a desire to be more physically active yet described a lack of motivation to start exercising or to maintain a routine beyond a short period of time. One woman described,

> The track at the park was about 1 or 2 miles long. I went for about 2 weeks, but the soap operas in the afternoon were really good, so I cook and I go and sit down. Relaxed, I'm like, 'Yes, tomorrow I'm going to do some exercise; tomorrow I'll start, next week'. And for me it's laziness, because I think I could go—even if I only go for half an hour, since the park is only 5 minutes away from my house—and I don't.

One woman emphasized how a lack of motivation reflected that taking care of one's health was a lower priority than other leisurely activities.

> You can always find time for everything; we don't have to fool ourselves. You find time to watch the soap opera, to go on Facebook, to gossip with the neighbor or to smoke. But for God and our own well-being we lack the time.

Stress and depressed mood. For both men and women, stress and depressed mood may have contributed to a lack of motivation for PA. Stress was mentioned during discussions about weight gain, managing multiple responsibilities and demands on one's time. One female participant indicated: 'I am always down; I don't know. I feel a bit depressed. They tell me to walk and oh, no! I don't want to'. In a similar vein, one male participant stated,

> In my case I don't feel in the mood to do any exercise. I get home annoyed already, sometimes. There are so many things that make me get upset at home and I don't want to do anything else. I used to be in the mood to exercise before, I loved cutting the grass, fixing things—I don't want to do anything else. I don't want to do anything.

Concern for physical well-being. This barrier was manifested in two ways. First, both men and women reported health problems (e.g.back, knee and foot problems, arthritis, ulcers) that limited their ability to be physically active or made them wary of exercise for fear of exacerbating their condition. Second, women in particular expressed concern of injury or pain from the exercise itself. For most, this was based on firsthand experiences of pain and discomfort following a bout of exercise. One woman stated,

> I have to go to the gym, and sometimes I go for an hour, when I'm really into it. Since there are so many people, one gets so encouraged there; sometimes I even stay for 2 hours, but the next day, when I am working, I can't even move. I say, 'So much wear and tear!' I think I'm going to end up sick or worse.

Some women framed this concern in the context of needing to ensure their ability to work and to conserve their energy and well-being for this purpose. In this context, exercise was viewed as potentially detrimental to their capacity to work. One woman shared, 'There are times when I say, "I better save my energy for work, because otherwise, I am wearing myself down too much"'.

Facilitators of PA

Engaging in PA that is fun and involves family or friends. Several women described incorporating PA into their lives in ways that are fun, appealing and typically involve family or friends. Women talked about being active with their children, which enabled them to exercise without taking time away from their families. One woman said,

> Sometimes I don't go to the gym and I just play with the girls, and we have so much fun. That way you don't abandon the family much and, well, you also do some exercise while the children are also having fun with you—because every day is working, working, working.

Both women and men mentioned dancing as an enjoyable form of PA. Participants described going out to dance as well as dancing at home with children. One woman stated:

> I don't like to exercise but I do like dancing. I have a 14 year-old daughter that always says to me, 'Let's go. Let's go dancing', in the afternoons so I take all my children with me. Or if I am cooking or I am cleaning my kitchen and I put on the stereo loudly and I dance and the little ones come with me and start to dance. Then yes, that is my way of exercising.

Experiencing positive effects of PA. Several women shared their experiences about how PA helped them to feel better and to have more energy. One woman said,

> I don't know if it has happened to you, but when one picks up the routine, into a rhythm of doing exercise, you get more energy.... Before, I used to get really tired, and now I do my daily routine and get home in higher spirits.

Another woman noted that her Zumba routine helped her deal with stress. 'It has helped me a little bit because I have a lot of stress and I can't handle it. By doing this I feel a little better'.

Relationships among smoking, eating behaviors and PA

Although the interview guide focused primarily on healthy eating and PA, participants' comments also provided insight regarding the ways in which these behaviors may relate to smoking. First, several participants acknowledged that quitting smoking would help them to be more active. One woman described tiring easily and attributed this to her smoking habit. Second, another woman spoke of how she enjoys dancing but that dancing leads to smoking: 'The problem is that I smoke when I go dancing... So I don't really think it has much to offer. I mean, I don't think dancing is a good option'. Third, some participants described a routine of smoking when they had finished physically demanding tasks. One woman explained how smoking is a part of her morning routine after cleaning the house: 'The last thing I do is mop the floor. So I end up very tired, and what do I do? Well, I light up a cigarette'. Finally, participants discussed routines around eating, watching television and smoking. One man stated,

> When I smoke, I always have to be drinking coffee. If not, it's soda or water that I drink, anything, but I just can't smoke a cigarette without having something else–or chewing gum or with chocolate.

A woman commented, 'As long as I have nothing to do or have just finished eating, as they say, after a good taco, a good tobacco'. Another woman described, 'I finish eating and as soon as I have finished I already want a cigarette, and while the soap opera is ending, I smoke my 3 or 4 cigarettes'.

Discussion

The aim of this research was to identify barriers and facilitators to healthy eating and PA among overweight Mexican-origin smokers to inform the adaptation of an evidence-based smoking cessation program. Consistent with previous research among Latinos more broadly and those of Mexican origin in particular, participants described demanding work schedules, domestic and caregiving responsibilities

and lack of time as important, practical barriers to healthy eating and PA [28, 36, 37, 39, 53–57]. Reflecting traditional gender roles, women's time was consumed with domestic responsibilities related to being a mother, spouse and daughter, and for many, this was in addition to working. Women's comments conveyed a sense of desperation and of feeling overwhelmed with their multiple roles and responsibilities, fatigue and lack of time. In comparison, men's comments generally focused on the demands of their occupations and limited discretionary time.

For healthy eating, participants expressed some motivation to eat healthfully and identified strategies for doing so, yet many, particularly women, experienced difficulties related to personal, family and work-related circumstances. Women discussed more often than men being motivated to improve their diet and framed this motivation within the context of losing weight and improving their health and their family's health, particularly children. Compared with men, women more often described efforts to eat healthfully and specific changes to facilitate healthy eating among family members. Barriers to healthy eating among men were largely related to preferences for unhealthy foods and limited familiarity with fruits and vegetables in the United States, a finding that has been observed by others among Latinos [32, 38, 58, 59]. Few studies have focused on the nutrition behaviors and perspectives of Mexican-origin or Latino men, yet research suggests that Mexican-origin men exhibit less knowledge of recommended servings of fruits and vegetables, beans and water compared with Mexican-origin women [60].

Food-related decision-making and influences within the family emerged as important factors affecting meal preparation and eating behaviors. Unsupportive family environments for healthy eating and the added burden of preparing separate meals were important barriers to a nutritious diet for some women. The defined gender roles common among participants may have contributed to a lack of support for healthy eating within the household. For example, although women were generally responsible for meal preparation, husbands' food preferences often dictated family meal choices. Men's limited familiarity with healthy foods in the United States, and men's lack of involvement in meal preparation may perpetuate a gap in knowledge that contributes to this lack of support. At the same time, both women and men described examples of positive changes brought about by children. Consistent with other research involving Latinos [38, 40, 61], these findings underscore the important role of the family context in shaping dietary behaviors and point toward the need for intervention strategies to move beyond an emphasis on individuals and to engage multiple family members in efforts to promote healthy eating.

In general, PA was performed primarily within the context of participants' work and domestic responsibilities, with little intention, motivation, time or energy for further engagement in leisure-time PA. Although participants' lack of regular, purposeful PA may be due in part to busy lives and work schedules, it may also stem from the observation that regular leisure-time PA was not a normative behavior. Most participants did not view it as a priority and did not expect to be physically active on a regular basis outside of routine tasks. Studies involving Mexican-origin adults have found that men and women perceived themselves to be sufficiently active given the physical nature of their jobs or lifestyle (e.g. walking to take the bus, caring for children, performing household duties) and did not perceive a need for additional exercise [36, 55, 62, 63]. In this and other studies participants also emphasized a lack of motivation [28, 37, 54, 62], including among those acknowledging having time to exercise.

Our findings also support prior research suggesting that stress and depressed mood may inhibit PA engagement [64]. Stress management and emotion regulation strategies may be important components of PA interventions. Additionally, clinicians might emphasize that increasing PA may reduce stress and improve mood [65]. In fact, a few participants in the current study highlighted how regular PA helped them to manage stress, feel more energetic and enhance their motivation.

Existing health problems (e.g. arthritis, back problems) have been indicated as important barriers to PA in prior research involving Latinos [28, 62, 66]. In this study, women also voiced concerns about the impact of exercise on their physical health, energy and as a consequence, their capacity to work. Importantly, women's experiences discouraged them from exercising and underscore the need for PA promotion efforts to properly instruct participants in safe ways to initiate and maintain PA.

Prior research has identified environmental characteristics, social norms and lack of social support as correlates of PA in diverse populations, including Mexican-origin adults [35–37, 54, 56, 67]. Although a few participants in this study noted the heavy reliance on cars as a barrier to active transportation, participants otherwise did not mention issues related to access, safety or transportation. Rather, participants focused primarily on interpersonal and individual barriers, and some participants described living near parks or walking paths, having access to a gym and even having exercise equipment in their homes. Regarding social support, some women alluded to the importance of being active with family and/or friends to make being active more enjoyable. Additionally, engaging in activities with children facilitated women's participation as it contributed to family time rather than competing with it.

Several limitations of this research should be noted. First, the qualitative design and the small sample size prevent inferences of causality and limit the generalizability of findings. This study focused on overweight Mexican-origin men and women who smoke; thus, findings may not be applicable for Mexican-origin non-smokers, individuals of a different race/ethnicity or Latino subgroup, or those who are not overweight. Further, participants who were immigrants had been in the United States an average of 19 years. A more recent immigrant sample or a sample of predominantly US-born participants may have produced different findings given that nutrition, PA and smoking behaviors have been shown to vary with time in the United States and acculturation [68–70]. Second, this study included five focus groups consisting of 30 participants (i.e. 9 men, 21 women). Due to the small number of groups and the small number of male participants, results should be interpreted with caution. Similarities and differences by gender regarding barriers and facilitators to healthy eating and PA did emerge during the analysis; however, further research is needed to support these findings before definitive conclusions can be drawn. Importantly, few studies in this area have focused on Mexican-origin or Latino men. Finally, demographic data were missing for ~23% of participants (1 man, 6 women). Thus, these data may not fully reflect the characteristics of all participants.

Conclusion

This study highlights individual, interpersonal and social contextual factors that may influence healthy eating and PA among overweight, Mexican-origin smokers. Findings suggest that interventions with Mexican-origin smokers need to address intrapersonal barriers such as personal food preferences, limited familiarity with fruits and vegetables and their preparation and lack of motivation for healthy eating and PA. Findings also emphasize the importance of family dynamics and social support on food preparation and healthy eating, calling for greater engagement of family members to promote increased awareness, motivation and support for healthy lifestyles within the home. Participants' daily contexts (e.g. busy schedules, lack of time/energy) reveal the challenges of addressing structural constraints. Problem-solving techniques may help to identify strategies for healthy meal preparation and incorporating PA into existing routines. This study also identified women's concerns of the perceived adverse impacts of PA on their physical well-being and ultimately their capacity to work.

Finally, intervention approaches targeting multiple risk behaviors in Mexican-origin adults need to be mindful of how these behaviors may interact. Participants' comments revealed how smoking may affect healthy eating habits and PA, and how different activities and eating routines may be linked to

smoking. Efforts to modify these behaviors are likely to benefit from further exploration of these relationships to identify ways to facilitate positive changes in multiple behavioral outcomes. Although this study did not explore coaction of multiple health behavior change, this is an important area of future research. Importantly, these findings suggest that tailored, participant-driven approaches such as MAPS that include discussion of participants' priorities and as such are amenable to addressing multiple behaviors concurrently or sequentially may play a critical role in navigating participants toward healthier lifestyles.

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Conflict of interest statement

None declared.

References

1. Mokdad AH, Marks JS, Stroup DF *et al*. Actual causes of death in the United States, 2000. *JAMA* 2004; **291**: 1238–45.
2. Ries LAG, Eisner MP, Kosary CL *et al*. (eds). *SEER Cancer Statistics Review, 1975-2001*. Bethesda, MD: National Cancer Institute, 2004.
3. Berrigan D, Dodd K, Troiano RP *et al*. Patterns of health behavior in U.S. adults. *Prev Med* 2003; **36**: 615–23.
4. Poortinga W. The prevalence and clustering of four major lifestyle risk factors in an English adult population. *Prev Med* 2007; **44**: 124–8.
5. Chiolero A, Wietlisbach V, Ruffieux C *et al*. Clustering of risk behaviors with cigarette consumption: a population-based survey. *Prev Med* 2006; **42**: 348–53.
6. Emmons KM, Marcus BH, Linnan L *et al*. Mechanisms in multiple risk factor interventions: smoking, physical activity, and dietary fat intake among manufacturing workers. Working Well Research Group. *Prev Med* 1994; **23**: 481–9.
7. Ma J, Betts NM, Hampl JS. Clustering of lifestyle behaviors: the relationship between cigarette smoking, alcohol consumption, and dietary intake. *Am J Health Promot* 2000; **15**: 107–17.
8. Schuit AJ, van Loon AJ, Tijhuis M *et al*. Clustering of lifestyle risk factors in a general adult population. *Prev Med* 2002; **35**: 219–24.
9. Woodward M, Bolton-Smith C, Tunstall-Pedoe H. Deficient health knowledge, diet, and other lifestyles in smokers: is a multifactorial approach required? *Prev Med* 1994; **23**: 354–61.
10. Strine TW, Okoro CA, Chapman DP *et al*. Health-related quality of life and health risk behaviors among smokers. *Am J Prev Med* 2005; **28**: 182–7.
11. Breslow L, Enstrom JE. Persistence of health habits and their relationship to mortality. *Prev Med* 1980; **9**: 469–83.
12. Freedman DM, Sigurdson AJ, Rajaraman P *et al*. The mortality risk of smoking and obesity combined. *Am J Prev Med* 2006; **31**: 355–62.
13. Marrero JA, Fontana RJ, Fu S *et al*. Alcohol, tobacco and obesity are synergistic risk factors for hepatocellular carcinoma. *J Hepatol* 2005; **42**: 218–24.
14. Slattery ML, Potter JD. Physical activity and colon cancer: confounding or interaction? *Med Sci Sports Exerc* 2002; **34**: 913–9.
15. Goldstein MG, Whitlock EP, DePue J. Multiple behavioral risk factor interventions in primary care. Summary of research evidence. *Am J Prev Med* 2004; **27**: 61–79.
16. Johnson SS, Paiva AL, Cummins CO *et al*. Transtheoretical model-based multiple behavior intervention for weight

management: effectiveness on a population basis. *Prev Med* 2008; **46**: 238–46.
17. Prochaska JO. Multiple health behavior research represents the future of preventive medicine. *Prev Med* 2008; **46**: 281–5.
18. Johnson SS, Paiva AL, Mauriello L *et al*. Coaction in multiple behavior change interventions: consistency across multiple studies on weight management and obesity prevention. *Health Psychol* 2014; **33**: 475–80.
19. Paiva AL, Prochaska JO, Yin HQ *et al*. Treated individuals who progress to action or maintenance for one behavior are more likely to make similar progress on another behavior: coaction results of a pooled data analysis of three trials. *Prev Med* 2012; **54**: 331–4.
20. Flegal KM, Carroll MD, Kit BK *et al*. Prevalence of obesity and trends in the distribution of body mass index among US adults, 1999-2010. *JAMA* 2012; **307**: 491–7.
21. Schoenborn CA, Adams PF, Peregoy JA. Health behaviors of adults: United States, 2008-2010. *Vital Health Stat* 2013; 10.
22. Centers for Disease Control and Prevention (CDC). *Behavioral Risk Factor Surveillance System Survey Data*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2009.
23. Cokkinides VE, Halpern MT, Barbeau EM *et al*. Racial and ethnic disparities in smoking-cessation interventions: analysis of the 2005 National Health Interview Survey. *Am J Prev Med* 2008; **34**: 404–12.
24. Lopez-Quintero C, Crum RM, Neumark YD. Racial/ethnic disparities in report of physician-provided smoking cessation advice: analysis of the 2000 National Health Interview Survey. *Am J Public Health* 2006; **96**: 2235–9.
25. Fine LJ, Philogene GS, Gramling R *et al*. Prevalence of multiple chronic disease risk factors. 2001 National Health Interview Survey. *Am J Prev Med* 2004; **27**: 18–24.
26. Kendzor DE, Costello TJ, Li Y *et al*. Race/ethnicity and multiple cancer risk factors among individuals seeking smoking cessation treatment *Cancer. Epidemiol Biomarkers Prev* 2008; **17**: 2937–45.
27. U.S Census Bureau. *The Hispanic Population: 2010 Census Briefs*. Washington, DC: U.S. Census Bureau, 2011.
28. Juarbe T, Turok XP, Perez-Stable EJ. Perceived benefits and barriers to physical activity among older Latina women. *West J Nurs Res* 2002; **24**: 868–86.
29. Marquez DX, McAuley E. Social cognitive correlates of leisure time physical activity among Latinos. *J Behav Med* 2006; **29**: 281–9.
30. Wilbur J, Chandler PJ, Dancy B *et al*. Correlates of physical activity in urban Midwestern Latinas. *Am J Prev Med* 2003; **25**: 69–76.
31. Juarbe TC, Lipson JG, Turok X. Physical activity beliefs, behaviors, and cardiovascular fitness of Mexican immigrant women. *J Transcult Nurs* 2003; **14**: 108–16.
32. Ramirez AG, Chalela P, Gallion K *et al*. Energy balance feasibility study for Latinas in Texas: a qualitative assessment. *Prev Chronic Dis* 2007; **4**: A98.
33. Bautista L, Reininger B, Gay JL *et al*. Perceived barriers to exercise in Hispanic adults by level of activity. *J Phys Act Health* 2011; **8**: 916–25.
34. Skowron MA, Stodolska M, Shinew KJ. Determinants of leisure time physical activity participation among Latina women. *Leisure Sci* 2008; **30**: 429–47.
35. Evenson KR, Sarmiento OL, Macon ML *et al*. Environmental, policy, and cultural factors related to physical activity among Latina immigrants. *Women Health* 2002; **36**: 43–57.
36. Martinez J, Powell J, Agne A *et al*. A focus group study of Mexican immigrant men's perceptions of weight and lifestyle. *Public Health Nurs* 2012; **29**: 490–8.
37. Martinez SM, Arredondo EM, Perez G *et al*. Individual, social, and environmental barriers to and facilitators of physical activity among Latinas living in San Diego County: focus group results. *Fam Community Health* 2009; **32**: 22–33.
38. Chavez-Martinez A, Cason KL, Mayo R *et al*. Assessment of predisposing, enabling, and reinforcing factors toward food choices and healthy eating among Hispanics in South Carolina. *Top Clin Nutr* 2010; **25**: 47–59.
39. Cuy Castellanos D, Downey L, Graham-Kresge S *et al*. Examining the diet of post-migrant Hispanic males using the precede-proceed model: predisposing, reinforcing, and enabling dietary factors. *J Nutr Educ Behav* 2013; **45**: 109–18.
40. Chang MW, Baumann LC, Nitzke S *et al*. Predictors of fat intake behavior differ between normal-weight and obese WIC mothers. *Am J Health Promot* 2005; **19**: 269–77.
41. Nuss H, Clarke K, Klohe-Lehman D *et al*. Influence of nutrition attitudes and motivators for eating on postpartum weight status in low-income new mothers. *J Am Diet Assoc* 2006; **106**: 1774–82.
42. Bandura A. Health promotion by social cognitive means. *Health Educ Behav* 2004; **31**: 143–64.
43. Vidrine JI, Reitzel LR, Figueroa PY *et al*. Motivation and problem solving (maps): motivationally based skills training for treating substance use. *Cogn Behav Pract* 2013; **20**: 501–16.
44. McClure JB, Westbrook E, Curry SJ *et al*. Proactive, motivationally enhanced smoking cessation counseling among women with elevated cervical cancer risk. *Nicotine Tob Res* 2005; **7**: 881–9.
45. Reitzel LR, Vidrine JI, Businelle MS *et al*. Preventing postpartum smoking relapse among diverse low-income women: a randomized clinical trial. *Nicotine Tob Res* 2010; **12**: 326–35.
46. Wetter DW, Mazas C, Daza P *et al*. Reaching and treating Spanish-speaking smokers through the National Cancer Institute's Cancer Information Service. A randomized controlled trial. *Cancer* 2007; **109**: 406–13.
47. Castro Y, Fernandez ME, Strong LL *et al*. Adaptation of a counseling intervention to address multiple cancer risk factors among Mexican Americans. *Health Educ Behav* 2015; **42**: 65–72.
48. Chow WH, Chrisman M, Daniel, CR *et al*. Cohort profile: the Mexican American Mano a Mano Cohort. *Int J Epidemiol* 2015. doi: 10.1093/ije/dyv016.
49. Smedley BD, Syme SL (eds). *Promoting Health: Intervention Strategies from Social and Behavioral Research*. Washington, DC: National Academy Press, 2000.
50. Ryan GW, Bernard HR. Techniques to identify themes. *Field Methods* 2003; **15**: 85–109.
51. Miles MB, Huberman AM. *Qualitative Data Analysis: An Expanded Sourcebook,* 2nd edn. Thousand Oaks, CA: Sage,1994.

52. Strauss A, Corbin J. *Basics of Qualitative Research*, 2nd edn. Thousand Oaks, CA: Sage Publications, Inc.,1998.
53. Evenson KR, Sarmiento OL, Tawney KW *et al*. Personal, social, and environmental correlates of physical activity in North Carolina Latina immigrants. *Am J Prev Med* 2003; **25**: 77–85.
54. Eyler AA, Matson-Koffman D, Vest JR *et al*. Environmental, policy, and cultural factors related to physical activity in a diverse sample of women: The Women's Cardiovascular Health Network Project–summary and discussion. *Women Health* 2002; **36**: 123–34.
55. Im EO, Lee B, Hwang H *et al*. "A waste of time": Hispanic women's attitudes toward physical activity. *Women Health* 2010; **50**: 563–79.
56. Lindsay AC, Sussner KM, Greaney ML *et al*. Influence of social context on eating, physical activity, and sedentary behaviors of Latina mothers and their preschool-age children. *Health Educ Behav* 2009; **36**: 81–96.
57. King AC, Castro C, Wilcox S *et al*. Personal and environmental factors associated with physical inactivity among different racial-ethnic groups of U.S. middle-aged and older-aged women. *Health Psychol* 2000; **19**: 354–64.
58. Hampl JS, Sass S. Focus groups indicate that vegetable and fruit consumption by food stamp-eligible Hispanics is affected by children and unfamiliarity with non-traditional foods. *J Am Diet Assoc* 2001; **101**: 685–7.
59. Evans A, Chow S, Jennings R *et al*. Traditional foods and practices of Spanish-speaking Latina mothers influence the home food environment: implications for future interventions. *J Am Diet Assoc* 2011; **111**: 1031–8.
60. Sharma SV, Gernand AD, Day RS. Nutrition knowledge predicts eating behavior of all food groups except fruits and vegetables among adults in the Paso del Norte region: Que Sabrosa Vida. *J Nutr Educ Behav* 2008; **40**: 361–8.
61. Smith TM, Dunton GF, Pinard CA *et al*. Factors influencing food preparation behaviours: findings from focus groups with Mexican-American mothers in southern California. *Public Health Nutr* 2016; **19**: 841–50.
62. Eyler AA, Baker E, Cromer L *et al*. Physical activity and minority women: a qualitative study. *Health Educ Behav* 1998; **25**: 640–52.
63. Hartweg D, Isabelli-Garcia C, McEwen M *et al*. Being physically active: perceptions of recent Mexican immigrant women on the ArizonaMexico border. *Hisp Health Care Int* 2012; **10**: 127–36.
64. Roshanaei-Moghaddam B, Katon WJ, Russo J. The longitudinal effects of depression on physical activity. *Gen Hosp Psychiatry* 2009; **31**: 306–15.
65. Rethorst CD, Wipfli BM, Landers DM. The antidepressive effects of exercise: a meta-analysis of randomized trials. *Sports Med* 2009; **39**: 491–511.
66. Heesch KC, Brown DR, Blanton CJ. Perceived barriers to exercise and stage of exercise adoption in older women of different racial/ethnic groups. *Women Health* 2000; **30**: 61–76.
67. Bungum TJ, Thompson-Robinson M, Moonie S *et al*. Correlates of physical activity among Hispanic adults. *J Phys Act Health* 2011; **8**: 429–35.
68. Ayala GX, Baquero B, Klinger S. A systematic review of the relationship between acculturation and diet among Latinos in the United States: implications for future research. *J Am Diet Assoc* 2008; **108**: 1330–44.
69. Ham SA, Yore MM, Kruger J *et al*. Physical activity patterns among Latinos in the United States: putting the pieces together. *Prev Chronic Dis* 2007; **4**: A92.
70. Abraido-Lanza AF, Chao MT, Florez KR. Do healthy behaviors decline with greater acculturation? Implications for the Latino mortality paradox. *Soc Sci Med* 2005; **61**: 1243–55.