HHS Public Access

Author manuscript

Am J Prev Med. Author manuscript; available in PMC 2019 September 09.

Published in final edited form as:

Am J Prev Med. 2013 May ; 44(5): 550–560. doi:10.1016/j.amepre.2013.01.016.

Evidence-Based Obesity Treatment Interventions for Latino Adults in the U.S.:

A Systematic Review

Lilian G. Perez, MPH, **Elva M. Arredondo, PhD**, **John P. Elder, PhD, MPH**, **Simón Barquera, MD, PhD**, **Brian Nagle, MPH**, **Christina K. Holub, PhD, MPH**

Institute for Behavioral and Community Health (Perez, Arredondo, Elder, Nagle, Holub), San Diego State University, San Diego, California; and the Nutrition and Health Research Center (Barquera), National Institute of Public Health, Cuernavaca, Morelos, Mexico

Abstract

Context: Latinos have one of the highest prevalences of obesity in the U.S. Efforts to address U.S. Latino health have expanded to include obesity prevention and treatment initiatives. The objectives of this review were to (1) conduct a systematic review of obesity-related treatment interventions targeting U.S. Latino adults and (2) develop evidence-based recommendations to inform culturally relevant strategies for obesity treatment targeting U.S. Latino adults.

Evidence acquisition: Obesity treatment interventions, published between 1990 and 2010, were identified through a systematic search of electronic databases conducted between January 2010 and December 2011. Details of the screening process and selection/exclusion criteria are reported in the *Guide to Obesity Prevention in Latin America and the U.S.* (GOL) parent study.

Evidence synthesis: Of the 325 studies identified in the GOL parent study, 105 met the inclusion criteria, and 22 involved obesity treatment interventions for Latinos and were included in the present review. The 22 studies were evaluated (between January 2010 and December 2011) for strength of study design and execution; effect sizes were also estimated for treatment effects on obesity-related outcomes. Interventions for physical activity or diet behavioral changes with strong or sufficient evidence included (1) community-based, culturally relevant, RCTs, and non-randomized controlled trials; (2) church-based interventions; and (3) *promotora*-led interventions.

Conclusions: Most interventions targeted physical activity and/or diet behavioral modification in Latinas and were led by bicultural/bilingual professionals. Potential key intervention settings include community clinics/centers and churches. Although there was limited literature on obesity treatment interventions for U.S. Latinos, the review findings provide valuable insight to researchers and practitioners involved in obesity treatment for U.S. Latino adults.

Address correspondence to: John P. Elder, PhD, MPH, Institute for Behavioral and Community Health (IBACH), San Diego State University, 9245 Sky Park Ct., Suite 221, San Diego CA 92123. jelder@projects.sdsu.edu.

No financial disclosures were reported by the authors of this paper.

Context

Latinos are the fastest growing ethnic group in the U.S. According to recent estimates by the U.S. Census Bureau, in 2010, Latinos made up 16% of the total U.S. population.[1] By 2050, Latinos are expected to make up about one quarter of the nation's total population.[2] In addition to having rapid population growth, Latinos are now also one of the groups with the highest prevalence of obesity in the U.S. In 2010, approximately 31.9% of the Latino adult population was obese.[3]

This growing epidemic of obesity among Latinos may be due in part to changes in dietary practices (i.e., higher fat intake and lower consumption of fiber) that occur during the acculturation process.[4,5] Because of growing evidence demonstrating the economic and social impacts of obesity on individuals, communities, and the nation, the focus of recent public health initiatives targeting Latinos has expanded to include interventions for the prevention and treatment of obesity. Obesity, which is defined as having a BMI ≥30, is a major risk factor for several noncommunicable chronic diseases (NCDs), including cancer; stroke; heart disease; osteoarthritis; respiratory disorders (e.g., dyspnea and sleep apnea); and diabetes.[6,7]

According to the National Health Interview Survey (NHIS), in 2010, Mexican-American adults were 1.7 times more likely to have physician-diagnosed diabetes than their non-Hispanic white counterparts.[3] Sufficient evidence now exists linking several modifiable risk factors, including physical inactivity and poor diet, to the development of NCDs and obesity in individuals. Moreover, in the U.S., compared to non-Latino whites, Latinos have been found to be less likely to engage in leisure-time physical activity[8] and to consume fewer fruits and vegetables and higher amounts of fat.[9] Despite growing efforts to prevent and/or treat obesity in the U.S., the current understanding of effective strategies and settings to address this problem among U.S. Latino adults remains limited.

The CDC *Community Guide,* from the *Guide to Community Preventive Services,* hereafter referred to as the *Guide*, recommends several types of evidence-based interventions targeting obesity across various population groups and settings (www.thecommunityguide.org/obesity/index.html). Examples include interventions delivered via the Internet as well as healthcare, school, and work settings; those targeting individuals, families, communities, the environment, and policies; and multilevel interventions. Currently, the *Guide* provides findings from scientific systematic reviews of obesity-related interventions that used provider-oriented approaches and those conducted in community settings. These reviews, however, were not focused necessarily on identifying interventions targeted at any particular racial/ethnic group, including Latinos.

The present review aims to enhance current understanding of evidenced-based obesity treatment interventions by focusing on interventions designed for overweight (BMI≥25) or obese (BMI ≥30) U.S. Latino adults, specifically those that involved behavioral change approaches (e.g., improving dietary and/or physical activity behaviors). This review is the first to examine the efficacy of various behavioral strategies for obesity treatment in overweight or obese U.S. Latino adults. Specifically, data from the "parent" project, *Guide*

to Obesity Prevention in Latin America and the U.S. (GOL), are drawn on to increase understanding of the settings (i.e., contexts) and approaches in which treatments are most effective.

Evidence Acquisition

From the literature identified by the GOL project systematic search (Figure 1), the latest publications (i.e., those published between 1965 and December 31, 2010) on community interventions conducted in the U.S. for obesity treatment in Latino adults were extracted. A detailed description of the methodology, including the screening process and inclusion/exclusion criteria, used for GOL is published in this issue of the *American Journal of Preventive Medicine.*[10] A database of studies on obesity-related interventions conducted in the U.S. and throughout Latin America was developed, with the exception of studies conducted in the Caribbean region.

Two independent reviewers screened and evaluated each full-text article for inclusion in the review. The reviewers abstracted the details of the articles that met the inclusion criteria into the *Guide*'s online system[11] for article abstraction. A third reviewer reconciled any discrepancy identified during the screening and abstraction steps.

For the present review, only interventions that targeted U.S. Latino adults and those designed for obesity treatment (i.e., for individuals already at obese/overweight levels) were used. The intervention components of each study were assessed to develop a category for type of strategy. Examples of strategy categories include work-based approaches to increase physical activity and home-based approaches to increase healthy eating. Categorization by intervention strategy allowed for interventions with similar features to be grouped together and compared. Interventions that involved medications as part of the treatment were excluded from the review to yield appropriate conclusions regarding which behavioral strategies and intervention settings yield the strongest evidence base for obesity treatment in Latinos; this exclusion criterion was necessary to prevent the introduction of bias because of possible medication side effects that may alter one's behavioral or physical state.

Quality evaluation of each study involved assessment of the strength of the study design and execution of the study. Study design suitability was considered "greatest" for those with concurrent comparison groups and prospective measurement of exposure and outcome; "moderate" for those with multiple pre- or post-measurements but no concurrent comparison group; and "least" for those with single pre- and post-measurements and no concurrent comparison group. Execution was based on the number of possible limitations identified by the investigators, where 0–1 limitation was considered "good," 2–4 limitations was "fair," ≥5 limitations was considered limited.

To calculate effect size (using Cohen's *d*), available data points of obesity-related outcomes collected during the abstraction process were used. The range for an effect size considered to be small was 0.0–0.19; medium was 0.21–0.79; and large ≥0.80. For pre-post study designs, the last follow-up measure to calculate Cohen's *d* was used.

Based on the number of available studies, the strength of the study design and execution, and the effect size, the strength of the body of evidence for each given category was rated as "strong," "sufficient," or "insufficient." Among studies in the "strong" or "sufficient" body of evidence categories, strategies for recommendation were identified as they related to the intervention implementer (e.g., *promotora);* setting; and/or culturally relevant approaches used that the authors identified as potentially linked with the observed obesity-related outcomes. All searches and analyses were conducted between January 2010 and December 2011.

Evidence Synthesis

A total of 325 obesity-related interventions were identified, of which 105 met the criteria for final inclusion in the GOL literature review. Details of the selection process can be found in the main GOL project paper.[10] Of the 105 studies, 22 were identified as treatment interventions for overweight/obese Latino adults (aged ≥18 years) and were included in the current review.[12–33] Table 1 outlines general intervention features, such as the focus, duration and frequency, effect size of primary outcomes of interest, and study design.

Of the identified 22 studies for obesity treatment for U.S. Latino adults, 18 provided sufficient data to calculate a Cohen's *d* effect size for the primary outcomes. Effect sizes ranged from −0.796 to 1.572. Nine studies yielded a small effect size (≤0.20) for the primary outcome of interest (i.e., BMI or weight); five yielded an effect size considered sufficient (0.21–0.79); and four studies yielded a large effect size (≥0.80).

Regarding study design, 15 of the 22 studies had a study design rating of "greatest." Two studies were rated as "moderate," and three were rated as "least." In terms of execution of the interventions, which is based on the number of limitations identified in the abstraction process, the majority of studies (n=20) had an execution classified as "fair"; only one study received an execution rating of "good" and another as "limited."

Among the 22 studies, half involved a healthcare setting in some aspect of the intervention delivery (e.g., recruitment or where the intervention was conducted). Other settings included churches (n = 2); community centers (n = 7); and the home (n = 2). Studies that provided the setting and change agent included those conducted in healthcare settings by registered dieticians, a medical assistant, physicians, or community health workers (n=6); in community centers by nutritionists/dieticians, a nurse, a behavioral specialist, a promotora, or lay leaders (n=6); and in the home setting by promotoras (n= 1). The majority of the intervention implementers were described as bilingual (i.e., Spanish- and English-speaking) and bicultural (i.e., of American and Latino background). Table 2 describes the strategy of delivery (i.e., where and by whom) for each intervention.

The mean number of sessions (on physical activity and/or healthy eating) for each core intervention was 28.3 ± 43.4 (range = 1–180). The mean age of the study participants was reported in 18 studies and ranged from 27 to 58.6 years; of these studies, the average age was 44.5 years. Sixteen of the studies had samples composed of 100% Latino participants; the other studies had proportions ranging from 58.8% to 86.0%. The mean proportion of

Latinos across all 22 studies was 91.6%. Half of the interventions were tailored to female participants; the average proportion of female participants was 86.8%.

Significant results were reported in 13 of the 22 identified studies. Nine interventions reported significant results between pre- and post-intervention obesity-related measurements. Measurements showing significant differences in time were most commonly BMI and weight, but also were reported for other weight-related outcomes, such as percentage body fat, waist-to-hip ratio, and waist circumference. Six interventions reported significant differences for BMI, waist circumference, weight, and percentage body fat between the intervention and control groups at the post-intervention time point.

Only two of the studies reported a significant time-series difference between the intervention and comparison groups for measurements for BMI, percentage body fat, waist circumference, and weight; both were tailored for an all-female sample and included brisk walking in the community as a component. Only one of the two studies, however, had an effect size that was considered large; it involved promotoras as the intervention implementers. Promotoras are individuals that were similar to the target population (e.g., bilingual Mexican Americans). The intervention yielding a smaller effect was delivered by a bilingual Mexican-American healthcare professional and consisted of weekly meetings and walking groups.

Discussion

The present review is part of the main GOL project literature review on obesity interventions among Latinos in the U.S. and Latin America. Among the identified 22 studies on obesity treatment interventions conducted in the U.S. for overweight or obese Latino adults, a little more than half found significant improvements for obesity-related measures (e.g., BMI or weight) in the short and medium terms. Few studies reported follow-up measurements, such as the study by Avila et al.,[12] which measured outcomes again at 3 months post-training; however, follow-up measurements were conducted on less than 50% of participants who attended the last evaluation, thereby reducing statistical power and limiting conclusions regarding long-term effects to findings from descriptive analyses among a likely biased sample.

The overall findings, as well as limitations identified, from this review are discussed, focusing on common elements found among successful interventions (i.e., those with medium to large effect sizes)[12,17,26,33] as well as an unsuccessful intervention (one that had a small effect size but promising strategies).[16] Specific elements of interest discussed include research design, potential key intervention implementers (e.g., promotoras); settings (e.g., community centers, clinics, and churches); and culturally appropriate strategies (e.g., materials translated into Spanish and use of social support systems) that showed promise in modifying obesity-related measures in a U.S. Latino population. Recommendations for obesity treatment interventions for U.S. Latino adults also were developed based on research design aspects of the successful studies. The findings from this review can help address the present knowledge gap in public health research and practice regarding what strategies and

intervention settings are most effective to address the high prevalence of obesity among U.S. Latino adults.

Overall, most evidence-based strategies in this review were found to report improvements for obesity-related outcomes in U.S. Latino adult participants of differing SES to an acceptable level of effectiveness. Interestingly, the interventions in this review that yielded large effect sizes were all conducted in distinct settings (healthcare, community center, home, church) and by individuals with differing roles (healthcare professionals, promotoras, and registered dieticians).[12,17,26,33] Three of these interventions[12,17,33] were RCTs; one[26] was nonrandomized but still included a treatment group and controls.

Specific Studies with Larger Effect Sizes

The study by Avila et al.,[12] which had one of the highest effect sizes (1.479), was an RCT by design and involved an 8-week physical activity and diet modification intervention for weight loss among a sample of obese Mexican-American women of low SES. Participants (n=44) were assigned randomly to either the treatment group (n=22), which involved physical activity and diet modification sessions, or the control group (n=22), which involved attending weekly cancer screening education sessions with no physical activity/diet education component. Pre- and post-intervention measures (physiologic and behavioral) were collected 1 week before the first session and 1 week following the last session, respectively, for both groups.

A strength of the Avila et al.[12] study is the use of a community medical clinic as the intervention setting, as it may have served as a key site for facilitating recruitment of minority and low-income residents as well as providing an appropriate and safe space for implementing dietary and physical activity behavior change activities (e.g., exercise classes). In addition, each intervention session (one per week) was led by a bicultural Spanish-speaking physician and involved use of a “buddy” support system, social support from the husband, self-monitoring, and enhanced problem-solving skills. As noted by the authors of that study, these elements may have played an important role in the observed obesity-related outcomes in the experimental group (i.e., significant reductions in BMI and improvements in fitness level as compared to the control group), thereby highlighting the importance of tailoring interventions to be culturally appropriate, at least for the low-income Mexican-American female population.

Although this study[12] was one of the only studies that conducted a 3-month follow-up post-intervention, only half the participants attended the follow-up session, possibly leading to biased results for this time point. Maintaining participant attendance is critical to conserving statistical power and preventing sampling bias; efforts to achieve this can include phone calls to the participants and coordination of transportation to sessions during the intervention. In addition, among the experimental group, BMI decreased further (even if at a slower rate), but increases toward pre-intervention levels also occurred for other variables (e.g., waist-to-hip ratio and cholesterol levels). The post-intervention results suggest that the beneficial changes in BMI and fitness levels that occurred at the end of intervention were returning to baseline with time.

This observation points to a limitation of short- or medium-term trials and highlights the need for longer-duration studies that can assess whether intervention strategies can lead to continued improvements in body weight and to maintenance of weight loss. However, there are challenges to pursuing long-term studies involving Latino populations, such as additional burdens on participants' time and resources (e.g., time off of work or need for child care while attending a session). Such factors should be taken into account at the study design stage in order to at least partially account for loss to follow-up.

The study by Faucher et al.,[17] which had the highest effect size (1.572), was also an RCT conducted at a community clinic–based setting but focused on portion control for weight loss in low-income Mexican-American women (N=19). The 20-week intervention consisted of four 2-hour classes on portion control led by a certified nurse-midwife and a promotora. The curriculum was developed to be culturally and economically sensitive (i.e., foods in class were specific to Mexican-American families, low-cost, and quick to prepare) and emphasis was placed on nutrition for the whole family. Although the greater weight loss observed among women in the intervention group as compared to those in standard care was not significant, there was an association found between self-weighing and a significant difference in mean weight loss among both groups at the final evaluation.

Three major limitations stand out for this study[17] and merit discussion. The limitations include respondent bias in reporting of self-weighing, initial small sample size that greatly underpowered the study from the beginning, and a substantial attrition rate. The first limitation can be addressed by incorporating objective measures to weigh participants, such as weighing participants directly using validated scales at each intervention session or as needed. The latter two limitations can be avoided with enhanced recruitment efforts.

As the authors of the study noted, there were also challenges to recruitment because of participant concerns with evolving immigration policies at the time. This finding points to an important need to consider, at the design stage, historical events that have the potential to affect research involving Latino populations. If a relevant event occurs during the intervention, researchers need to ensure that it is addressed in the discussion as a factor that may have influenced study outcomes, as discussed by Faucher et al.[17]

Strengths of the study include the use of promotoras as the intervention implementers as these community lay workers have the potential to facilitate communication with participants because of their Spanish-speaking abilities. They also can identify with the community norms and culture that may influence health, as well as establish trust and credibility. In addition, this study involved a midwifery model of care, which suggests a potentially important role of multidisciplinary teams (i.e., a combined promotora–midwife model) in providing obesity treatment interventions for U.S. Latina adults.

The RCT study conducted by Keller et al.[33] had a high effect size (1.079 for the 3-day group and 0.908 for the 5-day group) and involved promotoras as the intervention implementers of a physical activity intervention for reduction of coronary heart disease (CHD) risk factors at home and a community center, Camina por Salud (Walk for Health). The 36-week trial involved 18 Mexican-American women (aged 45–70 years) classified as obese and

sedentary. Participants were divided into two groups: Group I walked 3 days/week (n=11); Group II walked 5 days/week (n=7). The intervention also involved culturally relevant strategies, such as using promotoras as the program implementers; soliciting participant input to map walking routes for safety; having partners (e.g., friends or other female relatives) provide motivation and support; and including time for socialization and snacks.

The study[33] results showed significant improvements in BMI and trends toward favorable lipid levels from baseline to the 36 weeks for both groups. The culturally relevant mechanisms used in the study (e.g., promotoras and social support) may have played an instrumental role in initiating and keeping the women walking (as shown by their accumulation of minutes walked per week). The use of a community center for the intervention site also may have played an important role in recruiting participants as well as providing a familiar space in the community where the women felt comfortable participating.

Limitations of the study[33] include small sample size, respondent bias in self-reporting of minutes walked per week, and poor evidence that the social support system (i.e., *gran amigas/comadres* or close friend) influenced participation over the study duration. The small sample size may have resulted from limits on availability of older Mexican-American women at the recruitment site or from a lack of understanding among the target population regarding the intervention, which points to the need for enhanced recruitment efforts among this sample of older Latina women. The limitation regarding potential bias due to self-report of walking can be addressed via application of objective measures to monitor minutes of activity per week, such as accelerometer devices, as opposed to reliance on survey instruments alone. Finally, the lack of evidence linking social support and study participation may require additional survey questions and/or qualitative assessment (e.g., focus groups) to better illuminate the role of social support systems in initial and sustained study participation.

The study[26] with a nonrandomized trial design that yielded a medium effect size (0.798) involved an evaluation of Shape-Up Dallas. This modified intervention for Latinas consisted of culturally relevant weekly sessions (for 11 weeks) on nutrition and physical activity. Sessions were led by Hispanic and bilingual staff (a dietitian, a health educator, a social worker, and a teacher assistant at two church sites). The program was offered to the treatment group (n=20) twice at each church, and classes were taught in Spanish by a Hispanic dietician; the controls (n=14) were recruited from a neighborhood community center in a low-income area where the program was not offered. Classes were designed to be culturally appropriate and included topics such as maintaining food and exercise diaries; cooking methods (for foods familiar to the sample); shopping tips; balanced meals; portion sizes and recommended servings; developing a buddy system for support; and the importance of the whole family. The materials used, such as slide shows, recipes, audiocassettes, and pamphlets, could be understood by the participants.

The study[26] results showed significant reductions in weight among the treatment group (an average weight loss of 0.8 pounds/week) compared to the control group (an average weight increase of 0.07 pounds/week). The 3-week follow-up also showed that the experimental

group lost an average of 1 pound. Strengths of the study include utilization of culturally relevant strategies (sessions taught in Spanish, ethnically relevant foods, and emphasis on nutrition for the whole family) and provision of intervention activities at church sites. As with community centers, churches may help in the recruitment of participants and may provide a familiar space that participants readily recognize in the community and feel comfortable attending in order to participate in the intervention.

A similar study was conducted with black women in a low-income neighborhood in Dallas, and findings differed from those in the Latina study. For example, in the Latina group, weight loss was not significantly related to initial BMI, session attendance, or diary completion rate; in the group of black women, increased weight loss was significantly related to greater attendance and diary completion. Both groups of women, however, showed significant improvements in nutritional knowledge as compared to their control counterparts.

The authors highlight that interventions targeted at a specific racial/ethnic group should consider the populations' attitudes toward overweight, as they may differ across groups and may influence motivation to lose weight. For example, data from the 1985 National Health Interview Survey showed that black women were less likely than white women to perceive themselves as overweight; Latina women were also less likely than whites to perceive themselves as overweight but slightly more likely when compared to black women.[34] Women, regardless of race/ethnicity, however, were equally likely to attempt weight loss once they perceived themselves as overweight (i.e., triggering a desire to lose weight).

To date, little is known about perceptions of overweight among U.S. Latino men. Greater understanding regarding Latinos' perceptions of overweight, therefore, may be needed in studies involving obesity treatment interventions for U.S. Latino adults, as it may provide insight regarding stages of behavior change and motivation to participate in interventions targeting overweight/obese U.S. Latinos.

Overall, the findings from the four studies that had medium to high effect sizes pointed to several key limitations relevant to study design and included reduced power due to small initial sample sizes and high attrition rates (which limits the statistical capacity to detect changes in obesity-related outcomes); respondent bias due to self-report measures; historical events that can influence participation; and lack of long-term follow-up. Despite these limitations, however, important elements for obesity treatment in U.S. Latina adults also were detected and included the use of culturally relevant approaches; emphasis on social support systems; potential key settings for recruitment and intervention implementation (e.g., community centers/clinics and churches); and involvement of bilingual/bicultural intervention implementers (e.g., midwives and promotoras).

Specific Studies with Smaller Effect Sizes

In the current review, studies that had promising strategies (i.e., used culturally appropriate approaches and applied randomization of groups) but yielded small effect sizes because of several methodologic limitations also were identified and merit discussion. For example, the study by Cousins et al.,[16] which involved an RCT of a family-oriented intervention for weight loss in Mexican-American women, had high attrition, which may have reduced the

statistical power to detect differences. Similar to the four aforementioned studies (with medium to high effect sizes), this RCT study highlights the need to maximize the likelihood of continued program participation as well as long-term behavior change.

The study[16] randomly assigned 168 obese women to one of three groups. Group 1, the comparison group, received only printed materials on physical activity/diet/weight loss. Group 2, the individual group, received the same printed materials and attended 24 weekly classes on individual-oriented approaches for weight loss followed by six monthly maintenance classes. Group 3, the family group, which included the women and their spouses and children, received the printed materials and attended the same number of classes as Group 2 but on family-oriented approaches to diet/physical activity behavior change.

Although the study had a high attrition rate, the results showed important weight reductions among the participants who completed the study, with the greatest weight loss found among those in the family group, followed by the individual group, and least in the comparison group. Strengths of the study that may have contributed to the observed weight reductions may include the study's emphasis on a social support system for obesity treatment (specifically using a family-based approach); inclusion of culturally relevant food items; and use of a bilingual registered dietician as the program implementer (for facilitating communication). The setting for the intervention site for this study was not reported.

Limitations of the Review

This review of obesity treatment interventions for Latinos in the U.S. has some limitations. One is that very few studies of obesity treatment interventions with Latino adults in the U.S. were found, thereby limiting the findings to only a handful of studies. This limitation points to the need for increased research in the study of obesity among U.S. Latinos as well as enhanced capacity-building initiatives to advance the skills of public health professionals and researchers in program development and evaluation of interventions involving overweight/obese U.S. Latino adults.

Another limitation is that none of the interventions with medium or large effect sizes was designed to assess obesity-related measures in the long term. This is a major limitation to identifying evidence-based strategies for sustainable changes in obesity-related outcomes. Only a handful of the 22 studies evaluated in the current review were conducted over a 12-month period; however, high attrition rates were reported across the studies, which indicated loss of statistical power and external validity due to possible sampling bias (i.e., long-term outcomes may be biased toward those individuals with higher motivation to continue the study).

In addition, most of the studies included involved predominantly female samples. The focus on using women for these studies was deemed a function of the research designs. That is, study authors rationalized targeting Latinas (or low-income Latinas) because of the need to address the disproportionately high prevalence of obesity among this group in the U.S., as compared to their male counterparts or other racial/ethnic groups.

Effect size estimates, however, are disproportionately affected by studies targeting only female participants and might not reflect accurately interventions applied with both genders. Some studies highlight that targeting women in interventions has the potential to affect not only women's health but also their family's health[17]; however, the impacts of interventions targeting women on their family's health remains poorly understood. The final sample sizes for the studies reviewed were also small, which led to low statistical power and potential bias in the study findings. In addition, most of the studies reviewed did not include measures of external validity and therefore limit the generalizability of results to other settings or populations.

Strengths of the Review

This review has several strengths related to the search strategy used and implications of the findings for research and practice. The search strategy was adapted from The CDC *Community Guide* and allowed for the identification of publications available in languages other than English (i.e., Spanish and Portuguese). The *Guide* uses methods that are approved by The Community Prevention Services Task Force, which is composed of public health and prevention experts appointed by the CDC Director, and published in peer-reviewed journals.

Quality control of the screening process was ensured by having the reviewers begin the screening process only after 90% inter-rater reliability was achieved. Further, the present review is the first to focus on behavior-based interventions for obesity treatment among U.S. Latinos and to examine the efficacy of such interventions with an emphasis on the strategies and settings used for intervention delivery. The findings from the review can provide additional insight to researchers and practitioners involved in behavioral approaches to obesity treatment targeting U.S. Latino adults.

Conclusion

The results of the present review point to the need for a more culturally relevant perspective in obesity-related research and practice. Evidence-based strategies are unlikely to be optimized if the proportion of overweight or obese Latinos in the U.S. continues to grow while understanding of what constitutes culturally relevant interventions that effectively address obesity in this population remains limited. Obesity treatment initiatives should ideally apply relevant strategies and address factors at all levels of the socioecologic model: individual, behavioral, social, environmental, and policy. However, because of disparities in the availability of and access to resources for physical activity or healthy eating, especially in many Latino communities in the U.S., this approach would be difficult to achieve.

Public health professionals need to consider ways of tailoring obesity-relevant efforts. Potential strategies include involvement of bilingual/bicultural professionals in the intervention delivery; use of social support networks; use of key settings for participant recruitment or intervention implementation; and other social, policy, and environmental strategies to support opportunities for healthy eating and active living across various contexts. Special attention is needed to initiatives designed to address the needs of underserved Latino populations in the U.S.

Acknowledgments

The present study was funded by the CDC, Grant 1U48 DP001917; publication of the article was supported through the same CDC grant.

References

1. Ennis S, Rios-Vargas M, Albert N. The Hispanic Population: 2010.
2. U.S. Census Bureau. Hispanics in the U.S 2006 www.census.gov/population/hispanic/files/hispanic2006/Internet_Hispanic_in_US_2006.pdf.
3. Schiller J, Lucas J, Ward B, Peregoy J. Summary health statistics for U.S. adults: National Health Interview Survey, 2010. National Center for Health Statistics. Vital Health Stat 10 2012;(252):1–207.
4. Neuhouser ML, Thompson B, Coronado GD, Solomon CC. Higher fat intake and lower fruit and vegetables intakes are associated with greater acculturation among Mexicans living in Washington State. J Am Diet Assoc 2004;104(1):51–7. [PubMed: 14702584]
5. Ayala G, Baquero B, Klinger S. A systematic review of the relationship between acculturation and diet among Latinos in the U.S.: Implications for future research. J Am Diet Assoc 2008;108(8):1330–44. [PubMed: 18656573]
6. Cecchini M, Sassi F, Lauer JA, Lee YY, Guajardo-Barron V, Chisholm D. Tackling of unhealthy diets, physical inactivity, and obesity: health effects and cost-effectiveness. Lancet 2010;376(9754):1775–84. [PubMed: 21074255]
7. Visscher TL, Seidell JC. The public health impact ofobesity. Annu Rev Public Health 2001;22:355–75. [PubMed: 11274526]
8. Pleis JR, Lucas JW. Summary health statistics for U.S. adults: National Health Interview Survey, 2007. Vital Health Stat 10, 2009;(240):1–159.
9. Otero-Sabogal R, Sabogal F, Pérez-Stable E, Hiatt R. Dietary practices, alcohol consumption, and smoking behavior: ethnic, sex, and acculturation differences. J Natl Cancer Inst Monogr 1995;(18):73–82.
10. Holub CK, Elder JP, Arredondo EM, et al. Obesity Control in Latin American and U.S. Latinos: a systematic review. Am J Prev Med 2013; 44(5):530–8.
11. Briss PA, Zaza S, Pappaioanou M, et al. Developing an evidence-based Guide to Community Preventive Services—methods. Am J Prev Med 2000;18(1suppl):35–43. [PubMed: 10806978]
12. Avila P, Hovell MF. Physical activity training for weight loss in Latinas: a controlled trial. Int J Obes Relat Metab Disord 1994;18(7):476–82. [PubMed: 7920873]
13. Babamoto K, Sey K, Camilleri A, Karlan V, Catalasan J, Morisky D. Improving diabetes care and health measures among hispanics using community health workers: results from a randomized controlled trial. Health Educ Behav 2009;36(1):113–26. [PubMed: 19188371]
14. Boesch JE. A nutrition education/behavior modification intervention program for elderly Hispanic persons. Denton TX: Texas Woman's University, 1997.
15. Clarke K, Freeland-Graves J, Klohe-Lehman D, Milani T, Nuss H, Laffrey S. Promotion of physical activity in low-income mothers using pedometers. J Am Diet Assoc 2007;107(6):962–7. [PubMed: 17524717]
16. Cousins J, Rubovits D, Dunn J, Reeves R, Ramirez A, Foreyt J. Family versus individually oriented intervention for weight loss in Mexican American women. Public Health Rep 1992;107(5):549–55. [PubMed: 1410236]
17. Faucher MA, Mobley J. A community intervention on portion control aimed at weight loss in low-income Mexican American women. J Midwifery Womens Health 2010;55(1):60–4. [PubMed: 20129231]
18. Gill D Testing a biopsychosocial model of health behavior: a community intervention for reducing obesity in Mexican-American women. Cambridge, United Kingdom: ProQuest Information & Learning, 1998.

19. Huerta S, Li Z, Li H, Hu M, Yu C, Heber D. Feasibility of a partial meal replacement plan for weight loss in low-income patients. Int J Obes Relat Metab Disord 2004;28(12):1575–9. [PubMed: 15467776]
20. Jordan KC, Freeland-Graves JH, Klohe-Lehman DM, et al. A nutrition and physical activity intervention promotes weight loss and enhances diet attitudes in low-income mothers of young children. Nutr Res 2008;28(1):13–20. [PubMed: 19083382]
21. Keller C, Trevino R. Effects of two frequencies of walking on cardiovascular risk factor reduction in Mexican American women. Res Nurs Health 2001;24(5):390–401. [PubMed: 11746068]
22. Metghalchi S, Rivera M, Beeson L, et al. Improved clinical outcomes using a culturally sensitive diabetes education program in a Hispanic population. Diabetes Educ 2008;34(4):698–706. [PubMed: 18669812]
23. Osborn CY. Using the IMB model of health behavior change to promote self-management behaviors in Puerto Ricans with diabetes Storrs CT: University of Connecticut; 2006 digitalcommons.uconn.edu/dissertations/AAI3221561.
24. Poston WSC, Reeves RS, Haddock CK, et al. Weight loss in obese Mexican Americans treated for 1-year with orlistat and lifestyle modification. Int J Obes Relat Metab Disord 2003;27(12):1486–93. [PubMed: 14634679]
25. Poston WS, Haddock CK, Olvera NE, et al. Evaluation of a culturally appropriate intervention to increase physical activity. Am J Health Behav 2001;25(4):396–406. [PubMed: 11488550]
26. Smith SB. Weight control for low-income black and Hispanic women. Denton TX: Texas Woman's University; 1990.
27. Vincent D Culturally tailored education to promote lifestyle change in Mexican Americans with type 2 diabetes. J Am Acad Nurse Pract 2009;21(9):520–7. [PubMed: 19845810]
28. West D, Elaine Prewitt T, Bursac Z, Felix H.Weight loss of black, white, and Hispanic men and women in the Diabetes Prevention Program. Obesity 2008;16(6):1413–20. [PubMed: 18421273]
29. Anderson D, Christison-Lagay J, Villagra V, Liu H, Dziura J. Managing the space between visits: a randomized trial of disease management for diabetes in a community health center. J Gen Intern Med 2010;25(10): 1116–22. [PubMed: 20556536]
30. Parikh P, Simon E, Fei K, Looker H, Goytia C, Horowitz C. Results of a pilot diabetes prevention intervention in East Harlem, New York City: Project HEED. Am J Public Health 2010;100(S):S232–S239. [PubMed: 20147680]
31. Rocha-Goldberg MP, Corsino L,Batch B,et al.Hypertension Improvement Project (HIP) Latino: results of a pilot study oflifestyle intervention for lowering blood pressure in Latino adults. Ethn Health 2010; 15(3):269–82. [PubMed: 20379894]
32. Wadden T, West D, Neiberg R, et al. One-year weight losses in the Look AHEAD study: factors associated with success. Obesity (Silver Spring) 2009;17(4):713–22. [PubMed: 19180071]
33. Keller C, Cantue A. Camina por Salud: walking in Mexican-American women. Appl Nurs Res 2008;21(2):110–3. [PubMed: 18457751]
34. Dawson DA. Ethnic differences in female overweight: data from the 1985 National Health Interview Survey. Am J Public Health 1988; 78(10):1326. [PubMed: 3421389]

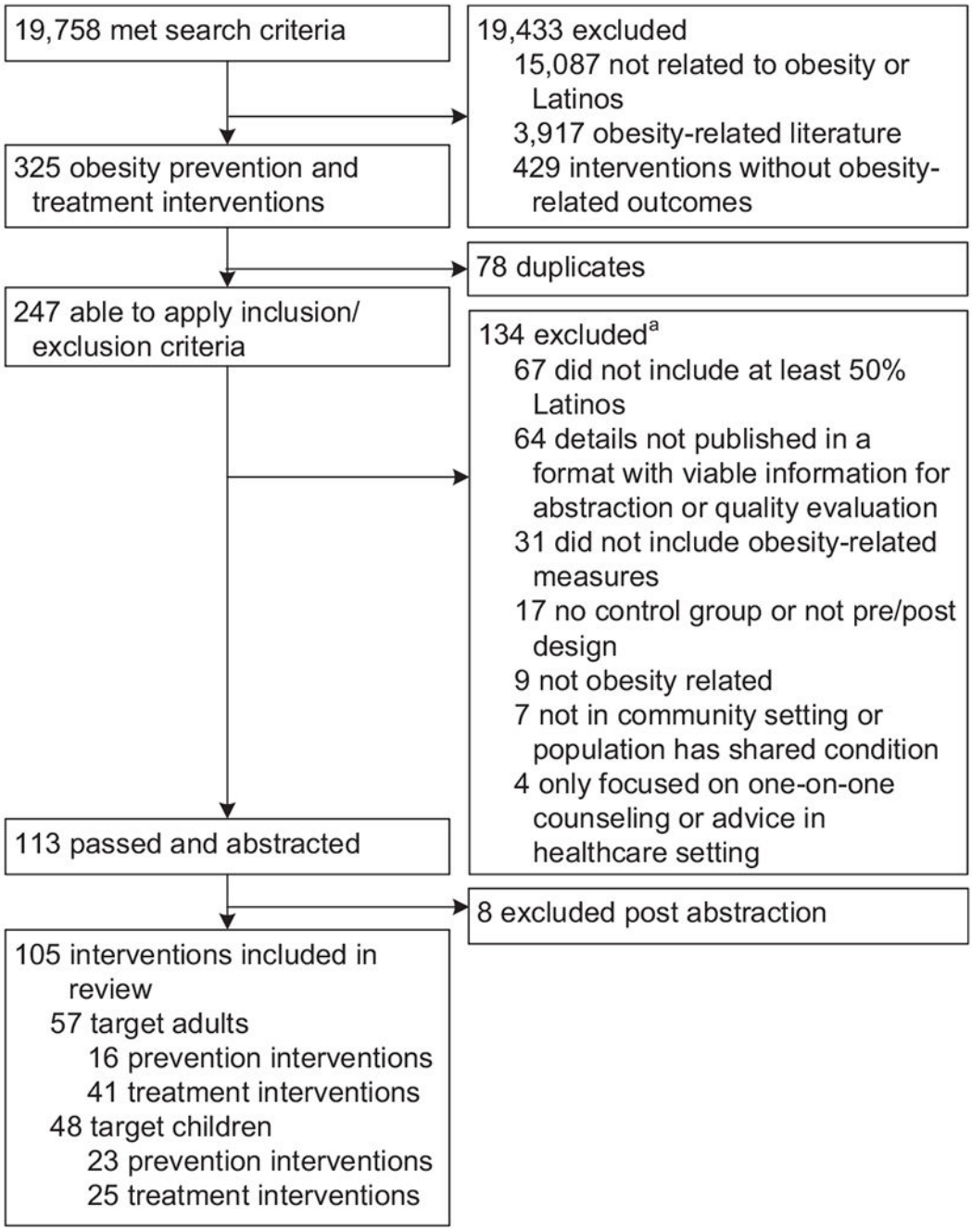

Figure 1. Project GOL literature review flowchart

[a]Participants are classified into as many exclusion categories as are applicable.

GOL, *Guide to Obesity Prevention in Latin America and the U.S.*

Table 1.

Summary of interventions to treat obesity in U.S. Latino adults (n=22)

Study	Duration (frequency)	Effect size (Cohen's *d*)	Study design
Avila (1994)[12]	2 months (1X/week)	1.479[a]	RCT
Babamoto (2009)[13]	6 months (n/a)	n/a	RCT
Boesch (1997)[14]	2 months (1X/week)	0.057[a]	Pre-post test
Clarke (2007)[15]	2 months (1X/week)	0.139[b]	Pre-post test
Cousins (1992)[16,c]	12 months (1X/week)	0.075[a]	RCT
Faucher (2010)[17,d]	5 months (<1X/week)	1.572[b]	RCT
Gill (1998)[18]	6 months (1X/week)	0.036[b]	Time series
Huerta (2004)[19]	6 months (<1X/week)	n/a	Time series
Jordan (2008)[20]	2 months (1X/week)	0.171[b]	Nonrandomized trial
Keller (2001)[21,e]	6 months (5X/week)	0.109[a] (3-day); 0.322[a] (5-day)	Nonrandomized trial
Keller (2008)[33,e]	9 months (5X/week)	1.079[a] (3-day); 0.908[a] (5-day)	RCT
Metghalchi (2008)[22,d]	3 months (1X/week)	0.065[a]	Pre-post test
Osborn (2006)[23]	3 months (<1X/week)	0.123[a]	RCT
Poston (2001)[25]	6 months (1X/week)	0.051[a]	Group randomized trial
Poston (2003)[24]	12 months (1X/week)	0.052[a]	Group randomized trial
Smith (1990)[26]	2.75 months (1X/week)	0.798[a]	Nonrandomized trial
Vincent (2009)[27]	2 months (1X/week)	0.071[a]	RCT
Wadden (2009)[32]	12 months (1X/week)	n/a	RCT
West (2008)[28]	6 months (<1X/week)	n/a	RCT
Anderson (2010)[29]	12 months (variable)	0.025[a]	RCT
Parikh (2010)[30]	2.5 months (1X/week)	—0.796[b]	RCT

Study	Duration (frequency)	Effect size (Cohen's *d*)	Study design
Rocha-Goldberg (2010)[31]	1.5 months (1X/week)	0.055[a] (total); 0.018[a] (women); 0.085[a] (men)	Pre-post test

Note: The focus of each study was physical activity and healthy eating, unless otherwise noted.

[a] BMI

[b] Weight

[c] Focus was physical activity and healthy eating plus family-based factors.

[d] Focus was healthy eating.

[e] Focus was physical activity.

n/a, not applicable; X, times

Table 2.

Treatment intervention strategy details in U.S. adults (*n*=22)

Study	Intervention details
Avila (1994)[12]	Setting: Healthcare organization Intervention delivered by: Physician Methods: A 10-week intervention consisting of eight 1-hour classes providing behavior modification tools, nutrition education, and walking/stretching time. Participants also monitored food and exercise using diaries.
Babamoto (2009)[13]	Setting: Medical office or clinic Intervention delivered by: Community health workers with personal diabetes experience Methods: Community health workers with personal experience with diabetes were trained in diabetes management and theory for intervention in medical offices or clinics.
Boesch (1997)[14]	Setting: Methodist church Intervention delivered by: n/a Methods: 8-week nutrition education and behavioral modification intervention with weekly classes and an optional physical activity component and nutrition education. Participants were also encouraged to keep daily food records during the project.
Clarke (2007)[15]	Setting: Community centers and clinics Delivered by: n/a Methods: Participants attended weekly classes on nutrition and physical activity that included a physical activity component during the class time. Participants also were instructed to exercise during the week at home at least five times per week for 45 minutes at a moderate intensity. Diet component consisted of menu planning of ethnic foods, cooking demonstrations, and information on recipe modifications, portion control, food budgeting, and the energy content of fast foods.
Cousins (1992)[16]	Setting: n/a Delivered by: Bilingual registered dietitian Methods: Weekly classes were for women and their families, including separate classes for the children. Classes focused on nutrition and exercise and participants were given printed information.
Faucher (2010)[17]	Setting: Community center Intervention delivered by: Certified nurse-midwife and a *promotora de salud* Methods: 20-week nutritional intervention aimed at portion control, consisting of four 2-hour classes on portion control.
Gill (1998)[18]	Setting: Community centers Intervention delivered by: Dietitian and master's-level behavioral specialist Methods: Weekly 90-minute classes addressing nutrition, behavior modification, physical activity, and social support followed by weekly maintenance support groups for 6 months led by two support group leaders selected from each class.
Huerta (2004)[19]	Setting: Healthcare organization Intervention delivered by: Physician and dietician Methods: Two daily meal replacements provided for free and instructions for a third low-calorie, portion-controlled, complete meal. Instructions to increase physical activity also were given at baseline. Patients reduced caloric intake through meal replacements.
Jordan (2008)[20]	Setting: Clinic or community center Delivered by: Registered dietitian Methods: Eight weekly small 2-hour group classes on nutrition, physical activity, behavior, setting goals, and recipe modifications, also including exercise activities. Provided in both English and Spanish.
Keller (2001)[21]	Setting: Home (telephone calls) Intervention delivered by: n/a Methods: Weekly phone calls were made to encourage participants to adhere to regimen of walking either 3 or 5 days per week for 30 minutes.
Keller (2008)[33]	Setting: Neighborhood and community center Intervention delivered by: Promotoras Methods: Promotoras worked with women to explain the program of walking for 30 minutes either

Study	Intervention details
	3 or 5 days per week (depending on group). Women walked on their own or with the promotora and recorded their progress.
Metghalchi (2008)[22]	Setting: School of public health Intervention delivered by: Hispanic registered dietitians, registered nurses, physicians and nutrition students Methods: Nutrition and diabetes education classes were held once a week for 3 months and participants learned about topics such as diabetes, healthy eating, and the food pyramid
Osborn (2006)[23]	Setting: Hospital Intervention delivered by: Bilingual medical assistant Methods: Use of a brief, culturally sensitive, theory-driven intervention to promote self-management behaviors. Information, motivation, and behavioral skills elements to address population-specific deficits associated with poor diet and exercise. Diabetes self-management behaviors were interwoven to create a 90-minute intervention.
Poston (2001)[25]	Setting: n/a Intervention delivered by: Bilingual Mexican-American healthcare professionals (i.e., counselors and dietitians) Methods: 6-month intervention combining individually oriented behavioral techniques with culturally compatible strategies derived from social support theory during weekly 90-minute meetings. Participation in 30 minutes of brisk walking during the weekly meeting and walking clubs/groups during the rest of the week.
Poston (2003)[24]	Setting: n/a Intervention delivered by: Bilingual Mexican-American registered dietitian Methods: 120 mg of Orlistat taken three times per day, plus behavior modification, a low-fat diet, and moderate physical activity.
Smith (1990)[26]	Setting: Church Delivered by: Registered dietitians Methods: A free 11-week program with sessions using conversation-style language and cooking. Weekly educational sessions on nutrition and physical activity. Participants also were instructed to keep a food and exercise diary on their own.
Vincent (2009)[27]	Setting: Health clinic Intervention delivered by: n/a Methods: Participants attended eight weekly 2-hour educational sessions on diabetes management and risk factors.
Wadden (2009)[32]	Setting: n/a Delivered by: Registered dietitians, behavioral psychologists, and exercise specialists Methods: Weekly educational sessions on nutrition and physical activity, including meal replacement plans and orlistat recommendations for some after 6 months.
West (2008)[28]	Setting: Healthcare organization Delivered by: Registered dietitians or individuals with master's degree in exercise physiology, behavioral psychology, or health education Methods: Lifestyle intervention included 16 core individual sessions led by case managers in the first 6 months, introducing behavior modification strategies to promote healthy dietary and physical activity changes, followed by maintenance with monthly individual sessions.
Anderson (2010)[29]	Setting: Community Health Center Intervention delivered by: Specialized nurses Methods: 1 year of weekly, every other week, or monthly unscripted telephonic disease management by nurses. Call content covered: brief clinical assessment, self-management, medication adherence, and glucose monitoring.
Parikh (2010)[30]	Setting: Community sites (i.e., churches, social service agencies, senior centers, and health fairs) Intervention delivered by: Lay leaders Methods: Workshop consisting of eight 90-minute sessions over 10 weeks with topics including diabetes prevention, finding and affording healthy foods, label reading, fun physical activity, planning a healthy plate, making traditional foods healthy, and portion control.
Rocha-Goldberg (2010)[31]	Setting: Community organization and health center Intervention delivered by: Female nutritionist, native Spanish speaker from Colombia Methods: Six weekly group sessions lasting 90–120 minutes. Information on physical activity and diet with motivational interviewing and self-monitoring encouraged to provide feedback.

n/a, not applicable