

## Cultural Adaptation for Ethnic Diversity: A Review of Obesity Interventions for Preschool Children

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### Abstract

Obesity disproportionately affects U.S. ethnic minority preschool children, placing them at risk for obesity related co-morbidities and premature death. Effective culturally appropriate interventions are needed to improve health behaviors and reduce obesity in young high-risk minority children, while their behaviors are still developing. All known obesity intervention studies (e.g., diet and physical activity) since 2000 targeting U.S. ethnic minority preschool children were reviewed. Five electronic databases and eight published literature reviews were used to identify the studies. Intervention studies without identified ethnic minority participants were excluded. Ten obesity interventions studies met the review criteria. Published cultural adaptation guidelines were used to develop a mechanism to analyze, score, and rank the intervention adaptations. Cultural adaptations varied widely in rigor, depth, and breadth. Results indicated a relative absence of appropriately adapted obesity interventions for ethnic minority groups, suggesting a need for more rigorous cultural adaptation guidelines when designing obesity interventions for diverse ethnicities. Culturally appropriate adaptations appeared to enhance intervention relevance, effectiveness, and feasibility. The purpose of this literature review was to evaluate 1) the type and extent of cultural adaptations strategies applied to the interventions, and 2) how these adaptations related to the study outcomes.

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*Keywords: cultural adaptations, obesity intervention, ethnic minorities, preschool children*

### Introduction

The obesity epidemic is a major public health concern in the United States. One-third of all children are overweight or at risk for becoming overweight. Of these children, one-fourth are toddlers and preschoolers (2- to 5- years old) (Ogden, Carroll, & Flegal, 2008). All face possible deteriorating health from cardiovascular disease and diabetes, leading to premature death (Franks et al., 2010; Goran, Lane, Toledo-Corral, & Weigensberg, 2008). Among preschool children, a disparity in the prevalence of obesity is especially evident in low-income, ethnic groups (Anderson & Whitaker, 2009; Division of Nutrition, Physical Activity, and Obesity, 2009). Alaskan Indian/Native American preschool children are at highest risk for obesity, followed by Hispanics and non-

Hispanic blacks, compared to non-Hispanic white and Asian children.

A promising strategy to help reduce childhood obesity is to instill healthy behaviors in high-risk preschool children while they are young and their lifestyle behaviors are still developing (Kimbrow, Brooks-Gunn, & McLanahan, 2007; Nader et al., 2006). Recent systematic reviews found limited obesity intervention studies focused on ethnic minority preschool children (Branner, Koyama, & Jensen, 2008; Brown, Kelly, & Summerbell, 2007; Wilson, 2009). The U.S. Surgeon General (U.S. Department of Health and Human Services [DHHS], 2010) and the Institute of Medicine (IOM) (2006) call for more research to identify effective interventions for groups at high risk for obesity. Additional recommendations are for research designs to be

more culturally appropriate for diverse ethnic minorities.

### **Objective**

The purpose of this literature review was to evaluate cultural adaptations made to obesity intervention studies targeting high-risk U.S. ethnic minority (e.g., Native Americans, Hispanics, and/or African American) preschool children (2- to 5-year-olds). This review addressed the extent to which cultural adaptation strategies were present in each intervention and how these strategies related to study outcomes.

The importance of culturally relevant interventions and suggestions for practical adaptation strategies to improve health promotion interventions are also addressed. Adaptations may help improve the quality of health promotion programs for ethnic minority preschool children and their families and address the growing demand for guidance in adapting interventions to effectively influence healthy behaviors (Cluss, Ewing, Long, Krieger, & Lovelace, 2010; Sanders Thompson et al., 2008).

The literature search found no published literature reviews evaluating cultural adaptation of obesity intervention studies for high-risk U.S. ethnic minority preschool children. This deficiency highlights the need for reviews evaluating cultural adaptations of obesity intervention studies for this population group.

### **Need for Cultural Adaptation of Interventions and Measures**

When designing interventions, it is important to take into account the unique cultural values, beliefs, socio-economic status (SES), and environment of ethnic minority populations (Elder, Ayala, Parra-Medina, & Talavera, 2009; Hurst & Nader, 2006). Improving health behaviors may be less effective if investigators disregard the need for cultural adaptation or inadequately adapt interventions (Marin, 2006). Some ethnic groups may perceive culturally inappropriate interventions as confusing,

irrelevant, and/or offensive (Castro, Barrera, & Martinez, 2004; Marin, 2006), resulting in less participant engagement, compliance, and retention.

Given the wide variability within and among cultural groups, investigators may not have the cultural competence to effectively adapt an intervention for a particular ethnic group. For example, African American and Hispanic designations consist of multiple distinct subgroups defined not only by race, but also by regional, national, and continental origin (Kreuter, Lukwago, Bucholtz, Clark & Sanders-Thomason, 2003; Office Of Minority Health, 2009), such as Puerto Ricans and Columbians. Clinicians and investigators have expressed limited awareness of published guidelines for culturally adapting interventions and translating materials (Cluss et al., 2010; Sanders Thompson et al., 2008), supporting the need for standardized guidelines.

Development of culturally equivalent versions of original measures (e.g., surveys, questionnaires, and interview guides) is needed to accurately determine the effectiveness of interventions with different cultural groups (Castro et al., 2004). Simply translating a measure verbatim into the ethnic group's dominant language is insufficient for adapting key constructs, concepts, and content, thus invalidating the measure (Ramirez, Ford, Stewart, & Teresi, 2005; Martinez, Ainsworth, & Elder, 2008). Diverse ethnic populations differ in cultural perspectives, and many original constructs and concept measures may not be commonly shared or understood unless they are appropriately translated (Castro et al., 2004).

Translated instruments should be: (a) equivalent to the original instrument; (b) culturally, conceptually, and contextually relevant for the intended audience; and (c) reliable and valid. Invalid measures (do not reflect original concepts) and unreliable instruments (inconsistent across settings) (Creswell 2009) may bias results, leading to irrelevant,

ineffective, and financially wasteful policies and health services for ethnic minority groups (Davidson & Knafl, 2006; Ramirez et al., 2005).

Surface versus deep structure. Resnicow, Baranowski, Ahluwalia, and Braithwaite (1999) conceptualized cultural sensitivity in two dimensions - surface structures and deep structures. Surface and deep structure adaptation are strategies used to design culturally and linguistically relevant measurement instruments, interventions, and program materials. Surface structure adaptations employ visual and auditory cues for culturally appropriate messages reflecting settings and lived experiences of the ethnic group, including: music, pictures, foods, clothing, locations, and people.

Deep structure adaptation is more abstract and usually more difficult to achieve than surface structure adaptations because it is complicated and time consuming. It involves cultural sensitivity and a comprehensive understanding of the ethnic group's core cultural values, norms, and stressors (e.g., economic, social, and environmental) affecting health behaviors (Resnicow et al, 1999). For example, it may be prudent to focus on health rather than obesity to avoid stigmatizing overweight participants or offending members of cultures that favor larger body builds (Tailor & Ogden, 2009). Deep structure adaptation may require input from the community and can dramatically improve the effectiveness of health promotion interventions.

Targeting and tailoring interventions. Additional cultural adaptation concepts include targeting and tailoring to address how broad or focused an intervention should be to affect change in the intended population. Targeting is a broadly tuned intervention approach designed to reach most group members and presumes sufficient population homogeneity. In contrast, tailoring creates a more fine-tuned intervention to reach one specific person or subgroup (Elder, Ayala, Slymen, Arredondo, & Campbell, 2009; Kreuter et al., 2003).

Categories of cultural adaptation strategies. To effectively influence healthy behavior changes, culturally adapted interventions may require

modifications tailored to a target group's worldview (Elder, Ayala, Slymen, et al., 2009). Depending on an ethnic group's characteristics, different cultural adaptation strategies may be required to modify interventions and program materials. Kreuter and associates (2003) organized commonly used intervention adaptation strategies into five categories: (a) peripheral, (b) evidential, (c) constituent-involving, (d) socio-cultural, and (e) linguistic.

Peripheral strategies target a culture's surface structure by incorporating audio and/or visual elements, (e.g., music, colors, pictures, clothing, ethnic foods, or people) easily recognized by members of the ethnic group. Evidential strategies present scientific evidence regarding health issues relevant to the intended audience (e.g., causes and prevalence of certain illnesses or diseases common in the target population). For example, noting that Hispanic children are at high risk for Type 2 diabetes is an evidential strategy.

Constituent-involving strategies solicit participation, knowledge, and input from members of the target community (e.g., lay health workers, leaders, and focus groups) regarding the culture's deep structure (e.g., cultural norms, beliefs, social structure, and SES). Community participation is essential to help develop a culturally appropriate intervention program (Horn, McCracken, Dino, & Brayboy, 2008). Community collaboration allows investigators to develop cultural sensitivity, employ local cultural resources, understand community health issues, and solicit stakeholders' input in the intervention design (Cardona et al., 2009). This is useful for incorporating both surface and deep structure within an intervention.

Socio-cultural strategies incorporate extensive social and cultural values into the intervention design to provide context and meaning or "deep structure" for the intended group. Examples of socio-cultural strategies might include seeking family approval when recruiting participants from Hispanic cultures or providing child-care and social services for participants with limited finances (Resnicow et al., 1999). Making the

intervention meaningful and relevant for participants can promote participant engagement and retention, which may improve program effectiveness.

Linguistic strategies typically follow established guidelines to develop culturally equivalent translations of measurement instruments, consent forms, and so on. The intent of linguistic strategies is to retain the concepts and constructs of the original materials and instruments while using language easily understood by the target population (Ramirez et al., 2005). Most published translation methods follow similar guidelines using forward and backward translation, independent bilingual translators, and multiple reviewers.

For example, Eremenco, Cella, and Arnold (2005) introduced a universal translation method for program materials and instruments. This method attempts to limit measurement bias from self-reported health measures by producing an equivalent translation of the original instrument or materials. It has been successful in retaining original concepts and constructs across many languages and cultures. It is applicable across countries where the same language is spoken (e.g., French speakers in France and Switzerland) and across subcultures within the same country (e.g., Spanish speakers in New York and Los Angeles). Program materials (e.g., educational handouts and consent forms) can also be translated using this method.

Translating program materials and measures using the universal translation method involves several steps: (a) forward translation into the target group language by independent bilingual translators; (b) backward translation to compare the new document with the original document; (c) a review by the original document developer to ensure consistency between documents; (d) pilot testing the translated document with members of the target community to guide additional adaptations; and finally, (e) a second review by independent bilingual translators (Eremenco et al., 2005). After people familiar

with the document's intent achieve translation consensus, it is proofread and reproduced.

Culturally appropriate intervention designs typically use strategies from several categories (Resnicow et al., 1999). Each intervention is unique, requiring a different set of strategies to achieve cultural relevance for the target population. For example, to achieve deep structure, socio-cultural adaptations may require incorporating constituent-involving strategies. To develop culturally equivalent measures, linguistic strategies may use strategies from the four other categories outlined above. For review purposes, the authors: 1) assessed the extent to which each of these adaptation strategies was present in each intervention study, and 2) how these strategies influenced the study results.

## Methods

### Data Sources

Topical searches were performed using five electronic databases: PubMed®, ERIC®, CINAHL®, PsycINFO® and Google Scholar®. Key words used included: children, intervention, prevention, education, program, cultural, adaptation, adapted, ethnic minority, ethnically diverse, low-income, preschool, weight, obesity, overweight, nutrition, diet, exercise, and physical activity.

### Inclusion and Exclusion Criteria

All childhood obesity intervention studies (e.g., diet, physical activity, parent- focused) since 2000 specifically targeting ethnic minority preschool children in the United States were included. Intervention studies not identifying the specific ethnic groups participating in the study were excluded.

### Data Extraction

The search identified eight systematic reviews (Bluford, Sherry, & Scanlon, 2007; Campbell & Hesketh, 2007; Connelly, Duaso, & Butler, 2007; Griffith, 2009; Hesketh & Campbell, 2010; Small, Anderson, & Melnyk, 2007; Stice, Shaw, & Marti, 2006; Summerbell et al., 2005),

which were scanned for obesity intervention studies meeting the inclusion criteria. Of these eight reviews, five targeted children and adolescents of all ages (Connelly et al., 2007; Griffith, 2009; Small et al., 2007; Stice et al., 2006; Summerbell et al., 2005), and three

specifically targeted preschool and younger children (Bluford et al., 2007; Campbell & Hesketh, 2007; Hesketh & Campbell, 2010). Intervention effectiveness was the primary focus of most of the reviews (Bluford et al., 2007; Campbell & Hesketh, 2007; Connelly et al.,

**Table 1**

**Scoring System for Cultural Adaptations**

Adaptation Strategy Category	Scoring Method and Strategy Examples	Category Base Score (Max)	Category Tailored Score (Max)	Category Total Score (Max)
Peripheral	<p><u>Base Score</u> = 1 if strategy used</p> <ul style="list-style-type: none"> <li>Ethnic food models</li> <li>Visual aids/colorful pictures</li> <li>Puppet food characters</li> </ul> <p><u>Tailored Score:</u> See footnote *</p>	1	1	2
Evidential	<p><u>Base Score</u> = 1 if strategy used</p> <ul style="list-style-type: none"> <li>Risk of Type 2 diabetes for obese Hispanic children</li> <li>Risk of sexual transmitted disease for sexually active teens</li> </ul> <p><u>Tailored Score:</u> See footnote *</p>	1	1	2
Constituent-involving	<p><u>Base Score</u> = 2 if strategy used</p> <ul style="list-style-type: none"> <li>Lay health care workers, culturally sensitive staff</li> <li>Focus groups of target group members</li> <li>Bilingual/bicultural interviewers, educators, etc.</li> <li>Community participatory approach</li> </ul> <p><u>Tailored Score:</u> See footnote *</p>	2	1	3
Socio-Cultural	<p><u>Base Score</u> = 2 if strategy or concept used</p> <ul style="list-style-type: none"> <li>Incorporating input from stakeholders</li> <li>Incorporating feedback from pilot-tests</li> <li>Child care</li> <li>Reflecting culture (e.g., norms, beliefs, values, SES and environment)</li> </ul> <p><u>Tailored Score:</u> See footnote *</p>	2	1	3
Linguistic	<p><u>Base Material Score</u> = 2 x <math>\frac{\text{\# Translated Program Materials}}{\text{\# Total Program Materials}}</math></p> <p><u>Base Instrument Score</u> = 2 x <math>\frac{\text{\# V &amp; R (or) Translated Instruments}}{\text{\# Total Study Instruments}}</math></p> <p><u>Tailored Score:</u> See footnote *</p>	2 Mat.  2 Instr.	1	5
<p><b>Category Total Score = Base Score + Tailored Score</b>  <b>Total Adaptation Score = <math>\sum</math> Category Total Scores</b></p>		Max 10	Max 5	Max 15

\* Tailored Score: None = 0, Group = .33, Subgroup = 0.67, Individual = 1  
V & R = valid and reliable  
 $\Sigma$  = Sum  
Mat. = Materials  
Instr. = Instrument

2007; Griffith, 2009; Small et al., 2007; Stice et al., 2006; Summerbell et al., 2005), while one review focused on intervention quality (Hesketh & Campbell, 2010). Another published review addressed cultural adaptations made to childhood obesity interventions, but targeted only school age and adolescent children (Wilson, 2009). No reviews were found evaluating cultural adaptation strategies for obesity interventions targeting ethnic minority preschool children.

The database and systematic review search identified 20 abstracts of interest. Full copies of these articles were retrieved and assessed. Ten intervention studies met the inclusion criteria (Alhassan, Sirard, & Robinson, 2007; Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Fitzgibbon, Stolley, Schiffer, Van Horn & KauferChristoffel, 2005, 2006; Harvey-Berino & Rourke, 2003; Klohe-Lehman et al., 2007; McGarvey et al., 2004; Williams, Strobino, Bollella, & Brotanek, 2004; Worobey, Pisuk, & Decker, 2004). Related references for these interventions were examined and authors contacted for additional details about intervention adaptations. Information extracted from the intervention studies selected for review included: sample size, participants' race/ethnicity, study design, intervention design, measurement tools, cultural adaptations, and findings.

### **Cultural Adaptation Scoring System**

The interventions were analyzed and scored using: (a) Kreuter and colleagues' (2003) five categories for cultural adaptation strategies (peripheral, evidential, constituent-involving, socio-cultural and linguistic strategies), (b) surface versus deep structure concepts, and (c) targeted versus tailored approaches. The selected interventions were then ranked based on the total score achieved.

### **Weighted, point-based scoring**

A weighted, point-based scoring system was developed by the primary author to evaluate the

overall depth and breadth of each intervention's cultural adaptation. Each of the five categories was assigned a weighted base score of 1 to 4 points. Less weight (1 point) was assigned to peripheral strategies involving surface structure adaptations reflecting cultural appearances (e.g., visual aids) and to evidential strategies addressing scientific evidence (e.g., risks for cardiovascular disease in obese children). More weight (2 points) was given to constituent-involving and socio-cultural strategies addressing deep structure. Linguistic strategies received the most weight, based on the complex and time-consuming translation requirements for materials (2 points) and instruments (2 points). Finally, each category was assigned a weighted tailored score, based on the level of tailoring employed. The most weight was given to tailoring for individual participants (1 point), less to tailoring for a subgroup (0.67 points), and the least to tailoring for the ethnic group as a whole (0.33 points). Table 1 summarizes the scoring system.

### **Scoring procedures**

A five-step procedure was used to analyze, score, and rank the interventions. Each intervention was first evaluated to determine which of the five cultural adaptation strategies were employed and whether the strategies were tailored. Next, each strategy category employed was analyzed and given a base score and a tailored score, which were then summed to create a total category score. All the category scores for each intervention were summed for a total adaptation score (15 maximum points). Finally, a normalized percent score was obtained by dividing the total adaptation score by 15, yielding the maximum possible score.

Prior to scoring, three interval ranks were selected: minimal adaptation (< 50%), moderate adaptation (> 50% and < 75%), and comprehensive adaptation (> 75%). The intervals were chosen so a moderately ranked intervention would employ at least two deep and one surface structure-based category, all tailored at the subgroup level.

Table 3

## Cultural Adaptation Scores for Interventions

Intervention Study	Adaptation Rank	Normalized Adaptation Score (%)	Total Adaptation Score	Total Peripheral Score (B + T)	Total Evidential Score (B + T)	Total Constituent -involving Score (B + T)	Total Socio-cultural Score (B + T)	Total Linguistic Score (Mat.B + Instr. B + T)
Alhassan, Sirard, and Robinson (2007) *	N/A	N/A	*	-	-	-	-	-
Williams, Strobino, Bollella and Brotanek (2004)	Minimal	0	0	-	-	-	-	-
Worobey, Pisuk, and Decker (2004)	Minimal	31%	4.67	2 + 0	0	2 + 0.67	0	0
Harvey-Berino and Rourke (2003)	Minimal	36%	5.34	0	0	2 + 0.67	2 + 0.67	0 + 0
McGarvey et al. (2004)	Minimal	44%	6.67	1 + 0.67	0	2 + 0.67	0	0 + 2 + 0.33
Clark et al. (July 2007)	Moderate	53%	7.90	1 + 0.67	0	2 + 0.67	2 + 0.67	0 + 0.22 + 0.67
Klohe-Lehman et al. (2007)	Moderate	58%	8.68	1 + 0.67	0	2 + 0.67	2 + 0.67	0 + 1 + 0.67
Clark et al. (June 2007)	Moderate	58%	8.68	1 + 0.67	0	2 + 0.67	2 + 0.67	0 + 1 + 0.67
Fitzgibbon et al. (2005)	Comprehensive	78%	11.68	1 + 0.67	0	2 + 0.67	2 + 0.67	2 + 2 + 0.67
Fitzgibbon et al. (2006)	Comprehensive	78%	11.68	1 + 0.67	0	2 + 0.67	2 + 0.67	2 + 2 + 0.67

\* Intervention design required minimal cultural adaptation

B + T = Base + Tailored scores

Mat. = Materials

Instr. = Instrument

## Results

Ten studies met the review criteria. Table 2 (see Appendix A) summarizes each study's design including documented details of cultural adaptation strategies. Eight of the ten interventions were family-based, focused on the mother and child (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al.,

2007; Fitzgibbon et al., 2005, 2006; Harvey-Berino & Rourke, 2003; Klohe-Lehman et al., 2007; McGarvey et al., 2004; Worobey et al., 2004). The other two studies (Alhassan et al., 2007; Worobey et al., 2004) focused solely on the child. Of the ten interventions, two were home-based (Harvey-Berino & Rourke, 2003; Worobey et al., 2004), four were school-based (Alhassan et al., 2007; Fitzgibbon et al., 2005, 2006; Williams et al., 2004), and four were

community-based (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Klohe-Lehman et al., 2007; McGarvey et al., 2004). All but one intervention (Williams et al., 2004) included measurement instruments. Of the five cultural adaptation categories, none of the interventions used evidential strategies. Table 3 presents the final scores and rank for each intervention reviewed.

### **Comprehensively Adapted Interventions**

The two Fitzgibbon et al. studies (2005, 2006) exhibited the highest cultural adaptation scores and comprehensive adaptation rank. Both used the same intervention design, targeting different ethnic groups. To tailor and culturally adapt their interventions, both studies used four of the five adaptation categories. For example, socio-cultural strategies incorporated participants' requests for specific education materials (e.g., newsletters), class schedules, and safety considerations. Linguistic strategies for translating program materials and measures followed established guidelines. Furthermore, step-wise procedures were reported for the interventions' adaptations.

### **Moderately Adapted Interventions**

Three interventions exhibited moderate cultural adaptation. Klohe-Leman et al. (2007) used four of the five categorical strategies: (a) three peripheral visual aids for nutrition education, (b) one constituent-involving strategy, (c) four socio-cultural strategies integrating norms regarding ethnic foods, as well as economic and environmental factors, and (d) a linguistic strategy for one valid and reliable instrument. No adaptations were reported for the other instrument or program materials (e.g., handouts, curriculum).

Both studies by Clarke and colleagues (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007) adopted the Klohe-Leman et al. (2007) intervention design including cultural adaptations. The linguistic strategy for both interventions used the same valid and reliable instrument employed by Klohe-Leman et al.

(2007). No adaptations were reported for other instruments or program materials.

### **Minimally Adapted Interventions**

The Williams and associates intervention (2004) required no oral or written input from participants. It simply directed the school foodservice to provide low saturated fat meals to the preschool children. No culturally adapted meals were provided. Educational materials were age appropriate, but no cultural adaptations to educational materials were reported.

The Worobey and associates' intervention (2004) also exhibited minimal adaptations. Only one of five adaptation categories was reported. A peripheral strategy addressing surface structure used bilingual public health nurses to facilitate the intervention. No cultural adaptations were reported for the intervention itself, materials, or instruments.

Cultural adaptations for the Harvey-Berino and Rouke (2003) intervention documented two out of five adaptation categories. Socio-cultural adaptations were incorporated by constituent-involving community peer educators assigned to adapt the intervention. However, no specific adaptations were reported for the intervention, program materials, or instruments, resulting in a minimal ranking.

The McGarvey and associates' intervention (2004) also received a minimal rank. Cultural adaptations to the intervention included three out of five categories: peripheral, constituent involving, and linguistic. Spanish program materials were provided, but translation procedures for these materials were not described.

### **Intervention Outliers**

By design, one of the interventions required minimal cultural adaptation. Thus, the intervention warranted no adaptation score. The Alhassan and colleagues' (2007) intervention was an observational study. No oral or written input was required from the children. Of note, this was the only intervention reporting to have culturally adapted the consent form.



## Discussion

Major differences were identified between the comprehensively, moderately, and minimally adapted interventions. Interventions were characterized by: 1) the type and extent to which cultural adaptation strategies were present, 2) deficiencies in cultural adaptation, and 3) how adaptation strategies influenced their outcomes.

### Type and Extent of Cultural Adaptations

Interventions ranked highest for cultural adaptation (Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007; Fitzgibbon et al., 2005, 2006; Klohe-Lehman et al., 2007) incorporated four of the five strategy categories and involved surface and deep structure, as well as tailoring. The Fitzgibbon et al. studies (2005, 2006) were ranked highest because they reported multiple tailored cultural adaptations of the interventions, program materials, and instruments.

Higher ranked interventions documented multiple deep structure strategies, whereas, lower ranked interventions used fewer strategies for deep structure. For example, constituent-involving strategies employed in the Fitzgibbons et al. interventions (2005, 2006) included stakeholder input, focus groups, and the use of bicultural/bilingual educators (Fitzgibbon, Stolley, Dyer, Van Horn & KauferChristoffel, 2002). A noteworthy feature that elevated both the Fitzgibbon and colleagues' interventions above the others was the in-depth use of linguistic strategies. Both interventions adapted all program materials and instruments and documented detailed translation procedures based on established guidelines as outlined by Eremenco and associates (2005). In contrast, moderately and minimally adapted interventions either neglected or only partially documented cultural adaptations made to program materials and instruments. Thus, comprehensive interventions not only used multiple cultural adaptation strategies, but also thoroughly documented them.

After examining lower ranked interventions, a clear pattern of weakness emerged, including

limited or missing documentation of adaptation strategies and limited or missing linguistic strategies for adapting program materials and instruments. This does not necessarily mean these interventions were culturally inappropriate, but it may mean the interventions are difficult or impossible to validate or replicate given the limited adaptation descriptions provided. For example, the Harvey-Berino and Rourke intervention (2003) used a community-based participatory approach delegating responsibility for cultural adaptations to the Mohawk community. This is an effective strategy for incorporating the culture's surface and deep structure to design a relevant intervention (Horn et al., 2008), but the absence of documented adaptations and procedures precluded a higher rank.

Interestingly, none of the interventions used evidential strategies. Further research may be needed to evaluate the effectiveness of using this adaptation strategy with obesity interventions.

### Deficiencies in Culturally Adapted Interventions

Notably, only 10 studies directed to ethnic minority preschool children qualified for review in the last decade. As displayed in Table 3, there were striking deficiencies in all the reviewed studies. Given the severity of childhood obesity, more research is needed on culturally adapted obesity interventions for high-risk preschool children. The paucity of such research studies is an example of the health disparities facing vulnerable populations (Branner et al, 2008; Brown et al, 2007; Bluford et al, 2007).

A major deficiency was the limited details about cultural adaptation and translation procedures for health promotion messages, materials, and measurement instruments. Elder, and colleagues (2009) reported that a majority of U. S. ethnic minority group members are functionally illiterate (reading at or below fourth grade) or marginally illiterate (reading between fifth and eighth grade). A common practice is to simply translate directly from English to the dominant ethnic language. This can render the translations culturally and linguistically inappropriate, especially for populations with low literacy

levels. Appropriate linguistically adapted measures and program materials improve comprehension among low-literacy groups, which is essential to reduce reporting bias and ensure credibility of study results. Inappropriate or inadequate translation of measures could have introduced significant bias, threatening the integrity of the outcomes (Martinez et al., 2008).

### **How Adaptation Strategies Relate to Outcomes**

The effect of cultural adaptation strategies on the success of an intervention is important. Assessing the success of an intervention, however, is neither simple nor straightforward. One issue is distinguishing the intervention shortcomings due to a faulty intervention design (e.g., inappropriate for its ethnic study group) versus a faulty intervention delivery (e.g., inappropriate translation of the educational materials) (Rychetnik, Frommer, Hawe, and Shiell, 2002). Intervention design as well as descriptive information provided by the author must be considered. Another issue is determining relevant dimensions of success to be considered. Evans (2003) proposed a hierarchy of evidence focusing on three dimensions for evaluation: effectiveness, appropriateness, and feasibility. Both the type of research design (e.g., randomized controlled trials, and descriptive studies) and the extent of cultural adaptations applied can influence these three dimensions.

Although it is beyond the scope of this review to perform a rigorous analysis of the 10 studies, some general conclusions can be drawn. It does appear the studies with higher adaptation scores (e.g., Fitzgibbon et al, 2005, and Klohe-Lehman et al, 2007), tended to be more appropriate for their ethnic groups, and demonstrated greater effectiveness and/or feasibility compared to the minimally adapted studies (e.g., Harvey-Berino and Rouke, 2003). Similarly, studies with moderate adaptation scores, (e.g., Clarke, Freeland-Graves, Klohe-Lehman, & Bohman, 2007; Clarke, Freeland-Graves, Klohe-Lehman, Milani, et al., 2007) tended to demonstrate moderate levels of effectiveness and feasibility.

Minimally ranked interventions in general showed minimal effectiveness and feasibility. For example, in the Williams et al, (2004) intervention documented no cultural adaptations for educational materials. Study findings indicated no difference in outcomes between the intervention group receiving nutrition education and the intervention group without nutrition education. The lack of adaptation strategies may have influenced the outcomes, diminishing the intervention's effectiveness.

This review has some limitations. The findings from these studies may be suspect for several reasons. First, lack of rigor in the study design can affect study outcomes. Most of the studies reviewed were not randomized controlled trials. Therefore, influences from confounding variables were difficult to identify or control. Second, inadequate cultural adaptation of the intervention may have resulted in non-equivalent measures. Strategies incorporating deep structure were also lacking and might have enhanced the relevance of interventions and outcomes for ethnic groups.

Based on the literature review search, no known scoring system for cultural adaptation was available. Therefore, a weighted scoring system was developed, as previously described. This scoring methodology is open to debate, as are the weights assigned to each adaptation category, the rank thresholds, and scores for each study reviewed. In addition, inadequate documentation of adaptation strategies used may have resulted in inaccurate scoring. Since few studies qualified for review, it is difficult to draw universally valid inferences regarding cultural adaptations.

Influences of adaptation strategies on study outcomes are very difficult to assess. In order for the effects of cultural adaptation on outcomes to be determined, there needs to be greater standardization in adaptation strategies used, with more attention to deep structure adaptations. Other factors that may be influencing outcomes, also need to be accounted for in study designs.

## Conclusion

Standardized guidelines recognized and endorsed by health organizations, such as the Institute of Medicine and the American Nurses Association, are needed to improve the quality of culturally adapted interventions and translated program materials and instruments. Making standardized guidelines available to health promotion practitioners and investigators could help address health disparities and the paucity of effective interventions for high-risk vulnerable populations. Standardizing adaptation guidelines may be difficult, but will pay large dividends by enhancing the ability of investigators to efficiently design and tailor effective interventions for ethnically diverse populations.

Clearly, research interventions should be appropriately adapted and relevant for the target ethnic group. One suggestion is for funding agencies to require grantees to adequately document details of adaptation strategies used for interventions targeting ethnically diverse populations. This may improve intervention effectiveness and credibility of study results. It would also place emphasis on the importance of culturally adapting interventions and help reduce disparity in the quality of health promotion

programs available to ethnic minority populations.

This review underscored the relative absence of culturally adapted obesity interventions for ethnic minority preschool children. Although not statistically rigorous, there seemed to be a consistent association between the extent of adapted interventions employed and the success of the outcomes. The most successful interventions in general were those that employed multiple cultural adaptations tailored to the intended ethnic populations.

Standardized cultural adaptation guidelines are needed for clinicians and investigators who are culturally adapting interventions. Findings suggest that documenting cultural adaptation strategies is crucial to support the integrity of study outcomes and permit study replication. There is also a need to examine, in depth, the influence of cultural adaptation strategies on intervention outcomes through carefully designed studies that account for other confounding variables. Finally, more research is needed for culturally appropriate interventions for ethnic minority preschool children at high risk for obesity.

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## Appendix A

**Table 2**

**Summary of Intervention Studies With Cultural Adaptation Strategies and Procedures**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score (%)
<b>Minimally Adapted Interventions</b>					
Alhassan Sirarrd Robinson (2007)	Pilot Randomized controlled trial	Low-income, Latino children 3- to 5-yr-olds	3-month school-based intervention to increase children's daily physical activity levels, minimal parental involvement	No program materials or tools needed	No significant difference between groups
	Observation study	Intervention (N=18) Control Group (N=15)  Latino 100%	Instruments: ActiGraph accelerometer	<i>Linguistic</i> Parental Consent translated into Spanish No reported translation procedures	NAS = N/A
Williams Strobino Bollella Brotanek (2004)	Quasi-experimental, multi-component, pretest, posttest study	Children 3 to 4 years old	9-month intervention to promote healthy behaviors and decrease CVD risk factors for children.	<i>Socio-Cultural</i>	Reduction (30%) in total serum cholesterol in Groups 1 & 2 compared to control
		Group 1 (N=242) Reduced fat meals & nutrition education	Provided nutrition education and reduced saturated fat in school meals. All groups received parent component of materials recommending home activities to enhance children's school learning experiences.	No report of cultural adaptation of nutrition education and parent program materials	Intervention effective in reducing serum cholesterol, positive in children "at risk".
		Group 2 (N=195) Reduced fat meals only	to enhance children's school learning experiences.	No report of culturally adapting meals	No difference in outcomes in Group 1 and Group 2
		Control Group (N=350)	Instruments: None		
		<u>G1% /G2%/C%</u> Hispanic 14.2 / 1.9/ 57.4 Black 54.2/ 44.9 /39.8 White 31.6 /53.2 / 2.8	Lab: serum cholesterol		NAS = 0 %

**Table 2. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score ( NAS - %)
Worobey Pisuk Decker (2004)	One-group, pre- and posttest	Low income, families of children with iron deficiency or high lead levels and pre- existing developmental delays  Children's ages: < 6 years  Intervention (N=60)  Hispanics 74% Non-Hisp. Whites 15% Eastern Indians 7% Asians 2% African-Am 2%	8-month, customized parent- focused home visits to improve health and developmental status in children and families  Instruments: Developmental Assessment of Young Children (DAYC)	No reported cultural adaptation of intervention  <i>Constituent Involving</i> Used bilingual nurses for home visits and education  <i>Socio/cultural</i> Input from participants Incorporated feedback into educational strategy  No reported cultural translations of tool or program materials	Reduction in total caloric intake and lead levels  Improvement in physical development scores for age  No change in cognitive scores  Effective in improving diet and remediating pre-existing developmental delays in children  _____  NAS = 31%
Harvey- Berino Rourke (2003)	Pilot test, feasibility, comparative cohort study	American Indian, Mohawk mother & child  9 months to 3 years old  Group 1 (N = 20) parent support only  Group 2 (N = 20) parent support & obesity prevention intervention  St. Regis Mohawk Community (NY, Ontario & Quebec)	16-week, obesity prevention intervention to assess change in mother's health behaviors to help reduce the risk of obesity in their children.  Facilitated through home visits by lay health workers  Instruments: 1) Outcome expectation report 2) Self-efficacy survey 3) Intention to change survey 4) Child Feeding Questionnaire (CFQ)	<i>Constituent-Involving</i> 1) Input from community peer educator (PE), project director and consultant 2) Intensive program training 3) Community culturally adapted intervention program  Tools: No reported cultural translation procedures	No significant differences in BMI, maternal eating or exercise behaviors  Grp 2 significantly decreased energy intake versus Grp 1  Decreased CFQ score for Grp 2 versus Grp 1 indicating less restrictive feeding by parents  No group differences in % of overweight or obese children before and after intervention  _____  NAS = 36%



**Table 2. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score (NAS - %)
McGarvey Keller Forrester Williams Seward Suttle (2004)	Quasi- experimental pretest, posttest, feasibility study	Low-income parents and children from birth to 4 years  Intervention (N=121) Control Grp (N=65)  <u>I%</u> <u>C%</u> Hispanics 70 37 Black 8 23 White 15 18 Other 7 22	FitWIC, a 1-year childhood overweight prevention program to promote 6 targeted parental behaviors related to nutrition and exercise  Instruments: Developed questionnaire for children’s physical activity, nutrition, TV viewing and family role modeling	<i>Peripheral</i> Pictures with simple message (English & Spanish)  <i>Constituent Involving</i> 1) Culturally competent WIC staff 2) Community participation to disseminate FitWIC messages  <i>Linguistic</i> 1) Provided Spanish educational materials., but no reported translation procedures for target group  2) Questionnaires adapted per guidelines using 2 bilingual translators	Positive change in parental frequency of offering water to child, and engaging in physical activities with child  Feasible “Fit WIC” program  _____ NAS = 44%
<b>Moderately Adapted Interventions</b>					
Clarke Freeland- Graves Klohe- Lehman Bohman (July 2007)	One-group pre- and post-test	Low-income mothers w/ 1- to 4-yrs-olds  Intervention (N=114)  Hispanics 64% Black 19.3% White 16.7%	8-week Weight Loss Intervention - Same as Klohe- Lehman et al. (2007) Identify predictors for weight loss at preprogram and post program  Instruments: 1) Multi-dimensional Body Relation Questionnaire, 2) Nutrition Attitude Scale, 3) Decisional Balance Inventory, 4) Depression Scale, 5) ESEQ, 6) Weight effect Life-Style Questionnaire, 7) Social Support Scale, 8) Stress Scale, 9) Nutrition Knowledge Test	Same as Clarke, et al. (June 2007)  <i>Linguistic</i> 1) ESEQ - valid and reliable for Hispanic men and women 2) All other questionnaires previously validated for women of child- bearing age. No reports on validity or reliability for race/ethnicity  No reported cultural translation of program material	<u>Correlates for weight loss</u> Cohabitation with partner <u>Pre-program</u> 1) Less satisfaction w/appearance by mothers 2) More consumption of protein energy 3) Enhanced nutrition knowledge 4) Positive attitudes for benefits of weight loss <u>Post-program</u> 1) Change in healthful eating attitudes 2) Social support Physical activity had no effect on wt loss  _____ NAS = 53%

**Table 2. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score (NAS - %)
Klohe-Lehman, Freeland-Graves, Clarke, Cai, et al. (2007)	One-group pre- and posttest	Low-income mothers and healthy 1-to 3-year-olds	8-week community-based weight-loss intervention to improve diet and physical activity in mothers and children	<i>Peripheral Strategy</i> Colorful handouts Ethnic foods Relevant food models & measuring utensils	Modest weight loss in mothers  Diet improved in mother/child dyads  Improved physical activity of mothers, mixed change in children, and positive change in at-risk/overweight children
		Intervention (N=91)  Hispanic 62.6% Black 22.0% White 15.4%			

**Table 2. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score (NAS - %)
Clarke Freeland-Graves Klohe-Lehman et al. (June 2007)	Comparative Cohort Study	Low-income mothers w/ 1- to 4-yr-olds  Group 1: (N=93) overweight  Group 2: (N=31) healthy weight  <u>Grp1%</u> <u>Grp2%</u> Hispanics 60 81 Black 19.4 16.1 White 20.4 41.9	8-week Weight Loss Intervention - Same as Klohe-Lehman et. al. (2007)  To improve diet and physical activity in mothers and children  Instruments: 1) Pedometers for mothers  2) Exercise Self-Efficacy Questionnaire (ESEQ),  3) Frequency and Intent to Exercise Questionnaire (FIEQ)	<i>Peripheral:</i> Colorful handouts Ethnic foods Relevant food models & measuring utensils  <i>Constituent-Involving</i> Pre-program focus group  <i>Socio-cultural</i> 1) Classes at community center 2) Adapted meal plans and recipes 3) Children allowed in classes  <i>Linguistic</i> 1) ESEQ - valid and reliable for Hispanic men and women (unpublished data) 2) FIEQ: valid and reliable for women (avg. age 40.5-yrs)  No reported translation for Hispanics	Positive results in: motivational readiness to exercise, exercise self-efficacy, pedometer steps, and expended energy  Significant decrease in: body weight, percent body fat, and waist circumference  Significant correlates of exercise self-efficacy with: pedometer steps, energy expended, and exercise readiness.  <hr/> NAS = 58%

**Table 2. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score (NAS - %)															
<b>Comprehensively Adapted Interventions</b>																				
Fitzgibbon Stolleu. Schiffer Van Horn KauferChrist offel Dyer (2005)	Cluster Randomized controlled trial	<u>Predominantly Black</u> 12 Head Start schools  3-to 5-year-olds  Intervention (N=212) Control (N=197)  <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>I %</th> <th>C%</th> </tr> </thead> <tbody> <tr> <td>Hispanic</td> <td>0</td> <td>12.7</td> </tr> <tr> <td>Black</td> <td>99</td> <td>80.7</td> </tr> <tr> <td>Multi-racial</td> <td>10</td> <td>6.6</td> </tr> <tr> <td>Female</td> <td>49.7</td> <td>50.5</td> </tr> </tbody> </table>		I %	C%	Hispanic	0	12.7	Black	99	80.7	Multi-racial	10	6.6	Female	49.7	50.5	Hip-Hop to Health Jr., 14-week school-based weight control for children & parental-participation (diet/physical activity)  Instruments: 1) Healthy Start Quiz (HSQ)  2) Healthy Eating and Exercise Questionnaire (HEEQ)  3) Physical activity measures for parents (PAPQ)  4) Parental support and role modeling questionnaire (PSRMQ)	Tailored intervention  <i>Peripheral</i> 1) Puppet food characters 2) Two & three dimensional pictures  <i>Constituent-Involving</i> 1) Stakeholder input 2) Focus groups 3) Bilingual teachers 4) Intensive training for facilitators 5) Bilingual/bicultural interviewers  <i>Socio-Cultural</i> 1) Pilot tested intervention 2) Interactive hands-on learning 3) Program schedule and newsletters 4) Safe meeting location  <i>Linguistic</i> 1) Program materials and 2) tools: translated per guidelines, considered all levels of literacy and obtained consensus with tool developers	No effect on total fat, dietary fiber, physical activity, or TV viewing at post-intervention, 1- and 2-year follow-ups.  Significant decreases in saturated fat intake at 1 yr, but not post intervention or 2-yr follow-up versus control.  Reduced BMI levels in children age at 1- and 2-year follow-ups versus control.  Feasible and effective intervention  NAS = 78%
	I %	C%																		
Hispanic	0	12.7																		
Black	99	80.7																		
Multi-racial	10	6.6																		
Female	49.7	50.5																		

**Table 2. Continued**

Author(s)	Design	Sample	Intervention & Measurement Tools	Cultural Adaptation Strategy and Procedures	Findings / Normalized Adaptation Score (NAS - %)
Fitzgibbon Stolley Sciffer Van Horn KauferChrist offel Dyer (2006)	Cluster Randomized controlled trial	<u>Predominantly Hispanic</u>  3-to 5-yr-olds  Intervention (N=202) Control (N=199)  <u>I% C%</u> Hispanic 73.3 89.4 Black 15.8 6.5 Multiracial 10.0 4.0 Female 47.5 51.3	Hip-Hop to Health Jr., 14-week, school-based, weight control for children, (diet/physical activity) intervention w/ parental- participation  Instruments: <i>Same as Fitzgibbon et al. (2005)</i> - plus - 5) Short Acculturation Scale	<i>Same as Fitzgibbon et al. (2005)</i>  <i>Linguistic</i> 1) PAPQ was being tested for reliability and validity 2) HSQ reliable for minorities in Head Start programs 3) HEEQ was being tested for reliability and validity 4) PSRMQ - internal reliability for Black and Hispanic women 5) Short Acculturation Scale –valid and reliable for Hispanics, Mexican and Central Americans	No significant differences between intervention and control for primary or secondary outcomes post- intervention, or at follow-up year 1 or year 2  <hr/> NAS = 78%