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Maintenance of traditional cultural orientation is associated with lower rates of obesity and sedentary behaviours among African migrant children to Australia

AMN Renzaho¹, B Swinburn² and C Burns³

¹Faculty of Health Medicine, Nursing and Behavioural Sciences, School of Health and Social Development, Deakin University, Burwood, Victoria, Australia; ²Faculty of Health Medicine, Nursing and Behavioural Sciences, School of Exercise and Nutrition Sciences, Deakin University, Burwood, Victoria, Australia and ³Faculty of Health Medicine, Nursing and Behavioural Sciences, School of Exercise and Nutrition Sciences, Deakin University, Burwood, Victoria, Australia

Background: Migrants from developing to developed countries rapidly develop more obesity than the host population. While the effects of socio-economic status on obesity are well established, the influence of cultural factors, including acculturation, is not known.

Objective: To examine the association between acculturation and obesity and its risk factors among African migrant children in Australia.

Design and participants: A cross-sectional study using a non-probability sample of 3- to 12-year-old sub-Saharan African migrant children. A bidimensional model of strength of affiliation with African and Australian cultures was used to divide the sample into four cultural orientations: traditional (African), assimilated (Australian), integrated (both) and marginalized (neither).

Main outcome measures: Body mass index (BMI), leisure-time physical activity (PA) and sedentary behaviours (SBs) and energy density of food.

Results: In all, 18.4% (95% confidence interval (CI): 14–23%) were overweight and 8.6% (95% CI: 6–12%) were obese. After adjustment for confounders, integrated (β=1.1; P<0.05) and marginalized (β=1.4; P<0.01) children had higher BMI than traditional children. However, integrated children had significantly higher time engaged in both PA (β=46.9, P<0.01) and SBs (β=43.0, P<0.05) than their traditional counterparts. In comparison with traditional children, assimilated children were more sedentary (β=57.5, P<0.01) while marginalization was associated with increased consumption of energy-dense foods (β=42.0, P<0.05).

Conclusions: Maintenance of traditional orientation was associated with lower rates of obesity and SBs. Health promotion programs and frameworks need to be rooted in traditional values and habits to maintain and reinforce traditional dietary and PA habits, as well as identify the marginalized clusters and address their needs.


Keywords: sub-Saharan African migrant children; acculturation; physical activity; sedentary behaviours; food energy density

Introduction

High prevalence of obesity among migrants is a major public health challenge in Australia¹,² and internationally.³,⁴ The effect of migration and acculturation on obesity remains poorly understood and little research has been done on the effect in children. Understanding acculturation as a potential explanation for the increased risk of obesity among migrants is paramount because migration and the process of acculturation are closely linked and associated with health outcomes, stress and coping strategies, family cohesiveness and subsequent health gains, dietary practices and eating disorders, cultural differences in the preference for participation in medical decision making and utilization of primary health care.⁵–⁹
However, it has been difficult to compare acculturation studies due to the use of different measures. Some studies have used surrogate measures of acculturation such as length of stay\textsuperscript{10,11} (a measure that does not take into account pre-immigration history), family values and health practices or changes in food habits and dietary practices.\textsuperscript{12,13} Other studies have considered acculturation as a linear process, where individuals move from one end of the axis (traditional) to the other (assimilation) at a different pace.\textsuperscript{14} A more nuanced view, however, is that acculturation is a bidimensional process that conceptually allows for four types of cultural orientation.\textsuperscript{15}

In the first type, ‘integration’ (a bicultural orientation—also known as ‘cultural incorporation’) describes a situation where an individual or a group retains their cultural identity at the same time moving to join the dominant society. In this sense, the individual or the group shows a resistance to acculturative pressures (that is, maintaining cultural integrity of their origin) at the same time adjusting to the new environment to become part of the larger societal framework.\textsuperscript{16} In the second type, ‘assimilation’ (also known as ‘cultural shift’\textsuperscript{17} or the ‘melting pot’ theory of acculturation\textsuperscript{16}) refers to the situation where an individual or a group accepts to lose their cultural identity but acquires a new identity of the dominant group or a second culture. In this sense, the individual or group adopts behaviours, beliefs, language, practices and values of the dominant group. In the third type, ‘traditional’ (also known as separation) refers to a situation where the acculturating group voluntarily has a strong identity with a particular group and does not wish to recognize or attain cultural characteristics of the dominant group.\textsuperscript{16,18} The individual or group voluntarily decides to keep loyalty to their customs, practices, beliefs and value. In contrast, marginalization, which constitutes the fourth and final type, refers to the condition where the acculturating group does not maintain its cultural characteristics but loses cultural and psychological contact with the dominant group by exclusion or withdrawal.\textsuperscript{16}

Most studies on acculturation have focused on adults rather than children where there is a lack of child appropriate acculturation scales. The few available studies in children have focused on reading achievements,\textsuperscript{19} problem-solving abilities in the school environment\textsuperscript{20} and the effect of acculturation on selected health risk behaviours for asthma, drug use and mental health.\textsuperscript{21–23} Studies examining the effect of acculturation on obesity and its risk factors remain scarce. Therefore, the purpose of this study was to examine the association between the bidimensional process of acculturation and obesity and its risk factors among African migrant children in Australia.

Methods

Design

The study sample, design and procedure, and outcome measurement including acculturation have been described elsewhere.\textsuperscript{2,24,25} Briefly, the study was nested within a larger study of nutrition, physical activity (PA) and relative body weight in sub-Saharan African (SSA) children between October 2001 and April 2002. A snowball sampling method was utilized. While this sampling method may not yield a representative sample, it is the method of choice where it is difficult to locate subjects\textsuperscript{26} especially ethnic minority groups.\textsuperscript{27} We attempted to overcome the short comings of snow ball sampling by stratifying our subject selection by age, gender and African region of origin. Anthropometric data were obtained on a total sample of 337 children aged 3–12 years from 139 households.\textsuperscript{28} Parents reported their child’s food intake and PA. This project was approved by Deakin University’s Ethics Committee, and informed consent from parents was acquired.

Measurement

The weight was measured by portable electronic scales (UC-321 Co. Ltd, London) to the nearest 50 g. Children were weighed without shoes and in light clothing. The height was measured to the nearest millimetre with a portable Harpenden Stadiometer (British Indicators Ltd, London). Overweight and obesity were defined using the body mass index (BMI) according to the International Obesity Taskforce age and sex-specific criteria.\textsuperscript{28}

Dietary intake was estimated using a 114-item food frequency questionnaire using a ‘photo-assisted food frequency questionnaire’, classified into 16 major groups containing either food commonly consumed or traditional African food culture. This method was modelled using a technique developed by Kumanyika et al.\textsuperscript{29} Food items included in the food datasheet were selected on the basis that they describe 75% intake of energy, protein, iron, calcium and vitamin A in Australian children.\textsuperscript{30} Dietary data are presented as the energy density of the diet. This was calculated as the total energy intake (in kJ) divided by the total weight of food and beverages (excluding water) consumed (in grams).

The SSA children’s PA and sedentary behaviour (SB) questionnaire was adapted from the PA questionnaire for older children\textsuperscript{31,32} and was modified to be completed as a proxy-report instrument by parents or carers.\textsuperscript{31} Some additional items were included from the Australian children’s participation in cultural and leisure activities survey,\textsuperscript{33} but adapted to reflect SSA children’s PA habits. PA included organized popular sport, leisure activities and home duties that were undertaken outside of school hours, but only activities of ≥3 METs\textsuperscript{34} were included in the analysis. SB activities included the total time children spend watching television (TV), engaged in computer games/internet and playing with electronic toys.\textsuperscript{33} Using a yes/no response dichotomy, parents indicated the PA (18 activities) and SBs (TV watching, internet and electronic toys) in which children participated during a typical week in the last 3 months. For PA in which children participated, parents were
asked to report the frequency and average duration per session for each activity. For SB, parents were asked to report the time that children spent in these behaviours ‘before and after school’. To calculate the time children spent in PA per day, PA frequency was multiplied by the duration and the total divided by seven. Results were given as minutes per day of PA and SB.

A series of consultations with African migrant social and settlement workers, complemented by a review of the literature, was undertaken to identify acculturative changes that occur in children as a result of migration. Identified themes were used to develop the initial 15 items. These items covered topics related to proficiency and frequency in the usage of mother tongue and English language; cultural identity; maintenance of traditional diet; participation in cultural events and social groups; and frequency of language-based media. The 15 items finally identified for the scale covered the same domains as previously developed scales for adults, five in addition to child-specific domains determined from our formative research. They portrayed two cultural orientations: African and Australian.

To pilot the acculturation scale, in the first stage, eight African migrant social and settlement workers were asked to comment on the draft of the questionnaire for clarity and relevance. In the second stage, the revised questionnaire was given to 14 African migrant community leaders (through a bilingual worker) for comment on cultural sensitivity and relevance of the items. Changes suggested in the first and the second stage related to fine-tuning the questionnaire in terms of language. At this stage, no item was dropped nor was there any additional item suggested. In the last stage, the final questionnaire was administered to 139 households, with the average (mean ± s.d.) number of children per household (including children non-eligible for the study that is >12 years) of 3.7 ± 2.

Obtained data were subjected to psychometric assessment using factor analysis, followed by a reliability analysis. Before the factor and reliability analyses, all items were subject to frequency analysis to assess frequency of responses and the curve of the distribution examined. Three items (watching TV programs in African languages, listening to music sung in African languages and listening to radio programs in African languages) were found to be highly negatively skewed as there are neither TV programs nor radio programs in Australia for the various SSA languages. These items were excluded from the analysis. The remaining 12 items were found to have very high internal consistency with Cronbach’s $z$ for the African-orientation and Australian-orientation acculturation subscales estimated at 0.85 and 0.83 respectively. These are similar to or greater than those reported for adults.

**Data analysis**

Data were analysed using Stata version 9.0 (Stata Corporation, TX, USA). To identify the four types of acculturation, a median split for each subscale was used as the criteria for group classification. That is, high and low orientation was determined by participants scoring above or below the median score on both acculturation subscales (Figure 1). The relationship between acculturation type and obesity, energy density of the diet, PA, and SB was assessed using

![Figure 1](image_url)

**Figure 1** Prevalence of overweight/obesity (%), physical activity (mean, 95% CI), sedentary behaviours (mean, 95% CI), energy density (mean, 95% CI) by acculturation level. BMI, body mass index; ED, energy density of the diet; Ov/Ob, overweight/obesity; PA, physical activity; SB, sedentary behaviours.
standard multiple regression, adjusting for household income, parental educational level, religion, child’s age, child’s gender, and length of stay in Australia and allowing for clustering by household. The relationship between two categorical variables was examined by \( \chi^2 \) test. The level of statistical significance was set at a probability of \( P<0.05 \) for all tests.

**Results**

Table 1 summarizes the demographic profile of the studied population. Unadjusted values for obesity prevalence, time spent engaged in PA and SB and energy density by acculturation level are summarized in Figures 1 and 2.

A total of 62 children were overweight (18.4%, 95% confidence interval (CI): 14–23%) and 29 were obese (8.6, 95% CI: 6–12%). There was a relationship between acculturation and the risk of overweight and obesity, with the prevalence being 30.2% (95% CI: 20.2–40.2%) for assimilated children, 32% (95% CI: 24–40.0%) for integrated children, 27.8% (95% CI: 19.8–35.8%) for marginalized children and 9.8% (95% CI: 1.6–18.0%) for traditional children (\( \chi^2 = 9.56, P = 0.023 \)) (Figures 1 and 2).

After adjustment for acculturation correlates, traditional children had significantly lower BMI than integrated and marginalized children, spent less time engaged in SB than integrated and assimilated children, and consumed less energy-dense diet than their marginalized counterparts (\( P<0.05 \)). The daily time spent engaged in PA was higher by 47 min in integrated children compared to their traditional counterparts (Table 2).

**Discussion**

This is the first study to examine the relationship between acculturation and obesity and its risk factors among migrant children in Australia. The study found that when you adjust for confounders, traditional children had significantly lower BMI than integrated and marginalized children, spent less time engaged in SB than integrated and assimilated children, and consumed less energy-dense diets than marginalized children. Our study confirms that the less traditional the African children become, the more likely they are to develop ‘obesogenic’ food and sedentary habits and an increase in the prevalence of obesity ensues. This finding has

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**Table 1** Demographic and socio-economic factors by acculturation type

<table>
<thead>
<tr>
<th></th>
<th>Traditional</th>
<th>Integration</th>
<th>Assimilation</th>
<th>Marginalization</th>
<th>Statistics</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)*</td>
<td>6.5 ± 0.4</td>
<td>7.6 ± 0.2</td>
<td>9.1 ± 0.4</td>
<td>6.0 ± 0.2</td>
<td>( F_{(3,333)} = 17.4 )</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Length of stay (years)*</td>
<td>4.8 ± 0.6</td>
<td>7.1 ± 0.5</td>
<td>5.9 ± 0.5</td>
<td>5.5 ± 0.3</td>
<td>( F_{(3,333)} = 4.5 )</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Gender*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>43.1</td>
<td>53.1</td>
<td>46.5</td>
<td>53.9</td>
<td>( \chi^2 = 2.23 )</td>
<td>0.526</td>
</tr>
<tr>
<td>Boys</td>
<td>56.9</td>
<td>46.9</td>
<td>53.5</td>
<td>46.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion*</td>
<td></td>
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</tr>
<tr>
<td>Muslim</td>
<td>43.1</td>
<td>25.8</td>
<td>74.4</td>
<td>85.2</td>
<td>( \chi^2 = 96.0 )</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Christian</td>
<td>56.9</td>
<td>74.2</td>
<td>25.6</td>
<td>14.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Household income ($A per year)*</td>
<td>19.6</td>
<td>38.3</td>
<td>9.3</td>
<td>4.3</td>
<td>( \chi^2 = 55.0 )</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>$46000 or more</td>
<td></td>
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<td></td>
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<tr>
<td>$30000–45000</td>
<td>19.6</td>
<td>30.5</td>
<td>39.5</td>
<td>33.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$29000 or less</td>
<td>60.8</td>
<td>31.3</td>
<td>51.2</td>
<td>62.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental education*</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>University level</td>
<td>27.5</td>
<td>52.3</td>
<td>27.9</td>
<td>13.0</td>
<td>( \chi^2 = 58.7 )</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>High school</td>
<td>35.3</td>
<td>39.1</td>
<td>32.6</td>
<td>53.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary or less</td>
<td>37.3</td>
<td>8.6</td>
<td>39.5</td>
<td>33.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Mean ± s.e., analysis of variance. *% within column, \( \chi^2 \) test. Sedentary behaviours = TV watching+internet+electronic toys.
important implications for the prevention and treatment of overweight and obesity in migrant African children and possibly other groups of migrant children.

These findings are consistent with other studies that have used length of stay as an indicator of acculturation. Schumacher et al.\textsuperscript{38} and Yip et al.\textsuperscript{39} found that the longer the children stay in a host country, that is the more assimilated they become, the heavier they were. Similar findings have been reported among Mexican-American subpopulations, using generation (first versus second generation) as a surrogate measure of acculturation\textsuperscript{40,41} and other migrants.\textsuperscript{42} Patterns of food intake and PA exacerbate an increase in relative body weight in migrant children. We have previously demonstrated a high prevalence of obesity and poor nutritional habits\textsuperscript{2,25} in this population of African migrant children. In the current study, we have shown that PA, SB and energy density of the diet were related to the acculturation status of these migrant children. Our findings point to the need to take into account acculturation level when targeting specific food and exercise habits in this population to prevent obesity.

It is difficult to compare studies that have examined the relationship between acculturation and PA and SBs due to methodological differences. The few available data present an inconsistent pattern. For example, a study by Kennedy\textsuperscript{44} assessing the association between TV viewing and acculturation level among young Hispanics found that assimilated Hispanic children spent more time engaged in SBs and were more likely to watch child informative shows, sports and adult comedy than traditional Hispanic children. Similar findings were also reported in separate studies among Hispanic and Asian migrants.\textsuperscript{45} In contrast, Crespo et al.\textsuperscript{46} found a positive relationship between traditional orientation and physical inactivity, with Spanish-speaking Mexican Americans found to have a higher prevalence of physical inactivity during leisure time than those proficient in English, independent of place of birth. In Australia, Bennett\textsuperscript{47} found that assimilation among Asian migrants was associated with increased PA during leisure time. Other studies have reported no relationship between acculturation and PA and SBs.\textsuperscript{48} This is in contrast to our findings suggesting that traditional children spent less time engaged in PA and SBs than assimilated children.

However, despite traditional children spending less time in PA, they also spend less time in SBs, which occupy a larger part of the day and are associated with increased energy intake,\textsuperscript{43} and have a lower energy-dense diet than children from the other acculturation groups. It is the sum of these behaviours that determines overall energy balance; so it is feasible to have lower PA and lower BMI because other more potent, obesogenic behaviours are also lower in this acculturation subcluster.

Although studies that have reported energy-density intake directly and its relation to acculturation level are nonexistent, our findings related to the relationship between acculturation and energy density of the diet were consistent with some but not all studies that have used proxy measures of energy density. Previous studies examining the relationship between acculturation and energy density of the diet have used proxy measures of density. For example, a lower consumption of fruit and vegetables but a higher intake of fat have been reported among traditional versus assimilated African Americans\textsuperscript{49} and traditional versus assimilated African Americans and Hispanics.\textsuperscript{45} In contrast, higher fat intake but lower fruit and vegetable intakes have been found to be associated with assimilation among Mexicans in Washington State,\textsuperscript{50} while Dixon et al.\textsuperscript{51} found no difference in energy intake by acculturation level but reported significantly higher fat intake among highly acculturated than traditional Mexican-American women.

There are several limitations to the current study; food frequency methodology can overestimate food intake\textsuperscript{52} and it is also possible that this overestimation may be culturally dependent. While the issue of underreporting is more a problem in a population in which being overweight and obese is stigmatized, the study population tends to have a preference and social desirability for large body size.\textsuperscript{53} The tendency would be towards overestimating intake, as a way of expressing plentifulness, although in the assimilated cluster, underestimation of intake among overweight and obese would be more likely to occur. However, using energy density rather than energy intake was a way of overcoming

Table 2 Adjusted coefficients (95% confidence intervals) of body mass index, physical activity, sedentary behaviours and diet energy density with acculturation type

<table>
<thead>
<tr>
<th>Acculturation type</th>
<th>Body mass index (kg m\textsuperscript{-2})</th>
<th>Physical activity (min day\textsuperscript{-1})</th>
<th>Sedentary behaviours (min day\textsuperscript{-1})</th>
<th>Energy density (kJ per 100 g)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(\beta) 95% CI P</td>
<td>(\beta) 95% CI P</td>
<td>(\beta) 95% CI P</td>
<td>(\beta) 95% CI P</td>
</tr>
<tr>
<td>Traditional (ref)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integrated</td>
<td>1.1 (0.2, 2.1) 0.019</td>
<td>46.9 (19.0, 74.8) 0.001</td>
<td>43.0 (4.4, 81.5) 0.029</td>
<td>1.2 (0.2, 2.1) 0.001</td>
</tr>
<tr>
<td>Assimilated</td>
<td>1.2 (0.6, 3.0) 0.192</td>
<td>6.2 (36.4, 24.0) 0.686</td>
<td>57.5 (15.0, 100.0) 0.008</td>
<td>6.2 (0.6, 3.0) 0.192</td>
</tr>
<tr>
<td>Marginalized</td>
<td>1.4 (0.4, 2.5) 0.008</td>
<td>1.1 (24.2, 26.4) 0.930</td>
<td>7.3 (31.2, 45.9) 0.707</td>
<td>7.3 (31.2, 45.9) 0.707</td>
</tr>
<tr>
<td></td>
<td>(F_{1(12, 130)} = 5.12, P&lt;0.001)</td>
<td>(F_{1(12, 130)} = 2.00, P=0.029)</td>
<td>(F_{1(12, 130)} = 4.69, P&lt;0.001)</td>
<td>(F_{1(12, 130)} = 2.83, P&lt;0.01)</td>
</tr>
<tr>
<td></td>
<td>(R^2 = 0.185, P&lt;0.05)</td>
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</tbody>
</table>

*Model adjusted for household income, parental educational level, religion, child’s age, child’s gender and length of stay in Australia.
the issues associated with overestimation. Nevertheless, there may still be some residual overestimation due to selective overreporting, which we cannot account for. Similarly, it could also be argued that parents reported only about PA observed at home. The lack of information about PA at school or outside home activities may make the reports in the current study an underestimation. While our sample was recruited through snowballing, we have attempted to overcome the bias inherent in this sample method by stratifying our subject selection by age, gender and African region of origin. Our final sample was demographically consistent with the overall profile of African migrants to Victoria.54

Conclusions and policy directions

Methodological differences to measuring acculturation make it difficult to compare study findings and could account for some of the variations between studies. Notwithstanding this, our findings suggest that keeping some elements of traditional identity and cultural values is associated with healthy eating and has a protective effect against the development of obesity in childhood and possibly chronic diseases later in life. It is worth noting that the positive health effect associated with the maintenance of traditional values is culture-specific. Thus findings from this study cannot be generalized beyond the studied population. Health promotion programs and frameworks need to be rooted in traditional values and habits to maintain and reinforce traditional dietary and PA habits, as well as identify the marginalized clusters and address their needs.

Acknowledgements

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Competing interests

The authors declare that they have no competing interests.

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