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Relationship between negative mood and health behaviors in an immigrant and refugee population

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Abstract

Background—Immigrants experience an escalation of negative health behaviors after arrival to the United States. Negative mood is associated with poorer health behaviors in the general population; however this relationship is understudied in immigrant populations.

Methods—Adolescent (n=81) and adult (n=70) participants completed a health behavior survey for immigrant families using a community-based participatory research approach. Data was collected for mood, nutrition, and physical activity.

Results—Adolescents with positive mood drank less regular soda, and demonstrated more minutes, higher levels, and greater social support for physical activity (all ps < .05). Adults with positive mood reported more snacking on fruits/ vegetables, greater self-efficacy for physical activity, and better physical well-being (all ps < .05).

Discussion—Negative mood was associated with low physical activity level and poor nutritional habits in adolescent and adult immigrants. Designing community-based programs offering

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COMPLIANCE WITH ETHICAL STANDARDS

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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strategies for mood management and healthy lifestyle change may be efficacious for immigrant populations.

Keywords

health behaviors; mood; immigrant families; intervention

INTRODUCTION

Immigrants and their descendants are expected to account for most of the U.S. population growth in coming decades [1]. Additionally, children of foreign born individuals (20% of children in the U.S.) represent the nation's most rapidly growing demographic [2]. Across many measures, immigrant and refugee populations arrive to the U.S. healthier than the general population [3]. However, the longer immigrant groups reside in the U.S., the more they approximate the cardiovascular risk profiles of the general population, including high rates of obesity, hyperlipidemia, smoking[4], hypertension [5], and cardiovascular disease [4]. For foreign-born children of immigrant families, dependent upon ethnic group, the chance of becoming overweight or obese increases with each generation [6] and with age [7]. Moreover, these children may be at even greater risk of developing obesity and associated complications with increasing duration of residence than immigrants who arrived as adults [8]. Despite many recent calls from health care professionals and community leaders for tailored interventions addressing physical activity and nutrition among immigrant and refugee populations [9], few have been reported [1].

Intervention research with U.S. ethnic minorities requires the use of culturally-relevant approaches, which make them informative for tailoring interventions to immigrant populations. Interventions targeting health behaviors with U.S. ethnic minorities have demonstrated increased physical activity levels [10], reduced weight and body mass index (BMI) [10], reduced consumption of saturated fats and sugar-sweetened beverages [10], and improvements in measures of mental health and emotional well-being [11]. Continued development of new interventions for high-risk minority groups [12, 13] encourages the expansion of research on interventions tailored to immigrant populations. Promising results show that culturally-relevant interventions to promote change in nutrition and physical activity behaviors yield successful outcomes for increased knowledge of illness risk, increased knowledge of national guidelines, and behavior change for children [14] and adults [15]. However, the association between mood and health behavior remains understudied for immigrant groups.

A growing literature suggests that the increase in overweight and obesity in US immigrants and their children over successive generations is multifactorial and likely to include the acculturation of unhealthy behaviors such as poor nutritional habits and inactivity [6, 16]. However, in light of prospective research suggesting that depressed mood independently predicts obesity even after controlling for demographic factors, baseline body mass index (BMI), and parent BMI [17], it is possible that negative mood may be an important factor that influences weight status in immigrant youth and adults. In fact, research with ethnic minority youth suggests that emotional health predicts changes in BMI [18]. Negative mood

may influence weight by lowering self-efficacy for having a healthy lifestyle, promoting overeating and inactivity, and causing isolative behavior. In light of this research, the exploratory aim of this paper is to examine the association between mood and physical activity level and nutritional habits in an immigrant population using baseline data collected prior to randomization in the parent study. The goal of the parent project [19], Healthy Immigrant Families, was to build on past experiences of an established community-based participatory research (CBPR) partnership to systematically develop and evaluate a sustainable, socioculturally appropriate physical activity and nutrition intervention with and for immigrant and refugee families in a community in the upper midwest of the U.S.

METHODS

Setting and Partnership Description

Rochester, MN is a small metropolitan area in southeast Minnesota (2014 estimated population: 111, 402). According to 2007–2011 American Community Survey estimates, there are 14,172 foreign-born residents in the metro area. In 2004, a community-academic partnership developed between Mayo Clinic and Hawthorne Education Center, an adult education center that serves approximately 2000 immigrants and refugees per year through access to coursework, community resources, and a health clinic. Between 2005 and 2007, this partnership matured by formalizing operating norms, adapting CBPR principles, and adding many dedicated community and academic partners to form the Rochester Healthy Community Partnership (RHCP). The mission of RHCP is to promote health and well-being within the Rochester community through CBPR, education, and civic engagement to achieve health equity. Since its inception, RHCP has matured through development of a community-based research infrastructure [20], and increased productivity and experience with deploying data-driven assessments and interventions with immigrant and refugee populations [21, 22]. Community and academic partners have conducted all phases of research collaboratively, including joint dissemination of research results at community forums and academic meetings.

Recruitment and Eligibility

This study was approved by an Institutional Review Board and all participants provided informed consent. Participants were recruited via in-person contact and word-of-mouth initiated and conducted entirely by RHCP community partners from each of the participating immigrant communities: Latino, Somali, and Sudanese. All community partners completed RHCP-facilitated human subjects protection training [23]. Community partners identified families who potentially met eligibility criteria, explained the study, and gauged interest in study participation. The community partner obtained permission from an adult family member of interested families to forward their contact information to a study staff member. A language congruent study staff member then called the family and performed a 10-15 minute telephone screen for eligibility. Eligible families were invited to attend one of several enrollment days. Cluster randomization, stratified by ethnicity, was used to assign families to either the intervention or a delayed intervention.

A “family” was defined as consisting of two or more people residing in the same housing unit who self-identify as a family. Eligibility criteria at the family level included households with at least one adult and at least one child between the ages of 10-18. Inclusion criteria for individual participants included 1) not planning to move from the area over the next two years, 2) willing and able to participate in all aspects of the study, and 3) able to provide oral informed consent. Individual exclusion criteria included 1) self-reported pregnancy, 2) self-reported insulin-dependent diabetes, 3) self-reported diagnosis of cancer within the past 3 years, and 4) answered “yes” to the following question: “Do you know of any reason why you should not do physical activity?”

Measures

Mood Classification—Our research team has validated an emotional well-being quality of life item [24]. In several studies, white participants have been asked to rate their overall well-being as 0 “as bad as it can be” to 10 “as good as it can be [25]. For this study, a survey team of community and academic partners acknowledged the potential complexity of the existing scale for this population by adapting this item to a 5-point Likert scale with visual cues to assess emotional well-being within the past 7 days. Participants were asked to report their current overall mood as being poor, fair, good, very good or excellent. Cartoon-drawn faces were used as anchors for poor, good, and excellent mood, ranging from a frowning face to a smiling face. Responses of poor or fair mood were classified as negative mood; responses of good, very good, or excellent mood were classified as positive mood.

Nutrition—Seven items were used from the 22-item Food Behavior Checklist, a measure of nutritional habits [26]. These seven items assessed fruit and vegetable consumption, snacking on fruits and vegetables, and consumption of regular soda and sugary drinks. Two open-ended items queried the number of daily servings of fruits and vegetables, respectively. Five items queried the frequency of nutritional behaviors on a 4-point scale: No; Yes, sometimes; Yes, often; and Yes, every day. Sample items are “Do you eat fruits or vegetables as snacks?” and “Do you drink fruit drinks, punch, or sport drinks (like Gatorade or PowerAde)?”

Physical activity—The Kinetic Activity Monitor (KAM) accelerometer, validated in previous studies [27], was used for objective assessment of physical activity. Participants were asked to wear the accelerometer on their waist line each day during waking hours for 14 days. The accelerometer was activated and collected without providing feedback to participants. A valid assessment requires five days of wear for at least 10 hours a day. Study staff made phone calls during the assessment period to maximize adherence [28]. Data output includes KAM points (approximation of energy expenditure), and minutes spent performing mild (=0.5 to 2.0 miles per hour (mph)), moderate (=2.0 to 4.5 mph), and vigorous (> 4.5 mph) physical activity.

Self-efficacy and social support for health behavior change—Social-Cognitive Theory [29], which suggests that behavior change is influenced by self-efficacy and social support, served as our theoretical framework for measuring self-efficacy and social support for behavior change for physical activity and nutrition. Among adolescents, survey items

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were adapted from instruments developed for the Patient-centered Assessment and Counseling for Exercise plus Nutrition (PACE+) Program for low-income, ethnically diverse adolescents [30]. The present study used four subscales: self-efficacy for physical activity (6 items); social support for physical activity (7 items); self-efficacy for fruit/vegetable consumption (7 items); social support for fruit/vegetable consumption (4 items). Self-efficacy items for the adolescents queried “how sure” they were about health behavior engagement, rating their responses from 0% (I’m sure I can’t) to 100% (I’m sure I can). A sample self-efficacy item is: “Rate how sure you are that you can do physical activity when you feel sad or stressed.” Social support items asked about the frequency of support received for health behavior engagement in a typical week using a 5-point scale ranging from Never (0) to Everyday (4). A sample social support item is: “During a typical week, how often did a member of your household eat fruits and vegetables with you?”

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Among adults, analogous subscales from the PACE+ program for adults [31] were used. The same four subscales were examined, though the number of items within each was slightly different as compared to the adolescent survey: self-efficacy for physical activity (6 items); social support for physical activity (5 items); self-efficacy for fruit/vegetable consumption (6 items); social support for fruit/vegetable consumption (6 items). Self-efficacy items for the adults asked them to identify “how confident” they were about health behavior engagement, ranging from 0% (Not at all confident) to 100% (Very confident). A sample item is: “How confident are you that you can make time to regularly exercise or do physical activity when you feel you do not have the time?” Social support items asked about the frequency of support received for health behavior engagement in the past 30 days using a 5-point scale ranging from Never (0%) to Always (100%). A sample item is: “How often in the past 30 days have your family or friends reminded you to choose healthy foods?”

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Physical well-being—As with emotional well-being, our research team has validated a physical well-being quality of life item [24, 32]. Using the same approach used to adapt the mood assessment items, ratings of physical well-being were adapted from a 0-10 scale (“as bad as it can be” to “as good as it can be”) to a 5-point Likert scale. Participants were asked to report their physical well-being over the past 7 days as poor, fair, good, very good or excellent. Cartoon-drawn faces were used as anchors for poor, good, and excellent mood, ranging from a frowning face to a smiling face.

Survey translation

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English-language versions of both surveys were reviewed and revised for cultural adaptation and meaning by a Healthy Immigrant Families (HIF) work group, a subgroup of the RHCP community group that included experts in linguistics. For the adult survey, we used separate work groups for translation to Somali and Spanish through further editing of each item by forward-translation, panel discussion, backward translation, a pre-test, and a consensus on the final version by a core group of community leaders from each participating community [33]. We have previously described the successful implementation of this survey adaptation and translation process with our CBPR partnership [34]. These translated surveys and interviews were pilot-tested and refined with four families prior to baseline measurements.

Adult participants were offered the option of completing the survey in their primary language (Spanish, Somali) or in English. The RHCP community partners noted that translation of the survey into Arabic for Sudanese participants was not needed; these participants completed the survey in English. The interpreters were provided with a language key to address any dialect differences that arose during the survey. Our community partners noted that non-English translations were unnecessary for adolescents as they were all fluent English speakers.

Data Analysis

Group differences classified by mood were compared using Wilcoxon tests for continuous variables and chi-square tests for categorical variables. All analyses were two-side using 5% type I error rates and were done using SAS version 9.2 (SAS Institute Inc. Cary, NC, USA). Since the analyses used only the baseline data, no adjustments were necessary to account for the cluster randomization.

RESULTS

A total of 151 individuals (70 adults, 81 adolescents) from 44 families were enrolled and randomized. There were 25 families (76 individuals) in the intervention group and 19 families (75 individuals) in the delayed intervention control group. Participant characteristics for adolescents and adults are shown in Tables 1 and 2, respectively. Most (76%) of the adult Latino participants identified Mexico as their birth country (Table 2); birthplace information for the remaining 24% of Latinos is unknown.

As noted in our previous paper on the parent study [35], accelerometry data were collected from 148 of 151 participants. One hundred-seventeen (117; 77%) met the minimal requirement for wear and their data are reported here. Mean *number of days of accelerometer wear* was 11.4 ± 6.4 (10.4 ± 6.5 for adolescents; 12.5 ± 6 for adults). The mean *number of hours per day of wear* was 11.9 ± 4.8 (11.4 ± 5.3 for adolescents; 12.6 ± 4.1 for adults). Time spent in *moderate to vigorous physical activity* was 64.7 ± 30.2 mean minutes per day for adolescents and 43.1 ± 35.4 minutes per day for adults.

Of the 81 adolescent participants, 78 provided baseline mood information. Of these 78 adolescents, 77% (n=60) endorsed positive baseline mood. Younger participants and participants with less education were more likely to report positive mood. The mean (SD) age for youth with positive mood was 13.0 (SD= 2.3) compared to 14.7 (SD= 2.3) for youth endorsing negative mood ($p < .01$). Eighty-nine percent (41 of 46) of adolescents with education only up to grade 8 had positive mood compared to 58% (18 of 31) for adolescents in 9th grade or higher ($p < .01$).

Ten percent of adults in this sample were US-born and belonged to the same family unit as an immigrant adult. Of the 70 adult participants, 65 provided baseline mood information. Of these 65, 72% (n=47) reported positive mood. Three sociodemographic differences were identified for adults endorsing positive versus negative mood. Those endorsing positive mood were more likely to have: 1) *larger family size* (number of family members: mean=6.0, SD=2.5 vs. mean=4.6, SD=1.1; $p < .05$); 2) *less education* (86% (31 of 36) of

adults with less than high school education reported positive mood compared to 55% (16 of 29) of other adults, $p < .05$); and 3) *an annual family income of less than \$20,000* (88% (22 of 25) adults with an annual income of less than \$20,000 reported positive mood compared to 56% (19 of 34) of adults with higher annual income; $p < .05$).

Significant health behavior results for either the adolescent or adult samples informed the presentation of both sets of results for comparison purposes. Analysis of items from the Food Behavior Checklist revealed significant results only for snacking on fruits and vegetables, and for consumption of regular soda. On the PACE, significant results were revealed for self-efficacy and social support for physical activity, but not for fruit and vegetable consumption.

Adolescent results for health behaviors, measures for behavior change, and physical well-being by mood classification are displayed in Table 3. At baseline, only 2% (1 of 60) of adolescents with positive mood drank regular soda every day compared to 28% (5 of 18) of adolescents endorsing negative mood ($p < .005$). Adolescents with positive mood also had higher levels of overall objectively-measured physical activity (mean of 26.3 vs 20.1 KAM points per day, $p = .01$), had more objectively-measured minutes of vigorous physical activity per day (mean of 2.4 vs 0.6, $p < .05$), and reported higher social support for physical activity (mean of 2.7 vs 2.1, $p < .05$).

Table 4 shows adult data for health behaviors, behavior change measures, and physical well-being by mood classification. At baseline, compared to adults endorsing negative mood, adults reporting positive mood were more likely to snack on fruits or vegetables often or every day (55% (26 of 47) of positive mood participants vs 22% (4 of 18) of negative mood participants, $p < 0.01$). There were no significant differences for mood and objective physical activity for adults. However, those endorsing positive mood rated their physical well-being higher than adults with negative mood with 79% (37 of 47) rating themselves as good, very good, or excellent compared to 28% (5 of 18) of adults with negative mood ($p < .005$). Additionally, those endorsing positive mood also reported higher levels of self-efficacy for physical activity. Their mean level of self-efficacy was 3.0 vs 2.6 for participants with negative mood ($p < 0.05$).

DISCUSSION

In this exploratory analysis of baseline health behaviors of adolescent and adult participants enrolled in a community-based participatory intervention for healthy lifestyle in an immigrant population, there were significant associations between negative mood and health behaviors for both groups. It is challenging to implement and maintain positive lifestyle behaviors and, in the context of negative mood, this may become even more difficult. The findings of this study are consistent with previous research that has found an association between negative mood and poorer health behaviors in both adolescents and adults [17, 36]. Certainly, persistent low mood may promote overeating as a maladaptive coping strategy, as well as decreasing motivation for having a physically active lifestyle and healthy nutritional intake. Comparing endorsement of negative and positive mood, significant group differences were found for both nutrition and physical activity, and for self-efficacy and social support,

mediators of behavior. Our finding that negative mood was associated with less engagement in health behaviors and with measures of change suggests that this is an important association.

Compared to adolescents endorsing negative mood, adolescents who reported positive mood engaged in higher levels of physical activity. This difference was most striking at the mild range of physical activity. Adolescents with positive mood also reported perceiving that they had greater social support for physical activity than adolescents endorsing negative mood. This is consistent with a study examining a diverse sample of adolescents that found associations between social and instrumental support for healthy eating and fruit and vegetable intake [37]. Social support can be practically important (e.g., my parents will give me a ride to practice), but also emotionally important (e.g., my friends encourage me to be active).

Drinking regular soda is a detrimental nutritional habit for youth in our country. As sales for sugared drinks have increased, childhood obesity rates have skyrocketed. This study found that significantly more adolescents with negative mood endorsed consuming regular soda than adolescents with positive mood. One possible biopsychosocial explanation is that low mood, poor nutritional choices, and inadequate sleep share a multi-directional relationship. Though not examined in the present study, future assessment of sleep behaviors (e.g. bed time, wake time, total sleep hours, sleep quality, use of sleep medications,) may assist in the explanation of adolescent mood and physical well-being. According to the National Sleep Foundation [38], as many as 45% of adolescents report inadequate sleep (i.e. < 8 hours) on school nights. Their report also found that inadequate sleep is associated with greater consumption of daily caffeinated beverages and greater severity of depressive symptoms. Compounding this is well-established evidence of emerging gender differences in clinical depression during adolescence after age 15, where girls and women are twice as likely to develop depression [39, 40]. Taken together, this suggests that low mood may be a potential mediator between poor sleep and poor health behaviors (nutritional and physical activity). The observed relationship between negative mood, poor health behaviors, and inadequate sleep behaviors in other studies identifies a potential target for biopsychosocial intervention. Intervention to target sleep behavior would specifically focus on modification of environmental and physical factors that disrupt sleep (e.g. having a standard bed time/wake time, avoiding electronics before bed, avoiding caffeine and other stimulating substances, eliminating naps).

Adults reporting a positive mood were not more physically active; however, they did report having more confidence for physical activity. Because self-confidence may predict future behavior, prospective association between low mood, low confidence, and low physical activity level should be examined. In spite of this lack of association between self-efficacy and physical activity in adults, there was a strong association between low mood and poor physical well-being. This could represent a bidirectional association; low mood may lead to poor perceived health, and/or poor perceived health may contribute to low mood.

It is important to note that there are numerous physical, mental, and psychosocial factors that may initiate and/or maintain low mood. The presence of comorbid medical conditions

can be linked with low mood, whether through physiological mechanisms (e.g. inflammatory markers) and/or through maladaptive psychological coping with illness. As noted, personal and family psychiatric history (subclinical/clinical symptoms, need for psychotropic medication) may also increase the likelihood of diminished mood in response to life stressors. Related to this, the life experiences of immigrants and refugees are often stressful, whether related to navigating a new culture/society, financial and legal stress, and racism and discrimination. Socioeconomic factors, namely low income and education, have been identified as predictors of depressive symptoms [41]; however immigrant populations have not been the focus of such studies. In this study, most (72%) adults reported positive mood, which was associated with less education and lower annual family income. This finding warrants future research in that it may reflect cultural reluctance to endorse negative mood in general, or there may be additional factors contributing to low mood in the context of higher education or income, for example the stress of finding and maintaining employment requiring greater education and offering greater income. The experiences of immigrants and refugees present a unique context in which to examine these biopsychosocial and socioeconomic factors impacting mental and emotional well-being.

Methodological limitations of the study are acknowledged. The cross-sectional design does not allow for causative statements and the sample size was moderate. As such, these findings may not be generalizable to these or other immigrant populations outside our community. Another limitation is that we queried mood but did not ask about personal or family mental health history. An assessment of mental health history was initially included; however we respectfully reconsidered in response to the concerns of our community partners. Our community partners expressed concern that the stigma associated with discussing mental health would dissuade study participation. Since the primary aim of this study was to implement a physical activity and nutrition intervention, rather than a mood management intervention, we removed the questions about mental health history. Certainly, the stigma of mental health difficulties highlights a target area for education, assessment, and treatment in immigrant and refugee individuals and families. Future research with larger immigrant subgroups will be needed to examine these and other ethnic group differences and consider an assessment of psychiatric history along with assessment of potential correlates of mood (e.g., sleep behavior), preferably preceded by community education concerning mental health issues. Strengths of the study include the range of self-report measures and the use of an objective measure of physical activity, and the focus on both adolescent and adult members of an understudied population with social and economic vulnerability.

CONCLUSIONS

Obesity and sedentary lifestyles are significant health problems in our country. There have been several national health campaigns to encourage individuals to consume at least five servings of fresh fruits and vegetables every day, and several national campaigns to increase activity level in children, adolescents and adults. Our findings suggest that an intervention targeting both low mood and low intake of fruits and vegetables, and physical activity level could be efficacious, and perhaps more impactful than an intervention or campaign that does not address low mood.

Preventive interventions targeting healthy nutrition, physical activity, and mood may not only yield benefits for healthy nutrition, weight management, and mood management, but also prevention of certain medical conditions. If confirmed by other investigators using larger samples and prospective designs, these results suggest that healthy living interventions for adolescent and adult immigrant populations should incorporate mood assessment and mood management strategies.

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TABLE 1

Participant characteristics in a sample of adolescents of immigrant families (N=81)

Age, mean (SD)	13.5 (2.5); range: 10-18
Gender	
Female	51% (n=41)
Male	49% (n=40)
Family Ethnicity	
Latino	46% (n=37)
Somali	49% (n=40)
Sudanese	5% (n=4)
Born in US	
No	53% (n=43)
Yes	47% (n=38)
Years in US (if not born in US), mean (SD)	6.8 (4.5)
English Fluency	
Not at all	1% (n=1)
Not very well	12% (n=10)
Well	16% (n=13)
Very well	71% (n=57)

TABLE 2

Participant characteristics in a sample of adults of immigrant families (N=70)

Age, mean (SD)	39.1 (10.9); range: 19-75
Gender	
Female	71% (n=50)
Male	29% (n=20)
Household Size, mean (SD)	5.6 (2.3)
Family Ethnicity	
Latino ¹	61% (n=43)
Somali	34% (n=24)
Sudanese	5% (n=3)
Born in US	
No	90% (n=63)
Yes	10% (n=7)
Years in US (if not born in US), mean (SD)	14.2 (8.3)
English Fluency	
Not at all	16% (n=11)
Not very well	34% (n=24)
Well	28% (n=20)
Very well	22% (n=15)
Education	
8 th grade or less	48% (n=33)
Some high school	8% (n=6)
High school graduate	23% (n=16)
Some college or technical degree	17% (n=12)
College graduate or higher	4% (n=3)
Family Income	
< \$10,000	37% (n=26)
\$10,000 to \$19,990	7% (n=5)
\$20,000 to \$29,990	16% (n=11)
\$30,000 to \$39,990	24% (n=17)
> \$40,000	16% (n=11)

¹ 76% of Latino participants were born in Mexico. Place of birth for the remaining 24% of Latinos is unknown.

TABLE 3

Health behaviors, measures of behavior change, and physical well-being by mood classification in a sample of adolescents of immigrant families (N=81)

	Negative Mood (n=18)	Positive Mood (n=60)	p-value
Health behaviors			
Snacks on Fruits or Vegetables ¹			p=.5
No	11%	3%	
Sometimes	50%	50%	
Often	22%	30%	
Every day	17%	17%	
Drinks Regular Soda ¹			p=.002
No	11%	13%	
Sometimes	33%	63%	
Often	28%	22%	
Every day	28%	2%	
Physical activity, objective²			
Mean Minutes of Exercise/Day			
Mild	159.9 (43.7)	196.2 (63.5)	p =.04
Moderate	51.5 (20.7)	64.8 (29.7)	p=.07
Vigorous	.6 (.8)	2.4 (3.4)	p=.004
KAM Points/Day ³	20.1 (6.2)	26.3 (9.3)	p=.01
Measures of change⁴			
Self-Efficacy for Physical Activity	3.2 (.6)	3.6 (.8)	p=.06
Social Support for Physical Activity	2.1 (.8)	2.7 (1.0)	p=.04
Physical Well-being⁵			p=.2
Poor	11%	5%	
Fair	22%	10%	
Good	45%	33%	
Very good	0%	17%	
Excellent	22%	35%	

Data is missing for 3 participants.

¹ adapted from Food Behavior Checklist;

² KAM: Kinetic Activity Monitor;

³ A KAM Point is a derivative of METs (Metabolic Equivalents) where $1 \text{ KAM Point} = (\text{METs} - 1) \times 100$. Higher points represent greater level of physical activity;

⁴ adapted from PACE+: Patient-centered Assessment and Counseling for Exercise plus Nutrition program;

⁵ Physical Well-Being, single item.

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TABLE 4

Health behaviors, measures of behavior change, and physical well-being by mood classification in a sample of adults in immigrant families (N=70)

	Negative Mood (n=18)	Positive Mood (n=47)	p-value
Health behaviors ¹			
Snacks on Fruits or Vegetables			
No	0%	10%	p=.01
Sometimes	78%	34%	
Often	6%	28%	
Every day	16%	28%	
Drinks Regular Soda			
No	28%	38%	p =.6
Sometimes	50%	36%	
Often	17%	13%	
Every day	5%	13%	
Physical activity, objective ²			
Mean Minutes of Exercise/Day			
Mild	279 (68.7)	265 (104.8)	p =.5
Moderate	51.8 (44.5)	38.6 (30.1)	p=.3
Vigorous	1 (2.2)	1.2 (5.3)	p=.9
KAM Points/Day ³	26.2 (10.1)	23.3 (10.2)	p=.3
Measures of change ⁴			
Self-Efficacy for Physical Activity	2.6 (.8)	3.0 (.8)	p =.04
Social Support for Physical Activity	2.9 (1.0)	3.0 (1.0)	p=.5
Physical Well-being ⁵			
Poor	6%	2%	p <.005
Fair	67%	19%	
Good	22%	43%	
Very good	5%	23%	
Excellent	0%	13%	

Data is missing for 5 participants.

¹ adapted from Food Behavior Checklist;

² KAM: Kinetic Activity Monitor;

³ A KAM Point is a derivative of METs (Metabolic Equivalents) where 1 KAM Point = (METs – 1) × 100. Higher points represent greater level of physical activity;

⁴ adapted from PACE+: Patient-centered Assessment and Counseling for Exercise plus Nutrition program;

⁵ Physical Well-Being, single item.

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