Perceived Physical Activity Barriers in Relation To Depressive Symptoms in Overweight/Obese Latinos –The Adelgaza Trial.

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Abstract

Background

Latinos are the most physically inactive population in the US and under-utilize depression treatment. Physical activity is a suitable depression treatment, but Latinos report high barriers. The relationship between perceived activity barriers and depression has not been assessed before in Latinos.

Methods

We included 54 overweight Latino participants, BMI > 24.9 kg/m², 68.5% female, mean age 45.3 years, enrolled in a weight loss intervention—the Adelgaza trial. Using multivariate regression, we examined the association between the total Barriers to Being Active Quiz (BBAQ) and the Center for Epidemiological Studies Depression Scale (CES-D). We post-hoc assessed this relationship for the BBAQ subscale-scores.

Results

Depression scores were associated with barrier scores (linear effect, estimate = 0.73, p = 0.02). A lack of resources was significantly related to higher depression (post-hoc exploratory, OR = 1.56, p = 0.002).

Conclusion

Physical activity barriers and depression are related in overweight Latino/a men and women. Perceived lack of resources might be a particularly important depression-related barrier.

Background

Physical inactivity and depression are one of the most prevalent risk factors for common chronic diseases (1) (2) (3), including diabetes and cardiovascular disease, in general and in particular for Latino population in the U.S. Based on the results of the Behavioral Risk Factor Surveillance System telephone survey conducted by Centers for Disease Control and Prevention (CDC), Hispanic adults (31.7%) had the highest prevalence of physical inactivity, followed by non-Hispanic Black (30.3%) and non-Hispanic White adults (23.4%)(4). Since this telephone survey defined physical inactivity as self-report of engaging in no leisure-time physical activity during the past month, the prevalence of physical inactivity may be much higher when objective measures are used (5).

Latinos also under-utilize mental health services. Depression prevalence rates are similar in Latinos and non-Latino Whites(8–9%)(6, 7), and according to the Hispanics Community Health study results, 1 in 3 Latinas and 1 in 5 Latinos report high depressive symptoms(8). Despite this, only 33.9% of all Latinos with mental health disorders in the U.S. receive treatment versus 50.3% of non-Latino whites(7). Reasons

for the treatment gap include inflexible employment schedules, inability to afford treatment and pervasive mental health stigma(9). In the United States (U.S.), Latinos constituted 18.5% of the U.S. population in 2019, and are expected to constitute 30% of the total US population by 2050(10). Despite the rapidly growing diverse Hispanic population in the U.S., comprehensive and tailored health programs that target both mental and physical health are still lacking for this group.

Depression and physical inactivity show strong relationships(11). It remains less studied how they are linked, especially in Latino populations, though studies found evidence of associations between the two. Physical activity interventions decreased depressive symptoms in Latino/a individuals with low socioeconomic status(12). Sedentary behavior has also been associated with higher depressive symptoms in Latinos(13). Because exercise simultaneously reduces the risk of obesity and diabetes—more common in Latinos(14, 15), engaging in regular physical activity could both be an effective treatment and prevention for depression and common chronic illness in Latinos.

Latino adults however report high barriers to physical activity barriers, which may differ from other racial and ethnic groups. A quantitative study in Latinos in Texas found that a “lack of time,” “being very tired,” and “lack of self-discipline” were most important barriers to exercise (16, 17). In a study in low-income Latina participants, using the Barriers to Being Active Quiz (BBAQ) (18), lack of willpower and lack of energy were most common. Perceived barriers were greater in overweight or obese participants(19). Qualitative research in Blacks and Latinos showed that key barriers to physical activity were lack of motivation, time constraints, and environmental safety concerns(20). Thus, barriers to exercise in Latinos may be both interpersonal and environmental (related to neighborhood resources such as gyms and parks).

In a community sample of women (majority White) enrolled in a mobile physical activity intervention, we previously showed that higher barriers to physical activity were associated with greater depression scores(21). To the best of our knowledge, it has not been examined whether this also holds in a Latino population. Understanding the relationships between perceived physical activity barriers and depressive symptoms would help us to better design interventions for physical activity promotion in Latinos. Effective and tailored physical activity interventions will help to decrease health inequities plaguing Latinos(22). Decreasing both the burden of physical activity and depression in Latinos can have a high public health impact.

Thus, the aim of this secondary data analysis paper was to examine the relationship between perceived physical activity barriers and depressive symptoms in overweight/obese Latino adults who were enrolled the Adelgaza trial(23). As a secondary aim we explored types of perceived physical activity barriers in relation to depressive symptoms.

Methods

Participants

In this paper, we analyzed the baseline data collected in the Adelgaza trial(23). The University of California San Francisco (UCSF) Committee on Human Research approved the study, and all participants provided written informed consent prior to their study enrollment. Detailed descriptions of the study design and eligibility of the participants have been previously published(23). In brief, the Adelgaza trial was designed to promote a weight loss for overweight/obese Latino adults at risk for type-2 diabetes (23). The goal of the intervention was to achieve 5% body weight loss over 8 weeks, at a rate of 1 to 2 pounds per week, by gradually increasing physical activity and reducing daily total caloric intake. The intervention consisted of two brief in-person counseling sessions, daily use of the Fitbit Zip (3-axis accelerometer) and Fitbit app, and social media (Facebook).

Participants were recruited from September 2014 to May 2016 through online advertisements, letters mailed to the home addresses of Latinos by zip code (as identified by census data), and by posting study flyers in hospitals, local businesses, and community centers in the San Francisco Bay Area, California. Initial eligibility was assessed by telephone, and final eligibility was confirmed by in-person screening at the screening/baseline visit. Eligibility criteria were as follows: body mass index (BMI) ≥ 25 kg/m²; age ≥ 18 years; self-identifies as Latino/a; owns a smartphone; willingness to use an app every day and wear a Fitbit Zip, ability to walk 1 mile or 20 min, no diagnosis of type 1 diabetes, type 2 diabetes with insulin therapy, untreated type 2 diabetes, or other medical condition necessitating special attention in an exercise and/or diet program, no ongoing participation in a lifestyle modification program, and no mild cognitive impairment (screened by the Mini-Cog test)(24).

Data collection

We screened 155 men and women for their eligibility by telephone. Of these 69 attended a screening/baseline visit. However, three participants did not meet all eligibility criteria at the screening/baseline visit and 12 did not meet subsequent run-in period criteria. In this paper, we analyzed the remaining 54 participants who received the intervention at the eligibility visit (2 weeks from the screening/baseline visit). Sociodemographic, self-reported medical history, acculturation, and physical activity barriers were collected at the screening/baseline. Depressive symptoms were measured at the eligibility visit before they received the intervention. The Short Acculturation Scale for Hispanics (SASH) (25) was used to assess the level of acculturation. This scale consists of three subscales with 12 items on a scale of 1 to 5, 1 being "Only Spanish or All Latinos/ Hispanics" and 5 being "Only English or All Americans." The language subscale includes 5 items (e.g., In general, what language(s) do you read and speak?); the media preference subscale includes 3 items (e.g., In what language(s) are the T.V. programs you usually watch?); and the ethnic social relations subscale contains 4 items (e.g., You prefer going to social gatherings/parties at which the people are) of the same ethnicity of close friends).

In addition, we used the BBAQ (18) developed by the Centers for Disease Control and Prevention to assess perceived physical activity barriers. The BBAQ is a 21-item measure and consists of seven subscales: 1) lack of time, 2) social influence, 3) lack of energy, 4) lack of willpower, 5) fear of injury, 6) lack of skill, and 7) lack of resources (e.g., recreational facilities, exercise equipment). Each subscale contains 3 items, with a total subscale score ranging from 0 to 9. Respondents rate the degree of activity

interference on a 4-point scale, ranging from 0 = “very unlikely” to 3 = “very likely.” A total BBAQ score ranges from 0 to 63, and higher scores indicate greater physical activity barriers.

Lastly, we used the 20-item Center for Epidemiological Studies Depression Scale (CES-D)(26) to measure self-reported depressive symptoms. Possible scores range from 0 to 60 and, higher scores indicate greater depressive symptom. A cutoff score of 16 indicates risk for clinical depression. The CES-D has been widely used to assess depressive symptoms in a research context(27) and in Latino populations(13, 28).

Analysis

We used descriptive statistics to summarize sample characteristics and linear or logistic regression to examine the association between the total and subscale BBAQ scores with CES-D scores. For BBAQ subscale scores with a non-normal distribution we computed a binary variable based on the median scores. We included self-reported age, employment (paid work, yes or no), education (higher or lower than high school), whether participants have children at home (yes/no), whether they have driven a car in the past week (yes/no), marital status (married/not married) and acculturation, as covariates in the model, based on previous evidence(29)·(30)·(31–33). We removed influential observations using Cook’s d and checked further model assumptions by visual inspections of residual plots. Analyses were carried out in R studio V. 1.1.423. Statistical significance was set at 2-sided P value less than .05.

Results

Table 1. shows the sample characteristics. The majority of the sample was female (68.5%), with a mean age of 45.3 (SD ± 10.7) years. The majority was born in the US (61.1%). Of those not born abroad, 38.9% had lived in the USA for more than 10 years. The mean Short Acculturation Scale for Hispanics was 3.77 indicating that participants were relatively acculturated. The mean CES-D score was 4.4 (SD ± 4.4), indicating a low risk for depression. **Table 2.** Shows the mean and median BBAQ total and subscale scores. The Major barriers were lack of willpower, lack of time and lack of energy.

Table 1. Baseline characteristics (N = 54)	n (%) or mean ($\pm$ SD)
Female gender, n (%)	37.0 (68.5)
Age in years, mean (SD)	45.3 (10.7)
Marital Status, n (%)	
Married/cohabiting	31.0 (57.4)
Divorced/single/widowed	23.0 (42.6)
Having a child(ren)	42.0 (77.8)
Drove a car at least once a week in the past month (yes), n (%)	44.0 (81.5)
Born in the US, n (%)	
Born outside U.S.	38.9 (21)
Born in the U.S.	61.1 (33)
Short Acculturation Scale for Hispanics, mean (SD)	3.77 (0.54)
Language subscale	3.79 (0.82)
Media subscale	4.49 (0.66)
Ethnic social relations subscale	3.19 (0.57)
Education, n (%)	
Completed high school or some college education or less than high school	17.0 (31.5)
Completed college or graduate school	37.0 (68.5)
Employed, n (%)	
Unemployed/homemaker/disable/others	12.0 (22.2)
Paid work	42.0 (77.8)
Center for Epidemiological Studies Depression, mean (SD)	4.37 (4.35)

Table 2. Barriers to Being Physically Active Quiz (N = 54)	
Total barriers, Mean (SD)	19.0 (8.93)
Median (IQR)	10 (10/20/25.75)
Lack of Time, Mean (SD)	3.81 (2.61)
Median (IQR)	4 (2/4/6)
Social Influence, Mean (SD)	2.80 (2.05)
Median (IQR)	2.50 (1/2.5/4)
Lack of Energy, Mean (SD)	3.59 (2.65)
Median (IQR)	3.5 (2/3.5/5.75)
Lack of Willpower, Mean (SD)	5.50 (2.93)
Median (IQR)	6 (3/6/8)
Fear of Injury, Mean (SD)	0.685 (1.26)
Median (IQR)	0.00 (0/0/1)
Lack of Skills, Mean (SD)	0.944 (1.34)
Median (IQR)	0.00 (0/2/5)
Lack of resources, Mean (SD)	1.69 (1.63)
Median (IQR)	2.00 (0/2/3)
Total score ranges from 0–63. Subscale scores range from 0–9.	

Total physical activity barriers and CES-D scores

We removed three outliers based on Cook's d for the model examining the relationship between total barriers and depression scores. As seen in Table 3, multivariate regression showed that employment, education and CES-D scores were significantly associated with total barriers scores ($p = 0.013$). In the model that contained outliers, CES-D and total barriers were not related ($p = 0.126$) (see supplementary material). The outliers were participants with very low depression scores (< 3) but somewhat elevated barriers scores (> 6). Figure 2. shows the linear relationship between the total BBAQ scores and the CES-D scores after removing 3 outliers.

Table 3
Results of a multivariate regression predicting the Barriers to Being Physically Active Quiz total score

<i>Predictors</i>	Total barriers score		
	<i>Estimates</i>	<i>95% CI</i>	<i>p</i>
(Intercept)	10.40	-19.73–40.52	0.503
Depression scale (CES-D)	0.73	0.18–1.29	0.013
Gender (female)	-2.97	-7.98–2.04	0.252
Age	0.07	-0.21–0.34	0.632
Education (Completed college or graduate school)	6.92	1.26–12.59	0.021
Employment (employed)	8.00	2.40–13.60	0.008
Not Married	-0.31	-5.21–4.58	0.901
Has children	5.83	-0.50–12.16	0.078
Drives a car	-1.75	-7.87–4.37	0.578
Acculturation scale	-1.40	-6.64–3.85	0.605

Total physical activity barriers subscales and CES-D scores (exploratory)

Out of all BBAQ subscales, a high score in the lack of resources subscale significantly related to higher depression (CES-D) (OR = 1.56, CI: 1.19–2.06, $p = 0.002$). The other six subscales showed no significant relations to depression.

Discussion

Higher depression symptoms, measured by the CES-D, were significantly associated with higher physical activity barriers in overweight/obesity Latino adults enrolled in a weight loss trial even after controlling for other potential confounding factors. The mean BBAQ score (19.0) was slightly lower than other studies using the BBAQ in a community sample of women (median = 25.0)(21) and inactive pregnant women (mean 22.3)(34). Lack of resources for physical activity may be a particularly important barrier for this group. These results illustrate the importance of tailoring physical activity interventions for Latinos to depression levels.

Understanding how we can increase the impact of physical activity interventions for depression in Latinos is an important public health question. Though a number of studies identified physical activity as an effective treatment for depression (35, 36), some studies also observed null-effects(37), or found that

the benefits minimize over time(38). The top barriers to physical activity in this sample were lack of willpower, time and energy. Several other studies in Latinos and Hispanics(16, 17), a community sample of Brazilian women (39) and inactive pregnant women (34) observed similar top barriers. Health care providers who provide physical activity education programs and researchers who design physical activity interventions should focus on helping individuals to identify and overcome their barriers. For instance, to overcome the lack of time barrier, they can help participants identify opportunities for physical activity that work within their daily schedules. To overcome the lack of energy barrier, they can include opportunities that gradually increase in intensity. Research in Hispanic and African American women showed that actual time commitments do not always predict whether participants perceive lack of time as a barrier(40). Reducing perceived physical activity barriers, for instance by using Cognitive Behavioral Therapy (CBT) approaches, could greatly increase the effectiveness of physical activity interventions(41).

Our exploratory analysis indicated that the subscale, “lack of resources” might be the driving factor in the relationship between physical activity barriers and depression in Latinos. This relationship holds after correcting for education and income, factors associated with perceived lack of resources as physical activity barriers(39). The lack of resources subscale consists of questions such as “I don’t have access to jogging trails, swimming pools, bike paths, etc.” Other research found that environmental factors such as perceived neighborhood safety and access to facilities prevent Latinos from exercising(42). These results differ from our earlier work in community-dwelling women—social influence and lack of energy were the most important subscales related to depression in this sample(21). Latinos may perceive barriers distinct to non-Latino Whites.

Our research shows that in the design phases of clinical trials, researchers should pay particular attention to the influence of depressive symptoms on participants’ barriers and motivations to engage in exercise. They could also help Latino participants to identify low-cost and safe opportunities for exercise in their environment. Perceived lack of resources may stem from a lack of information on (free) exercise opportunities in people’s homes, workplaces, and neighborhoods(42). Helping individuals identify suitable opportunities through psychological therapies such as CBT or behavioral activation(43) may lower these perceived barriers.

Higher education and employment were associated with higher perceived physical activity barriers. This is in line with previous work(44). Educated and employed participants may have more demanding jobs, and thus perceive they are less able to find the time to engage in exercise. Socioeconomic status is associated with higher leisure time, but lower job-related physical activity(45). Higher education and employment may also increase awareness of the need for, and the lack of sufficient exercise (45). For example, people who are higher educated show greater intentions to engage in physical activity(46). Participants who were more highly educated may thus have been more aware of their physical activity barriers that stand in the way of sufficient exercise.

Strengths & limitations

This is the first study to assess the relationship between depression and physical activity barriers in a Latino community sample. We previously showed a link between physical activity barriers and depression in a community sample of women who signed up for a physical activity intervention ($n = 310$) (21). Here we replicate this finding in a new sample.

This study also has limitations. Before removing outliers, the positive relationship between physical activity barriers and depression was not significant. Further, the participants in this study were relatively high educated (69% had bachelor's or higher degrees, compared to 20% in the US Latino community)(47). Additionally, we were not able to assess differences between groups within the Latino population. Latinos are a diverse ethnic population, with different national origins, immigration, acculturation status, and other socioeconomic characteristics, who also differ in physical activity behavior and depression prevalence. For instance, Latinos with a Cuban background report the lowest level of physical activity and those with a Puerto-Rican background the highest levels of depressive symptoms(8). Our study needs to be replicated in other, larger and more diverse, Latino community samples with enough statistical power to detect differences between subgroups.

In addition, the BBAQ does not assess culturally specific barriers. Earlier work found that, besides resources like time and money, Latinos often cite culturally specific barriers(48). These include different views on weight and body shape, and more negative views about physical activity(48). Of note, in this study the acculturation scale was not associated with the BBAQ scale ($r = 0.18$, $p = 0.19$). Future studies should quantify these cultural barriers and assess their relationship to depressive symptoms. Qualitative work could further elucidate how to overcome culturally specific depression-related barriers. Future research should also assess how the relationship between physical activity and depression changes over time, and if it is modified by physical activity interventions.

Conclusion

Physical activity barriers and depression are positively related in overweight Latino/a men and women. Perceived lack of resources might be a particularly important depression-related barrier. Both physical inactivity and depression are urgent health problems in the Latino community. Our results indicate that physical activity interventions for Latinos should tailor to overcoming barriers associated with depression. Future work should assess how PA barriers evolve over time with depression, and how randomized controlled interventions can address depression specific barriers.

List Of Abbreviations

BBAQ: Barriers to Being Active Quiz; **CES-D**: Center for Epidemiological Studies Depression Scale; SASH: The Short Acculturation Scale for Hispanics; U.S: United States.

Declarations

Ethics approval and consent to participate: The University of California San Francisco (UCSF) Committee on Human Research approved the study, and all participants provided written informed consent prior to their study enrollment.

Consent for publication: NA

Availability of data and material: Data used for this paper are available upon a reasonable request with a data usage agreement.

Competing interests: The authors report no competing interests

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Authors' contributions: FY conceptualized and designed the study and collected the data. CAF performed the current analysis and wrote the first draft of the manuscript. FY, CAF and AA commented on previous versions of the manuscript, read and approved the final manuscript.

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Figures

Figure 1

The linear relationship between the total BBAQ scores and the CES-D scores after removing 3 outliers.