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Article

Community Exercise Program Participation and Mental Well-Being in the U.S. Texas-Mexico Border Region

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Abstract: Hispanics are disproportionately affected by low rates of physical activity and high rates of chronic diseases. Hispanics generally and Mexican Americans specifically are underrepresented in research on physical activity and its impact on mental well-being. Some community-based interventions have been effective in increasing physical activity among Hispanics. This study examined data from a sample of low-income Hispanic participants in free community exercise classes to characterize the association between self-reported frequency of exercise class attendance, intensity of physical activity, and participant well-being. As part of two cross-sectional samples recruited from a stratified random sample of community exercise classes, 302 participants completed a questionnaire consisting of a modified version of the Godin-Shephard Leisure-Time Exercise Questionnaire (LTEQ) and the Mental Health Continuum Short Form (MHC-SF). Adjusted binary logistic regression analyses indicated that those who achieve moderate and strenuous self-reported physical activity have 130% higher odds ($p = 0.0422$) of positive mental well-being after adjustment for age, attendance, and self-reported health. This study provides evidence that physical activity intensity and time are associated with flourishing mental health among Hispanics. The study provides insight into the planning and development of community-based physical activity programming tailored to low-income populations.

Keywords: US-Mexico border health; community-wide campaign; physical exercise; mental health; public health; Latino community health; health behavior promotion

1. Introduction

Many studies have shown that regular, moderate, and strenuous physical activity prevents the risk of noncommunicable diseases including obesity, cardiovascular disease, and diabetes [1]. Hispanics in the U.S. are less physically active across all subgroups than non-Hispanic whites, with socioeconomic factors partially contributing to the disparity [2]. A study comparing Hispanic respondents from the 2009 national Behavioral Risk Factor Surveillance System (BRFSS) to the Cameron County Hispanic Cohort (CCHC), a randomly-ascertained cohort of around 5,000 Mexican American living in communities near the Texas-Mexico border, revealed significant health disparities in preventive health behaviors, including physical activity. National BRFSS respondents were significantly more likely than local CCHC participants to meet recommended physical activity guidelines (44.14% vs 33.3%) [3].

Hispanics generally and Mexican American populations specifically are underrepresented in research on physical activity, but literature exists to guide the development of community interventions prioritizing these groups. Interventions focused on addressing barriers to physical activity (e.g., cost, transportation, cultural fit) have been shown to increase the adoption and



maintenance of regular leisure-time physical activity among underserved populations, including Mexican American and lower-income individuals living in the Rio Grande Valley [4–6]. In addition, community-based interventions have been shown to be successful in increasing physical activity among Mexican Americans by culturally tailoring interventions and increasing social support [7,8]. Social support is associated with regular exercise in all adults, regardless of ethnicity [9,10], and may explain why greater participation is reported for group exercise [11–13]. Evidence also suggests that participation in group park runs was statistically associated with higher levels of participation, satisfaction with exercise activity, and group cohesion [14].

Another area of physical activity research where Hispanics are underrepresented is in the impact of physical activity on mental well-being. Studies have shown an association between physical activity and positive emotions in older Hispanic adults [15]. Additionally, a statistically significant association between lack of physical activity and depressive mood symptoms, specifically among Spanish-speaking participants in the U.S. Texas-Mexico Border region, has also been reported [16]. These findings support the beneficial nature that physical activity has in association with positive mental health outcomes. Studies within the general population show that lack of physical activity can also impact mental health, resulting in increased risk of depression, anxiety, and lower levels of positive mental health [17–19]. These associations have not been evaluated among Mexican American populations, specifically those from low-income backgrounds. In general, the relation between poverty, physical activity, and mental health has been explored with findings demonstrating that low-income adults with low levels of physical activity experience poorer mental health outcomes using the Patient Health Questionnaire for Depression and Anxiety (PHQ-4) and Perceived Stress Scale (PSS) [20]. However, there is a gap in the literature substantiating this relationship between the amount of time doing physical activity, the intensity of that activity, and mental health among low-income Mexican American populations. The aim of this study is to fill that gap. Specifically, this study examined data from a sample of low-income Hispanic participants in free community exercise classes along the U.S. Mexico Border to characterize the association between self-reported frequency of exercise class attendance, intensity of physical activity, and participant well-being.

2. Materials and Methods

The Tu Salud ¡Si Cuenta! (TSSC) program was developed to address health disparities in chronic disease disproportionately affecting residents of Cameron and Hidalgo counties, located in the U.S. Texas-Mexico Border region. Approximately 1.2 million people, predominantly Mexican American residents, live in Cameron and Hidalgo counties [21]. Residents experience some of the highest rates of poverty, chronic disease, and related mortality when compared to other regions of the state and nation [22,23]. Historically, the high poverty rates, lack of access to healthcare, and lack of environments, systems, and policies that promote healthy living result in nearly two-thirds of the population overweight or obese [3,24]. One-third of adults live with diabetes, exceeding the rate of U.S. Mexican Americans and non-Hispanic white populations [23]. The Tu Salud ¡Si Cuenta! (TSSC) program is based on evidence provided through recommendations from The Guide to Community Preventive Services. The guide recommends community-wide campaigns as large-scale initiatives delivering messages using mass media and providing individually-focused efforts such as physical activity counseling, health risk screenings, and education [25].

The TSSC community-wide campaign was designed and implemented by community partners, and has grown over the last 15 years to include many communities throughout the U.S. Texas-Mexico Border region. As one component of the program, TSSC offers hundreds of weekly and free exercise classes across the region community sites for residents [26,27]. The exercise classes offered through the TSSC program include walking groups, chair exercises, aerobics, and strength training exercises. The different class offerings help provide physical activity opportunities for participants of all experience levels and capabilities over time.

Two cross-sectional samples of participants attending community exercise classes between October 2018 and November 2019 were recruited from randomly selected exercise classes. Exercise classes were selected from the total number of classes available during the study period by year. A

stratified random sample was conducted to ensure a proportional response from different class groupings. Classes are offered throughout the year but may vary based on venue and instructor availability along with participant interest. Random selection was done each year to account for this variability. Tu Salud ¡Si Cuenta! offers up to 250 free exercise classes each week at different times and venues across the county in 11 municipalities. A listing of the classes was enumerated by the city for the random selection process. If a city had only one type of class or one class, it was grouped with the nearest city geographically. Classes were listed in numerical order and assigned a class identification number. Using a random sequence generator without duplicates, classes were randomly selected for inclusion in the study. Between 30-40 classes were selected each year in order to provide a 15-20% sample of the total number of classes offered. The number of classes randomly selected in each city was determined by dividing 30 by the total number of blocks. The first sample selection was assessed for proportional representation of all class types being offered at that point in time. Both years, the sample was expanded to include an additional 2-3 classes to help ensure that the sample list captured all types of classes being offered. A total of eight of the 63 selected classes had no class participants or were canceled in 2018 and 2019.

A total of 481 participants from the 55 randomly selected exercise classes completed study questionnaires in 2018 and 2019. Of the 481 participants who completed the surveys, 302 participants were included in the analysis after excluding those who were not Hispanic, did not provide demographic information, did not correctly answer the physical activity questions, or did not complete the mental health portion of the questionnaire (Figure 1). All adults over the age of 18 years in every randomly selected class were asked to complete the questionnaire. The questionnaire was self-administered, took approximately 20 to 30 minutes to complete, and was available in both English and Spanish. The questionnaire was distributed at the randomly selected classes between October and November the year the sample was drawn, and it was only administered once per selected class. Staff were present to assist participants with completing the questionnaire if they were having difficulties with reading the questions. Some participants chose not to participate because they did not have time or for other unknown reasons. Participants were not asked to provide identifying information, so the questionnaires were completed anonymously.

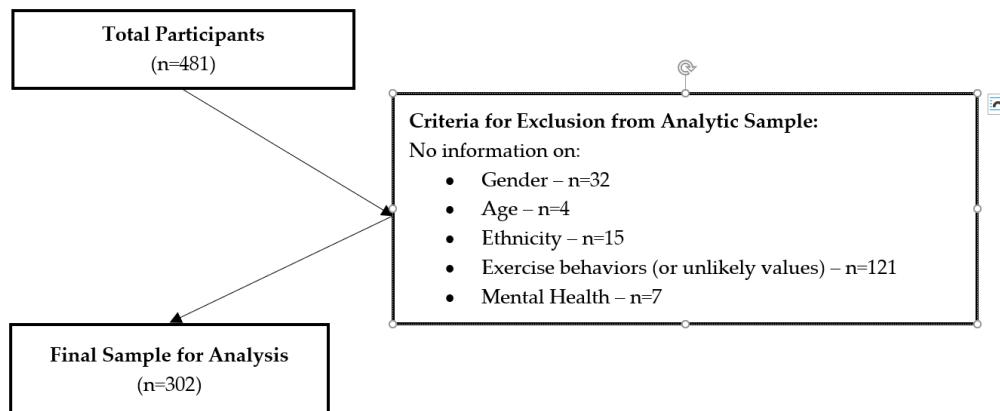


Figure 1. Flow diagram – Final sample size.

Demographic variables: Categorical variables included Age (18-29, 30-39, 40-49, 50-59, 60), Sex (M/F), Hispanic / Latino (yes/no), Language (English vs Spanish), Insurance Status (Y/N), Employment (Employed for Wages, Self-Employed, Student, Other(retired/homemaker), Unable to Work, Currently Unemployed). We also measured Self-Reported Health (Fair, Good, Very Good, Excellent, Other), and How Often Do You Attend Class (None to Several times a month, One to Multiple times a week)(Table 1).

A modified version of the Godin-Shephard Leisure-Time Exercise Questionnaire (LTEQ) instrument was used to measure the intensity, frequency, and duration of intentional physical activity [28]. The LTEQ contains three main questions regarding strenuous, moderate, and mild

exercise behaviors within a 7-day period. The responses to these items determine the intensity of physical activity. Each question provides examples of activities related to the specified intensity and asks for both the average number of minutes exercised and how many times each week the participant exercises. Minutes and times to participate in exercise were used as estimates for time completing physical activity. Weekly frequency of moderate or strenuous physical activity was multiplied by the minutes spent on each moderate or strenuous activity to calculate each participant's weekly metabolic equivalent adjusted minutes (MET-minutes). The metric for being "physically active" was quantified as meeting the U.S. physical activity recommendations of ≥ 600 MET-minutes weekly [29].

The Mental Health Continuum Short Form (MHC-SF) was included in the questionnaire. The MHC-SF contains 14 questions regarding emotional, social, and psychological well-being over the course of two weeks prior to completing the questionnaire. All questions were answered using a six-point Likert scale ranging from Never to Every Day. This instrument was used to measure mental health, and using total scores, participant mental well-being was categorized into Languishing, Moderately Mentally Healthy, or Flourishing categories [30].

Simple descriptive statistics were created for all covariates, with standard deviations for continuous variables and counts and percentages for categorical variables. Chi-Square values (Table 2) were used to measure the association between mental well-being and all exercise covariates. Due to unexpected cell counts less than 5 for physical activity and frequency of class attendance, these variables were collapsed into binary variables. The Chi-Square test was used to determine whether an association existed between mental well-being and frequency of class attendance or the amount of self-reported MET minutes of activity. Logistic regression was used to explore these associations for all covariates. Unadjusted ORs (95% CI) models explored how each covariate individually is associated with mental well-being (Table 3). All covariates with p -values < 0.25 were used to create a final adjusted model. Since participation in exercise classes was the exposure of interest, we evaluated all two-way interactions between exercise classes (MET minute classifications and number of classes attended) and all other covariates using an alpha of 0.01 to account for multiple testing. SAS 9.4 was used to perform all analyses. An alpha of 0.05 was used to determine significance.

3. Results

Table 1. Demographic characteristics for Hispanic participants attending free community exercise classes, 2018-2019 (n=302).

Variable	Class	n (%)
Age Category	18-29	28 (9.3)
	30-39	58 (19.2)
	40-49	77 (25.5)
	50-59	74 (24.5)
	60+	65 (21.5)
Sex	M	26 (8.6)
	F	276 (91.4)
Preferred Language	English	161 (53.3)
	Spanish	141 (46.7)
Year	2018	149 (49.3)
	2019	153 (50.7)
Insurance Status	No	141 (48.0)
	Yes	153 (52.0)
Employment Status	Unemployed (all reasons)	151 (52.8)
	Employed	135 (47.2)
Self-Reported Health Status	Poor/Fair/Not Sure	83 (28.2)
	Good	129 (43.7)
	Very Good	50 (17.0)
	Excellent	33 (11.2)
Physical Activity Intensity Level 1	Sedentary/Low	42 (13.9)

(mild+mod+strenuous)	Mild/Strenuous (met recommendations)	260 (86.1)
Physical Activity Intensity Level 2 (mod+strenuous)	Sedentary/Low Mild/Strenuous (met recommendations)	61 (20.2) 241 (79.8)
Time in Class Attendance	<1 to several times a month or my first wk. At least once weekly to multiple times wk.	59 (19.9) 238 (80.1)
MHC-SF Diagnosis of Mental Well-Being	Languishing/Moderate Flourishing	75 (24.8) 227 (75.2)

Most participants were female (91.4%) and over 40 years (n = 216, 71.5%). The average age of participants was 48.2 (SD=13.9) with an age range of 18 to 86 years. Most participants in the study reported having met the standard for exercise using MET minutes whether activity levels used all types of activity (mild, moderate, strenuous) or simply included moderate and strenuous activity, which is more typical. Additionally, most participants reported an MHC-SF flourishing diagnosis (75.2%). There was roughly equal representation across employment status, preferred language, year of participation, and insurance status.

Table 2. Chi-Square tests for the association between mental well-being and frequency of class attendance and levels of physical activity among Hispanic participants.

	Mental Well-Being		
	Languishing & Moderate n (%)	Flourishing n (%)	χ^2 p-value
<i>Time Attending Community Exercise Class</i>			
None to several times a month or first time	20 (27.8)	39 (17.3)	0.0532
One to multiple times a week	52 (72.2)	186 (82.7)	
<i>Mild, Moderate and Strenuous Intensity of Physical Activity (MET-adjusted minutes)</i>			
Sedentary to Low	15 (20.0)	27 (11.9)	0.0786
Moderate to Strenuous	60 (80.0)	200 (88.1)	
<i>Moderate and Strenuous Intensity of Physical Activity (MET-adjusted minutes)</i>			
Sedentary to Low	19 (25.3)	42 (18.5)	0.2014
Moderate to Strenuous	56 (74.7)	185 (81.5)	

Without adjustment, age is associated with mental well-being. Participants who are aged 60+ have 140% higher odds of reporting flourishing mental well-being relative to those who are aged younger than 60 years.

Table 3. Unadjusted binary logistic regression predicting 'flourishing' mental well-being among Hispanic participants – ORs [95% CI and p-value].

Variable	Class	OR (95% CI)	p-value
Age Category	60+ vs < 60	2.40 (1.12,5.13)	0.0237
Sex	Male vs Female	0.59 (0.25,1.39)	0.2310
Insurance	No vs Yes	0.75 (0.44,1.27)	0.2817
Employment Status	Currently Unemployed vs Employed	0.68 (0.4,1.18)	0.1738
Self-Reported Health	Good vs Poor/Fair/Not Sure Very Good vs Poor/Fair/Not Sure Excellent vs Poor/Fair/Not Sure	1.51 (0.83,2.76) 2.72 (1.13,6.58) 5.18 (1.45,18.47)	0.1440 0.4798 0.0612
How Often Do You Attend Class	None to Several Times a Month vs One to Several Times a Week	1.83 (0.99,3.41)	0.0554
Physical Activity Level	Moderate and Strenuous vs	1.85 (0.93,3.71)	0.0818

		Sedentary and Low		
Physical Activity Level†	Moderate and Strenuous vs Sedentary and Low		1.50 (0.81,2.78)	0.2031

†moderate+strenuous.

After adjustment, we found that physical activity level is associated with mental well-being in Model 1 where all activity levels are considered (Table 4). The inclusion of mild activity increased the odds of positive mental health. When considering all levels of activity, those who achieve moderate and strenuous self-reported physical activity have 130% higher odds ($p = 0.0422$) of mental well-being after adjustment for age, attendance, and self-reported health. When only considering moderate and strenuous activity in self-reported physical activity level, the association is attenuated. Using moderate and strenuous activity after adjustment, those who achieve moderate and high activity report 89% higher odds of flourishing mental well-being with a p -value that is not significant at the traditional 0.05 level.

Table 4. Adjusted binary logistic regression results of association with mental well-being among Hispanic participants – ORS [95% CI and p -value].

Var	Class	Physical Activity Level			
		Model 1 mild+moderate+strenuous		Model 2 moderate+strenuous	
		OR (95% CI)	p-value	OR (95% CI)	p-value
Age Category	60+ vs < 60	2.21 (0.97,5.06)	0.0596	2.22 (0.97,5.1)	0.0595
Self-Reported Health	Good vs Poor/Fair/Not Sure	1.72 (0.9,3.29)	0.5062	1.7 (0.89,3.26)	0.4692
	Very Good vs Poor/Fair/Not Sure	2.28 (0.91,5.69)	0.7382	2.28 (0.91,5.68)	0.7520
	Excellent vs Poor/Fair/Not Sure	4.36 (1.19,15.93)	0.1098	4.5 (1.23,16.41)	0.0974
	At least once weekly to multiple times wk. vs <1 to several times a month or my first wk.	1.75 (0.89,3.44)	0.1075	1.79 (0.91,3.52)	0.0904
Physical Activity Level	Moderate and Strenuous vs Sedentary and Low	2.30 (1.03,5.12)	0.0422	1.89 (0.92,3.9)	0.0848

4. Discussion

This study provides evidence that physical activity intensity and time are associated with flourishing mental health among a Hispanic population attending exercise classes. We found that moderate and strenuous physical activity is associated with a flourishing mental health categorization as measured by the MHC-SF instrument among low-income Hispanics participating in exercise classes. Similarly, a study conducted with older Hispanic adults noted that physical activity was associated with positive emotions [16]. In general, exercise has been shown to improve mental health [31]. A study found the optimal range of physical activity required to associate it with better mental health was between 2.5 to 7.5 hours of physical activity a week [32]. Our study provides cross-sectional evidence that aligns with the current recommended physical activity guidelines [29]. When considering mild physical activity along with moderate and strenuous physical activity, our study provides additional evidence of a positive correlation between all levels of intensity of physical activity and flourishing mental health.

This study also found that mild, or light-intensity, physical activity was associated with a flourishing mental health categorization as it strengthened the association between physical activity and positive mental health among the same population of Hispanics participating in exercise classes. Similarly, a study found that mild physical activity was the optimal intensity for women to report

positive mental health. However, the study also found that the optimal physical activity intensity for men for positive mental health was high intensity [33]. Interestingly, studies have found that light-intensity physical activity is also associated with many physical health benefits as well as meaningful improvements in mental health related to depressive symptoms in both the general adult and older adult populations [34–36]. Our study supports existing evidence that physical activity at any level is associated with positive mental health and our findings suggest that attending group exercise classes in low-income communities is associated with positive mental health.

Regarding the amount of time spent participating in physical activity, as shown in Table 2, participants who reported attending exercise classes one to multiple times a week were more likely to belong to the flourishing mental health category (82.7%) as opposed to those who reported attending exercise classes none to several times a month (17.3%). Studies suggested that higher participation or exercise class attendance may be explained by the social support aspect of group exercise classes [10].

A study conducted on Scottish adults indicated some estimates of time and intensity as it is associated with improved mental health. This study found that a minimum of 20 minutes of physical activity a week was associated with observed mental health benefits. The higher the participation and/or intensity the greater the mental health benefits [37]. The average length of a TSSC exercise class is 60 minutes, so participants attending one or more times a week easily achieved more than the 20 minutes observed by Hamer et al. [37]. In fact, attending two to three free TSSC exercise classes per week can help participants meet U.S. physical activity guidelines [29].

The TSSC program is helping to address moderate and strenuous physical activity disparities and reinforcing positive behaviors by tailoring classes to address the cultural and socio-economic barriers to exercising [3]. Cultural tailoring included use of local appealing music, recruitment of Hispanic instructors, provision of classes in Spanish, and opportunities for exercise incorporating culturally familiar dance styles (e.g., huapango). Additionally, by creating many opportunities at different times of day and days of the week, and in locations seen as familiar and safe in underserved neighborhoods (churches, schools, parks), accessibility is increased to individuals employed in shift work, acting as caregivers, and with mixed immigration status concerns. Future research should examine the effects of providing a safe infrastructure and active transportation to create opportunities for moderate and strenuous physical activity as well as activating public spaces for active transportation (i.e., walking and hiking) to ensure mild physical activity effects on mental health well-being.

Our findings indicate that frequent attendance at free TSSC exercise classes is associated with self-reported flourishing mental health. Based on these data, we can infer that at any level of physical activity and group exercise attendance are associated with reporting a flourishing positive mental health. We are not able to indicate that this relationship is causal, however. The TSSC program currently offers hundreds of group exercise classes each week, all of which are opportunities for participants to work towards meeting weekly physical activity recommendations. Future studies should examine the extent of the effect of social support as a factor influencing mental health through group exercise classes.

There are several limitations to consider in this study. Firstly, this cross-sectional study did not include a no-treatment control group. Therefore, we are unable to draw conclusions about flourishing and languishing mental health status among a group of Hispanic individuals not participating in exercise classes. Additionally, because this is cross-sectional data, it is not possible to determine causality between exercise class attendance and positive mental health. We are also not able to determine if participants who self-reported flourishing mental health were more likely to attend the exercise classes or whether attendance contributes to a flourishing mental health status. Another limitation is that participants self-reported their physical activity levels and positive mental health. It is possible that both variables could be reported more favorably. The sample was largely female, with only 8.6% male participants. Therefore, the associations reported are more robustly sound for Hispanic women. Engaging men in the TSSC exercise offerings is an ongoing challenge that is being addressed by providing various exercise options, including those centered around strength training

and boot camps. Lastly, because identifying information was not collected, we were unable to determine whether a participant submitted multiple questionnaires either by attending two of the selected classes in one year, or by completing a questionnaire both years. As such, all data points may not be unique and some of the data may be duplicated.

5. Conclusions

All levels of physical activity were found to be associated with self-reported flourishing mental health among participants in the free, culturally relevant, exercise class offerings among low-income Mexican American Hispanics in this study. The exercise offerings ranged from light-intensity to high-intensity. Our findings contribute to existing research about the effect of physical activity on general mental health and can provide insight into the planning and development of community programming tailored to low-income populations.

Author Contributions: Conceptualization, Alma G. Ochoa-Del Toro, Belinda M. Reininger, Lisa Mitchell-Bennett, Candace Robledo, Michael Machiorlatti; methodology, Belinda M. Reininger, Michael Machiorlatti; software, Alma G. Ochoa-Del Toro, Amanda Davé, Rebecca Lozoya; validation, Rebecca Lozoya, Michael Machiorlatti; formal analysis, Michael Machiorlatti, Candace A. Robledo; investigation, Lisa Mitchell-Bennett, Belinda M. Reininger; resources, Belinda M. Reininger; data curation, Alma G. Ochoa Del-Toro, Rebecca N. Lozoya, Amanda C. Davé; writing—original draft preparation, Alma G. Ochoa-Del Toro; Michael Machiorlatti, Belinda M. Reininger writing—review and editing, Alma G. Ochoa-Del Toro, Belinda M. Reininger, Lisa Mitchell-Bennett, Amanda C. Davé, Michael Machiorlatti, Candace A. Robledo, and Rebecca N. Lozoya; visualization, Alma G. Ochoa-Del Toro; supervision, Belinda M. Reininger; project administration, Lisa A. Mitchell-Bennett, Amanda C. Davé, Belinda M. Reininger; funding acquisition, Belinda M. Reininger. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

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