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The association of social support and depressive mood in physical activity goal setting

A Thesis submitted in partial satisfaction of the requirements  
for the degree Master's degree

in

Public Health

by

Lilliana Osuna

Committee in charge:

Professor Britta Larsen, Chair  
Professor Suzi Hong  
Professor Michael Pratt

2022

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University of California San Diego

2022

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## LIST OF ABBREVIATIONS

PA	Physical Activity
WHO	World Health Organization
CDC	Center for Disease Control
NIH	National Institutes of Health
PAR	Physical Activity Recall (Survey)
CES-D	Center for Epidemiological Studies Depression Scale
MVPA	Moderate-to-vigorous physical activity
SSE	Social Support and Exercise Survey

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I would like to acknowledge Professor Britta Larsen for the opportunities she has provided me throughout the Chicas Fuertes study in the last 2 years. This experience has provided me firsthand public health experience and has given me the opportunity to work on this ongoing study and see preliminary results through this thesis. Her patience, support, and guidance has proven to be invaluable. Words cannot express my gratitude!

I would also like to acknowledge my committee members, Professors Suzi Hong and Michael Pratt who generously provided knowledge and expertise. I am grateful for their willingness to be a part of my committee, I could not have done it without their speedy feedback, ideas, and contributions.



## ABSTRACT OF THE THESIS

The association of social support and depressive mood in physical activity goal setting

by

Lilliana Osuna

Master in Public Health

University of California San Diego, 2022

Professor Britta Larsen, Chair

**Objective:** Physical inactivity is a leading cause of death and majority of the adolescent population is insufficiently physically active. The purpose of this study is to evaluate whether depressive mood and social support are correlated with physical activity goal setting, specifically goal importance and goal confidence.

**Methods:** Data was collected from an ongoing study in a UC San Diego Chicas Fuertes. Data was cleaned to focus on intervention participants since they set behavior change goals compared to the control group. Most of the data is self-reported by participants.

Results: A correlation matrix was used to evaluate associations between measures. Majority of the results were of small effect with r-values  $< 0.2$  possibly due to the small sample size. Depression measurement (CES-D) scores were not statistically significant with goal setting such as goal confidence and importance. Social support scores (SSE) were also not statistically significant to goal confidence and importance.

Conclusion: Physical inactivity is a global health issue and is greatly affecting vulnerable communities such as ethnic, minorities, and low SES. Specifically, Latina adolescents are an at-risk group of developing chronic conditions and living a sedentary lifestyle due to their low levels of physical activity compared to the males and other ethnicities. Social support and goal setting may be useful in promoting PA amongst this group. Our analysis had small effects but call for additional research to examine behavior change in Latina adolescents.

## CHAPTER 1: INTRODUCTION

Physical inactivity is a leading cause of morbidity and mortality with much of the world being insufficiently active (Lee et al., 2012). Approximately 80.3% of adolescents do not participate in moderate to vigorous PA per day and females are less active than boys (Hallal et al., 2012). Despite the well documented importance of regular physical activity, many individuals still do not meet the minimum physical activity (PA) recommendations. Latino children and adolescents are at an increased risk, with one out of three Latino children (ages 2-19) being classified as overweight. Previous research has demonstrated that Latino children and adolescents are consistently less active than their white counterparts. In particular, Latina girls are at an increased risk for inactivity and sedentary lifestyle. Sedentary lifestyle is defined as any waking behavior such as sitting or lying down with an energy expenditure of 1.5 metabolic equivalent task (MET) or less (SBRN). The literature has also suggested that Hispanic/Latino

youth have higher rates of depressive symptoms, alcohol use, and have rising numbers of mental health issues (Isasi, et al., 2017). According to the CDC, “46.8% of Latina adolescents reported feeling sad and hopeless on a daily basis, compared to 38.2% of non-Latina white adolescent girls and 40.7% of non-Latina black adolescent girls.” Physical activity can promote psychological well-being by reducing symptoms of depression and anxiety. Overall, there are many benefits that come from physical activity including improving physical and psychological well-being and preventing and managing diseases such as cardiovascular diseases, cancer and diabetes. Adolescents are at an age where the habits they create now can last for a lifetime and physical activity is an important habit to develop for quality life longevity. A few ways to set up Latina adolescents for lifelong success may be through encouraging social support from family and friends, and teaching them how to set realistic, achievable goals.

Social support has been determined as a factor that may increase physical activity in adolescents according to previous studies. Social support is described as “support accessible to an individual through social ties to other individuals, groups, and the larger community.” (Ozbay et al., 2007) Social support is embedded in multiple theories such as the Social Ecological Model and the Social Cognitive theory as a way to explain physical activity behavior. Social Cognitive Theory emphasizes social support by focusing on social influence and external and internal social reinforcement. The Social Ecological Model has two components of social support and are defined as relationships and community. Therefore, the use of these two theories may be useful in determining the effectiveness of social relationships for an individual in order to increase physical activity. Previous literature focuses on the social support network of family members such as parents, siblings, friends and teachers as they have been defined as primary sources of support. A systematic review determined that those who received more overall social

support from both parents, friends and family showed higher levels of physical activity. (Mendonça et al., 2014) Encouragement to participate in physical activity is the most common way parents show social support for adolescents although may not be deemed as always the most effective. When focusing specifically on adolescent girls, one meta-analysis suggests that overall support from parents and friends, as well as sub-domains of support such as encouragement, instrumental support and modeling, are all associated with adolescent girls' physical activity. This analysis resulted in a small but significant association between social support and girl's PA, suggesting that both friends and family influence adolescent girls' PA, but only explains a small amount of the variance in adolescent girls' PA behavior (Laird et al., 2016). . One study also found that social support can also come from acts such as parents driving their children to practices or physical activities. Latinas. This study found a high correlation between mother's support and transporting Latina teens to activities (Benitez and Cano, 2020). Ultimately, having a positive and multiple networks of social support can be helpful to influence adolescents girls to participate in more physical activity.

A second component that is crucial to set up Latina teens for physical activity success is encouraging and teaching them how to set goals. Goals are defined as “what an individual is trying to accomplish; it is the object or aim of an action within a specified time. (Locke, Shaw, Saari, & Latham, 1981)” In the literature, goal setting is often used as a way to change an individual's health behavior, specifically physical activity. Goal setting is an effective way to promote physical activity at an individual level. Locke and Latham's five principles of goal setting may be useful in helping teens achieve their goals. The five principles consist of clarity, challenge, commitment, feedback, and task complexity. To achieve the clarity principle one must create clear goals and an effective way is to use the SMART criteria which is an acronym

standing for Specific, Measurable, Achievable, Realistic, and Timed. SMART goals may lead to success since they create well-defined goals that help motivate individuals to focus on their intentions. The second principle is setting challenging goals, “individuals are often motivated by challenging goals, however it's important not to set a goal that is so challenging it can't be achieved. (MindTools) The third principle of commitment encourages individuals to stay on track, some suggestions are visualizations as a reminder of hard work. Locke and Latham’s fourth principle of feedback can give individuals the opportunity to review their personal expectations and adjust the difficulty of their goals. Lastly, the fifth principle of complexity is to ensure that the goals are not too overwhelming and leading to goal failure. Furthermore, one systematic review suggested that goal setting is an effective strategy to promote physical activity (McEwan et al. 2016). reported a medium effect size ( $d = .55$ , 95% CI = .43–.67) on goal-setting interventions on PA. Overall, it was concluded that goal-setting interventions were effective at post-intervention regardless of research settings, modes of delivery, lengths of program, type of physical activity, type of measure used to assess physical activity, regardless of age, baseline weight, activity status prior to the intervention. However, it is important to note that any intensity or moderate intensity exercise has a significant effect on targeted PA goals compared to when individuals are asked to participate in vigorous intensity exercise (McEwan et al., 2016). Teaching Latina teens how to set achievable and realistic goals may encourage them to participate in more physical activity.

Latina adolescents will positively benefit from physical activity if they are able to set goals to reach the minimum PA recommendations. The US Health and Human Services Department recommends that children and adolescents engage in at least 60 minutes (1 hour) or more of physical activity each day, preferably in moderate-to-vigorous physical activity (MVPA)

to obtain the most health benefits. According to the CDC, individuals between the ages of 6-17 years old are recommended to participate in muscle-strengthening and bone-strengthening exercises at least 3 days a week. Moderate or vigorous aerobic activity is recommended to be done daily with vigorous intensity at least 3 times a week. “The current rate of children and adolescents achieving 60 minutes of MVPA daily decreases severely as they age, with only 12% of boys and 3% of girls (ages 12-15 years) achieving this goal (Olvera et al., 2010).” Latina teens are also less likely to participate in organized sports activity within their schools or community. In 2019, data from the CDC noted that 54.6% of high school girls played on at least one sports team, and only 48.4% of Hispanic/Latina girls did. One study conducted focus groups in order to determine what stops Latina teens from participating in sports at their schools and many factors included negative messages from individuals in their support system and community. A few messages included, “Girls are physically different and too emotional,” “Latina girls and their families don’t value sports” (Burtka, 2020) The literature has provided evidence that many Latina teens refrain from any physical activity due to external negative messages, lower self-esteem, and not having enough confidence to put themselves out there.

In this study, we will be looking at the associations between CES-D and PA goal setting, social support and goal setting, and PA and demographics in 37 Latina teens between the ages of 12 and 18 years old in the intervention arm of the Chicas Fuertes study. The primary question of this study is how are social support and depressive mood associated with physical activity goal setting and goal confidence? The overall purpose of this study is to help Latina adolescents learn about the benefits that come from physical activity and to encourage them to engage in the minimum exercise recommendations. Latinas face many barriers when it comes to participating in PA, they are an at-risk group for developing future chronic conditions such as diabetes,

depression, and much more. The study focuses on encouraging girls to increase their social support by inviting family or friends to engage in PA with them. The study also has girls set goals and rate how important and confident the girls are in achieving their goals. As mentioned in a previous study, goals are representations of wanted outcomes, and goal setting is when an individual identifies specific goals and determines how they will be achieved (Bailey, 2019).

## CHAPTER 2: METHODS

### 2.1 Background

Chicas Fuertes is an ongoing web-based randomized control study being conducted at University of California, San Diego. Chicas Fuertes focuses on promoting physical activity among Latina adolescents residing in San Diego County. Individuals who are deemed eligible are asked to participate in the study for one year. Most procedures of the study can be done via Zoom due to the COVID-19 pandemic, although participants are asked to participate in one in-person visit, baseline. All participants receive a free Fitbit Inspire HR and can be compensated up to \$270 throughout their study for time and participation. The study is a three-year project ongoing until March 2023 and is funded by the National Institutes of Health (NIH) and is approved by UC San Diego's Institutional Review Board (IRB).

Chicas Fuertes focuses on Latina adolescents between the ages of 13 to 18 years old in San Diego county. This web-based randomized control study uses different Internet platforms such as a customized Chicas Fuertes website, Instagram, and the Fitbit app.

The most common recruitment approach is through online social media outreach such as Facebook and Instagram ads and recruitment through local high school presentations done by Chicas Fuertes staff. Current participants were also offered the opportunity to become Recruitment Ambassadors by referring their friends or family members to the study with an incentive of five dollars per referral. Interested participants were contacted by Chicas Fuertes staff to determine whether they were eligible for the study; those under the age of 18 were required to provide parental information for screening eligibility. Parents/Guardians provided information on their child's medical history while those aged 18 provided their own information.



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## 2.2 Recruitment

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## 2.3 Participants

Some eligibility requirements included being within the age group of 13-18, must live in San Diego county, identify as female and Latina, and read, write, and speak fluently in English. Participants must also have regular access to the Internet and to a cellphone that can send and receive text messages, however there are exceptions to web and phone inaccessibility. Individuals who reported medical conditions such as asthma, diabetes, and other conditions were contacted by the study's nurse in order to determine safety in participating. Participants who had family members or friends in the study were yoked. Exclusion criteria included individuals with

a Body Mass Index (BMI) greater than 45, and also individuals who were considered “very” physically active with over 150 minutes of moderate physical activity weekly.

## 2.4 Procedures

Informed consent and assents were received from all enrolled individuals at orientation. Orientation provides additional information on the Chicas Fuertes study where parents are asked to participate if their child is under the age of 18. The goal of the study is to recruit 200 participants, 100 in the intervention group and 100 in the control group. Currently there are 94 individuals enrolled in the study, however this analysis focuses on individuals in the intervention group (n=37). Participants are randomized through the REDCap software and then stratified into groups based on the Transtheoretical Model (TTM) that focuses on the stages of change such as pre-contemplation, contemplation, or preparation. The stages of change is used to determine how ready participants are to engage in exercise that is consider moderate to vigorous. TTM has demonstrated to be an effective model for behavior change, especially when it comes to PA promotion (Zazo et al., 2020). Another study had significant results with one intervention group using the TTM methodology, youth participants showed progress in the stages of change compared to the two other groups (Pirzadeh et al., 2020) Previous studies have shown that the stages of changes can be effective at PA behavior change.

## 2.5 Control group vs Intervention group

In our study, participants receive their study assignment at their first baseline visit. At baseline, individuals receive their randomized study assignment, intervention group or control group, also known in the study as the “Fitbit Only group”. Both groups participate in the 7 Day

Physical Activity Recall (PAR) during their baseline, 6 month follow up visit, and 12 month follow up. The 7-day PAR is a questionnaire that evaluates how much time an individual spent engaging in physical activity, strength training, and flexibility activities in the seven days leading up to the interview (Sallis, et al., 1985). The participants also engage in a moderate-intensity walk demonstration where staff and participants walk at different beats per minute (BPM). The different BPMs demonstrated include 80 BPM (equivalent to 2 MPH), 110 BPM (equivalent to 3 MPH), 125 BPM (equivalent to 3.5 MPH) and lastly 140 BPM (4 MPH). Participants are told that 110 BPMs and higher are considered moderate-intensity and anything below is at a lower intensity.

Those who are randomized to the Fitbit group are tasked with syncing and charging their Fitbits daily and are compensated \$10 a month for wearing and syncing their Fitbit devices. They may use their Fitbit and the Fitbit app as desired and create challenges and goals on their own without any guidance or information from Chicas Fuertes staff. They do not receive any further information about exercise or engaging in PA aside from participating in a moderate-intensity walk demonstration at the baseline visit.

Individuals who are randomized to the intervention group, are provided with a health coaching session at baseline. The interventionists use motivational interviewing (MI) to help individuals focus on their internal motivation for change. MI is a client-centered interaction style that has a collaborative approach that helps guide individuals to change without force. It uses a guided style of communication that uses good listening and helping direct individuals. MI is intended to enable people to change by eliciting their own meaning, significance, and ability to change (Miller and Rollnick 2013)..Previous studies have shown that MI is effective for increasing PA, by its established aspects of behavior change principles and the flexible approach

to promote PA (Brodie and Inoue, 2005). Furthermore, the Chicas Fuertes baseline health coaching session focuses on listening to barriers that the teens may face when it comes to engaging in PA and the interventionist guides them on how to overcome these challenges. The interventionist provides information on the health benefits that come from engaging in PA and invites individuals to think about goals they want to set for themselves. The ultimate goal of the interventionist is to eventually help the teens reach the national physical activity guidelines of > 300 minutes of MVPA or more by the end of the study and set them up for lifelong success in PA. One of the study's goal is to encourage participants to aim for at least 30 minutes of moderate intensity physical activity daily. The exercise can be done as a continuous 30 minutes or 3 bouts of 10 minute moderate intensity exercises. The interventionist also promotes change talk by asking participants about their previous exercise activities, what they liked or didn't like about those activities and encourages them to talk about exercises they currently enjoy. The interventionist guides the intervention participants into setting up a weekly physical activity plan by setting SMART goals. Their PA goals/plan describes what type of PA they would like to do, what day of the week, for how long, and where. Once their PA plan has been created, participants are asked on a scale of 0-10 how confident they are in achieving their set PA goals. Participants are also asked how important it is to them to reach their goals based on the same scale of 0-10. The interventionist also uses MI to elicit change talk by using the rating scales, asking why they chose a certain number on both scales. For example, "why would you say you 7 on the confidence scale compared to a 10 or 4" (Arkkukangas, 2019). Once the intervention participants have set their goals, they receive follow up phone calls by the interventionist to see if their plan needs to be adjusted by increasing or decreasing their physical activity. Intervention participants are also free to use the Fitbit and its app however they would like but are taught how

to navigate the Fitbit app compared to those in the control group. Individuals in the intervention group have access to the Chicas Fuertes Instagram account where daily posts display different content themes such as self-efficacy posts, benefits of exercise, physical activity demonstration “modeling”, social support from family and friends, ideas for workouts and locations around San Diego, weekly physical activity challenges, and reminders to sync and charge their Fitbit. The intervention participants also received personalized text messages throughout the study to motivate and encourage them to participate in PA. The Chicas Fuertes website is also accessible and is used to track weekly physical activity, support other participants through a leaderboard, provide them reminders on monthly questionnaires with the ability to gain Chicas Fuertes points which are redeemable for a prize.

After the baseline visit, both groups are asked to return for a 6 month and 12 month follow up visit during which they participate in the PAR and are outfitted with an actigraph monitor for the following 7 days. Those in the intervention group are asked for additional information at the 6 month visit and are also asked to participate in an Exit Interview at 12 months where they are asked about their experiences using the Fitbit, using the Chicas Fuertes website, Instagram page and their overall thoughts on the program.

## 2.6 Measures

Individuals who were eligible were scheduled for a baseline visit where a series of questionnaires were sent via browser-based software, REDCap. Not all data from the questionnaires were analyzed for this study. However, one of the questionnaires included was the Center for Epidemiologic Studies Depression Scale (CES-D), a short self-reported survey designed to measure depressive symptoms in individuals. Response options range from 0 to 3 for

each item (0 = Rarely or None of the Time, 1 = Some or Little of the Time, 2 = Moderately or Much of the time, 3 = Most or Almost All the Time). Scores range from 0 to 60, with high scores indicating greater depressive symptoms. The Social Support and Exercise (SSE) measure was also used to assess the level of support participants felt from their family and friends when engaging health-behavior changes such as PA (Sallis et al., 1985 ). Scoring for these measurements ranges from 1 (none) to 5 (very often) and 8 as “does not apply”.

As previously mentioned, at baseline, those in the intervention group set physical activity goals such as how many times per week they planned to exercise, what type of physical activity they plan to engage in, how many minutes of PA, and a targeted step goal. Once they determined what exercise and the frequency, an importance and confidence scale of 1- 10(1=Not at all Important/ Not at all Confident, 10=Very Important/Very Confident) were recorded.

The 7-Day Physical Activity Recall (PAR), questionnaires, and self-reported height and weight are collected at baseline, 6 and 12 month follow-up visits.

## 2.7 Statistical Analyses

All analyses were done through the statistical program, R Studio. Data cleaning was done to use only participants in the intervention group because they used behavior change techniques such as goal setting and focused on aspects such as social support to promote PA compared to the control group. Descriptive analyses were conducted to summarize baseline data that was self-reported. Due to a small sample size, size of associations were evaluated instead of statistical significance. A matrix correlation was done in order to measure the associations between measures. A regression analysis was also ran to evaluate variables impact on each other.

## CHAPTER 3: RESULTS

Baseline sample characteristics and measurement scores for Center for Epidemiological Studies Depression Scale (CES-D) and Social Support and Exercise Survey (SSE) are provided in Table 1. Participants had a mean age of 17.8, however many of the participants have already completed the program within the past year indicating that they may have participated in the study at a younger age. The mean height and weight of all included participants were also noted. The mean weight was 65.39 kilograms, mean height was 157.5 in centimeters and mean BMI was 26.44.

**Table 1: Characteristics of participants & measurements**

Characteristics (n=37)	Mean	SD	Minimum	Maximum
Age	17.89	1.58	14	20
Height (cm)	157.5	8.52	129.5	172.7
Weight (kg)	65.39	14.18	47.17	108
BMI	26.44	5.59	18.02	39.78
CES-D Score	10.7	4.33	5	25
Social Support Exercise Score (SSE)	17.46	8.44	10	49

Participants set physical activity goals at baseline such as a step goal, a target for how many days they would like to engage in PA, how many minutes they would like to exercise, and how important and confident they feel towards these goals. Table 2 depicts the mean of the goals set at baseline. The goals the participants set were based on activities they enjoy participating in, they indicated how important it was to stick to their exercise goal with a mean of 8.11, however their confidence in sticking to their goals was a mean value of 7.1. In Table 3, the different types of physical activity the participants planned to engage in are listed. Table 3 also includes challenges that participants believe have previously prevented them from engaging in PA, or that may possibly stop them throughout the study. However, the most popular activity for their

primary PA goal was walking (32%), and second was YouTube exercise videos (24%). As a secondary physical activity goal, walking continued to be a top choice for participants (27%) and jogging/running was also noted (27%). Top challenges that were mentioned as possible prevention from PA were primarily homework/schoolwork (51%) and chores (16%).

**Table 2: Targeted Goals, Importance, and Confidence**

Goal Setting (n=37)	Mean	SD	Minimum	Maximum
Targeted Step Goal	7,824	2,492	4,000	15,00
Targeted PA # of Days per week	4.71	0.68	4	7
PA #1 Minute Goal	39.7	29.12	10	150
PA #2 Minute Goal	48.53	37.32	10	180
Goal Importance	8.11	1.34	5	10
Goal Confidence	7.1	1.34	5	10
<i>*PA = physical activity</i>				



**Table 3: PA Goals and Challenges**

<b>Physical Activity Goal #1</b>	<b>n</b>	<b>%</b>
Walking	12	32%
Run/Jog	4	11%
Biking	1	2%
Dancing	1	2%
Hiking	0	0
YouTube Exercise Videos	9	24%
Other (Elliptical, Cardio, Football, Rollerskate)	7	19%
Missing Data	3	8%
<b>Physical Activity Goal #2</b>		
Walking	10	27%
Run/Jog	10	27%
Biking	3	8%
Dancing	2	5%
Hiking	2	5%
YouTube Exercise Videos	3	8%
Other (Elliptical, Cardio, Football, Rollerskate)	4	11%
Missing Data	3	8%
<b>Challenges #1</b>		
Chores (Siblings, Housework)	6	16%
Homework/Schoolwork	19	51%
Motivation	3	8%
Safety	2	5%
Lack of time	2	5%
Other (Forgetting, Energy level)	2	7%
Missing data	3	8%
<b>Challenges #2</b>		
Chores (Siblings, Housework)	8	22%
Homework/Schoolwork	7	19%
Motivation	5	14%
Safety	0	0
Lack of time	0	0
Other (Forgetting, Energy level)	1	3%
Missing data	3	8%
Blanks	13	35%

Table 4 is a correlation matrix and provides the correlation coefficients (R-values). The study revealed that the participants' primary physical activity goal of minutes was negatively correlated with their level of confidence (-0.4), indicating that the higher PA minutes they set goals for, the less confident they are in achieving them. There was a negative correlation (-0.32)

between targeted PA days per week and SSE scores. The mean of SSE was 17.6 (SD= 8.44) There were also negative correlations for goal importance and age (-0.29) and goal confidence and age (-0.35) suggesting that as age increases their confidence and importance of physical activity goals decrease. Another correlation worth noting is that as weight increases, goal confidence decreases (-0.29). Goal confidence and SSE scores were negatively correlated (-0.17) as were goal importance and SSE scores (-0.16). A multiple linear regression was done looking to evaluate whether there was an effective of SSE and goal importance and goal confidence. SSE and goal importance ( $p = 0.58$ ) and confidence ( $p = 0.52$ ) were also not statistically significant. The mean SSE scores was 17.46 (SD = 8.44). The CES-D scores had negative correlations between importance (-0.11) and confidence (-0.08). CES-D scores also have negative correlations between the two PA goal minutes individuals set, PA Activity #1 Minute (-0.14) and PA Activity #2 Minutes (-0.19) suggesting the higher the CES-D score indicating greater depressive symptoms the lower the number of PA minutes they set. The mean CES-D score was 10.7 (SD = 4.3). A positive correlation was noted between goal confidence and goal importance indicating as confidence increases so does importance (0.42). A multiple linear regression was done looking whether lower or higher CES-D scores (below/above 15) was a moderator in primary targeted goal minutes and goal confidence and importance. Participants with a lower CES-D score still did not have statistical significance between primary targeted PA minutes and goal confidence ( $p = 0.65$ ) and goal importance ( $p = 0.07$ ). There was also no statistical significance between targeted PA days and goal confidence ( $p = 0.65$ ) and goal importance ( $p = 0.67$ ) with low CES-D scores as a moderator. Participants with a higher CES-D score of above 15 did not have statistical significance between primary targeted PA minutes and goal confidence ( $p = 0.74$ ) and goal importance ( $p = 0.77$ ) as well. There was also no statistical

significance between targeted PA days and goal confidence ( $p = 0.27$ ) and goal importance ( $p = 0.44$ ) with high CES-D scores as a moderator.

**Table 4: Correlation Matrix**

	Income	Height (cm)	Weight (kgs)	Age	Targeted Step Goal	Targeted PA # of Days per Week	Goal Importance	Goal Confidence	CES-D Scores	Social Support Exercise (SSE)	Activity 1	Activity 1 Minute Goal	Activity 2	Activity 2 Minute Goal
Income	1													
Height (cm)	-0.23	1												
Weight (kgs)	-0.11	0.3	1											
Age	-0.35	-0.08	0.34	1										
Targeted Step Goal	-0.08	0.04	0.09	-0.09	1									
Targeted PA # of Days per Week	-0.19	-0.02	-0.13	-0.08	0.24	1								
Goal Importance	-0.22	0.22	0.14	-0.29	0.07	0.16	1							
Goal Confidence	0.02	0.2	-0.29	-0.35	-0.01	0.12	0.42	1						
CES-D Scores	-0.12	0.23	0.03	0	0.12	0.09	-0.11	-0.08	1					
Social Support Exercise Score (SSE)	0.02	-0.05	0.06	0.19	-0.13	-0.32	-0.16	-0.17	-0.14	1				
Activity 1	-0.05	-0.09	0.07	-0.01	0.33	-0.03	-0.01	-0.18	-0.16	0.11	1			
Activity 1 Minute Goal	0.11	-0.32	-0.05	0.03	-0.07	-0.09	-0.24	-0.4	-0.14	0	0.39	1		
Activity 2	0.03	0.33	-0.07	-0.15	0.3	0.03	-0.03	0.17	0.01	0.04	0.35	0.25	1	
Activity 2 Minute Goal	0.07	-0.06	-0.24	-0.01	0.01	-0.11	-0.1	0.09	-0.19	-0.07	0.26	0.59	0.3	1

*\* Activity 1 and Activity 2 - Recoded to numerical values*

## CHAPTER 4: DISCUSSION

### 4.1 Summary of Findings

Due to the alarming statistics of physical inactivity in the United States, the study Chicas Fuertes aimed to increase physical activity in Latina teens in San Diego county. The current study analyzed the baseline/cross-sectional data from the intervention group at baseline who received additional tools to increase PA compared to the control group. Specifically, the study aimed to examine the associations between psychosocial influences on PA (e.g. social support, depressive symptoms) and goals set by participants and their confidence in reaching those goals.

One research question was whether depression symptoms were correlated with physical activity goal setting and goal confidence. The CES-D associations were negative but of small effect possibly due to the small sample size. The CES-D scores had a negative correlation with goal importance suggesting that the higher the depressive symptoms, the less important goal achievement was to the participant. There was also a negative correlation for CES-D scores and goal confidence suggesting that the higher the depressive symptoms the less confident participants were in achieving the goals they set. CES-D scores were also not statistically significant when looking at goal confidence and goal importance in group of below a score of 15 or above 15. This can suggest that individuals may have less motivation to engage in physical activity when they are experiencing greater levels of depressive symptoms. In a previous study focusing on college students, students with more depressive symptoms were less successful in achieving their PA goal pursuits. They also had a decrease in goal commitment and confidence and a lower rating of overall goal completion (Moss and Cheavens, 2019).

Another research question was whether social support was also correlated with goal setting and goal confidence. Similarly to CES-D, majority of the SSE associations had a small

effect with the exception of targeted PA days per week and SSE scores, these effects may be a result of a small sample size which could be changed in the future with a larger sample size. Moreover, higher SSE scores indicate the more social support the participants perceive receiving from family and friends. Curiously, the SSE scores were negatively correlated with goal confidence demonstrating that the higher perceived social support for exercise was, the less confident they were in the goals that they set. In addition, the SSE scores were negatively correlated with goal importance suggesting that the higher the SSE score was the lower the importance for achieving their goals were. There was also a negative correlation between SSE scores and the targeted number of days of physical activity indicating the more support the participants had the less number of days they planned for physical activity. The SSE scores were not statistically significant when looking at goal importance and goal confidence. In the literature, one systematic review noted that adolescents who received more social support from either family or friends, showed higher levels of physical activity (Mendonca, et al., 2014). The literature lacks in focusing on goal setting and social support, especially on goal importance and confidence. Associations between social support and goal setting may be more complex in studies due to the nature of an individual's perception of support received. However, our study's results demonstrated that social support was negatively correlated with multiple variables such as PA goal confidence and importance which is contrary to the literature. This could be due to a small sample size and currently ongoing enrollment which may lead to a change in the future.

The study also revealed that there was a negative correlation for goal importance and age. Goal confidence was negatively correlated with many variables including age, participant's weight, and participant's primary physical activity goal of minutes. There was a positive

correlation between goal importance and goal confidence suggesting as goal importance increases so does the confidence in achieving the goals they set.

#### 4.2 Comparison to the Literature

Previous literature focuses mainly on adults and college students' physical inactivity and mostly individuals that identify as White. Multiple studies primarily focus on males although women are less likely to consistently engage in physical activity. Ethnic groups are also less likely to be studied for sedentary behaviors while having the highest rates of physical inactivity. Many of studies also fail to focus on constructs that contribute to the physical inactivity in underserved populations such as social support, goal-setting, self-efficacy, and benefits of engaging in PA.

In the literature, there is a lack of PA studies that specifically looks at variables such as depression and PA in adolescent girls. However, one longitudinal study focused on adult women and their findings demonstrated that PA is inversely associated with depression. The study used the CES-D to measure depression, the study concluded that there are positive effects of voluntary exercise and PA on mental health (Dugan et al., 2016). This study failed to mention if there were any negative effects from their depression such as if it affected their motivation to participate in PA. This study also did not have any goal setting activities when it came to PA behavior change. Our analysis also used the CES-D measurement but found that individuals were less likely to engage in PA with a higher CES-D score. Bailey et al., 2018 conducted a metaanalysis focusing on adolescents and young adults evaluating the consistencies between studies where the overall main findings were PA improved depressive symptoms. Some studies in the metaanalysis, used the CES-D however the Beck Depression Inventory (BDI) was primarily used to measure

depression in this different populations. These findings coincide with our study's negative association of higher PA and lower CES-D symptomology. There we no current studies in the literature that focused on whether CES-D and goal setting were associated when it came to physical activity (Bailey et al., 2017).

As mentioned previously, many studies have demonstrated positive associations between PA and social support. One systematic review focused primarily on adolescents engaging in PA and found that increased social support led to increased PA. This review noted that adolescents benefited more from social support from friends and this had a greater overall PA consistency (Mendonca, et al., 2014). Our study however, had opposite results where social support led to lower goal confidence and importance in PA which could suggest individuals are not confidence in the goals they've set. Many studies use goal setting in order to encourage behavior change when it comes to PA, however many lack on reporting on specific factors such as goal importance and goal confidence in PA studies, which are important components in goal attainment. There was one study that focused on adults, participants were primarily white and female, the main findings were SMART goals proved to be effective in their study with an increase of goal attainment especially if the specific goals were actionable and had the ability to be evaluated for further PA progress. This study also found social support to be linked to participants success in achieving their goals, their social support came from family and friends outside of the intervention setting (Floegel et al., 2015). Once again, our study results were opposite from this study with social support being negatively associated therefore impacting participants goals negatively. One RCT focused on social support in adults diagnosed with obesity, they used a version of the SSE created by Jim Sallis with results consistent with current literature that social support has a positive effect on PA. This study found that encouragement

and social support participation from friends and family led to greater PA engagement and confidence (Rieger et al., 2018). Rieger et al., findings focused on individuals with a higher BMI and who have been diagnosed as obese and found that their PA confidence increased, in comparison, our study participants must have a BMI lower than 45 and we found a negative correlation as weight increased in our participants their PA goal confidence decreased. Our study may have found this negative correlation due to the individuals age ranging from 12-18, where they may have negative feelings due to stigma of weight gain especially throughout adolescence. Iwasaki et al., 2017 focused on adults in a workplace and found that self-efficacy, an individual's belief in themselves, mediated goal-setting and increased PA but also found that goal-setting indirectly influences increases in PA. This study highlighted self-efficacy and as our study does not include specific self-efficacy behaviors besides goal setting. Our study did not have similar results as we found a negative correlation between goal confidence and minutes of PA conducted which could perhaps be explained by participants age and pressures from school. Our analysis results may have differed from the literature due to a possibility of factors such as our target population was different or the teens in our study may have social support networks that do not value PA as much as the participant. Another study found that Latinx families faced PA barriers such as work-related demands, schedules, and limited PA opportunities. The families also faced high cost of PA activities for their children to engage in organized PA and a barrier of transportation for these activities (Domogalla et al., 2021).

Majority of PA studies have also been conducted in person while this current study is completely online and allows flexibility by providing a web-based intervention which increases accessibility to individuals and reduces barriers they may face.



### 4.3 Strengths and Limitations

There were a few limitations to this study, first the study is currently ongoing and has not yet reached its recruitment goal. This led to a smaller sample size to be analyzed (n=37) and could have reduced the power of the study and increased the margin of error. Another limitation is that the participants self-report all measures including height and weight and they had the chance to skip survey questions leading to a “no response” indicating potential recall bias. The Chicas Fuertes study also does not focus on other behaviors that are associated with chronic disease, such as nutrition and diet.

A strength of this study is that this is a randomized control trial and a great way to measure the effectiveness of the a web-based intervention. This type of intervention makes it more accessible to individuals and reduces barriers such as transportation and time. The study’s intervention program has strengths such as providing resources to participants that they can keep forever such as information on physical activity, different resources available in San Diego county, workout ideas and websites where they can find information on how to become physically active. Another strength of this study is providing the intervention individuals the tools to create “SMART” and effective goals that they believe they can achieve by teaching them how to track and plan their activity for the week. This analysis primarily focused on PA goal-orientated findings and its association to different variables and constructs.

### 4.4 Future Directions

Researchers should continue to focus on underserved populations such as Latina adolescents due to their physical inactivity statistics. Web-based interventions are also deemed beneficial to many individuals since it has shown to break down barriers they may face such as

transportation costs and time due to school. Researchers should also find ways to effectively reduce recall bias when it comes to self-reporting measures such as height and weight. Future physical activity studies should also closely look at depression as an outcome since this target population is also at risk for developing mental health conditions such as depression and anxiety. It is important to see whether physical activity interventions can reduce depression symptoms and improve overall quality of life in teens, especially Latinas. Social support is a common construct that is often looked at in PA studies, however, future research should focus on more details such as does it matter if support comes from family or friends? Researchers should also evaluate whether social support plays a role in individuals ability to achieve PA goals that have been set and whether including an important support person in some part of future studies. Lastly, researchers should also consider using goal setting and looking at how confident and important goals are to individuals, and find effective ways for them to stay committed to the SMART goals they set. Previous goal setting literature has mentioned how goals can improve PA health behavior providing guidance and confidence in attainment may be useful for an effective change in individual's lives.

## CHAPTER 5: CONCLUSION

Overall, the literature lacks focusing on providing physical activity interventions for underserved populations, such as ethnic groups and adolescents. This study shows that Latina adolescents could benefit from setting goals for physical activity. Helping Latina teens become more physically active by setting realistic goals that they are confident in achieving and that are important to them to achieve. Goal importance and goal confidence can be useful to evaluate whether it is useful to individuals when engaging in physical activity and if they will actually participate. Goals can also be a way to hold an individual accountable and as a motivation factor. The next steps in our research would be to analyze the progress our participants made with their self-reported data from baseline, six month follow up, and 12 month follow up. Also, focusing on Fitbit data and accelerometer Actigraph data to review if the participants overall physical activity increased and if individuals in the intervention group were able to achieve the goals they set for themselves. This type of intervention could be used by researchers who are focused on reaching hard to reach populations which are often underserved and vulnerable.

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