

# Just Do It: Exploring the Factors that Predict Physical Activity among Women over Age 40

Christina E. Nikitopoulos<sup>1</sup>, Ivy K. Ho<sup>1,\*</sup>, Jared R. Dmello<sup>2</sup>

<sup>1</sup>Department of Psychology, University of Massachusetts Lowell, Lowell, MA, USA

<sup>2</sup>Department of Criminal Justice & Criminology, Sam Houston State University, Huntsville, TX, USA

\*Corresponding author: [christina\\_nikitopoulos@uml.edu](mailto:christina_nikitopoulos@uml.edu)

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**Abstract** Physical activity is a critical health behavior for people as they age; yet, the majority of individuals do not meet recommended levels. Women over the age of 40 are less active than both their younger counterparts and men, and experience barriers to incorporating physical activity into their daily lives. Using the 2015 National Health Interview Survey data, this study investigated the association between psychological well-being, neighborhood cohesion, and the recommended types of physical activity among women over 40, using a two-step approach. First, binary logistic regressions examined whether psychological well-being, neighborhood cohesion, and covariates influenced physical activity frequency. Next, negative binomial regressions examined the associations for only physically active women. When comparing women who were active with those who were not, there were strong associations between variables. When examining only active women, the differences in the frequency of physical activity is primarily lost, suggesting these factors more strongly affect the likelihood of exercising than the frequency. Campaigns which encourage women (and all individuals) to exercise, such as Nike's Just Do It campaign and others on both the national and local levels, have the potential to make a strong impact on getting women to add physical activity into their lives.

**Keywords:** *physical activity, women over 40, psychological well-being, neighborhood cohesion*

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## 1. Introduction

Physical activity is associated with reduction of risk to chronic diseases, improvement of daily functioning, sleep and overall physical and psychological health [1,2]. Other benefits include increased strength and endurance, weight loss, and lower death rates from chronic illnesses, such as high blood pressure, arthritis, cardiovascular disease, and diabetes [3]. While exercise, especially for aging individuals, is extremely important, most individuals continue to remain inactive. In fact, more than three-quarters of Americans do not reach the recommended levels of physical activity [4,5]. As a result, the promotion of physical activity has become a high public health priority over the past 40 plus years [6].

Thus, there is a need to identify factors that influence physical activity involvement [6]. There have been several health campaigns nationwide that address the increase of physical activity and health behaviors – some aim to target children while some promote active lifestyles for aging individuals. Some are community-based and some are on the national level [7]. One campaign that became popular around the world is Nike's "Just Do It" campaign. Over the past 30 years, Nike has spent over \$39 billion

promoting exercise and just getting it done [8]. While Nike was trying to recreate their brand and beat out another company for athletic wear, they tapped into American's desire in the mid-1980s to become healthy and fit. Nike used humor to engage the consumer and made individuals believe that they can each be healthy, cool, and part of a "desirable group" by starting an exercise regime, and wearing their athletic wear, of course [8].

As these campaigns show, physical activity can be influenced at the personal (psychological and biological), social (family, friends and work) and environmental (settings in which physical activity takes place and the availability of such settings) levels, and much work is needed at each level to help individuals become and stay active [9]. Further understanding these influences may provide clues to help individuals increase their physical activity. While campaigns have helped on some level, there is still very much a lack of physical activity – from youth through adulthood. Nike's campaign in the 1980s expanded to attract women and youth (after initially attracting men between 18 and 40). This paper adds to the body of knowledge, of the influences on physical activity, by examining the role of psychological well-being and neighborhood cohesion on a woman's participation in three types of physical activity: moderate/light, vigorous,

and strength, focusing specifically on women aged 40 and over.

### 1.1. Barriers to Physical Activity

Despite the documented positive effects from participation in exercise, women over 40 tend to be the least physically active, and the most in need of physical activity [10,11,12,13]. With women living longer and the proportion of aging individuals growing at a faster rate than other age groups, and with physical activity being such a key factor in healthy aging [14], it is critical for women to engage in physical activity throughout their lives. Women over 40 encounter multiple barriers that contribute to the low rates of involvement in physical activity. Typical barriers include health concerns, financial concerns, lack of time, safety issues in the neighborhood (animals, traffic and crime), lack of energy or being tired, lack of enjoyment, not having a partner, available facilities (either indoor or outdoor), and a number of competing responsibilities (such as being a parent, caretaker, and employee) [5,15,16].

Underserved, ethnic minority groups report lower levels of physical activity than white individuals in the United States [17]. African Americans, especially African American women, have the lowest rates of activity [18]. In addition, relative to White women, the health of Hispanic and African American/Black women is poor with higher rates of diabetes, cardiovascular disease, and obesity, and the higher rates of inactivity make these women more vulnerable to such diseases [18,19].

### 1.2. Psychological Well-Being

Physical activity confers mental health benefits that may be comparable in effectiveness to anti-depressant medication use, and in some instances, physical activity enhances the therapeutic effects of these medications [20]. Individuals' physical health, psychological health, and quality of life are interwoven; the hypotheses around this relationship are that individuals who participate in more physical activity have higher levels of self-esteem, enhanced levels of mood and positive affect [21] and a lower probability of symptoms of depression and anxiety [22]. On the other hand, having symptoms of anxiety and depression either once or multiple times increased the probability of not meeting physical activity levels [23].

Both acute and chronic stress can act as barriers to proper health behaviors and perpetuate unhealthy lifestyles. Life events and stressors affect exercise adherence, but this influence varied according to level and frequency of stress (life events versus acute stress, and whether individuals were in the adoption or maintenance stage of an exercise program). Further research is needed to further understand how individual response to stress and life events differs and how the frequency and types of stress play into these responses [24]. In their systematic literature review, Stults-Kolehmainen and Sinha [25] reviewed 168 papers to examine the relationship between stress and physical activity. Most of the papers examined found a relationship between greater psychological stress and lower levels of physical activity and higher levels of sedentary behavior. A small number of studies found an

inverse relationship indicating that physical activity levels increased with stress. They found that the relationship direction does vary and may be influenced by various individual attributes.

Past research demonstrates an association between psychological well-being and participation in physical activity, yet further work is needed to explore individual- and environmental-level factors that impact this connection [26]. Interpersonal factors, such as social support, may enhance mental health among those who participate in physical activity [23]. Despite research indicating a link between higher levels of psychological well-being and positive health outcomes, the link between psychological well-being and physical activity participation still needs further examination [26,27,28].

### 1.3. Neighborhood Cohesion

Higher levels of social connectedness have profound effects on people's physical and psychological health, and positively impacts health and well-being [29]. Social capital is based on the premise that connections, cooperation, trust and reciprocity with others provide numerous benefits [30]. There is a strong positive relationship between health and social capital [29]. The more integrated a person is in their neighborhood and community (e.g., social bonds with neighbors and involvement in neighborhood activities), the more likely they will be proactive in their health behaviors. In addition, as social connectedness has been declining over the past few decades, there has been an increase in depression and suicide [31], further emphasizing the salience of the relationship between neighborhood cohesion and physical activity.

Social support, integration, and interactions play an important role in predicting physical activity. A social environment can help shape behaviors and responses to various situations. Whereas most research on physical activity has focused on individual behaviors, it is important to also consider the environment and social norms. These factors would include influences from all parts of the spectrum from social relationships to social inequalities [32]. More neighborhood research has examined the physical environment (i.e., safety concerns, access to transportation) in comparison to social environment such as norms for health behaviors such as physical activity [33].

### 1.4. The Present Study

Using a subset of the 2015 NHIS data, a nationally-representative sample of the U.S., this study examined the extent to which psychological well-being and neighborhood cohesion was associated with participation in physical activity [34] among women 40 years of age and older. For each hypothesis, physical activity was examined in three levels: moderate/light, vigorous, and strength training. We hypothesized that:

$H_1$ : As age increased, the likelihood of engaging in physical activity would decrease.

$H_2$ : Women who were married would be more likely to engage in physical activity than those who were not married.

$H_3$ : White women would be more likely to participate in physical activity than women of other racial groups

$H_4$ : Psychological well-being would be positively associated with physical activity.

$H_5$ : Perceived neighborhood cohesion would be positively associated with physical activity.

## 2. Method

### 2.1. Data and Sample

This study used publicly available data from the 2015 National Health Interview Survey (NHIS), which was the main source of data collection on the health of U. S. civilians. According to the Centers for Disease Control and Prevention [35], the primary objective of the NHIS was to examine the health of the U.S. population through the collection and analysis of data on a broad range of health topics. Administered annually via in-person interviews, these datasets are used by the Department of Health and Human Services to observe health and disability trends with the goal of achieving national health objectives.

The Adult Sample Data collected in 2015 includes additional health and mental health variables that were not collected in previous years. Participants were also asked to complete questions regarding the type and frequency of participation in physical activity [36] Respondents were from all 50 states and the District of Columbia. For this study, data from 10,602 women over the age of 40 were examined.

#### 2.1.1. Control Variables

Control variables were body mass index (BMI), age, marital status, and race. Body Mass Index (BMI) was calculated using participants' height and weight. Participant age at time of survey was recorded. Marital status was used as a categorical variable with the options of married/partnered, widowed, divorced/separated, or never married. Race was broken down into White, Black/African American, American Indian/Alaskan Native, Asian, and Multiracial.

#### 2.1.2. Outcome Variables

Physical activity was measured through three constructs that assessed different levels of activity: moderate/light (leisure time physical activities that took place for at least 10 minutes and caused only light sweating or a slight to moderate increase in breathing or heart rate; vigorous (leisure time physical activities that took place for at least 10 minutes and caused heavy sweating or large increases in breathing or heart rate), and strength (how often an individual participated in physical activities that were designed for muscle strengthening, such as lifting weights or doing gymnastic movements) activities [1,36]. Survey respondents were asked how often they participated in each of these three physical activity constructs. As an example, one question was "How often

do you do VIGOROUS leisure-time physical activities for AT LEAST 10 MINUTES that cause HEAVY sweating or LARGE increases in breathing or heart rate?" [37].

#### 2.1.3. Predictor Variables

Psychological well-being was measured with six items that included: so sad they could not be cheered up, nervous, restless, hopeless, everything was an effort, and worthless, past 30 days. Each item was measured on a five-point Likert-type scale ranging from 1 (all of the time) to 5 (none of the time). Cronbach's alpha for this scale was 0.87.

Neighborhood cohesion was measured with four variables that indicate an individual's connection to and support from his/her neighborhood, including mutual help, trust, closeness, and dependability. The individual variables were measured on a four-point Likert-type Scale ranging from 1 (definitely agree) to 4 (definitely disagree). Cronbach's alpha was 0.89.

#### 2.1.4. Analytic Strategy

The items in the neighborhood cohesion scale were reverse coded (i.e., higher scores indicate more positive responses). When no more than 20% of the items in a scale (i.e., psychological well-being or neighborhood cohesion) were missing, the missing value was imputed by averaging all other non-missing items in the scale for each participant [38]. The analysis was conducted using the **R** statistical software to explore the factors that predict exercise in women over 40 in the U.S. in two steps: 1) binary logistic regression models were used to assess the likelihood of exercising, then 2) for women who were physical active, negative binomial regression analyses were employed to assess the predictors of exercise frequency. For the first set of analyses, each construct was dichotomized for incidence (i.e. either it occurred or did not). For the second set of analyses, they were operationalized as the number of times per week the individual participated in each physical activity, which ranged from zero to 28 times per week.

## 3. Results

Table 1 presents demographic data on the participants. The average age of participants was 60.88 ( $SD = 12.09$  years), and they had a mean BMI of 28.29 ( $SD = 6.89$ ). Seventy-eight percent identified as White. Less than half indicated they were married/partnered (46.5%), less than one quarter indicated they were divorced/separated (23.3%), and one-fifth indicated they were widowed (20.0%). Out of 28 possible times of participating in physical activity per week, participants were physically active in moderate/light activity with a mean of 2.72 times per week ( $SD = 3.68$ ), in vigorous activity with a mean of 1.32 times per week ( $SD = 2.82$ ), and in strength activity with a mean of 0.83 times ( $SD = 2.18$ ). The participants had a mean score of 27.09 ( $SD = 4.27$ ) for psychological well-being and a mean score of 12.61 ( $SD = 3.20$ ) for neighborhood cohesion.

**Table 1. Descriptive Statistics of Demographic, Predictor, and Outcome Variables**

Variable	Mean / Percent	S.D.	Min	Max
Psychological Well-Being	27.09	4.27	6.00	30.00
Neighborhood Cohesion	12.61	3.20	4.00	16.00
Frequency of Moderate Exercise	2.72	3.68	0.00	28.00
Frequency of Vigorous Exercise	1.32	2.82	0.00	28.00
Frequency of Strength Exercise	0.83	2.18	0.00	28.00
Age	60.88	12.90	40.00	85.00
BMI	28.29	6.89	13.25	88.59
Race				
White ( <i>n</i> = 8,272)	78			
Black/African Am ( <i>n</i> = 1,514)	14			
Am Indian/Native Am ( <i>n</i> = 97)	1			
Asian ( <i>n</i> = 536)	5			
Mixed Race ( <i>n</i> = 183)	2			
Marital Status				
Married ( <i>n</i> = 4,940)	47			
Divorced ( <i>n</i> = 2,473)	23			
Never Married ( <i>n</i> = 1,068)	10			
Widowed ( <i>n</i> = 2,121)	20			

*N* = 10,602.

**Table 2. Bivariate Correlations of Demographic, Predictor, and Outcome Variables**

	1	2	3	4	5	6	7
1. Vigorous	—						
2. Strength	0.31***	—					
3. Moderate	0.28***	0.27***	—				
4. Neighborhood Cohesion	0.07***	0.06***	0.08***	—			
5. Psychological Wellbeing	0.09***	0.05***	0.06***	0.17***	—		
6. Age	-0.13***	-0.02	-0.04***	0.13***	0.11***	—	
7. BMI	-0.09***	-0.10***	-0.08***	-0.09***	-0.11***	-0.12***	—

Note. \*\*\**p* < 0.001.

### 3.1. Bivariate Correlations

A correlation analysis, presented in Table 2, indicated significant relationships between all continuous variables ( $p < 0.001$ ), except for the relationship between age and frequency of strength activity, though the effect size on most relationships was low (up to 0.2) [39]. The only variables with medium effect sizes (up to 0.5) are the positive relationships between the three types of physical activity (moderate/light, vigorous, and strength), suggesting that individuals who engage in activity are more likely to diversify their routines. The two key predictor variables, neighborhood cohesion and psychological well-being, have positive relationships with levels of physical activity and age. Conversely, age was negatively correlated with physical activity levels and BMI, and BMI was negatively correlated with all other variables.

### 3.2. Binary Logistic Regression

Fifty-six percent of participants engaged in moderate/light activity at least once per week, 32% in vigorous activity at least once per week, and 22% in strength activities at least once per week. A key assumption of binary logistic regression is that the outcome variable is comprised of two categories relatively equal in size. Moderate/light activity was comparable

between the two categories (5,918 exercisers versus 4,684 non-exercisers); however, for vigorous and strength activity, there was a large difference between the two categories (3,343 exercisers versus 7,259 non-exercisers, and 2,328 exercisers versus 8,274 non-exercisers, respectively). The large discrepancy between categories within the vigorous and strength activities may impact the reliability of the regression models. To establish a comparable sample of 50% per category, a random sample of non-exercisers was drawn for each of these two activities.

To test the first three hypotheses, binary logistic regression models were conducted to examine the relationship between marital status, race, age, and BMI and the likelihood of women over 40 participating in the three levels of physical activity (moderate/light, vigorous, and strength) (see Table 3). As age increased, the likelihood of engaging in each type of physical activity decreased (in support of  $H_1$ ). Similarly, although not hypothesized, we found these results with BMI, indicating that the higher the BMI levels, the likelihood of engaging in physical activity decreased.

Widowed women were significantly less likely to participate in all three types of physical activity than married women. Women who were never married were less likely to engage in vigorous activity. Divorced women were less likely to engage in moderate/light activity. These findings lend support to  $H_2$ .

Table 3. Binary Logistic Regression Models Predicting Frequency of Physical Activity

	Moderate/Light	OR (95% CI)	Vigorous	OR (95% CI)	Strength	OR (95% CI)
	Activity $\beta$ (SE)		Activity $\beta$ (SE)		Activity $\beta$ (SE)	
Intercept	0.406*** 0.031	1.50 (1.41 - 1.59)	0.087* (0.039)	1.09 (1.00 - 1.17)	0.075 (0.046)	1.07 (0.98 - 1.18)
Age	-0.023*** (0.001)	0.97 (0.97 - 0.97)	-0.049*** (0.002)	0.95 (0.94 - 0.95)	-0.016*** (0.003)	0.98 (0.97 - 0.98)
BMI	-0.026*** (0.003)	0.97 (0.96 - 0.97)	-0.045*** (0.004)	0.95 (0.94 - 0.96)	-0.056*** (0.005)	0.94 (0.93 - 0.95)
Marital Status – Divorced	-0.141** (0.052)	0.86 (0.78 - 0.96)	-0.143 <sup>†</sup> (0.080)	0.86 (0.74 - 1.01)	-0.012 (0.093)	0.98 (0.82 - 1.18)
Marital Status – Never Married	-0.089 (0.071)	0.91 (0.79 - 1.05)	-0.212* (0.108)	0.80 (0.65 - 0.99)	-0.011 (0.130)	0.98 (0.76 - 1.27)
Marital Status – Widowed	-0.277*** (0.061)	0.75 (0.67 - 0.85)	-0.248* (0.100)	0.78 (0.64 - 0.94)	-0.342** (0.115)	0.71 (0.56 - 0.89)
Race – Black/African Am	-0.418*** (0.059)	0.65 (0.58 - 0.73)	0.016 (0.091)	1.01 (0.84 - 1.21)	-0.149 (0.110)	0.86 (0.69 - 1.06)
Race – Asian	-0.118 (0.210)	0.88 (0.58 - 1.34)	-0.118 (0.317)	0.88 (0.47 - 1.64)	0.246 (0.327)	1.27 (0.67 - 2.44)
Race – Am Indian/Alaskan Native	-0.050 (0.094)	0.95 (0.79 - 1.14)	-0.351** (0.129)	0.70 (0.54 - 0.90)	-0.370 <sup>†</sup> (0.155)	0.69 (0.50 - 0.93)
Race – Mixed Race	-0.186 (0.154)	0.82 (0.61 - 1.12)	0.163 (0.231)	0.84 (0.53 - 1.33)	-0.059 (0.271)	0.94 (0.55 - 1.60)
Psychological Well-Being (PWB)	0.039*** (0.005)	1.04 (1.03 - 1.05)	0.070*** (0.008)	1.07 (1.05 - 1.09)	0.052*** (0.009)	1.05 (1.03 - 1.07)
Neighborhood Cohesion (NC)	0.057*** (0.006)	1.05 (1.04 - 1.07)	0.091*** (0.009)	1.09 (1.07 - 1.11)	0.067*** (0.011)	1.06 (1.04 - 1.09)
PWB x NC	0.001 (0.001)	1.00 (0.99 - 1.00)	-0.000 (0.002)	0.99 (0.99 - 1.00)	0.000 (0.002)	1.00 (0.99 - 1.00)
N	10,602		5,459		3,774	
Akaike Information Criteria	13,971		6,883.6		4994.4	

Note. <sup>†</sup>p < 0.1, \*p < .05, \*\*p < .01, \*\*\*p < .001.

Across racial categories,  $H_3$  was partially supported. Black/African American women were less likely to engage in moderate/light activity than White women. American Indian/Alaskan Native women were less likely than White women to participate in both vigorous activity and strength activity. No significant differences were found for Asian women or women of Mixed Race.

Both psychological well-being and neighborhood cohesion had strong, statistically significant relationships with moderate/light, vigorous, and strength activity. Psychological well-being was significantly associated with participation across all three types of physical activity. As psychological well-being increased, the likelihood of engaging in each type of physical activity also increased (in support of  $H_4$ ). Similarly, neighborhood cohesion was significantly associated with participation across all three levels of physical activity. As neighborhood cohesion increased, the likelihood of engaging in the three types of physical activity also increased (in support of  $H_5$ ).

### 3.3. Negative Binomial Regression

Negative binomial regression (NBR) analyses were conducted to provide further insight into the relationship between the variables for those individuals who were engaged in physical activity (i.e., data for those who indicated participation at least once per week in at least one of the types of physical activity). A generalized Poisson model would be favored over ordinary least

squares (OLS) for this analysis because the outcomes are count models. However, because the variables are over-dispersed, the negative binomial variant is more accurate for producing reliable models [40]. The variance greatly exceeds the mean (as seen in Table 1), suggesting over-dispersion in the outcome variables. However, over-dispersion was empirically tested by implementing the Cameron & Trivedi [41,42] test. Because the Cameron & Trivedi test for over-dispersion yielded highly significant results ( $p < .001$ ), over-dispersion was confirmed, and thus negative binomial regression would be the most appropriate analytical framework.

All continuous variables were mean-centered to enable a meaningful interpretation of the regression constant [43,44]. As such, each unit change would be a deviation in relation to the mean. Predictions can be made by inputting these deviations directly into the regression coefficients. Three NBR analyses were conducted with each type of physical activity as the outcome variable (i.e., moderate/light, vigorous, strength) for female participants who were physically active. For each of the analyses, demographic variables (i.e., age, BMI, marital status, and race) were used as covariates. Predictors are psychological well-being (PWB) and neighborhood cohesion (NC), and the PWB x NC interaction. Results for the NBRs are presented in Table 4. To facilitate a logical interpretation of the results, they are discussed using percent change, which was calculated using the following expression:  $(100 * (e^{(coef)} - 1))$ , where “ $e^{(coef)}$ ” refers to the exponentiation of the regression coefficient.

**Table 4. Negative Binomial Regression Analyses Predicting Frequency of Physical Activity**

Predictors	Moderate/Light Activity	Vigorous Activity	Strength Activity
	$\beta$ (S.E.)	$\beta$ (S.E.)	$\beta$ (S.E.)
Intercept	1.56*** 0.013	1.393*** (0.017)	1.290*** (0.021)
Age	0.004*** (0.000)	0.004*** (0.001)	0.007*** (0.001)
BMI	-0.003 <sup>†</sup> (0.001)	-0.008*** (0.002)	-0.000 (0.002)
Marital Status – Divorced	0.029 (0.022)	0.000 (0.030)	0.072 (0.036)
Marital Status – Never Married	0.087*** (0.031)	0.065 (0.042)	0.059 (0.052)
Marital Status – Widowed	0.000 (0.028)	0.057 (0.043)	0.092 <sup>†</sup> (0.047)
Race – Black/African Am	-0.000 (0.028)	0.198*** (0.037)	0.077 (0.047)
Race – Asian	-0.030 (0.095)	0.246 <sup>†</sup> (0.141)	0.368 (0.138)
Race – Am Indian/Alaskan Native	0.052 (0.038)	-0.010 (0.056)	-0.058 (0.071)
Race – Mixed Race	-0.036 (0.071)	-0.087 (0.104)	-0.355** (0.123)
Psychological Well-Being	-0.001 (0.002)	0.005 (0.003)	-0.010 <sup>‡</sup> (0.004)
Neighborhood Cohesion	0.006 <sup>‡</sup> (0.003)	0.003 (0.004)	0.002 (0.005)
Psych Well-being x Neighborhood Cohesion	0.000 (0.000)	-0.002 <sup>†</sup> (0.001)	-0.001 (0.001)
Observations	5,918	3,343	2,328
$\theta$	4.075 (0.132)	3.918 (0.170)	4.591 (0.267)
Akaike Information Criteria	29,326	15,750	10,466

Note. <sup>†</sup> $p < 0.1$ , \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

While the likelihood of participating in physical activity decreased as women become older, for women who were physically active, age was positively associated with all three types of physical activity ( $p < .001$ ). For each additional year increase in age above the mean, the number of times spent in vigorous activity was expected to increase by 0.40%. For each additional year increase in age above the mean, the number of times spent in moderate/light activity was also expected to increase by 0.40%. For each additional year increase in age above the mean, the number of times spent in strength activity was expected to increase by 0.70%.

BMI was significant and negatively associated with moderate/light and vigorous activity. For each additional unit increase in BMI above the mean, the number of times spent in vigorous activity per week was expected to decrease by 0.79%. For each additional unit increase in BMI above the mean, the number of times spent in moderate/light activity was also expected to decrease by 0.29%. The relationship between strength activity and increase in BMI was not significant.

For other covariates, there were unique findings within individual types of physical activity. Women who were never married were 9.08%, on average, more likely to engage in moderate/light activity more times per week than married women. And women who are divorced were 7.46%, on average, more likely to engage in strength activity more times per week than married women. There was no significant relationship for widowed women in the three levels of activities in comparison to married women. Even though Black/African American women were less likely than White women to participate in moderate

physical activity, for women who were active, Blacks/African Americans were 21.89% more likely than White women to engage in vigorous activity per week. Women who identified as Asian were 44.48% more likely than white women to participate in strength activities per week. Women who identified as Mixed Race are 29.88% less likely to engage in strength activity per week than White women.

Two significant relationships were identified in the predictors. The relationship between psychological well-being and strength activity was negative and indicated that with every unit increase in psychological well-being, the number of times spent in strength activity is expected to decrease by 0.99% (against  $H_4$ ). There were no significant findings with moderate/light or vigorous activity. For each unit increase in neighborhood cohesion, the number of times spent in moderate/light activity is expected to increase by 0.60% (in support of  $H_5$ ). There was no significant relationship between neighborhood cohesion and vigorous or strength activity.

## 4. Discussion

This study sought to identify factors that predicted participation in physical activity among women over age 40. It builds on the extant literature by examining psychological well-being and neighborhood cohesion. Age, race, and other covariates all significantly predicted the likelihood of women engaging in physical activity. Results were consistent with prior research findings which indicated that age, BMI, marital status, and race were associated with participation in physical activity.

Multiple studies have examined physical activity's positive influence on psychological well-being, including a reduction in depression, anxiety, and a number of other aspects of psychological well-being [45]. Participation in recommended levels of physical activity was associated with the probability of experiencing lower rates of depression and anxiety. Individuals who reported symptoms of anxiety and depression also reported decreased likelihood of participating in physical activity at the recommended levels [23]. In the current study, when comparing women who were not physically active with those who were, those who reported higher levels of psychological well-being also reported a greater likelihood of participation in physical activity. Similarly, in a longitudinal study in England, greater levels of psychological well-being were found to predict higher levels of physical activity in a sample of adults aged 50 and over. Among women who were physically active, the current study did not find any differences in psychological well-being with the frequency of participation in moderate/light or vigorous activity. In contrast, Kim et al. [26] reported a significant relationship for active women between psychological well-being and frequency of strength activity. Among adults who were initially active, higher levels of psychological well-being were associated with a lower probability of reducing activity levels over time. Among those who were initially not active, those with higher levels of psychological well-being had a greater chance of becoming more active over time.

For women who were physically active, those with higher levels of neighborhood cohesion also reported a greater likelihood of being physical active, compared to women who were not physically, as shown in the regression models. Similarly, a study [46] that used the same questions to identify neighborhood social cohesion from the 2013-2014 NHIS data looked at the relationships between this predictor and physical activity among various Latinx subgroups. Neighborhood social cohesion was divided into low, medium, and high cohesion. Overall, those who reported high levels of neighborhood social cohesion were more likely to meet the recommended physical activity guidelines. Different Latinx subgroups did report variations cohesion and physical activity levels. The authors questioned, based on previous studies, whether these findings are partly a result of neighborhoods with higher levels of cohesion having direct factors that might contribute to an increase in physical activity, such as parks, safe walking spaces, and indirect factors that might influence well-being and health behaviors [46]. The present study addressed this possibility with the finding that social cohesion did influence physical activity.

Another previous study found that women who perceived more support from their social and physical environments also participated in more physical activity and health behaviors [47]. Integration with friends was a stronger predictor of physical activity than integration with family, and moderate integration with family predicted greater amounts of physical activity than high levels of family contact [32]. While the present study did not examine the role of family and friends (not available in the 2015 version of the survey), neighborhood cohesion

represents social networks and social support through a different lens. Studies have indicated that social support contributes to an increase in health behaviors; having support leads individuals to be more active, eat healthier, and live healthier lives [48,49].

To date, prior research focused on the differences between those who engaged in physical activity and those who did not. This study innovates on these traditional approaches by further examining the predictors of workout frequency specifically among the women who were physically active in the sample. When homing in on this sample of women who did engage in some level of physical activity, few differences were found across frequency of physical activity. In other words, women who were less frequently active were, for the most part, not different from their more active counterparts in terms of psychological well-being, neighborhood cohesion and demographic factors, with some exceptions. First, women who were older engaged in more frequent physical activity than younger women. This stands in contrast to the differences between women who engaged in physical activity and those who did not, whereby in that comparison, older women were less likely to engage in physical activity than younger women. Second, women with higher BMIs were less frequently active than those with lower BMIs.

Overall, these findings indicate that once women start exercising, factors that were previously instrumental in predicting actual engagement in physical activity are no longer important. This finding ties in well with the influence of campaigns such as Nike's Just Do it, in which the hope and expectation is that an individual simply begins and continues exercising. Whether it is simply walking or being in an exercise program, just doing it is what matters. This study's data illustrates that there are significant differences between those who do and do not participate in the various levels of physical activity, which supports justification of campaigns such as Just Do It. Once an individual exercises, or just does it, it encourages individuals to keep exercising and leads to more activity and participation. The social factors are not significant in predicting the amount of time these participants were working out, as they predicted whether one would or would not exercise at all. Nike's campaign seems to be effective in this situation, but future campaigns need to take it to the next level.

Policymakers and practitioners should focus on encouraging women over 40 to engage in physically active lifestyles, regardless of psychological well-being, neighborhood cohesion, or demographic characteristics, because once women are active, the differences amongst them appear to be minimal. One possible reason for this finding is that women who are active have overcome the barriers to being physically active, not because these barriers do not exist in their lives, but because the women have found a way to make physical activity a part of their days. Physical activity is generally intimidating for women, and women encounter a number of barriers, as discussed. However, creating a plan for making it a part of one's life - by figuring out what, how, and when to exercise - women can overcome these barriers.

## 4.1. Implications for Interventions

In general, people know that physical activity is important for one's health, especially as they age. Yet, there remains a disconnect and the number of sedentary individuals is increasing. Interventions at a number of levels need to be implemented to help increase physical activity and overall health behaviors. Increasing awareness of supports in one's environment, including safety concerns, and resource availability for physical activity in one's neighborhood might be a plausible strategy for interventions [47]. To increase effectiveness, programming, including both prevention and intervention, for physical activity promotion should be specifically designed for women (or the target audience) and address the various levels of influence on an individual's behavior: intrapersonal and interpersonal (biological and psychological characteristics), social and community (family, social and work affiliations) and physical environments and policy (neighborhood; [9,50,51].

Intrapersonal, social, physical environmental, and policy domains can influence the many components of an individual's behavior. Change at the individual and social level can offer women the motivation, social support, discipline and resources to incorporate physical activity into their daily life and can create a culture of support for all individuals to participate in physical activity where they can feel comfortable in taking the steps to improve their health. Community level change can offer safe spaces and opportunities for individuals to move. Creating partnerships between community organizations (i.e., businesses, policy and advocacy groups, recreation centers, and health centers, city planning departments, and transportation) is critical to empowering the success of physical activity programming. For example, healthcare-based prevention models that partner with resources in the community provide more benefits to the individual than an independent model in promoting physical activities [9]. Combining aspects of each of these domains would be most beneficial in facilitating change.

Appropriate recommendations and programming for physical activity can help decrease barriers women experience as they age, and further promote the significance of incorporating physical activity into their lives. Such programming can result in an increase in knowledge and self-efficacy of physical activity, an improvement in attitude toward physical activity, and an increase in physical activity participation [52]. The main goal is to increase women's physical activity levels and maintain these as they age. Providing the proper platform for this change to occur is essential. To be most effective, the goals and programming should be tailored to address gender, age, and culturally specific needs [53,54]. Providing a safe place for participants to enjoy movement, feel safe, build self-confidence and increase personal satisfaction can encourage women to maintain physical activity [55].

## 4.2. Limitations

Some of the limitations in this study have to do with the selection of variables considered in this dataset. Because only data from women over age 40 were examined, the present results cannot be generalized to younger women.

However, by focusing on women in midlife and older, this study addresses the gap in literature on physical activity among this specific age group. Another limitation is that this is secondary data analysis; thus, the researchers could not control question phrasing. For example, the variables assessing participants' socioeconomic status were not usable. Household income is another variable that was not in the 2015 dataset that could impact women's participation in physical activity. A limitation to this data set, is that in 2018, the physical activity guidelines from the CDC were modified; it is important to note that these findings should be contextualized with the current guidance [1]. Furthermore, the sample was overwhelmingly White, making it less generalizable to racial minority groups.

Finally, other factors not included in these analyses may be predictive of frequency of physical activity, including geographic residence and other health-related behaviors. A neighborhood, whether it is rural, urban, or suburban, and barriers that each provides may also affect frequency. While geospatial methods could have provided additional insight into the impact of neighborhood cohesion on physical activity, accurate locational data was not collected in the sample. Future research could employ geospatial approaches to further explore the relationship between these constructs.

## 4.3. Conclusion

The current study contributes to the literature regarding predictors of physical activity. Overall, the findings in this study indicate is that there are many significant differences when comparing women who do and do not participate in physical activity. These findings parallel those from other studies showing that as age or BMI increased, the likelihood of activity decreased (citation). As discussed, when examining only the women who participate in physical activity, these differences dissipate, indicating that movements such as Nike's "Just Do It" have some merit to what they are attempting to achieve. In order to further examine factors on the influence of physical activity, future research should try to determine what are the underlying mechanisms which influence women to participate in physical activity. Learning more about these underlying mechanisms could help clinicians and researchers put programming into place where all individuals could benefit and make all three types of physical activity more of a priority in their lives.

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