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The Influence of Marriage and Cohabitation on Physical Activity Among Middle-Aged and Older People

Shuhan Yuan[1], Kit K. Elam[1], Jeanne D. Johnston[2], and Angela Chow[1]

Abstract

Using data from a nationally representative longitudinal study, Midlife in the United States (waves 1–3; $N = 1113$; aged 49–93), this study investigated whether partnered living status (partnered vs. non-partnered) and partnered living quality (support/strain from partner, partner disagreements) were associated with physical activity in middle-aged/older adults. Regressions were performed to test the effect of change or stability in partnered living status across three waves and relationship quality on the frequency of moderate and vigorous physical activity at Wave 3. Subjects who changed from non-partnered to partnered living had the highest moderate and vigorous physical activity levels. Partner support was positively associated with moderate physical activity ($\beta = .50$, $p < .01$), and partner disagreement was negatively associated with vigorous physical activity ($\beta = -.27$, $p < .01$). Results suggest that partnered living status and quality can influence physical activity among the aging population. Physical activity interventions among older adults may benefit from including social support as a key component.

Keywords

marriage and cohabitation, physical activity, aging population

What this paper adds

- A comprehensive measure of intimate domestic relationship, partnered living status (married or cohabitating vs. non-partnered living), has been cohesively examined relative to physical activity among middle-aged and older people.
- This study provides evidence that partnered living quality plays an essential role in moderate and vigorous physical activity in middle-aged/older adults.

Applications of study findings

- Public health stakeholders should provide additional physical activity support and community resources to individuals without partners. Middle-aged/older adults with partners should continue to receive education on maintaining healthy intimate relationships in the long term.
- Gerontological interventions on physical activity and intimate relationships should consider partnered living status and quality together to have the greatest impact.

Introduction

According to U.S. Census Bureau population projections, the older-aged population (65 and older) is forecasted to nearly double from 52 million in 2018 to 95 million by 2060 (Vespa et al., 2018). With the continuing increase in the elderly U.S. population, identifying nonmedical and protective factors associated with health outcomes is extremely important (Mather et al., 2015). Routine participation in physical activity can enhance health-related quality of life and physical functioning in older adults (Crombie et al., 2022; Cunningham et al., 2020). Physical activity has also been considered a treatment and medicine for a wide range of

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[1]Department of Applied Health Science, School of Public Health, Indiana University Bloomington, Bloomington, IN, USA
[2]Department of Kinesiology, School of Public Health, Indiana University Bloomington, Bloomington, IN, USA

Corresponding Author:
Angela Chow, Department of Applied Health Science, School of Public Health, Indiana University Bloomington, 1025 E. 7th Street, Suite 111, Bloomington, IN 47405, USA.
Email: chowa@indiana.edu

chronic conditions for older adults based on compelling associations between increased physical activity and decreased mortality and morbidity in this population (Anderson & Durstine, 2019; Taylor, 2014). Although physical activity is beneficial, a large proportion of the older population is still inactive, with the prevalence of inactivity increasing from 25.4% among adults aged 50–64 years to 35.3% for those 75 years and older (Watson et al., 2016).

The role of intimate partner relationships in physical activity engagement in mid-life and beyond has been identified as an important research topic (Cunningham et al., 2020; Mather et al., 2015). Although studies have extensively examined the link between marital status and physical activity engagement (Pettee et al., 2006; Porch et al., 2016; Sobal & Hanson, 2010), two important gaps in the literature informed the goals of the current study.

First, in the last two decades, many couples have chosen to cohabitate instead of getting married (Manning et al., 2014), resulting in more diverse couple relationship structures in modern society (Sassler & Lichter, 2020). However, the role of intimate domestic relationships on physical activity has only been empirically examined in married populations, whereas cohabitation has been overlooked. To appropriately capture how intimate domestic relationships are associated with physical activity, it is critical to take cohabitating, married, and non-partnered populations all into account (Rapp & Schneider, 2013). More specifically, in this study, we employed "living with a partner" or "partnered living" (Burke et al., 2004) to describe individuals who are either married or cohabitating compared with those who are non-partnered. Accordingly, the first goal of this study was to examine how longitudinal patterns of partnered living were associated with physical activity engagement.

Second, findings on physical activity and marriage are mixed. For example, some studies find that being married is positively associated with the frequency of exercise (Pettee et al., 2006), and the change from being single to married results in increased physical activity compared to people staying single (King et al., 1998). In contrast, some studies found being married was negatively linked to physical activity engagement (Rapp & Schneider, 2013) and married individuals spend less time exercising than unmarried individuals due to limited leisure time (Nomaguchi & Bianchi, 2004). On the other hand, some studies reported no significant relationship between marriage and physical activity participation (Hull et al., 2010). The above studies have only examined the relationships between relationship status and physical activity without considering their relationship quality, like partner support, partner strain, or partner disagreements, which may explain these differential findings. Literature and theoretical frameworks suggest that the quality of intimate relationships, in addition to marital status, plays a vital role in influencing physical activity engagement. For example, Umberson (1987) suggested that marriage provides a protective and beneficial living environment, especially among the elderly population, that facilitates self-regulation. Additionally, Burman and Margolin (1992) provided a complementary explanation in the stress/social support theory, which emphasizes the roles of relationship quality and interaction, especially in long-term intimate relationships. This theory also suggests that stress and support in intimate relationships can shape individuals' health-related habits, coping abilities, and emotions, which in turn, further impact their health. For example, previous research indicates that negative or positive marital quality can correspondingly influence health outcomes, including depression (Jacobson et al., 1989), as well as eating and sleep habits (O'leary, 1990). In summary, previous research and theories suggest that not only a partner's presence but also the quality of their relationship should be considered in understanding physical activity engagement. Guided by these theoretical frameworks, the second objective of this study was to investigate the association between the quality of intimate domestic relationships and physical activity among middle-aged and older adults living with a partner.

Thus, prior research provided the rationale for further investigation on how partnered living (married and cohabitation) and partnered living quality (support and strain from spouse/partner and spouse/partner disagreements) are associated with physical activity among the middle- and old-age population. This paper aimed to answer the following two research questions. The first research question (RQ1) was to understand how changes in partnered living status were associated with subsequent physical activity engagement among middle-aged and older adults. The second research question (RQ2) was to understand the relationship between the quality of partnered living and physical activity engagement among middle-aged and older adults living with a partner. In line with existing evidence and theoretical frameworks, the following hypotheses were made: (1) individuals who are stably married or who are cohabitating with a partner would be more likely to engage in physical activity, (2) greater levels of partner support would be associated with higher levels of physical activity, and (3) negative influences from partners (partner strain and partner disagreements) would be associated with lower levels of physical activity.

Method

Participants

This study used the longitudinal data set Midlife in the United States (MIDUS), including data from Wave 1 to Wave 3 (Brim et al., 1999; Ryff et al., 2007, 2017). MIDUS includes questions related to behavioral, physical, psychological, and social relationship factors to understand the overall well-being of the American population. The project conducted three assessment waves: MIDUS 1 ($N = 7108$) from 1995 to 1996, MIDUS 2 ($N = 4963$) in 2009, and MIDUS 3 ($N = 3294$) from 2013 to 2014, with varying time intervals

between waves. Variables were collected from all three waves. The current study only included middle- and old-age adults (age 45 or older at Wave 1) who participated in all three waves. Outliers were identified as data points that were 1.5 times outside the interquartile range (Rousseeuw & Hubert, 2011) of the BMI variable since other variables were collected on a scale basis. There were 1778 participants who withdrew from the study at Wave 2 (47.78% attrition rate), and 223 participants withdrew from the study at Wave 3 (11.47% attrition rate). Participants who returned their surveys at Wave 2 were more likely to be older, retired, had more children, had lower partnered disagreements, and had higher support from friends than those who did not return their surveys. Participants who returned their surveys at Wave 3 were more likely to be younger, not retired, married, and had more chronic diseases than those who did not return their surveys. All *p*-values were less than .05.

After excluding the participants who were younger than 45 years older at Wave 1, participants who withdrew from the study at Wave 2 or Wave 3, and those with outlier BMI values, the final sample size decreased from 15,365 to 3408 (n = 1136 participants). Figure 1 provides more information regarding the sampling process of the current study.

Measures

Leisure Time Physical Activity. Participants' leisure time physical activity (LTPA) was measured using the following questions: "*How often do you engage in moderate physical activity during your leisure or free time*" and "*How often do you engage in vigorous physical activity during your leisure or free time*" (Ryff et al., 2017) from Wave 1 to 3. These questions also included explanations and examples of moderate and vigorous physical activities, such as "*Moderate physical activity is not physically exhausting, but causes your heart rate to increase slightly and you typically work up a sweat*" and "*Vigorous physical activity causes your heart to beat so rapidly that you can feel it in your chest and you perform the activity long enough to work up a good sweat and are breathing heavily*" (Ryff et al., 2017). To account for seasonal influence, the questions were asked separately for summer and winter. A six-point scale from "1" = "several times a week or more" to "6" = "never" was used for measuring the response (see Supplementary Table 1 for detailed scale distributions). For the current study, the scale was reverse coded, so greater scores indicated more LTPA. The summer and winter physical activity levels were averaged to obtain the final LTPA score for both moderate and vigorous intensity levels in each wave, with higher scores reflecting higher LTPA for the past year.

Partnered Living Status

A primary aim of the current study was to examine whether partnered living, rather than just being married, contributes to LTPA. A partnered living status variable was created based on marital status and cohabitation status. Participants indicated marital status using five categories: married, separated, divorced, widowed, and never married. Participants indicated cohabitation status

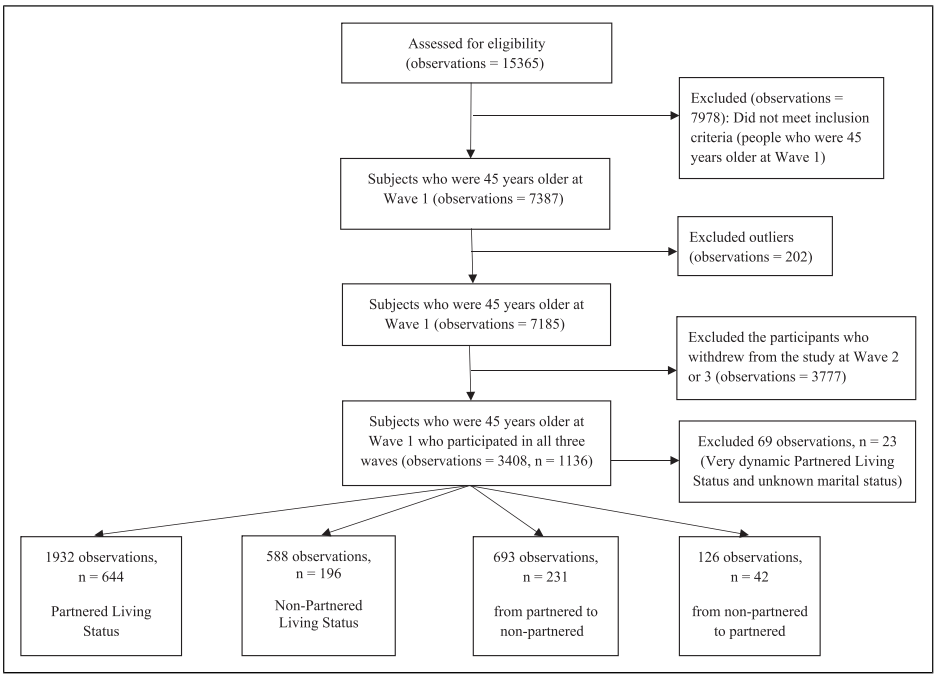

Figure 1. Flow diagram of participation.

using a yes or no binary scale. An individual's marital status response was replaced with "cohabitating" if they were currently in cohabitation. We defined partnered living based on a combination of marital and cohabitation conditions in MIDUS: married, separated, divorced, widowed, never married, and cohabitating. This was categorized into two groups: (1) partnered living, including participants who were married and/or cohabitating and (2) non-partnered living, including participants who were separated, divorced, widowed, and never married. In addition, partnered living status is a dynamic process that changed over the three waves of MIDUS (Table 1). To capture this, partnered living status over the three waves was categorized into four groups: (1) partnered living in all three waves, (2) non-partnered living in all three waves, (3) change from partnered living to non-partnered living, and (4) change from non-partnered living to partnered living. Participants were excluded if they made two status transitions given the scarcity of cases (n = 21) or if they had no marital and cohabitation status data in all three waves (n = 2). Detailed participant status across the three waves and subsequent categorization is illustrated in Table 1. This resulted in an analytic sample of 1113.

Support From Spouse/Partner. Six questions were used to measure how much support participants received from their spouse or partner using questions, for example, "How much does your spouse or partner care about you?" and "How much do you rely on him or her for help if you have a serious problem?" (Schuster et al., 1990). Responses were given based on a four-point scale ("1" = "a lot" to "4" = "not at all"). Cronbach's alphas were .86 (Wave 1), .90 (Wave 2), and .93 (Wave 3). The mean of the reversed values was calculated for each participant, with higher scores reflecting more support from spouse/partner.

Strain From Spouse/Partner. Six questions were used to assess the strain between the participant and their spouse or partner using questions, for example, "How often does your spouse or partner make too many demands on you?" and "How often does he or she criticize you?" (Schuster et al., 1990). Responses were solicited using a four-point scale ("1" = "Often" to "4" = "Never"). Cronbach's alphas were .81 (Wave 1), .87 (Wave 2), and .87 (Wave 3). The mean of the reversed values was calculated for each participant, and higher scores reflected higher strain from spouse/partner.

Spouse/Partner Disagreements. Three items were used to capture disagreement with spouses or partners on various issues, including money, household tasks, and leisure time activities (Grzywacz & Marks, 2000). Respondents were asked to report how often they disagreed with their spouses or partners on "Money matters such as how much to spend, save, or invest," "Household tasks, such as what needs doing and who does it," and "Leisure time activities, such as what to do and with whom." Responses were provided based on a 4-point scale ("1" = "A lot" to "4" = "Not at all"). Each spouse/partner's disagreements were created by reverse coding the item's value to indicate greater disagreement on each type of activity. The three items were examined separately to assess their unique associations with LTPA.

Other Health-Related, Social, and Demographic Variables. Friends' support is one social facilitator of physical activity participation among middle-aged and older adults (Lindsay Smith et al., 2017). This study adjusted the effect of friends' support to understand the unique role of support in intimate relationships. Four items were used to measure how

Table 1. Categorization Process of Partnered Living Status Variables.

Partnered living status at Wave 1	Partnered living status at Wave 2	Partnered living status at Wave 3	Number of participants	Partnered living status variable	Categories
Partnered living	Partnered living	Partnered living	644	Partnered living in all three waves	1
Non-partnered living	Non-partnered living	Non-partnered living	196	Non-partnered living in all three waves	2
Partnered living	Partnered living	Non-partnered living	150	Change from partnered living to non-partnered living	3
Non-partnered living	Non-partnered living	Partnered living	18	Change from non-partnered living to partnered living	4
Partnered living	Non-partnered living	Non-partnered living	81	Change from partnered living to non-partnered living	3
Non-partnered living	Partnered living	Partnered living	24	Change from non-partnered living to partnered living	4
Partnered living	Non-partnered living	Partnered living	9	Exclusion: Very dynamic marital status	—
Non-partnered living	Partnered living	Non-partnered living	12	Exclusion: Very dynamic marital status	—

much support participants received from friends using questions such as "How much do your friends really care about you?" and "How much do they understand the way you feel about things?" (Walen & Lachman, 2000). The scale was from "1" = "A lot" to "4" = "Not at all." Cronbach's alphas were .88 (Wave 1), .88 (Wave 2), and .87 (Wave 3). The average of the reverse-coded values of the four items was calculated such that higher scores reflected higher support from friends.

Three health-related variables, including the number of chronic diseases, self-evaluated mental health, and body mass index (BMI), were included in the analysis as control variables. The number of chronic diseases (see Supplementary Table 2 for detailed list of chronic diseases) over the past 12 months ranged from 0 to 30, with higher values representing a higher number of chronic diseases. Self-evaluated mental health at the present time was assessed by asking participants to rate their perceived overall mental health on a five-point scale ("1" = "poor" to "5" = "excellent"). The self-evaluated mental health at the present time and the diagnosed emotional disorders over the past year (one of the diseases listed in the number of chronic diseases variable) captured distinct conditions. BMI was calculated by dividing subjects' weight (kilograms) by height (meters) squared. Other demographic variables, including age, gender (male or female), race (White or non-White), retirement status (yes or no), and the number of biological children, were also included in analyses.

Statistical Analysis

Descriptive statistics, including the variable's mean, standard deviation, percentage, and frequency, were first examined for each variable across the three waves. Analysis of variance (ANOVA) for continuous variables and chi-square tests for categorical variables were conducted to compare variable means across the three waves.

When examining missing data patterns of all 1113 subjects at three waves, mean levels of predictors were not significantly different for moderate LTPA when comparing missing (316 observations) versus non-missing (3023 observations) cases, except for self-evaluated mental health ($p < .001$) and the number of children variables ($p < .05$). For vigorous LTPA missing (293 observations) versus non-missing cases (3046 observations), mean levels of predictors were not significantly different, except on income, race, self-evaluated mental health, and chronic diseases (all ps $< .01$). Since the probability of missing data depended on some of the observed variables, multiple imputations using predictive mean matching (Little, 1988) was performed. Incomplete data were imputed by calculating the predicted values from five sets of complete cases that were close to the missing cases, using the default settings of the R package mice (Van Buuren & Groothuis-Oudshoorn, 2011).

In order to answer the two research questions, the sample was, respectively, categorized into two subsamples. The first subsample included all 1113 subjects (with different types of partnered living status changes), which included 433 complete cases and 680 incomplete cases. This subsample was used to assess the association between different partnered living status changes and physical activity engagement. The second subsample included subjects who had partnered living in all three waves ($n = 644$), which included 248 complete cases and 396 incomplete cases. This subsample was used to examine the relationship between the quality of partnered living with physical activity engagement.

To compare physical activity engagement at Wave 3 across different partnered living categories (RQ1), ANOVA was applied to compare the mean difference in LTPA at Wave 3 across the four partnered living status change groups controlling previous waves of physical activity, age, sex, race, BMI, number of children, chronic diseases, and mental health. This was done separately for moderate and vigorous LTPA. To further explore the difference between each partnered living group, Tukey's HSD post-hoc tests were conducted to test pairwise differences. To analyze the relationship between the quality of partnered living with physical activity engagement (RQ2) at Wave 3, linear regression models were used to separately examine the effect of partnered living quality-related variables on moderate and vigorous LTPA at Wave 3 among the subjects with stable partnered living status ($n = 644$). The linear regression models were first tested only with control variables, and partnered living quality variables (partnered support, partnered strain, and three partnered disagreement items on money, household tasks, and leisure time activities) were added in a separate step. The assumptions of a linear regression model were tested before performing the regressions. All regression models controlled for participant age, sex, race, chronic diseases, self-evaluated mental health, retirement status, number of biological children, BMI, and friends' support. All analyses were conducted using RStudio Version 1.2.1335.

Result

Table 2 illustrates the study sample, which consisted of 3339 observations for 1113 participants across the three waves. The sample's average age was 58.2 at Wave 1, 67.1 at Wave 2, and 76.1 at Wave 3. There were more female participants ($n = 625$, 55%) compared to male participants, and most participants were White with a status of partnered living. Participants had an average of two to three children. The percentage of participants who were retired increased from 25.1% at Wave 1 to 38.7% at Wave 3. Partnered living status, support and strain from partner, the three partner disagreement items, moderate LTPA, and vigorous LTPA were all significantly different across the three waves (all ps $< .05$). Chronic diseases, self-evaluated mental health, retirement, BMI,

children, race, and age were significantly different across the three waves (all $ps < .05$).

Results comparing subsequent physical activity engagement across different partnered living categories are shown in Tables 3 and 4. The ANOVA test results suggested the mean was different across the four partnered living status groups for both moderate and vigorous LTPA at Wave 3 (all $ps < .05$; see Supplementary Table 4 for repeated ANOVA as a sensitivity analysis). Specifically, Tukey's post-hoc test indicated that the subjects who were partnered living at all three waves had significantly higher moderate and vigorous LTPA engagement at Wave 3, as compared to the subjects who changed from partnered living to non-partnered living status ($p < .05$). On the other hand, subjects who changed from non-partnered living to partnered living status had a significantly higher moderate LTPA engagement at Wave 3, as compared to the subjects who changed from partnered living to non-partnered living status ($p < .05$).

Results for the linear regression models examining the relationship between the quality of partnered living with physical activity engagement are in Table 4 (see Supplementary Table 3 for correlations between key

Table 2. Descriptive Statistics of Study Sample Before Imputation ($n = 1136$).

Variables	Range/categories	Wave 1	Wave 2	Wave 3	p-value[a]
Age (M, SD)	49–93	58.16 (6.11)	67.06 (6.04)	76.13 (6.07)	<.001
Sex (n, %)	Male	511 (44.98)	511 (44.98)	511 (44.98)	1.00
	Female	625 (55.02)	625 (55.02)	625 (55.02)	
Race (n, %)	White	1030 (90.67)	1051 (92.52)	1015 (89.35)	<.01
	Non-White	62 (5.46)	84 (7.39)	108 (9.51)	
Partnered living status (n, %)	Partnered living	884 (77.82)	830 (73.06)	695 (61.29)	<.001
	Non-partnered living	252 (22.18)	306 (26.94)	439 (38.71)	
Retired (n, %)	Yes	285 (25.09)	645 (56.78)	440 (38.73)	<.001
	No	846 (74.47)	487 (42.87)	238 (20.95)	
Children (M, SD)	(0–13)	2.64 (1.65)	3.04 (1.87)	2.88 (1.75)	<.01
Chronic diseases (M, SD)	(0–30)	2.54 (2.39)	2.71 (2.56)	3.72 (3.38)	<.01
Self-evaluated mental health (M, SD)	(1–5)	3.86 (.90)	3.91 (.88)	3.62 (.92)	<.01
BMI (M, SD)	(15.6–39.32)	26.51 (4.03)	27.03 (4.13)	26.81 (4.37)	.02
Partner support (M, SD)	(1–4)	3.65 (.53)	3.70 (.48)	3.71 (.46)	.03
Partner strain (M, SD)	(1–4)	2.16 (.60)	2.07 (.58)	2.03 (.62)	<.01
Partner money disagreement (M, SD)	(1–4)	1.98 (.91)	1.89 (.90)	1.79 (.85)	<.01
Partner household disagreement (M, SD)	(1–4)	1.86 (.85)	1.78 (.86)	1.74 (.81)	.01
Partner leisure disagreement (M, SD)	(1–4)	1.87 (.83)	1.76 (.81)	1.74 (.82)	<.01
Friend support (M, SD)	(1–4)	3.30 (.63)	3.36 (.61)	3.30 (.62)	.05
Moderate LTPA (M, SD)	(1–6)	5.26 (1.02)	3.76 (1.91)	3.65 (1.97)	<.01
Vigorous LTPA (M, SD)	(1–6)	4.01 (1.74)	2.78 (1.83)	2.81 (1.92)	<.01

Note. M = mean; SD = standard deviation; n = number of participants; % = percentage; LTPA = leisure time physical activity; BMI = body mass index.
*$p < .05$; **$p < .01$; ***$p < .001$.
[a]p-values were calculated from chi-square tests for categorical variables (sex, race, retirement, and partnered living status) and ANOVA tests for continuous variables (children, BMI, friends support, chronic diseases, self-evaluated mental health, support from partner, strain from partner, three partner disagreement items, moderate LTPA, and vigorous LTPA).

Table 3. ANOVA and Tukey Post-Hoc Test on the Relationship Between Different Partnered Living Status and LTPA ($n = 1113$).

ANOVA test on partnered living status	Moderate LTPA at Wave 3 mean (SD)	Vigorous LTPA at Wave 3 mean (SD)
Change from non-partnered living to partnered living ($N = 42$)	4.07 (1.98)[b]	3.05 (1.91)[b]
Partnered living in all three waves ($N = 644$)	3.75 (1.96)[a]	2.87 (1.94)[a]
Non-partnered living in all three waves ($N = 196$)	3.59 (1.98)[c]	2.71 (1.90)[c]
Change from partnered living to non-partnered living ($N = 231$)	3.12 (2.01)[a,b,c]	2.52 (1.83)[a]
p-value	<.05	<.05

Note. Controlling previous waves of physical activity, age, sex, race, BMI, number of children, chronic diseases, and mental health. ANOVA = analysis of variance; SD = standard deviation; n = number of participants; LTPA = leisure time physical activity.
[a-c]Within a column, the same superscript indicates a significant pairwise difference across living condition (ps<.05).
*$p < .05$; **$p < .01$; ***$p < .001$.

Table 4. Regression on the Association Between Partnered Living Quality and Physical Activity Level (n = 644).

		Moderate LTPA at Wave 3				Vigorous LTPA at Wave 3			
		Regression 1		Regression 2		Regression 1		Regression 2	
Variables		Coefficient estimate	SE	Coefficient estimate	SE	Coefficient estimate	SE	Coefficient estimate	SE
Step 1	Age at Wave 3	−.05***	.01	−.05***	.01	.01	.01	−.02	.01
	Sex at Wave 3: Male	—	—	—	—	—	—	—	—
	Sex at Wave 3: Female	.06	.13	.17	.13	−.27*	.13	−.35*	.13
	Race at Wave 3: White	—	—	—	—	—	—	—	—
	Race at Wave 3: Non-White	.03	.20	−.01	.20	.08	.20	.08	.20
	Chronic diseases at Wave 3	−.05*	.02	−.04*	.02	−.002	.02	−.03	.02
	Self-evaluated mental health at Wave 3	.09	.06	.11	.07	.01	.07	−.01	.07
	Retirement at Wave 3: Yes	—	—	—	—	—	—	—	—
	Retirement at Wave 3: No	.06	.12	.03	.12	−.01	.13	.01	.12
	Children at Wave 3	.04	.04	.04	.03	−.01	.04	−.01	.04
	BMI at Wave 3	−.03*	.01	−.03*	.01	.03*	.01	.03*	.01
	Friend support at Wave 3	−.08	.10	−.08	.10	.004	.13	−.01	.10
	Moderate LTPA at Wave 1	.12	.06	.10	.06	−.02	.06	−.01	.06
	Moderate LTPA at Wave 2	.18***	.04	.17***	.04	−.01	.04	.01	.04
	Moderate LTPA at Wave 3	—	—	—	—	.57***	.03	.58***	.03
	Vigorous LTPA at Wave 1	.06	.04	.06	.04	.11*	.04	.11*	.04
	Vigorous LTPA at Wave 2	−.03	.04	−.03	.04	.16***	.04	.16***	.04
	Vigorous LTPA at Wave 3	.55***	.03	.55***	.03	—	—	—	—
Step 2	Partnered support at Wave 3	—	—	.50**	.17	—	—	−.24	.17
	Partnered strain at Wave 3	—	—	.23	.13	—	—	−.02	.13
	Partnered money disagreement at Wave 3	—	—	.13	.08	—	—	.04	.08
	Partnered household disagreement at Wave 3	—	—	.01	.08	—	—	−.06	.09
	Partnered leisure disagreement at Wave 3	—	—	.09	.08	—	—	−.27**	.08
	Adjusted R-squared	.48		.50		.46		.48	

Note. SE = standard error; LTPA = leisure time physical activity; BMI = body mass index.
*p < .05; **p < .01; ***p < .001.

predictors and physical activity across the three waves). All four models underwent tests for variance inflation factors on included variables, and the findings indicated that there was no multicollinearity, with results ranging from 1.04 to 2.05. Before adding the partnered living quality variables into the regression model (Step 1), the adjusted R-squared indicated that the models explained 46% of the variance in the moderate LTPA and 48% in the vigorous LTPA. After adding partnered living quality variables into the regression model (Step 2), the adjusted R-squared increased from .48 to .50 for moderate LTPA and from .46 to .48 for vigorous LTPA, adjusted for the number of predictors in a model. The change in R-squared from Regression 1 to Regression 2 was examined via the Wald tests. The results indicated that the R-squared change were statistically significant (ps < .01).

Age (β = −.05, p < .001), chronic diseases (β = −.05, p < .05), and BMI (β = −.03, p < .05) were negatively associated with moderate LTPA. After adding the partnered living quality variables into the regression model (Step 2), the association between age, chronic diseases, and BMI remained, and partnered support was positively associated with moderate LTPA (β = .50, p < .05). For the vigorous LTPA model, female participants engaged in less vigorous LTPA (β = −.27, p < .05) than male participants, and BMI was positively associated with vigorous LTPA (β = .03, p < .05). After adding the partnered living quality variables into the regression model (Step 2), partnered disagreement on how to spend their leisure time was negatively associated with the vigorous LTPA (β = −.27, p < .05), and sex and BMI variables remained significant. However, the partnered strain variable was not significantly associated with moderate or vigorous LTPA (all ps > .05).

Discussion

This study used longitudinal data from the MIDUS study to investigate whether partnered living status (married/cohabitating vs. non-partnered) and partnered living

quality (support/strain from partner, partner disagreements) were associated with physical activity in middle-aged/older adults. The results align well with the hypotheses. Subjects with a status of partnered living at all three waves and those who changed from non-partnered to partnered living had the highest moderate and vigorous physical activity levels. Partner support was positively associated with moderate physical activity, and partner disagreement on leisure time activities was negatively linked to vigorous physical activity among participants who were partnered living at all three waves. This study is one of the very few studies that address both the diversity of modern intimate relationship structures and relationship quality in LTPA.

This study reinforces the literature and addresses gaps by providing a new categorization of partnered living status (married/cohabitating) to understand the influence of modern domestic relationships on LTPA. Previous research among the older population indicated that unmarried people, particularly those not in a partnered living status, are more likely than married people to be physically inactive (Hilz & Wagner, 2018). Also, unmarried people have lower odds of meeting physical activity guidelines (Porch et al., 2016). Consistent with this literature, this study also found that individuals with a stable partnered living status and those individuals who changed to a partnered living status were more likely to engage in physical activity. One possible explanation is that married or cohabitating individuals monitor each other's health-related behaviors, which may facilitate individual self-regulation of one's health status (Waite, 1995). Another possible explanation is that being physically fit makes people more attractive to potential partners (Goldman, 1993). This social selection process implies that healthy and physically fit individuals have a higher likelihood of being joined into an intimate relationship; therefore, it may lead to better overall health compared to individuals that are non-partnered (Goldman, 1993).

The present study also validated the stress/social support theory proposed by Burman and Margolin (1992) by illustrating that disagreement on leisure time activities and support in intimate relationships can influence LTPA levels. This is in line with recent literature. Pauly et al. (2020) found that a higher level of moderate-to-vigorous intensity physical activity was associated with longer intimate relationship duration and higher perceived closeness to the partner. A recent study using large national samples suggested that marital stress and emotional support from a partner could impact physical activity trajectories (Thomas et al., 2022). Other studies among older adults indicate that exercise is associated with higher marital satisfaction (Yorgason et al., 2018), and partner support can mediate the association between physical activities and positive affect (Lee et al., 2022). Consistent with the study hypotheses and prior research, in the current study partner support was positively associated with moderate LTPA and partner disagreement on leisure time activities was negatively associated with vigorous LTPA. In line with stress/social support theory, factors like partner disagreements and support in long-term intimate relationships can impact an individual's mental health. These findings highlight the critical role that partnered living quality plays in relationships and individual health behaviors. It also reveals the potential challenges partnered middle-aged and older adults have maintaining a healthy and nourishing relationship and active lifestyle. Future research should further examine the underlying mechanism that may facilitate these effects.

There are limitations that need to be addressed. First, the outcome variable LTPA was measured using a six-point scale where "1" was "several times a week or more" and "6" was "never." This method captured general engagement in LTPA but overlooked the duration of each physical activity and was subjective in nature. Future research should use more comprehensive measurements and objective tools to fully capture LTPA levels, including their type, intensity, duration, and frequency. Second, subjects who had changed across partnered living conditions more than once across the three waves of the study were excluded. However, given the scarcity of participants in this category (~2%), this appears to be uncommon in the general population. Third, we acknowledge that the effect size observed in our analysis was relatively small, which should be considered in findings interpretations. Additionally, there were 13 years between Wave 1 and Wave 2, but only 5 years between Wave 2 and Wave 3. Due to the extended period, partnered living changes were more likely to have happened between the first two waves. This dynamic change and the different time periods between waves may have contributed to nuanced associations with LTPA, which should be explored in future research. Examining individual change over waves would also be an intriguing avenue for further research.

Collectively, findings indicate that partnered living status and intimate relationship quality have the potential to influence LTPA among middle- and older-aged populations. These findings underscore the importance for public health educators and professionals to provide additional social support and community resources to older adults with a non-partnered living status. Moreover, the study highlights the potential challenges that individuals with a partner may face, such as low levels of partner support and marital conflicts, which should also be recognized and addressed by public health professionals. People with a partnered living status should continue to receive health education during their middle age, with the aim of supporting each other to be more physically active and solving partner disagreements on how to spend their leisure time. Future studies and interventions should also explore mechanisms underlying the impact of intimate domestic relationships on physical activity. For instance, future gerontological studies to understand physical activity and intimate domestic relationships should consider both married and cohabitating people together to expand the population of influence (Davis et al., 2016; Rauer & Hornbuckle, 2019). Future spousal pair-based interventions

on physical activity and marriage/cohabitation should consider partnered living status and partner living quality together to have the most significant impact (Franks et al., 2018; Rapp & Stauder, 2020). Innovative programs that focus on partnered support and interactions should also be designed to promote physical activity among the middle-aged and older population.

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ORCID iD

Angela Chow https://orcid.org/0000-0002-0269-1023

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