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Physiologic and psychosocial changes of the menopause transition in US Latinas: A narrative review

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Abstract

Latinos comprise the fastest-growing minority group in the United States (U.S), with Hispanic women (Latinas) constituting 17% of women age 45–54 years. The menopause transition (MT) is associated with many physiological, behavioral, and psychosocial changes that can affect disease risk in women. While several epidemiologic investigations have enhanced our understanding of the MT, to date, menopause research has mostly focused on non-Latina White women. As a consequence, there is a dearth of information on strategies for managing menopause-related issues in Latinas and important factors to consider to provide culturally appropriate care and promote lifestyles that may reduce adverse health outcomes. This narrative review summarizes existing evidence of the MT in Latinas, with a focus on hormonal alterations, menopausal symptoms, mental health, cognition, and cardiometabolic health. The clinical and research implications of the current literature will also be discussed.

Keywords

Hispanic/Latina; cardiovascular; cognition; depression; menopause; sleep; vasomotor symptoms; sexual function

Introduction

In 2019, 17% of women aged 45–54 years in the United States (U.S) identified as Latina [1]. The age at natural menopause among Latinas in the U.S averages approximately 51 years, which does not differ from non-Latina White women [2]. However, these data include a small sample of Latinas (n=450). Given that Latinos comprise the fastest-growing minority group in the U.S [1], a greater proportion of women transitioning through menopause are Latina. According to the U.S Census, the term Hispanic/Latino refers to a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race [1]. Latinas are a heterogeneous group with varied sociocultural and historical experiences, including nationality, racial identity, language, immigration history, religion, cultural beliefs, education, and level of acculturation. Many key indicators suggest that Latinas in the U.S are disadvantaged by limited English proficiency, less formal

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education, living below the federal poverty level, lack of health insurance, and social isolation and discrimination [3, 4]; these factors are known to affect lifestyle and health adversely [5].

The MT is associated with many physiological, behavioral, and psychosocial changes that can affect disease risk in women. The MT has been related to increases in depressive symptoms [6], sleep disturbances [7], body fat deposition [8], and vascular remodeling [9]. While several epidemiologic investigations have enhanced our understanding of the MT, to date, menopause research has mostly focused on non-Latina White women. Of five epidemiologic studies [10, 11, 12, 13, 14] across the U.S with data on midlife Latinas and menopause (Table 1), three studies collected longitudinal data [10, 12, 13] and two [11, 14] were cross-sectional. The Seattle Midlife Women's Health Study and the Study of Women's Health Across the Nation (SWAN) [10, 12] are the longest-running cohorts of midlife women that include Latina participants. However, Latinas were underrepresented in these epidemiologic studies, constituting <10% of participants (Table 1). SWAN has the largest longitudinal sample of midlife Latinas (n=286) (Table 1). The overall purpose of this narrative review is to critically evaluate and summarize the evidence of the MT in U.S Latinas, with a focus on hormonal alterations, menopausal symptoms, mental health, cognition, and cardiometabolic health. Given the small sample size of U.S Latinas in current epidemiological research, this narrative review also includes evidence from ancillary studies as well as qualitative studies with midlife Latinas to fully capture what is known about Latinas during the MT. The clinical and research implications of the reviewed findings are also discussed.

Hormonal Alterations

The MT is characterized by alterations in follicle-stimulating hormone (FSH) and estradiol. Longitudinal studies, including the Melbourne Women's Midlife Study and SWAN have shown a progressive rise in serum FSH as early as six years before the final menstrual period, and a decrease in serum estradiol two years before the final menstrual period [15, 16]. Few studies have examined sex hormone levels among Latinas during the MT, with SWAN [16] providing the most information (Table 2). Baseline estradiol levels in SWAN [17] were higher and testosterone levels were lower for Latinas than other racial/ethnic groups (i.e., Chinese, Japanese, non-Latina Black, non-Latina White).

On average, FSH and estradiol levels in Latinas across the MT do not differ significantly from non-Latina White women [15, 16]. Analyses in SWAN [18] identified distinct patterns of change in sex hormones during the MT and found that a greater proportion of Latinas experienced a higher rise in FSH as opposed to a medium rise or low rise pattern. Women experiencing a higher rise in FSH after menopause demonstrate elevated risk of atherosclerosis development [19]. Few existing studies suggest that Latinas have lower testosterone levels at midlife, but no differences in estradiol or FSH [20]; however, most of this evidence is based on cross-sectional studies. Higher testosterone among midlife women have been associated with visceral fat [8]. In longitudinal analyses, Latinas were more likely to follow a pattern of a high risk in FSH during the MT, which has been related to greater carotid intima-media thickness [19, 21]. These findings suggest that hormonal

concentrations differ across racial/ethnic groups and that Latinas follow hormone trajectories associated with an elevated risk of atherosclerosis development after menopause. Additional analyses with a larger sample of Latinas could highlight the importance of these sex hormone trajectories in midlife Latinas.

Menopausal Symptoms and Mental Health

The majority of the current evidence of the menopause transition in Latinas focuses on menopausal symptoms. While the prevalence and duration of VMS does not seem to differ from non-Latina White women when adjusting for socio-demographic and psychosocial factors [22], depressive symptoms and adverse health behaviors have a more negative affect on VMS among Latinas than other racial/ethnic groups [23]. Similarly, current evidence suggests that depressive symptoms are related to lower sexual function among Latinas [24], but we only found two studies focused on sexual health in midlife Latinas [25]. In terms of cardiometabolic health, midlife Latinas have a higher prevalence of metabolic syndrome [26], a more adverse CVD risk profile [27], yet less carotid plaque burden [28].

Vasomotor symptoms (VMS)

VMS, including hot flashes and night sweats, are the cardinal symptoms of the MT and can affect up to 80% of women [29]. A cross-sectional survey of mostly premenopausal midlife women, 40–55 years of age, found that Latinas had a higher prevalence of VMS than non-Latina White women (35% vs. 31%) [30]. The prevalence of VMS increases dramatically in early to late perimenopause, with nearly 70% of Latinas reporting any VMS during this transition [31]. In addition, SWAN analyses found that Latinas experienced VMS for a median of 8.4 years over the MT compared to 6.5 years for non-Latina White women (Table 2) [32]. However, these differences in VMS prevalence and duration were attenuated when adjusting for socio-demographic and psychosocial factors [22, 23, 30].

The underlying physiology of VMS is not well understood, but is likely an interplay between several biological, psychosocial, environmental, and behavioral factors. VMS has been associated with a range of negative outcomes, including impaired quality of life, sleep disturbances, depressed mood, and indicators of poor cardiovascular health [31–34]. SWAN found that current smoking and depressive symptoms were more strongly related to VMS among Latinas compared to other racial/ethnic groups [23]. Midlife Latinas also reported higher levels of social support, which were inversely related to VMS [23]. This was consistent with the qualitative finding that family support was important for Latinas and alleviated menopausal symptoms [35].

The proportion of Latinas reporting any VMS during the MT may vary based on national origin, cultural contexts, and level of acculturation. A baseline assessment of SWAN found that while 72% of Central American women reported any VMS in the past two weeks, 34% of Cuban-American women of similar age and menopausal status reported any VMS [36]. In this analysis, Cuban-American women reported higher levels of education and acculturation.

Sleep

Sleep disturbance in midlife encompass a variety of complaints, including short sleep duration, difficulty falling asleep or staying awake, and poor sleep quality [37]. Among Latinas in the U.S., the age-adjusted prevalence of difficulty sleeping ranges from 30% in premenopausal to 50% in naturally postmenopausal Latinas [7]. Consistent with data from SWAN, postmenopausal Latinas in the Sister Study (Table 2), a prospective cohort of women age 35–74 years who had a sister with breast cancer [38], were more likely to report poor sleep characteristics compared to premenopausal Latinas (Table 3); this association remained even after adjusting for age, education, income, smoking status, alcohol use, and history of depression [38]. In a longitudinal analysis [39], SWAN investigators found that compared with other racial/ethnic groups, Latinas were less likely to report difficulty staying asleep and early morning awakenings during the MT. However, analyses of the Sister Study [35] found that Latinas had a higher prevalence of inconsistent sleep patterns, sleep debt, and both short sleep and insomnia symptoms compared to non-Latina White women (Table 3). These conflicting results could be due to the use of different sleep measures across studies and differences among Latino subgroups. For example, in the SWAN Hispanic cohort [33], Puerto Rican and Dominican women in the U.S report more sleep disturbances (66.1% and 64.3%, respectively) than other Latina women.

Multiple psychosocial and sociocultural factors, including lower income, chronic stress, discrimination, and acculturative stress, have each been associated with sleep disturbances [36–39]. SWAN investigators found that US-born Latina, Chinese, and Japanese women were more likely to report sleep complaints than first-generation immigrants of the same ethnic background [38]. Similarly, Im et al. (2017) reported that Latinas who immigrated to the U.S. and stayed longer in the U.S., were more acculturated and tended to report a greater prevalence and severity of sleep-related symptoms [39]. These associations may, in part, be due to language acculturation and whether subjective or objective sleep measures were used. While the SWAN Sleep Study included in-home polysomnography [40], Latinas were not included in this ancillary study. Similarly, few studies relating sleep with health outcomes [7, 41–43] have included midlife Latinas or been conducted exclusively in a Latina cohort.

Depressive symptoms, stress, and anxiety

Compared to non-Latina White women, Latinas reported more mood changes and decreased energy during the MT [44]. Using the Center for Epidemiological Studies of Depression (CES-D) scale, longitudinal analyses in SWAN demonstrated that Latinas were over twice as likely to experience higher depressive symptoms (CES-D ≥ 16), regardless of menopausal stage, than non-Latina White women [45]. More recently, SWAN investigators identified five depressive symptom trajectories during the MT (very low; low; increasing; decreasing; high), with a greater proportion of Latinas following the high depressive symptom trajectory versus the other four trajectories [6]. In other words, Latinas were more likely to sustain high depressive symptoms levels during midlife independent of age and menopause status.

Negative mood states during the MT have been associated with greater VMS, sleep disruption, and higher rates of stress globally [32]. In the U.S, SWAN found that depressive symptoms were associated with greater odds of reporting frequent VMS, particularly among

Latinas [23]. Studies have also shown that women who reported depressive symptoms had a longer duration of VMS [30]; whether this association differed by race/ethnicity was not examined. However, increasing sleep problems during the MT were more strongly related to depressive symptoms among Latinas [6]; whether these differences are in part due to psychosocial sociocultural factors such as acculturative stress has not been determined. Other studies explored if certain social roles impact mood. SWAN analyses have shown that being “employed” or being a “mother” decreased depressive and anxiety symptoms regardless of the stress associated with the roles [46]. Coping resources influenced by cultural factors such as familism (e.g. family prioritized over self), which may mitigate depressive symptoms and stress [47]. The relationship between VMS, sleep, and mood in midlife Latinas is essential to examine in future studies; particularly, the role of midlife Latina’s coping mechanisms in buffering negative effects on health outcomes.

Cognitive performance

While recent evidence suggests that older Latinas (age >64 years) have a greater risk of cognitive impairment and dementia than non-Latina White women [48], the literature on cognitive performance in midlife Latinas is sparse. Approximately 60% of women report cognitive changes, such as forgetfulness or concentration problems, during the MT [49]. The evidence on the relation between menopause stage and cognitive performance is conflicting [50–52]; cross-sectional analyses have noted no difference in cognitive performance across menopause stage, but longitudinal studies found lower cognitive function among perimenopausal women. However, these studies were limited by small sample sizes and short follow-up. Notably, a longitudinal analysis noted significant declines in processing speed and verbal memory during perimenopause [53]; yet, Latinas were excluded from this analysis due to the small sample size (n=21) [53]. One study using the Cognitive Symptom Index for Midlife Women found that Latinas reported a lower total number and severity of cognitive symptoms [54]; however, this scale is not strictly a measure of cognitive function and includes self-reported mood, sleep, and VMS. Future data is necessary to better determine any racial/ethnic differences and factors related to cognitive impairment specifically in midlife Latinas. Given that Latinas are at an elevated risk for cognitive impairment and dementia [48], an understanding of cognitive function during the MT may assist in the development of early interventions to slow cognitive decline in Latinas.

Sexual Health

Existing evidence suggests that sexual function worsens as menopause advances [24]. Overall, 14% of women aged 45–64 years reported at least one distressing sexual problem (e.g., low desire, low arousal, low orgasm) [55]. In a prospective study of postmenopausal women (n=404, 50% Latina), 40% of the women reported a decreased libido [25]; however, the frequency did not differ between Latinas and non-Latina White women. SWAN, on the other hand, found that Latinas reported lower rates of sexual arousal at midlife than non-Latina White, African American, Chinese, or Japanese women [56]. Studies have shown that depressive symptoms and sleep disturbances, which disproportionately affect midlife Latinas, may contribute to reports of sexual dysfunction during the MT [25]. Sexual health outcomes are also related to vaginal dryness and dyspareunia, which may worsen with

increasing time from the final menstrual period [57]. Latinas report worse vaginal dryness, urine leakage, and bladder problems than non-Latina White women [30]. It is important to note that studies on sexual health in this review excluded women on hormone therapy, or lacked hormone therapy data among Latinas [25]. Studies have shown consistently that relationship factors (availability of sexual partner and quality of relationship) and mood outweigh hormonal contribution to overall sexual function in midlife women.

Cardiovascular Health

CVD remains the leading cause of death for women globally [58]. Latinas have a significantly worse CVD risk factor profile than non-Latina White women [26, 59], which may be attributable to several factors, including lower socioeconomic position, discrimination, and stress [60, 61]. These factors may be related to CVD through their influence on health behaviors [62, 63] as well as potential mechanisms involving inflammatory and neuroendocrine pathways [64]. Despite a significantly worse CVD risk factor profile, Latinas have similar or lower rates of CVD-related mortality than non-Latina White women, an epidemiological phenomenon known as the “Hispanic paradox” [65]. However, prevalence of coronary heart disease is higher among Latinas (6.1%) than non-Latina White (5.3%) and non-Latina Black (5.7%) women [66], challenging the existence of a “Hispanic paradox” across all Latino subgroups. Perimenopause is an important period to study in women because it is associated with an increase in blood pressure, adverse lipid profiles, and blood glucose [67]. Even with their increased risk, however, perimenopausal Latinas remain underrepresented in CVD research.

Traditional CVD risk factors

Risk of CVD increases during in midlife [68]. Several studies have shown that midlife Latinas have a higher rate of abdominal obesity [38] and greater BMI [69] than non-Latina White women. A prior cross-sectional analysis reported that 56% of midlife Latinas were prehypertensive compared to 32% non-Latina White women and 35% non-Latina Black women [70]. Among women treated for hypertension, Latinas and non-Latina Black women achieved the lowest rate of control ($140 \text{ mmHg}/ 90 \text{ mmHg}$). Similarly, a more recent SWAN analysis found that Latinas had a higher mean systolic blood pressure than non-Latina White, Chinese, or Japanese women at the time of hypertension diagnosis [71]. It is important to note that many of the studies in the current literature review defined hypertension using the Joint National Committee’s Seventh Report; thus, it is possible that rates of elevated blood pressure are even higher when using current guidelines [72]. A baseline assessment of SWAN found that the mean LDL-C level was highest, and mean HDL-C was lowest for perimenopausal Latinas [70]. Among Latinas, Puerto Rican women had lower LDL-C compared with Cuban women, and Dominican and Central American women had higher HDL-C compared with Puerto Ricans [70]. HDL subclasses may affect the vasculature differently, particularly during the MT [73]. In addition, midlife Latinas have shown significantly higher triglyceride levels than non-Latina White women [70]. However, studies examining whether different changes in HDL-C particles were associated with cardiovascular risk among midlife Latinas are limited.

The Hispanic Community Health Study/Study of Latinos found that among Latinas, the prevalence of metabolic syndrome increases at age 45–64 years, with a 50% prevalence in this age group compared to 23% in Latinas age 18–44 years and 43% in midlife Latino men [74]. A recent analysis in SWAN reported that 6% of Latina participants met all five clinical components of metabolic syndrome, and had a higher risk of incident metabolic syndrome compared to non-Latina White women [27]. Ward et al. [27] also showed that Latinas were nearly twice as likely to develop incident metabolic syndrome during the MT than non-Latina White women, with the most common constellation of incident metabolic syndrome being obesity/hypertension/low fasting HDL-C. Interestingly, despite lower levels of education, higher stress, and a worse CVD risk profile, Latinas with a higher level of religiosity progress to metabolic syndrome at a lower rate similar to that of non-Latina women [75]. These findings underscore the importance of characterizing both early risk factors and protective factors of CVD in perimenopausal Latinas.

Subclinical vascular health

Markers of subclinical CVD, including increased intima-media thickness, arterial plaque, and coronary artery calcification have been reported to predict future CVD events independently [76]. While there is evidence to suggest that perimenopausal Latinas have a higher CVD risk factor burden [26], few studies have assessed the extent of subclinical CVD in midlife Latinas. A recent longitudinal analysis in SWAN found that carotid intima-media thickness did not differ significantly between Latinas and non-Latina White women during the MT [28]. Still, Latinas had significantly lower plaque prevalence [28]. This is consistent with the Northern Manhattan Study, a multi-ethnic longitudinal study of stroke risk factors, which found that Latinos had significantly less carotid atherosclerosis than non-Latina Black and non-Latina White participants after adjusting for sociodemographic and atherosclerotic risk factors [77]. These studies suggest that associations between CVD risk factors and subclinical CVD vary across racial/ethnic groups.

Several menopause-related factors have been associated with markers of subclinical CVD. SWAN investigators found that women who reported VMS early in the MT, or who reported consistently high levels of VMS, had greater carotid intima-media thickness than women with consistently low VMS [21]. Similarly, women with a high rise of FSH during the MT had a greater carotid intima-media thickness than women with a low rise of FSH [19]. While a greater proportion of Latinas followed the consistently high VMS [21] and high rise of FSH trajectory [19], whether these associations vary by race/ethnicity was not assessed, potentially due to the sample size of Latinas. These findings highlight the importance of adequate cohort representation for historically underrepresented populations, such as Latinas, particularly in studies that focus on relationships between menopause and CVD outcomes.

Conclusions

This narrative review is the first to examine endocrinologic, symptomatic, psychologic, and physiologic changes among Latinas during the MT. While fluctuations in sex hormones have a role in the physical and psychosocial changes that occur during the MT, evidence on sex

hormone patterns among Latinas is limited. These studies have found that midlife Latinas report increased vaginal dryness and sexual problems than non-Latina White women [46, 56]. This review highlights important limitations in the current literature on the MT in Latinas. First, existing studies are limited by a small sample of Latina participants (Table 1, Table 2). Despite representing roughly 17% of the US population [1], the domestic studies in this review included a much smaller proportion of Latina participants, averaging between 8–10% (Table 2). Even fewer studies stratified Latinas by place of birth, or Latino sub-group. Next, studies among perimenopausal Latinas have primarily focused on VMS, mood, and social functioning. However, there was a lack on hormone therapy data in this population. There is a dearth of information on the endocrinologic and cognitive changes that occur during this period in Latinas. Future studies within a large Latina cohort are necessary to fully understand the endocrinologic, symptomatic, psychological, and physiologic changes of the MT.

Latinas are a heterogeneous group with differing nationalities, immigration histories, religion, cultural beliefs, education, and level of acculturation. These factors have a profound effect on the health and lifestyle of Latinas. As such, researchers must consider sociological frameworks in their work with midlife Latinas. It is plausible that these sociocultural factors partially explain disparities in health outcomes during the MT. Study findings suggest that Latinas, particularly those from a lower socioeconomic status and lower social support, experience more adverse changes in multiple health indicators during the MT. However, several potential resiliency factors have been identified, such as religiosity, social support, and positive attitudes towards the MT [35, 75]. Identifying risk and resilience factors within this population may elucidate mechanistic pathways of how the MT impacts disease development and potential targets for health promotion and disease prevention in midlife Latinas. While existing evidence suggests midlife is a critical window among Latinas to implement positive health behaviors to delay or prevent poor health outcomes in later life, there is still a need to examine these outcomes across diverse groups of Latinas.

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Table 1.

Overview of Epidemiologic Studies including Midlife Latinas

Study	Country	Purpose	Study Years	Baseline Age (Years)	N	Latina %	Sex Hormones	VMS	Health Behaviors	Cardio-metabolic Factors	Psychological Factors and QOL
Hilo Women's Health Study	Hawaii, USA	To assess general health, menopause status, and health-related complaints among adult women in Hilo, Hawaii.	2004–2005	40–60	994	0.9	N/A	Yes	Diet/Nutrition; Physical activity; Smoking; Alcohol	BMI; Blood pressure; Hypertension; Diabetes; Cholesterol	N/A
San Francisco Midlife Women's Health Study (SFMWHS)	San Francisco, CA, USA	To describe changes in the biopsychosocial health of midlife women through the menopausal transition.	1996–2001	40–48	347	27.4	Urine: FSH	Yes	Sleep quality	BMI	Social support; Stress; Discrimination
Seattle Midlife Women's Health Study (SMWHS)	Seattle, WA, USA	To describe the menopause transition in terms of personal and social factors, hormone changes, stress, health behaviors, and symptoms in midlife women.	1990–2013	35–55	508	1.2	Urine: FSH, estrone, testosterone	Yes	Diet/Nutrition; Physical activity; Sleep quality; Alcohol	BMI; Hypertension; Diabetes;	Anxiety; Depression; Stress
Study of Women's Health Across the Nation	Ann Arbor, MI; Boston, MA; Chicago, IL; Alameda and Contra Costa County, CA; Los Angeles, CA; Jersey City, NJ; and Pittsburgh, PA, USA	To examine the physical, biological, psychological and social changes of midlife women during the menopause transition.	1996–Current	42–52	3302	8.7	Serum: FSH, estradiol, testosterone, SHBG	Yes	Diet/Nutrition; Physical activity; Smoking; Sleep quality; Alcohol; Illicit Drugs	BMI; Blood pressure; Hypertension; Diabetes; Lipids; Subclinical vascular measures; CVD	Anxiety; Childhood adversity; Depression; Social support; Stress; Discrimination; QOL
The Decision at Menopause Study (DAMES-USA)	MA, USA	To better understand the various factors that influence therapeutic decisions by middle-aged women related to the burden of menopause symptoms.	2001–2002	45–55	293	1.00	N/A	Yes	Physical activity; Smoking; Alcohol	BMI	N/A

Note. FSH = follicle stimulating hormone. N/A = not applicable, QOL = quality of life, SHBG = sex hormone binding globulin, VMS = vasomotor symptoms

Table 2. Characteristics of studies with analyses among midlife Latinas during the menopause transition

Author (Year)	Study Design	Location	N Total	N Latina (%)	Age Range or Mean Age	Latina Identity	Outcome Measure
<i>Sex Hormones, Menstrual Cycle Patterns</i>							
Crawford (2009) [78]	Cross-sectional analysis of SWAN	USA	2886	248 (8.6)	42–52 years, Mean: 46 years	Self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Concentration of circulating dehydroepiandrosterone sulfate (DHEAS).
Lasley (2002) [20]	Longitudinal analysis of SWAN (baseline thru follow-up Visit 2)	USA	3029	252 (8.3)	Mean (baseline): 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Circulating DHEAS, testosterone, and estradiol.
Randolph (2003) [17]	Cross-sectional analysis of SWAN	USA	2930	258 (8.8)	42–52 years, Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Serum estradiol (E2), FSH, testosterone (T), DHEAS, and SHBG concentrations and calculated estimates of free steroid availability, free testosterone index, and free E2 index.
Randolph (2004) [79]	Longitudinal analysis of SWAN (baseline and follow-up Visit 1 or Visit 2).	USA	3257	275 (8.4)	Mean (baseline): 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Serum E2 and follicle-stimulating hormone (FSH).
<i>Menopausal Symptoms and Mental Health</i>							
Avis (2001) [80]	Cross-sectional analysis of SWAN screening visit	USA	14907	1859 (12.5)	40–55 years, Mean: 47 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Presence or absence of the following in the past two weeks: hot flashes, night sweats, joint stiffness, forgetfulness, feeling tense or nervous, feeling blue or depressed, vaginal dryness, irritability or grouchiness, heart pounding or racing.
Avis (2003) [81]	Cross-sectional analysis of SWAN	USA	3302	264 (8)	42–52 years, Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Health related quality of Life assessed using the Short Form-36.
Avis (2015) [22]	Longitudinal analysis of SWAN (baseline thru follow-up Visit 13) in overall sample	USA	Overall: 1449, Post-FMP: 881	Overall: 109 (7.5), Post-FMP: 50 (5.7)	Overall: 50 years; Post-FMP: 52 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican	Frequent VMS; Report of hot flashes or night sweats for 6+ days in the previous 2 weeks.

Author (Year)	Study Design	Location	N Total	N Latina (%)	Age Range or Mean Age	Latina Identity	Outcome Measure
	and a post-FMP subsample					American, Puerto Rican, South American, Spanish or other Hispanic.	
Bromberger (2001) [82]	Cross-sectional analysis of SWAN screening visit	USA	10374	1403 (13.5)	42–52 years, Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Mexican American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Psychological distress (feeling tense, depressed, irritable) in prior 2 weeks.
Bromberger (2010) [45]	Longitudinal analysis in SWAN (baseline thru follow-up Visit 8)	USA	3292	284 (8.6)	Mean (baseline): 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Mexican American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Depressive symptoms using Center for Epidemiologic Studies Depression Scale (CES-D 16)
Gaston (2019) [38]	Cross-sectional analysis of The Sister Study	USA, Puerto Rico	38007	1829 (4.8)	35–74 years, 55 years	Self-report of Hispanic/Latino ethnicity and any race.	Sleep characteristics (sleep duration, inconsistent sleep patterns, sleep debt, napping 3 or more times a week, insomnia symptoms, difficulty falling asleep, difficulty staying asleep, sleep medication use).
Gibson (2011) [31]	Cross-sectional analysis of SWAN Daily Hormone Study	USA	625	46 (7.4)	42–52 years, Mean: 49 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Mexican American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Hot flashes, night sweats, trouble sleeping, or abdominal pain/cramps in the last 24 hours (yes/no).
Gold (2000) [30]	Cross-sectional analysis of SWAN screening visit	USA	16065	1718 (13.8)	40–55 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Mexican American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Hot flashes and/or night sweats in past two weeks (any vs. none).
Gold (2006) [23]	Longitudinal analysis of SWAN (baseline thru follow-up Visit 5)	USA	3198	284 (8.9)	Mean (baseline): 46 years	Self-identified as Central American, Cuban or Mexican American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Frequency of VMS = # of days in past 2 weeks with cold sweats, night sweats, HF: Any vs. None; <6 days vs. 6+ days.
Green (2010) [60]	Cross-sectional analysis of SWAN	USA	419	277 (66)	42–52 years, Mean: 46 years	Self-report of Central American, South American, Cuban, Puerto Rican, and Dominican	Vasomotor symptoms, vaginal dryness, and changes in sleeping patterns; number of days in the past 2 weeks (1–5, 6–8, 9–13 and every day).
Hale (2014) [37]	Cross-sectional analysis of SWAN	USA	1180	196 (16.6)	42–52 years, Mean: 45.8 years	Self-report of Central American, South American, Cuban, Puerto Rican, and Dominican	Sleep-related complaints among US-born versus foreign-born women undergoing the menopausal transition.
Im (2009) [35]	Qualitative online forum	USA	27	27 (100)	Mean: 50 years	Self-report of Puerto Rican, Venezuelan, Mexican, Mixed, or Unspecified.	Menopausal symptom experience

Author (Year)	Study Design	Location	N Total	N Latina (%)	Age Range or Mean Age	Latina Identity	Outcome Measure
Im (2017) [39]	Cross-sectional secondary analysis of two larger surveys	USA	1054	255 (24.2)	40–60 years; Mean: 49 years	Self-identify as Hispanic.	Sleep symptomatology among immigrant women during the menopausal transition.
Im (2018) [54]	Longitudinal, secondary analysis of two larger surveys	USA	1054	255 (24.2)	40–60 years; Mean: 49 years	Self-identify as Hispanic.	Symptoms assessed using the Cognitive Symptom Index for Midlife Women (forgetfulness, concentration problems, depression, anxiety, VMS).
Kravitz (2003) [7]	Cross-sectional secondary analysis of SWAN	USA	12603	1656 (13)	40–55 years	Self-report of Central American, South American, Cuban, Puerto Rican, and Dominican.	Difficulty sleeping over the past two weeks (yes/no).
Kravitz (2008) [40]	Longitudinal analysis of SWAN (baseline thru follow-up Visit 7)	USA	3045	229 (7.5)	42–52 years; Mean: 46 years	Self-identify as Hispanic.	Self-reported difficulty falling sleep, staying asleep, and early morning awakening during the previous 2 weeks; Number of nights of difficulty.
Lanza di Scalea (2012) [46]	Cross-sectional during third SWAN visit	USA	2549	162 (6.2)	45–55 years; Mean: 49 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Depressive symptoms (CES-D 16); Anxiety symptoms (feeling tense, nervous, irritable, grouchy, fearful, and heart pounding or racing total score 4), or low social functioning (bottom 25th percentile of the Short-Form-36 social functioning subscale).
Reece (2006) [83]	Cross-sectional	USA	147	63 (43)	40–60 years; Mean: 49 years	Self-identify as Latina.	Perimenopausal health self-efficacy, perceived stress, and self-perceive functional health status.
Reed (2013) [84]	Cross-sectional.	USA	5632	349 (6.1)	45–58 years; Latinas 53.4	Self-report of Hispanic (yes/no).	VMS frequency within 2 weeks; VMS ever (yes/no); recent symptom bother (hot flashes, night sweats, headache and joint-ache within 3 months).
Schnatz (2006) [44]	Cross-sectional.	USA	404	202 (50)	Mean: 61 years (overall); 60 years (Latinas)	Self-report of Hispanic. Within the Latina group women reported several places of birth including: USA, Puerto Rico, Peru, Colombia, Western Europe, Brazil, Dominican Republic, Cuba, Bolivia, and "Other"	Health-related quality of life using the Short Form-36 scale and an assessment of VMS ever and subsequent intensity.
Sexual Health							
Schnatz (2010) [25]	Cross-sectional	USA	102	78 (80)	Mean: 52 years	Self-identify as Hispanic; women were primarily Puerto Rican.	Female sexual dysfunction (vaginal dryness, dyspareunia, decreased sexual desire) reported "not at all", "sometimes", "often".
Cardiovascular and Cardiometabolic Health							
Allshouse (2018) [75]	Cross-sectional analysis of SWAN	USA	2371	168 (3.9)	42–52. Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Incident metabolic syndrome; time to metabolic syndrome.

Author (Year)	Study Design	Location	N Total	N Latina (%)	Age Range or Mean Age	Latina Identity	Outcome Measure
Derby (2006) [69]	Cross-sectional analysis of SWAN	USA	1490	110 (7.4)	Mean: 46.7 years (overall); 46.4 years (Latinas)	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Blood pressure classification according to JNC7 Guidelines; Low-density lipoprotein cholesterol levels according to ATP III Guidelines.
Im (2015) [85]	Cross-sectional internet survey	USA	466	102 (21.9)	40–60 years; Mean: 49.3 years	Self-report of Hispanic/Latina ethnicity and any race.	Cardiovascular symptoms (e.g., assessed using the Cardiovascular Symptoms Index in Midlife Women).
Jackson (2017) [71]	Longitudinal analysis over an average of 9.1 years in SWAN	USA	3302	133 (8.7)	42–52 years; Mean: 50.6 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Antihypertensive medication utilization, including medication class.
El Khoudary (2016) [19]	Longitudinal analysis of SWAN (baseline thru follow-up Visit 12)	USA	856	52 (6.1)	Mean: 46 years (baseline); 60 years (Visit 12)	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Carotid ultrasound measurement of intima-media thickness, adventitial diameter, and presence/absence of plaque.
Sutton-Tyrrell (2005) [86]	Cross-sectional analysis of SWAN	USA	3297	286 (8.7)	42–52 years; Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	CVD risk factors (body composition, blood pressure, lipids/lipoproteins, insulin, glucose, hemostatic/ inflammatory markers)
Thurston (2015) [21]	Longitudinal analysis of SWAN (baseline thru follow-up Visit 12)	USA	811	46 (5.7)	Mean: 46 years (baseline); 60 years (Visit 12)	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Carotid ultrasound measurement of intima-media thickness and presence/absence of plaque.
Torrrens (2004) [87]	Cross-sectional analysis of SWAN	USA	2789	218	42–52 years; Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	B-cell function and insulin sensitivity.
Ward (2019) [26]	Longitudinal, SWAN	USA	3003	237 (7.9)	42–52 years; Mean: 46 years	Participants considered Hispanic/Latinas if self-identified as Central American, Cuban or Cuban American, Dominican, Mexican or Mexican American, Puerto Rican, South American, Spanish or other Hispanic.	Components of metabolic syndrome (high fasting triglycerides, low high-density lipoprotein cholesterol, high fasting plasma glucose, abdominal obesity, hypertension).

Note. SWAN = Study of Women's Health Across the Nations; USA = United States of America;

Table 3.

Summary of study objectives and key findings

Author (Year)	Objective	Key Findings
Sex Hormones, Menstrual Cycle Patterns		
Crawford (2009) [78]	Examine changes in dehydroandrosterone sulfate (DHEAS) with chronological and ovarian aging	<ul style="list-style-type: none"> - Latinas had lower level of DHEAS (µg/ml) at baseline (107.0 [63.7–146.6]) than other racial/ethnic groups, but no significant annual decline (1.34%; p = 0.47). - Compared to other racial/ethnic groups, Latinas had the lowest testosterone (ng/dl) at baseline (37.5 [26.8–51.8]) and the highest concentration of estradiol (pg/ml) at baseline of 69.1 (28.2–98.0).
Lasley (2002) [20]	Evaluate the relationship of race/ethnicity to circulating DHEAS, testosterone, and estradiol to stages of the menopause transition.	<ul style="list-style-type: none"> - Testosterone was positively correlated with DHEAS across ethnicities. The magnitude of this correlation was strongest in Latinas even after adjustment for age, menopause status, and BMI (r=0.43, p<0.0001).
Randolph (2003) [17]	Evaluate serum reproductive hormone concentrations by race/ethnicity	<ul style="list-style-type: none"> - Adjusted mean FSH levels were higher for Latinas (25.9 IU/L) than non-Latina White or Asian women. - Adjusted mean testosterone levels were lower for Latinas (45 ug/dl) than non-Latina White women or Asian women.
Randolph (2004) [79]	Assess patterns of change in serum estradiol and follicle stimulating hormone (FSH) concentrations across age by race/ethnicity	<ul style="list-style-type: none"> - Estradiol and FSH concentrations did not differ between Latinas and non-Latina White women.

Menopausal Symptoms and Mental Health

Avis (2001) [80]	Identify menopausal symptomatology congruence across various ethnic groups in the United States.	<ul style="list-style-type: none"> - Identified two factors of menopausal symptoms in midlife women: psychological/psychosomatic and vasomotor symptoms.
Avis (2003) [81]	Examine the association between health-related quality (HRQL) of life and early perimenopause and race/ethnicity.	<ul style="list-style-type: none"> - Compared to non-Latina White women, Latinas report less psychosomatic and VMS. - OR (95% CI) of Latinas scoring at or below the 25th percentile for each subscale: (1) Role-Physical: 1.58 (1.20, 2.09); (2) Bodily pain: 3.87 (2.95, 5.08); (3) Vitality: 1.81 (1.38, 2.37); (4) Role-Emo: 0.81 (0.61, 1.08); (5) Social Function: 2.87 (2.19, 3.78).
Avis (2015) [22]	1) Determine total duration of frequent vasomotor symptoms (VMS) during the menopause transition; 2) Quantify how long frequent VMS persist; post-FMP; 3) Identify risk factors for longer VMS and longer post-FMP VMS persistence.	<ul style="list-style-type: none"> - Latinas were more likely than NHW women to have impaired functioning on all HRQL subscales except the role-emotional domain. - Frequent VMS duration was 6.5 years for NHW women, but 8.4 years among Latinas. - Post-FMP VMS duration was 4.9 years for Latinas and 5.4 years for NHW.
Bromberger (2001) [82]	Examine the association between psychological distress and natural menopause in a community sample of multiethnic women.	<ul style="list-style-type: none"> - There were no differences between Latinas and NHW after adjusting for age, education, financial strain, study site, menopause status, health status. - OR (95% CI) of psychologic distress in Latinas compared to NHW: 0.64 (0.54, 0.76); rates were similar whether they were educated in the United States or elsewhere or completed the interview in English or Spanish (22.4% vs 26.7%).
Bromberger (2010) [45]	1) Evaluate the relationship between sex hormones and high depressive symptoms; 2) assess whether hormone levels or their change might explain the association of menopausal status with depressive symptoms.	<ul style="list-style-type: none"> - OR (95% CI) of CES-D score 16+ for Latinas compared to NHW: 2.69 (1.32–5.48). - Additional factors related to CES-D score of 16+: lower education (<high school), smoking, any VMS, upsetting life events

Author (Year)	Objective	Key Findings
Gaston (2019) [38]	1) Examine the relationship between sleep characteristics and prevalent metabolic syndrome; and 2) Determine whether these relationships vary by menopause status and race/ethnicity	<ul style="list-style-type: none"> - Latinas had higher prevalence of inconsistent sleep patterns, sleep debt, frequent napping, and insomnia symptoms compared to NHW women. - NHW women and Latinas who reported concurrent short sleep duration and insomnia had higher prevalence of metabolic syndrome. - Notably, associations between poor sleep and abdominal obesity were often strongest for Hispanics/Latinas among postmenopausal women. - Metabolic syndrome prevalence among Latinas during pre and postmenopause was 8.7% and 21%, respectively. - Short sleep duration was reported at 33% premenopausal and 41% postmenopausal among Hispanic/Latina women. - OR (95% CI) of next-day negative affect for previous-day VMS: 1.27 (1.03, 1.58) - OR (95% CI) of VMS within 24-hours of negative affect: 1.72 (1.39, 2.13) - Association of next day VMS or negative affect did not differ for Latinas.
Gibson (2011) [31]	To examine the directional relationship between negative affect and VMS.	<ul style="list-style-type: none"> - Latinas reported urine leakage, vaginal dryness, heart pounding or racing, and forgetfulness more frequently than did NHW women. - Prevalence of any VMS was highest during early to late perimenopause: 70% for Latinas and NHW women
Gold (2000) [30]	Investigate the relation of sociodemographic and lifestyle factors to menopausal symptoms.	<ul style="list-style-type: none"> - Unlike other groups, menopausal status was not associated with frequency of VMS among Latinas
Gold (2006) [23]	To assess whether VMS over the menopause transition differ by race/ethnicity.	<ul style="list-style-type: none"> - Baseline depressive symptoms were related to greater odds of frequent VMS for Latinas (OR [95% CI]: 2.25 [1.13, 4.48]).
Green (2010) [60]	Evaluate if menopausal symptoms differ among Latinas, based upon country of origin and degree of acculturation in SWAN.	<ul style="list-style-type: none"> - Current smoking was associated with greater odds of frequent VMS among Latinas (OR [95% CI]: 3.09 [1.53, 6.25]). - Central American women were more likely to report VMS (72.4%) than Dominicans (45.2%), Cubans (34.1%), South Americans (50.9%), or Puerto Ricans (51.8%). - Puerto Ricans and Dominicans reported more trouble sleeping (66.1 and 64.3%, respectively) than other Latino groups (36%–52%). - Acculturation did not appear to impact menopausal symptoms.
Hale (2014) [37]	Examine the prevalence of self-reported sleep complaints among US-born Hispanic/Latina, Chinese, and Japanese immigrant women compared to their first-generation immigrant ethnic counterparts and consider the role of acculturation in sleep behaviors among these groups	<ul style="list-style-type: none"> - US-born Hispanic/Latina, Chinese, and Japanese immigrants were more likely to report sleep complaints than their first-generation ethnic counterparts.
Im (2009) [35]	The objective of the study is to have Hispanic, midlife women feel empowered to describe menopausal symptoms in their own terms.	<ul style="list-style-type: none"> - Four themes arose: (a) “Cambio de vida (change of life),” (b) “being silent about menopause,” (c) “trying to be optimistic,” and (d) “getting support.” - Many participants reported how supportive their family members were during this transition. They stated that “in their culture, people believe that women in the menopausal transition need to relax more than usual”. - Women reported that having family support relieved stress and gave them an opportunity to manage their menopausal symptoms.

Author (Year)	Objective	Key Findings
Im (2017) [39]	Explored the associations of immigration to sleep-related symptoms among midlife women.	<ul style="list-style-type: none"> - Among Latinas, longer time in the U.S and higher acculturation were related to greater sleep-related symptoms (e.g., difficulty falling asleep). - The most frequently reported symptoms across the racial/ethnic groups were worrying (54.1%), sleep problems (52.6), and hot flashes (44.8%).
Im (2018) [54]	Explore racial/ethnic differences in the Cognitive Symptom Index for Midlife Women and determine other multifaceted influences on symptoms.	<ul style="list-style-type: none"> - Among Latinas, higher acculturation, unemployment, and postmenopausal status were significantly associated with higher total numbers of symptoms. - Latinas were less likely than NHW women to report mental exhaustion (OR = 0.51, 95% CI [0.35, 0.75]) or concentration problems (OR = 0.48, 95% CI [0.32, 0.71]). - NHW (40.3%) and Latinas (38.0%) reported the highest rates of sleep difficulty.
Kravitz (2003) [7]	Compare age-adjusted and ethnic differences in prevalence of sleep difficulty at various stages of the menopausal transition	<ul style="list-style-type: none"> - Age-adjusted prevalence of difficulty sleeping ranged from 30.4% in pre- to 50% in naturally postmenopausal Latinas.
Kravitz (2008) [40]	Evaluate the relationship between difficulty sleeping, progression through the menopausal transition, and racial/ethnic difference.	<ul style="list-style-type: none"> - A larger proportion of Latinas reported trouble falling asleep (14.4%) compared to other racial/ethnic groups. - In adjusted model, Latinas were less likely to report waking up several times and early morning awakening. - Among women without VMS, Latinas were less likely to report early morning awakening (OR = 0.37, P = 0.002)
Lanza di Scalea (2012) [46]	Examined associations among role occupancy, role stress, and role reward and mental health among women undergoing menopausal transition	<ul style="list-style-type: none"> - There were racial/ethnic differences in the proportion of women engaged in each type of role, with Latinas having the highest proportion of mothers (92.9%). - Latinas with high stress across roles had lower odds of low social functioning compared NHW women with high stress (OR [95%CI]: 0.67 [0.45,0.96]).
Reece (2006) [83]	Investigate perimenopausal self-efficacy beliefs in a sample of Caribbean Latinas and non-Latina White women.	<ul style="list-style-type: none"> - For mothers, high reward reduced the effect of high stress on depression and social functioning. - Latinas scored lower than NHW women in the cognition/decision-making behaviors subscale of the Perimenopausal Health Self-Efficacy Survey.
Reed (2013) [84]	Evaluate the association of self-reported vasomotor symptom (VMS) frequency with race/ethnicity among a diverse midlife US population and explore menopause symptom differences by dietary soy isoflavone (genistein + daidzein) consumption.	<ul style="list-style-type: none"> - Total perceived self-efficacy was positively associated with perceived functional health. - Stress and control over health were related to perceived functional health. - Compared with NHW women, Latinas were less likely to report hot flashes (79% vs. 84%) or night sweats ever (67% vs76%).
Schnatz (2006) [44]	The objective of this study was to assess differences in menopausal symptoms between postmenopausal Latinas and non-Latina White women.	<ul style="list-style-type: none"> - No observed difference in the proportion of Latinas vs. NHW women reporting at least moderate hot flash or night sweat bother. - Compared to NHW women, Latinas reported greater mood changes (76% vs. 54%), a decrease in energy (56% vs. 36%), palpitations (54% vs. 26%), breast tenderness (39% vs. 28%), memory loss (34% vs. 22%), and lower rates of vaginal dryness (34% vs. 44%). - Differences in mood changes, energy, palpitations, and memory loss remained after adjusting for sociodemographic factors.

Sexual Health

Author (Year)	Objective	Key Findings
Schnatz (2010) [25]	Identify the prevalence of female sexual dysfunction in a sample comprising of mostly Latinas and women of low socioeconomic status.	<ul style="list-style-type: none"> - Prevalence of depression was 80.9% vs. 52.8% and that of anxiety was 76.6% vs. 45.7% among women with versus without a decrease in sexual desire. - The prevalence of depression was 83.3% vs. 55.9% and that of anxiety was 76.7% vs. 52.9% among women who reported dyspareunia versus those who did not. - Problems sleeping was the only variable associated with a statistically higher likelihood of sexual dysfunction (OR [95%CI]: 5.6 [1.2, 25.3]). - No significant differences were seen when comparing sex dysfunction between Latinas and non-Latina women.
Cardiovascular and Cardiometabolic Health		
Allshouse (2018) [75]	Investigate whether faith was associated with a difference in time to incident metabolic syndrome among midlife women.	<ul style="list-style-type: none"> - Latinas had the highest incidence rate of metabolic syndrome of any racial/ethnic group. - Among women with low levels of faith, Latinas had a faster progression to metabolic syndrome than did non-Latina women. - Latinas were more likely than non-Latina women to report that faith brought them strength and comfort in times of adversity. - The prevalence of pre-hypertension was highest among Latinas (61%) and hypertension was highest among Latinas and African-American women (17%). - Latinas had the lowest HDL-C (48.3 mg/dL, 1). Blood pressure and body mass index were highest for African-American women and Latinas. - Among women treated for hypertension, the proportion at or below blood pressure goal was lowest for African-American (54%) and Latina women (28%). - Hispanics were more likely to report suffocating (12.7%) and joint swelling (16.7%; OR=5.23, 95% Confidence Interval [CI] = 1.92–14.23) - Hispanics were less likely to report night sweats (OR=0.37, 95% CI=0.16–0.87) than NH Whites. - Among Latinas, the total number and severity of cardiovascular symptoms increased during the menopause transition.
Derby (2006) [69]	Identify the proportion of midlife women who are candidates for preventive interventions according to national screening guidelines for hypertension and cholesterol.	<ul style="list-style-type: none"> - Among Latinas, financial strain and higher body mass index were positively associated with the total number of cardiovascular symptoms, while marital status (married/partnered) and employment were negatively associated. - On average, Latinas have higher mean blood pressure (systolic/diastolic = 130/83 mmHg) than NHW (123/77 mmHg), Chinese (125/79 mmHg), and Japanese women (121/79 mmHg). - Latinas were more likely on an ACE/ARB antihypertensive medication [OR=2.03, (1.36–3.02)] or CCB antihypertensive medication [OR=1.81, (1.13–2.89)].
Im (2015) [85]	Explore racial/ethnic differences in midlife women's cardiovascular symptoms and to determine the factors related to these symptoms in each racial/ethnic group.	<ul style="list-style-type: none"> - Four distinct trajectories of estradiol were identified: (a) low estradiol before and after the FMP; (b) medium estradiol before FMP but stable and high estradiol after FMP; (c) high rise of estradiol before FMP followed by early decline at FMP; (d) high rise of estradiol before FMP followed by late decline after FMP. Latinas were more likely to belong to the high rise-late decline estradiol group.
Jackson (2017) [71]	Describe antihypertensive medication use over time among midlife women.	
ElKhouady (2016) [19]	Assess associations between trajectories of estradiol and FSH over the menopause transition and subclinical measures of atherosclerosis after menopause.	

Author (Year)	Objective	Key Findings
Sutton-Tyrrell (2005) [86]	Evaluate relationship among sex hormone-binding globulin (SHBG) and cardiovascular risk factors in premenopausal and perimenopausal women.	<ul style="list-style-type: none"> - Three distinct trajectories of FSH were identified: (a) low rise before/after FMP; (b) medium rise before/after FMP; (c) high rise before/after FMP. Latinas were more likely to belong to the low rise FSH group than to the other trajectory groups. - Three distinct trajectories of FSH were identified: (a) low rise before/after FMP; (b) medium rise before/after FMP; (c) high rise before/after FMP. - High rise-late decline estradiol group and low FSH group had a more adverse CVD risk profile. - Women with the high estradiol-late decline trajectory had a lower odds of carotid plaque. - Spearman correlation of risk factors among Hispanics between BMI and testosterone was 0.15 ($p<0.05$) and SHBG, FAI is 0.27 and 0.30, respectively ($p<0.001$). - Sex hormone binding globulin and free androgen index are correlated with hemostatic factors, particularly among Latinas. - Latinas were more likely to have a consistently high probability of VMS.
Thurston (2015) [21]	Evaluated temporal patterns of VMS assessed over 13 years in relation to carotid intima-media thickness among midlife women.	<ul style="list-style-type: none"> - Women with consistently high VMS and early-onset VMS also had a more adverse CVD risk factor profile. - Women with consistently high VMS or early-onset VMS had higher carotid intima-media thickness than women with consistently low VMS.
Torrens (2004) [87]	To assess differences in insulin sensitivity and B-cell function between nondiabetic premenopausal or early perimenopausal among five racial/ethnic groups	<ul style="list-style-type: none"> - There were no differences in homeostatic model assessment between Latinas and NHW women. - On average, Latinas had lower income, were less educated, had higher perceived stress, less physical activity, and a worse CVD risk factor profile than NHW women. - Fasting insulin levels were highest in African Americans and Latinas. - Hispanic women (HR = 1.61; 95% CI: 1.07, 2.43) and black women (HR = 1.25; 95% CI: 1.00, 1.57) had higher estimated risks of incident metabolic syndrome.
Ward (2019) [26]	To characterize and identify factors longitudinally related to constellations of cardiometabolic risk components in a multi-ethnic sample of midlife women.	<ul style="list-style-type: none"> - Hispanic women had the highest proportion of women with five components at baseline (6%). - Constellation pattern of obesity/hypertension/low high-density lipoprotein had the highest proportion of Hispanic women (11%).