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Salivary cortisol, perceived stress and coping strategies: A comparative study of working and nonworking women

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Abstract

Aims: This study investigated stress levels and coping strategies among working and nonworking women in the United Arab Emirates.

Background: Stress levels in working and nonworking women have previously been studied, but few studies used cortisol to measure stress or examined how coping strategies affect stress levels.

Methods: We employed a cross-sectional design with a convenience sample of women aged 20–65 years. Information on women's sociodemographic characteristics, perceived stress (using the Perceived Stress Scale) and coping strategies (using

the Brief-COPE) was collected. Participants' morning (07:00–08:00) and evening (19:00–20:00) cortisol levels were measured using unstimulated saliva samples.

Results: In total, 417 working and 403 nonworking women participated in this study. More nonworking women reported high stress levels than working women (14.1% vs. 4.1%, $p = .001$). Working women reported more use of informational support and venting to cope with stress compared with nonworking women (94.0% vs. 88.1%, $p = .001$). More nonworking women had impaired morning (<0.094 mg/dl) and evening (>0.359 mg/dl) cortisol compared with working women (58.1% vs. 28.5% and 41.7% vs. 18.0%, respectively). Compared with working women, nonworking women had 3.25 (95%CI: 2.38, 4.47) and 3.78 (95%CI: 2.65, 5.43) times the odds of impaired morning and evening cortisol, respectively.

Conclusion: Nonworking women exhibited higher levels of stress than working women. There is an urgent need to support nonworking women to manage stress through appropriate awareness campaigns and public health policies.

Implications for Management: Policymakers and community leaders should consider the mental health of nonworking women as a priority in planning public health policies and programmes. Nurse managers must have a voice in reforming public health policy to support early assessment and management of stress among nonworking women.

KEYWORDS
evening cortisol, mental health screening, morning cortisol, nonworking women-coping strategies, perceived stress, working women

1 | BACKGROUND

Stress encompasses physical, emotional, cognitive and behavioural responses to events that are appraised as threatening or challenging (Ornek & Esin, 2020). As a normal response to stressful stimuli, the hormonal response system (hypothalamic–pituitary–adrenal [HPA] axis) is activated to release a stress hormone known as cortisol, which plays a critical role in the body's physiological adaptation to stress (Young et al., 2021). Over time, prolonged exposure to stress can lead to extra activation of the HPA axis, which may in turn lead to dysregulated diurnal rhythm and cause blunted cortisol peaks and flattened slopes (Shrout et al., 2020). These dysregulated patterns lead to adverse health outcomes and affect multiple regulatory systems in the human body (e.g., immune and metabolic systems and autonomic function), which can increase morbidity and mortality risks (Shrout et al., 2020).

Globally, many women are under a considerable amount of stress, which affects their psychological and physical well-being (Young et al., 2021). Engaging in multiple concurrent roles (e.g., juggling heavy workloads, domestic work and childbearing) and balancing family priorities, along with personal health and financial worries, can mean women experience high levels of stress (Young et al., 2021). Women's status has also shifted from domestic affairs, such as cleaning, rearing children and cooking, to fulfilling higher level professional activities (Young et al., 2021). Increased education levels, growing social awareness, industrialization, financial pressures and changes in community values have motivated women to seek identity development and achieve financial security through working outside their homes while juggling multiple life roles (e.g., employment/housework/motherhood/caregiving) (Rajora, 2019; Sumra & Schillaci, 2015; Young et al., 2021).

Nonworking women face various stressors in daily life. Engagement in multiple roles such as routine household tasks, parenting and balancing other family and social responsibilities can be sources of stress for nonworking women. The literature suggests that nonworking women have an equally vigorous routine to working women but less available informational support and social networks, which decreases their ability to cope with stress (Rajgariah et al., 2021). A comparative study showed that working women were better able to cope with stress through adopting healthy practices and could learn how to relax and enjoy life better than nonworking women (Sultanpur, 2019). A recent study that included housewives from Turkey ($N = 500$) found that participants experienced chronic levels of stress, burnout and psychological distress because of loneliness, managing familial conflicts, lacking a plan for the day, limited social support and human resources and an overwhelming amount of

repeated household chores (Durak et al., 2022). Those authors emphasized the need for focused interventions to assist nonworking women to manage daily life stressors.

Although stress in women is a common subject in the literature, few comparative studies have focused on stress in working and nonworking women, their coping strategies and the impact of stress on their cortisol levels. In the United Arab Emirates (UAE), the majority of working women are expatriates and come from diverse backgrounds. However, with the modernization of the country, more Emirati women are participating in the workforce and taking a substantial share of employment in both the private and public sectors. The UAE government has directed specific attention to the voices of women and their overall well-being and happiness (The UAE Government, 2021). In 2016, the Ministry of Happiness/UAE was launched, which targeted the happiness of all citizens, including women, who represent a critical sector of this young society. The UAE government aimed to empower women, support their education and employment and encourage them to take leadership positions (The UAE Government, 2021).

This study investigated the mental health of working and nonworking women in the UAE, which is a timely subject to explore. Our results are expected to assist managers and community leaders in developing evidence-based interventions and public health policies targeting the mental health, happiness and productivity of both working and nonworking women, which are core values of community health. Our objectives were as follows.

1. Determine and compare morning and evening cortisol levels between working and nonworking women.
2. Identify and compare levels of perceived stress (using the Perceived Stress Scale, PSS) and stress coping strategies (using the Brief-COPE) between working and nonworking women.
3. Identify women at risk for impaired levels of morning and evening salivary cortisol levels.

2 | METHODS

2.1 | Study design

This quantitative study used a cross-sectional design. Data were collected using self-reported questionnaires covering sociodemographic variables, perceived stress and stress coping strategies. Participants' morning and evening cortisol levels were obtained through unstimulated saliva samples. This study was conducted over 2 years from January 2018 to January 2020.

2.2 | Participants and recruitment procedure

Recent epidemiological studies that used salivary cortisol values as the main outcome and focused on working women indicated that 50% of women in the UAE had high stress levels (Bani-Issa et al., 2020). To achieve results at a significance level of 0.05, 95% confidence interval (CI) and a 5% margin of error, 384 participants were required in each group (working and nonworking women) ($N = 768$). To compensate for non-responses and unsuitable saliva samples, we aimed to recruit an additional 200 participants, giving a final sample of 968 working and nonworking women.

We used convenience sampling to recruit adult women (aged ≥20 years) of all nationalities (expatriate and Emirati) who met the study criteria and agreed to participate. The inclusion criteria were women with a sufficient understanding of the English or Arabic languages, aged 18–65 years and committed to giving two saliva samples. To be eligible, working women had to work outside their homes on a full-time basis. Nonworking women must not work outside their homes; they could be unemployed housewives (married), single, widowed or divorced. In addition, nonworking women must not have been previously employed and not expecting workforce participation in the near future as this may partially impact their stress levels. Women who had experienced a recent traumatic event (e.g., death or sickness of loved ones, serious accidents, major injury, job loss and divorce) within 3 months before study recruitment or who reported having psychiatric disorders or taking psychiatric medication were also excluded from this study as these factors may influence their stress levels.

We used a convenience, non-random sampling approach to recruit working and nonworking women based on accessibility of sites. Convenience sampling is pragmatic and practical when a complete list of participants or sites cannot be attained (Sedgwick, 2013). In our study, it was not possible to identify all governmental and nongovernmental entities in each emirate or reach out to all nonworking women. Furthermore, access was limited for privacy and security reasons. However, we recruited working women from both governmental and private sectors in all seven emirates (Sharjah/northern Emirates, Abu Dhabi/Al Ain, Dubai, Al Fujairah, Umm Al Quwain, Ras Al Khaimah and Ajman) to obtain a real representation of working women in the UAE.

Following ethical approval, we identified public and private sites with employed women through a preliminary Internet search and contacted the site gatekeepers via email, phone calls and direct field visits to request access. Participant recruitment was undertaken by posting flyers online (e.g., using social media) and onsite (in traditional paper format) with information about the study, an invitation to participate and contact information for the research team.

Using convenience sampling based on accessibility and geographical proximity of the locations, we collected data from women working in the governmental and private sectors. For the governmental sector, we collected data from women working in local offices/branches that operated under ministries that provided public services with no access restrictions, including Human Resources and Emiratization/Labor, Education, Community Development and Health and Prevention. We also collected data from women working in local municipality offices, universities (public), schools (public) and health care institutions (governmental hospitals and clinics). Working women from the private sector were recruited from private companies/corporations, salons,

women's social clubs, fitness centres, shopping centres, universities, schools and hospitals/clinics.

We accessed nonworking women via convenience sampling from salons, fitness centres, women's social clubs, shopping centres and social media. The research team also visited several community health care centres and outpatient clinics to invite women waiting for doctors' appointments to participate in this study. Furthermore, we used a snowball sampling technique whereby we asked participants if they knew other nonworking women in their networks who may be interested in participating. We asked participating working women if they could identify any nonworking women who may wish to join this study. We also asked participants to assist in inviting women through their social media networks (e.g., Facebook and WhatsApp groups). We aimed to reach out to nonworking housewives and any other adult women who did not work outside the home.

To facilitate and streamline data collection, we assigned two research assistants to each emirate to distribute advertisements (online and paper) inviting women to participate, meet participants, collect data and collect saliva samples. The research assistants received training before data collection. In addition, regular debriefing meetings were held with the whole research team throughout data collection to ensure the process was smooth and allow discussion of any obstacles or issues that arose, particularly with the collection and transportation of saliva samples. Furthermore, arrangements were made with gatekeepers at several sites to encourage employed women to participate and support the research team in data collection, especially when saliva samples needed storing (freezing) until further collection. Data were gathered from July 2018 to January 2020 (see data collection flow chart).

2.3 | Survey information

Before data collection, a survey questionnaire was prepared in both the English and Arabic languages so participants could choose their preferred language. The survey covered general demographic information, the PSS and the Brief-COPE. Both tools had been previously validated in Arabic and English versions. A small-scale study (pilot) was conducted with a sub-sample (25 women) to confirm the feasibility of the full-scale study, especially the process and procedure of collecting, storing and transporting participants' saliva samples (Ruel et al., 2015).

Data were collected on participants' demographic and lifestyle variables, including age, years living in the UAE, emirate/city, nationality, level of education, marital status, workplace (for working women), number of children, family income and happiness levels. Lifestyle factors included smoking and exercise status, body weight (cm) and height (kg) (to calculate body mass index; BMI) and level of overall happiness.

2.3.1 | Perceived Stress Scale

Participants' subjective stress was assessed using the 14-item PSS, which is used to evaluate global stress levels in the general adult population (e.g., 'In the last month, how often have you been upset because of something that happened unexpectedly?') (Cohen & Williamson, 1988). Responses are on a 4-point Likert-type scale from 0 = *never* to 4 = *very often*. We divided participants into three groups by their total PSS score: Scores 0–13 were classified as low stress, scores 14–26 as moderate stress and scores ≥27 as high stress (Cohen & Williamson, 1988). The English version of the PSS demonstrated sufficient psychometric properties with good internal reliability (Cronbach's $\alpha > .70$) (Cohen & Deverts, 2012). The Arabic version of the PSS showed adequate reliability and validity (test–retest reliability: intra-class correlation coefficient of .90) in the Jordanian general adult population (Almadi et al., 2012), high internal consistency reliability (Cronbach's $\alpha = .90$) and content validity (content validity index .94) among college students in Jordan (Algaralleh et al., 2019).

2.3.2 | Brief-COPE

The Brief-COPE was developed to determine stress coping mechanisms. The scale includes three main coping strategies: problem-focused, emotion-focused and avoidant coping (Carver, 1997; Carver et al., 1989). The instrument consists of 28 items that measure 14 factors (two items each) with responses on a Likert scale from 0 = *I have not been doing this at all* to 3 = *I have been doing this a lot*. The tool assesses a range of coping responses among adults, including health coping using problem-focused (active coping, using information support, positive reframing and planning) and emotion-focused (venting, humour, acceptance, religion and self-blame) strategies. It also includes unhealthy coping or avoidant coping (self-distraction, denial, substance abuse and behavioural disengagement).

The English version of the Brief-COPE has reasonably good reliability (total Cronbach's $\alpha = .50–.90$) (Rahman et al., 2021). The Arabic version of the Brief-COPE was validated in an Arabic adult population and showed sufficient psychometric properties; testing in a Tunisian adult population showed sufficient reliability indices (Cronbach's α between .63 and .94) and good divergent and construct validity (Nawel & Elisabeth, 2015).

2.3.3 | Morning and evening salivary cortisol

To collect information on cortisol, two unstimulated saliva samples (morning and evening) using the passive drooling method were collected from each participant. The inclusion of salivary cortisol as an outcome measure provided a useful, non-invasive biological marker to investigate stress levels in women. Salivary cortisol is fast and reliable technique to assess HPA function and patterns of cortisol secretion in study participants (Bani-Issa et al., 2020; Faassen et al., 2017).

Participants were given clear oral and written instructions (including a drawing) by trained research assistants on how to collect reliable and adequate saliva samples based on the manufacturers' instructions for sample collection, transportation and storage (Salimetrics LLC & SalivaBio LLC, 2011). These instructions included avoiding eating,

drinking, smoking, chewing gum and brushing teeth for 10–15 min before providing a sample, rinsing the mouth with water at least 10 min before giving a sample and, if possible, waiting another 10 min after rinsing to avoid sample dilution.

Cortisol concentration is influenced by circadian rhythm; therefore, we aimed to collect saliva samples at almost at the same time for each participant (Faassen et al., 2017). As cortisol peaks after waking in the morning and then declines gradually until evening or bedtime, we collected two consecutive saliva samples (morning and evening) to obtain an accurate understanding of cortisol secretion patterns in women (Faassen et al., 2017). Participants collected their saliva samples in 5 ml sterile plastic containers. Morning (07:00–08:00) salivary samples were collected from participants directly by the research team and transferred in portable freezers to the laboratory for analysis. For evening samples, research assistants instructed participants to collect their saliva samples before bedtime (usually 19:00–20:00) of that same day, following the same procedure used for the morning salivary sample, and place them in their home freezers (usually below −20°C) for collection by the research team the next day.

Samples were processed using the expanded range high sensitivity salivary cortisol enzyme immunoassay kit (Kit 1–3102) (Salimetrics LLC & SalivaBio LLC, 2011), in accordance with the manufacturer's instructions. Absorbance values were used to calculate the concentrations using a standard curve by four-parameter logistic fit (4PL) model (Cox et al., 2004).

2.4 | Data analysis

Sociodemographic characteristics and study outcomes, including perceived stress levels (low/moderate/high based on the PSS) and coping mechanisms (based on the Brief-COPE), were first described using frequencies and percentages and then stratified by working status (working and nonworking women) using chi-squared tests for independence. Cortisol levels were described as follows. Morning salivary levels were classified as in the normal range (0.094–1.551 μg/dl) or below normal (impaired) (<0.094 μg/dl). Evening/bedtime salivary levels were classified as in the normal range (not determined to 0.359 μg/dl) and above normal range (impaired) (>0.359 μg/dl) (Aardal & Holm, 1995). BMI categories were defined according to the World Health Organization: 18.5–24.9 kg/m^2 (healthy weight range), 25.0–29.9 kg/m^2 (overweight range) and ≥30.0 kg/m^2 (obese).

Further exploration was performed using simple bivariate and multivariable binomial logistic regression. All analyses were performed using R version 4.1.1 and RStudio version 1.4.1717 for Mac. *P* values less than .05 were considered statistically significant (two-sided).

2.5 | Ethical considerations

This study was approved by the Research Ethics Committee at Ministry of Health in the UAE (MOHAP/DXB/SU BC/No 6 I 2O1 7) and the Research Ethics Committee at the principal investigator's institution (REC/15/11/P007). This study was conducted in accordance with the Declaration of Helsinki. Informed written consent was obtained from all participants before study enrolment. Participants were notified of the results of their cortisol levels through their private email addresses provided to the research team.

3 | RESULTS

3.1 | Sociodemographic variables

Table 1 depicts the overall sample characteristics of the 820 participating women (84.7% response rate). Not all saliva samples were appropriate for analysis as some were diluted, insufficient or mixed with materials such as coffee and toothpaste; these samples ($n = 100$) were excluded from processing and analysis. In addition, some participants ($n = 48$) did not provide evening saliva samples; therefore, their morning samples were not processed.

More than 70% of participants were aged 21–40 years and were expatriates, although 67.2% had been in the UAE for more than 10 years. Most participants were from Sharjah (43.3%), 67.4% had university diplomas, more than half were married and 46.7% had children. Investigation of lifestyle factors showed that 8.3% of participants were smokers, 19.8% exercised regularly and 58.5% were overweight/obese (BMI ≥ 25 kg/m^2). Most participants reported that they were at least somewhat happy with life.

Exploration of these characteristics by working (50.9%) and nonworking (49.1%) women showed that there were significant differences in several factors. Compared with nonworking women, there were significantly higher proportions of working women who were aged 21–30 years, had been in the UAE for less than 10 years, had an education level of a university diploma or above and were from Sharjah. However, compared with working women, significantly higher proportions of nonworking women had high family income and were classified as overweight/obese. Working women in our sample were recruited from different places such as higher education institutions (university colleges), schools (primary/secondary/tertiary education), governmental and private sectors (corporations/offices) and health care settings (clinics and hospitals). A total of 171 (41%) working women were nurses who were employed in workplaces that need nurses: school nurses ($n = 10$, 2.3%), registered nurses in university-affiliated health facilities (sports complexes, students' dormitories and clinical training centres) ($n = 50$, 12%) and clinics and hospitals ($n = 111$, 26.6%).

3.2 | Morning and evening cortisol

More than half of the participants ($n = 467$, 57.0%) had a morning cortisol level above 0.094 mg/dl (normal range), and 70.4% had an evening cortisol level less than 0.359 mg/dl (normal range). Significantly more nonworking women had impaired morning cortisol level (<0.094 mg/dl) than working women (58.1% vs. 28.5%, $p < .001$). In

TABLE 1 Characteristics of working and nonworking women ($N = 820$)

	Nonworking women ($n = 403$)		Working women ($n = 417$)		Total ($N = 820$)		
	n	%	*n*	%	*n*	%	*p* value[a]
Age, years							<.001
≤20	73	18.1	6	1.4	79	9.6	
21–30	190	47.1	188	45.1	378	46.1	
31–40	65	16.1	160	38.4	225	27.4	
>40	75	18.6	63	15.1	138	16.8	
Years in the UAE							<.001
0–10	87	21.6	182	43.6	269	32.8	
11–20	136	33.7	82	19.7	218	26.6	
21–30	134	33.3	101	24.2	235	28.7	
>30	46	11.4	52	12.5	98	11.9	
Emirate							.005
Abu Dhabi	30	7.4	13	3.1	43	5.2	
Dubai	61	15.1	63	15.1	124	15.1	
Sharjah	158	39.2	197	47.2	355	43.3	
Al Ain	12	3.0	9	2.2	21	2.6	
Ras Al Khaimah	19	4.7	34	8.2	53	6.5	
Ajman	109	27.0	93	22.3	202	24.6	
Um Al Quwain/Fujairah	14	3.5	8	1.9	22	2.7	
Nationality							.523
Local	90	22.3	101	24.2	191	23.3	
Expatriate	313	77.7	316	75.8	629	76.7	
Education							<.001
No school completed	24	6.0	10	2.4	34	4.1	
High school/secondary	157	39.0	76	18.2	233	28.4	
Diploma/bachelor's	195	48.4	226	54.2	421	51.3	
Master's/doctorate	27	6.7	105	25.2	132	16.1	
Marital status							.208
Single	211	52.4	200	48.0	411	50.1	
Married	192	47.6	217	52.0	409	49.9	
Workplace							<.001
Not working	403	100.0	0	0.0	403	49.1	
University/college	0	0.0	165	39.6	165	20.1	
Schools (primary, secondary, tertiary)	0	0.0	47	11.3	47	5.7	
Governmental corporate/private sector	0	0.0	94	22.5	94	11.5	
Health care agency							
Hospitals/clinics (nurses)	0	0.0	111	26.6	111	13.5	
Children							.383
No	221	54.8	216	51.8	437	53.3	
Yes	182	45.2	201	48.2	383	46.7	
Family income							.003
Above average	61	15.1	55	13.2	116	14.1	
Average	324	80.4	317	76.0	641	78.2	
Below average	18	4.5	45	10.8	63	7.7	
Happiness							.254
Not happy at all	12	3.0	5	1.2	17	2.1	

(Continues)

TABLE 1 (Continued)

	Nonworking women ($n = 403$)		Working women ($n = 417$)		Total ($N = 820$)		
	n	%	*n*	%	*n*	%	*p* value[a]
Somewhat happy	135	33.5	143	34.3	278	33.9	
Happy	187	46.4	206	49.4	393	47.9	
Very happy	69	17.1	63	15.1	132	16.1	
Smoking							.727
No	370	91.8	381	91.4	751	91.6	
Yes	32	7.9	36	8.6	68	8.3	
Exercise							.069
No	313	77.7	345	82.7	658	80.2	
Yes	90	22.3	72	17.3	162	19.8	
Body mass index (kg/m^2)							.010
Normal (<25)	149	37.0	191	45.8	340	41.5	
Overweight/obese (≥25)	254	63.0	226	54.2	480	58.5	

[a]Chi-square test for independence.

addition, significantly more nonworking women had impaired evening cortisol levels (>0.359 mg/dl) compared with working women (41.7% vs. 18.0%, $p = .001$).

3.3 | PSS and Brief-COPE scores

Table 2 displays the PSS and Brief-COPE results. Most participants (84.9%) reported a moderate level of stress (83.4% of nonworking women and 86.1% of working women). Significantly more nonworking women reported high stress levels (PSS score >27) compared with working women (14.1% vs. 4.1%, $p < .001$).

Analysis of Brief-COPE scores showed that participants tended to use problem-focused coping: planning (96.3%), positive reframing (96.0%) and active coping (95.2%). In addition, participants reported using emotion-focused coping, mainly acceptance (97.1%) and religion (95.0%). Substance abuse (7.4%) was the least reported coping strategy. Working women used informational support (84.0% vs. 88.1%, $p = .002$) and venting (93.3% vs. 86.1%, $p < .001$) as coping strategies significantly more than nonworking women.

3.4 | Determinants of morning and evening cortisol levels

Table 3 presents bivariate and multivariable logistic regression results for the factors significantly associated with morning and evening cortisol levels. No outliers were detected in the final models and the Hosmer–Lemeshow goodness-of-fit test showed the final models were stable. Bivariate correlations showed that age, years in the UAE, level of education, working status, exercising and coping through substance abuse were significantly associated with morning cortisol levels ($p < .05$). After adjusting for all potential confounders in the multiple logistic regression analysis, we observed that nonworking women were 3.25 (95% CI: 2.38, 4.47) times more likely to have impaired morning cortisol (<0.094 mg/dl) compared with working women. Participants who exercised regularly were less likely (39%) to have impaired morning cortisol levels than those who did not exercise.

Factors that were significantly associated with evening cortisol levels in the bivariate analysis were years living in the UAE, level of education, working status, smoking status, exercise, BMI and perceived stress. After adjusting for potential confounders in the multiple regression model, nonworking women were 3.78 (95%CI: 2.65, 5.43) times more likely to have impaired evening cortisol level (>0.359 mg/dl) compared with working women. Women who reported smoking were 2.05 (95% CI: 1.09, 4.14) times more likely to have impaired evening cortisol levels. In addition, those who used denial for coping were at 1.46 (95% CI: 1.03, 2.06) times more likely to have impaired evening cortisol levels. Finally, increased age was significantly associated with a lower probability of having impaired evening cortisol level ($p \geq .05$).

4 | DISCUSSION

This study provided empirical data for stress levels in working and nonworking women and their coping strategies using subjective and objective measures of stress. Our study included a large number of working and nonworking women and was conducted in the multicultural environment of the UAE. The findings from this study provide policymakers and community leaders with important information to address chronic stress among nonworking women in the UAE.

Results for perceived stress (subjective reports) and morning and evening cortisol levels (objective reports) confirmed that nonworking women had higher levels of stress than their working counterparts. Our results were somewhat comparable with previous research in different parts of the world that supported the link between unemployment and reduced psychological health in women (Perreault

TABLE 2 Cortisol levels, Perceived Stress Scale scores and Brief COPE scores for working and nonworking women ($N = 820$)

	Nonworking women (n = 403)		Working women (n = 417)		Total (N = 820)		
	n	%	*n*	%	*n*	%	*p* value[a]
Cortisol level							
Morning[b]							<.001
<0.094 mg/dl (impaired)	234	58.1	119	28.5	353	43.0	
>0.094 mg/dl (normal)	169	41.9	298	71.5	467	57.0	
Evening[b]							<.001
>0.359 mg/dl (impaired)	168	41.7	75	18.0	243	29.6	
<0.359 mg/dl (normal)	235	58.3	342	82.0	577	70.4	
Perceived Stress Scale score							<.001
Low (0–13)	10	2.5	41	9.8	51	6.2	
Moderate (14–26)	336	83.4	359	86.1	695	84.9	
High (≥27)	57	14.1	17	4.1	74	9.0	
Brief-COPE score							
Problem-focused coping (score 2–8)	5.2	1.4	5.5	1.3	5.4	1.3	.006[c]
Active coping	380	94.3	400	95.9	780	95.2	.278
Use of informational support	355	88.1	392	94.0	747	91.2	.002
Positive reframing	382	94.8	404	96.9	786	96.0	.132
Planning	384	95.3	405	97.1	789	96.3	.167
Emotion-focused coping (score 2–8)	4.9	1.1	5.1	1.0	5.0	1.1	.026[c]
Emotional support	361	89.6	387	92.8	748	91.3	.102
Venting	347	86.1	389	93.3	736	89.9	<.001
Humour	273	67.7	307	73.6	580	70.8	.064
Acceptance	392	97.3	403	96.6	795	97.1	.601
Religion	388	96.3	390	93.5	778	95.0	.073
Self-blame	337	83.6	337	80.8	674	82.3	.293
Avoidant coping (score 2–8)	3.7	1.0	3.6	0.8	3.6	0.9	.496[c]
Self-distraction	365	90.6	391	93.8	756	92.3	.088
Denial	267	66.3	267	64.0	534	65.2	.504
Substance abuse	33	8.2	28	6.7	61	7.4	.421
Behavioural disengagement	305	75.7	302	72.4	607	74.1	.287

[a]Chi-square test for independence.
[b]Categories defined according to Aardal and Holm (1995).
[c]Independent *t* test (equal variance not assumed).

et al., 2017). A comparative cross-sectional study from India showed that nonworking women ($n = 78$) had significantly higher levels of stress (PSS scores) compared with working women ($n = 156$) (Panwar & Srivastava, 2019). Similar results were observed in studies from different countries, including Jordan (Smadi, 2019) and India (Fernandes et al., 2020; Rajora, 2019), in which working women reported lower levels of stress than nonworking women.

Conversely, the results of our study were inconsistent with large body of literature that showed working women exhibited greater levels of stress than nonworking women and where the workplace was viewed as a debilitating environment for women's mental health (Kumar & Kumar, 2018). Two studies from Pakistan found that working women reported higher level of stress than nonworking women (Abbas et al., 2019). A large-scale longitudinal study involving adult women from Korea ($N = 4,663$; data collected 2008–2012) showed that working women exhibited greater stress levels than non-working women, which was attributed to family–work conflict (Ju et al., 2018). Those authors emphasized that organisations and managers must support the mental health of working women through proper work scheduling systems and adopting a flexible working hours (Ju et al., 2018).

Our findings supported the hypothesis that for working women, juggling multiple life roles, such as being an employee in addition to a family caretaker/housewife/mother may act as a psychological buffer

TABLE 3 Factors associated with cortisol level in the morning (reference group <0.094 mg/dl: impaired) and evening (reference group >0.359 mg/dl: impaired) using single and multivariable binomial logistic regression ($N = 820$)

	Cortisol AM (ref. group <0.094 mg/dl: impaired)						Cortisol PM (ref. group >0.359 mg/dl: impaired)					
	OR	(95% CI)	*p* value	*Adj.* OR	(95% CI)	*p* value	OR	(95% CI)	*p* value	*Adj.* OR	(95% CI)	*p* value
Age, years												
≤20	1.00	-	-				1.00	-	-	1.00	-	-
21–30	**2.68**	**(1.63, 4.46)**	**<.001**				0.91	(0.52, 1.54)	.747	**0.35**	**(0.18, 0.66)**	**.001**
31–40	**3.01**	**(1.77, 5.16)**	**<.001**				1.12	(0.63, 1.97)	.674	**0.34**	**(0.16, 0.67)**	**.002**
>40	1.54	(0.87, 2.72)	.138				0.90	(0.49, 1.65)	.752	**0.41**	**(0.20, 0.80)**	**.010**
Years in the UAE												
0–10	1.00	-	-				1.00	-	-			
11–20	**0.66**	**(0.46, 0.96)**	**.030**				**0.60**	**(0.41, 0.89)**	**.011**			
21–30	0.74	(0.52, 1.06)	.102				0.83	(0.56, 1.22)	.351			
>30	0.84	(0.53, 1.36)	.496				0.95	(0.56, 1.63)	.864			
Emirate												
Abu Dhabi	1.00	-	-				1.00	-	-			
Dubai	1.35	(0.67, 2.73)	.388				0.91	(0.41, 1.93)	.810			
Sharjah	1.59	(0.84, 3.01)	.152				0.96	(0.45, 1.89)	.909			
Al Ain	0.95	(0.33, 2.71)	.927				0.77	(0.25, 2.46)	.655			
Ras Al Khaimah	2.21	(0.97, 5.16)	.060				1.19	(0.47, 2.98)	.707			
Ajman	1.04	(0.54, 2.03)	.889				0.77	(0.36, 1.58)	.503			
Um Al Quwain/Fujairah	2.24	(0.78, 6.90)	.141				1.31	(0.41, 4.70)	.653			
Nationality												
Local	1.00	-	-				1.00	-	-			
Expatriate	1.14	(0.82, 1.58)	.426				1.08	(0.75, 1.53)	.664			
Education												
No school completed	1.00	-	-				1.00	-	-			
High school/secondary	1.27	(0.62, 2.67)	.507				0.98	(0.45, 2.04)	.965			
Diploma/bachelor's	1.74	(0.86, 3.58)	.120				1.66	(0.78, 3.40)	.166			
Master's/doctorate	2.81	**(1.30, 6.15)**	**.008**				**2.52**	**(1.10, 5.67)**	**.025**			
Marital status												
Single	1.00	-	-				1.00	-	-			
Married	0.90	(0.68, 1.19)	.487				1.02	(0.76, 1.38)	.854			
Working												
Working	1.00	-	-	1.00	-		1.00	-	-	1.00	-	-
Nonworking	3.46	**(2.59, 4.64)**	**<.001**	**3.25**	**(2.38, 4.47)**	**<.001**	**3.25**	**(2.37, 4.50)**	**<.001**	**3.78**	**(2.65, 5.43)**	**<.001**
Workplace												
Higher education (university/college)	1.00	-	-				1.00	-	-			
School (primary/ secondary/tertiary)	0.84	(0.42, 1.74)	.649				0.69	(0.31, 1.62)	.375			
Governmental/private sectors (corporates)	0.85	(0.49, 1.48)	.562				0.57	(0.30, 1.08)	.087			
Health care agency (hospitals/clinics)	1.23	(0.71, 2.16)	.445				1.11	(0.57, 2.21)	.760			
Husband works												
No	1.00	-	-				1.00	-	-			
Yes	1.01	(0.75, 1.35)	.933				1.20	(0.87, 1.65)	.256			

(Continues)

TABLE 3 (Continued)

	Cortisol AM (ref. group <0.094 mg/dl: impaired)						Cortisol PM (ref. group >0.359 mg/dl: impaired)					
	OR	(95% CI)	*p* value	*Adj.* OR	(95% CI)	*p* value	OR	(95% CI)	*p* value	*Adj.* OR	(95% CI)	*p* value
Children												
No	1.00	-	-				1.00	-	-			
Yes	0.97	(0.74, 1.29)	.873				0.92	(0.68, 1.24)	.592			
Family income												
Above average	1.00	-	-	1.00	-	-	1.00	-	-			
Average	0.66	(0.43, 1.00)	.052	**0.62**	**(0.39, 0.94)**	**.007**	0.76	(0.47, 1.18)	.240			
Below average	0.95	(0.50, 1.81)	.876	0.74	(0.34, 1.34)	.394	0.77	(0.39, 1.54)	.457			
Happiness												
Not happy at all	1.00	-	-				1.00	-	-			
Somewhat happy	2.02	(0.75, 5.72)	.165				1.37	(0.45, 3.74)	.545			
Happy	1.79	(0.67, 5.02)	.244				1.38	(0.46, 3.73)	.530			
Very happy	2.06	(0.74, 6.00)	.167				0.98	(0.32, 2.76)	.980			
Smoking												
No	1.00	-	-				1.00	-	-	-	-	-
Yes	0.78	(0.47, 1.29)	.341				1.86	(1.02, 3.62)	.051	**2.05**	**(1.09, 4.14)**	**.033**
Exercise												
No	1.00	-	-	1.00	-		1.00	-	-			
Yes	**0.58**	**(0.41, 0.82)**	**.002**	**0.61**	**(0.42, 0.87)**	**.007**	**0.65**	**(0.45, 0.94)**	**.021**			
Body mass index												
Normal	1.00	-	-				1.00	-	-			
Obese/overweight	1.03	(0.78, 1.36)	.815				**0.73**	**(0.53, 0.99)**	**.048**			
Brief-COPE (Reference = No)												
Problem-focused coping												
Active coping	0.70	(0.35, 1.34)	.294				1.81	(0.93, 3.44)	.071			
Use of informational support	1.40	(0.865, 2.27)	.169				0.88	(0.50, 1.49)	.661			
Positive reframing	1.04	(0.51, 2.08)	.898				1.14	(0.52, 2.32)	.723			
Planning	1.25	(0.60, 2.57)	.541				1.32	(0.60, 2.75)	.468			
Emotion-focused coping												
Emotional support	1.27	(0.78, 2.07)	.319				1.20	(0.71, 2.00)	.472			
Venting	1.36	(0.86, 2.15)	.176				1.36	(0.84, 2.17)	.199			
Humour	1.17	(0.86, 1.58)	.300				1.17	(0.84, 1.62)	.323			
Acceptance	1.22	(0.54, 2.74)	.612				0.74	(0.26, 1.78)	.532			
Religion	0.72	(0.36, 1.36)	.326				0.63	(0.28, 1.29)	.235			
Self-blame	0.93	(0.65, 1.34)	.733				0.80	(0.53, 1.19)	.293			
Avoidant coping												
Self-distraction	1.35	(0.81, 2.26)	.244				1.00	(0.56, 1.72)	.992			
Denial	0.81	(0.61, 1.09)	.177				1.26	(0.92, 1.72)	.138	**1.46**	**(1.03, 2.06)**	**.031**
Substance abuse	**0.53**	**(0.31, 0.90)**	**.020**	**0.56**	**(0.31, 0.99)**	**.047**	0.72	(0.42, 1.27)	.255			
Behavioural disengagement	0.98	(0.71, 1.34)	.911				0.77	(0.54, 1.09)	.157			
Perceived Stress Scale score												
Low	1.00	-	-				1.00	-	-			

(Continues)

TABLE 3 (Continued)

	Cortisol AM (ref. group <0.094 mg/dl: impaired)						Cortisol PM (ref. group >0.359 mg/dl: impaired)					
	OR	(95% CI)	*p* value	Adj. OR	(95% CI)	*p* value	OR	(95% CI)	*p* value	Adj. OR	(95% CI)	*p* value
Moderate	0.97	(0.53, 1.72)	.923				0.67	(0.32, 1.29)	.263			
High	0.56	(0.27, 1.15)	.119				**0.38**	**(0.16, 0.84)**	**.019**			

Note: Bold values mean significant at .05 and .001.
Abbreviations: Adj. OR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

that enhances their mental health, life satisfaction and self-acceptance. In contrast, nonworking women have responsibility for child-rearing, performing household chores, and other familial duties, which bring less life satisfaction and more feelings of worthlessness, and ultimately lead to increased levels of stress and depression (Durak et al., 2022). Among nonworking women, feeling depressed may impact eating patterns, especially given the previously reported link between unemployment, poor lifestyles and poor mental health in nonworking women (Rosenthal et al., 2012). This was consistent with our finding that significantly more nonworking women were classified as overweight/obese than working women. However, further research is needed to clarify the exact link between mental health and lifestyle in nonworking women to guide mental health interventions (Rosenthal et al., 2012).

The greater stress levels noted among nonworking women in our study highlights the need to consider women's mental health as an important public health concern that warrants further attention by health managers and community leaders. A previous study identified that feeling lonely, lack of a planned schedule, lack of resources, limited leisure time and a feeling of burden with less satisfying jobs led to chronic stress among nonworking women (Durak et al., 2022). All of these causes need to be identified and addressed in public health programmes and policies to build healthier families and ultimately achieve better community outcomes. Although the UAE national agenda has addressed many aspects of community happiness, more efforts are needed to promote the mental health of nonworking women (The UAE Government, 2021). Different stakeholders, including nurse mangers, policymakers and community leaders, must make concerted efforts to develop appropriate health interventions and ensure the timely identification of nonworking women who are at greater risk of stress.

Although our study may support the hypothesis of the multiplicity of roles and the associations with less stress in working women, it is critical to consider the personal characteristics of the women under study. A study involving 308 women from North America reported that factors such as increased education level and older age were associated with increased life satisfaction and better mental health outcomes (Sumra & Schillaci, 2015). In our study, almost two thirds of participants were expatriates, in their midlife (aged 31–40 years), had less than 20 years of work experience in the UAE and had high education levels. It is possible that work represented a buffering factor for mental health in working women in the UAE through offering a source of financial security and self-fulfilment, which are considered prerequisites (especially in middle life) for physical and mental well-being regardless of juggling multiple life roles (Rajora, 2019).

Occupational-related factors such as the nature of the job and the amount of support received from managers and supervisors must be also considered in further studies. In our group of working women, 165 (39.5%) worked in universities/colleges, which can be an environment for women with satisfactory payment options. In addition, 171 (41%) working women in our sample were nurses who worked in hospitals, clinics or community health sites (e.g., schools or facilities affiliated with universities). It is possible that nurses' mental health is well supported by work supervisors and managers in these workplaces. Nurse executives and managers must continue to support nurses' mental health and be involved in the design of workplaces for nurses in a variety of settings to ensure their mental health is addressed and maintained (Bani-Issa et al., 2020).

There is a need for an integrated structural model that considers all possible personal, household, occupational and environmental contextual factors to examine factors leading to stress in women. For nonworking women, number of children, their age and their health status may be important factors that impact their stress levels. Consideration of these factors in UAE public health policies may facilitate development of focused interventions tailored to the needs of nonworking women.

Coping mechanisms are an important factor that buffers the impact of stress among working women (Bani-Issa et al., 2020; Ornek & Esin, 2020). Unlike nonworking women, we found that working women used healthier strategies (e.g., informational support and venting) to cope with stress, which could assist them in rectifying the long-term impact of stress on their cortisol level. A household survey from Canada ($N = 1{,}982$, 51.7% women) showed that positive coping strategies (e.g., seeking support) mediated stress levels, whereas avoidant coping (e.g., drugs/medication) increased stress levels (Perreault et al., 2017). Among Saudi working women ($N = 30$), a negative correlation was found between stress and problem-focused coping (e.g., seeking instrumental support) and emotional focused coping (e.g., venting), which directly assisted women to cope with and eliminate stressors (Alghamdi, 2020a, 2020b).

It has been reported that workplace social networks may enable women to better cope with occupational stress and other daily life stressors and lead to positive mental health outcomes (Alghamdi, 2020a). In contrast, nonworking women have a limited social circle with less informational support available, which may contribute to greater stress levels and an inability to cope with stress in this group

(Durak et al., 2022). However, our sample represented women from different cultural backgrounds, and coping mechanisms may be influenced by cultural and religious backgrounds; therefore, further studies are needed that consider ethnicity and religion in examining relationships between stress and coping strategies in women (Alghamdi, 2020a). Furthermore, avoidant coping through denial was significantly related to impaired evening cortisol in our sample. Avoidant coping has been positively correlated with stress level in women (Alghamdi, 2020b) and is known to be an unhealthy and less helpful coping strategy that increases stress levels. Women should therefore be motivated to use healthy coping strategies (e.g., problem- and emotional-focused coping) rather than avoidant coping to tackle and eliminate sources of stress.

Our regression model showed women's employment status was significantly associated with morning and evening cortisol levels. This result further supported the hypothesis that engagement in multiple roles does not increase stress levels but rather acts as a protective psychological factor in working women (Sumra & Schillaci, 2015). Similarly, a study with a non-random sample of North American women ($N = 308$) showed that carrying multiple roles (e.g., 'superwomen': wife/mother/worker/homemaker) did not increase stress levels in women but was a protective factor for mental health (Sumra & Schillaci, 2015). Therefore, more emphasis should be placed on the early identification and assessment of stress among nonworking women, developing focused interventions that target women at high risk for stress and increasing public awareness regarding the early signs of stress.

Lifestyle factors also significantly contributed to impaired evening cortisol levels among women in our study. Those who were smokers were more likely to have impaired cortisol levels. It has been suggested that smoking cigarettes stimulates the HPA axis and disturbs cortisol levels (Cohen et al., 2019). A previous study found tobacco smoking was associated with urinary cortisol in 130 workers (57.7% males and 42.3% females) working in a teaching hospital in Rome (de Sio et al., 2018). However, it is critical to consider the low number of smokers in the present study before making any conclusive association between smoking and salivary cortisol levels. More longitudinal research is needed to determine how smoking and nicotine could have an accumulative on cortisol levels.

Exercise was also significantly associated with morning cortisol levels in this study. A recent systematic review of 463 studies showed that physical exercise reduced cortisol levels (Beserra et al., 2018). Specifically, aerobic exercise and exercising five times per week had a significant effect on reducing cortisol levels (Beserra et al., 2018). However, another systemic review concluded that more evidence was needed to determine the threshold of exercise that influenced the HPA axis and decreased cortisol levels (Anderson & Wideman, 2017).

4.1 | Limitations

Our results are subject to several important limitations. We did not include occupational factors that may impact stress levels in working women. Furthermore, we did not collect information on the characteristics of children like children's age and chronic health conditions which may affect their stress level. Because the majority of the women in the UAE are expatriates, future studies must include information on the social support systems available to both working and nonwomen living in the UAE. Data collection, especially of saliva samples, was challenging, and we could not access women from geographically distant places such as Abu Dhabi, and the majority of the participants were recruited from Sharjah and closeby Emirates. Our cross-sectional design did not allow us to draw conclusions about the causal relationships between women's multiple roles and stress levels. Although we collected morning and evening salivary samples to gain an accurate picture of cortisol secretion patterns, taking more consecutive samples over a longer period might have given more accurate estimates of cortisol levels. The inclusion of longitudinal and qualitative components in further research may yield a better picture about daily stress and its impact on cortisol levels during different times of the day in working and nonworking women. Further studies could integrate more physiological measures of stress such as heart rate, pupil diameter and pulse wave amplitude to provide more accurate estimate for stress level in women (al Abdi et al., 2018).

5 | CONCLUSIONS

This was the first study to investigate stress levels in working and nonworking women in the UAE using both objective and subjective measures of stress. The findings suggest that community leaders and health care leaders need to support nonworking women to improve their mental health and bring cortisol levels into balance. Nonworking women must receive special attention in public health policies. They must be encouraged to indulge in activities other than housework to boost their self-esteem, improve their coping strategies and reduce their stress levels (Beserra et al., 2018; Rose & Mustafa, 2018). Launching counselling services and promoting healthy lifestyles and stress-relieving techniques (e.g., the practice of yoga, deep breathing, realization and mindfulness breathing) are possible strategies to boost women's mental health, especially among nonworking women.

It is critical to consider that extant research on the relationships between women's roles in life and their stress and cortisol offers mixed results. Contextual and occupational factors that determine women's stress level, cortisol and coping styles must be considered when examining significant associations between multiple roles for women and how they cope with stress. Whether multiple life roles are rewarding or depleting requires further exploration in longitudinal research.

6 | IMPLICATIONS FOR NURSING MANAGEMENT

The findings of our study suggest that stress among women, particularly nonworking women, is a public health concern that must be

addressed by managers, senior executives, community and health care leaders. Nurse managers, as trusted partners of community leaders, can play a key role in addressing mental health among nonworking women and formulating health policies related women's health (González-García et al., 2021; Iriarte-Roteta et al., 2020). Therefore, nurse leaders and managers are in a good position to be involved in modifying public health policy to ensure a greater emphasis on women's mental health and determine the best approaches to assist nonworking women to positively manage stress (Hajizadeh et al., 2021; Iriarte-Roteta et al., 2020). Through proper coordination and partnership with community leaders, nurse managers can assist in identifying nonworking women who are vulnerable to chronic stress to allow implementation of timely interventions.

Routine basic assessment of stress in primary health care facilities could facilitate early identification of vulnerable nonworking women at risk for mental health problems, and proper counselling and diagnostic check-ups should be introduced during women's visits to these settings (Mulvaney-Day et al., 2018). In addition to physical examination and medical history, general practitioners and nurses could conduct routine stress screening, particularly among nonworking women and those with limited access and resources. Effective nursing management is critical to formulating and implementing new protocols and adjusting workflow to support assessment of non-working women's mental health in community health care settings to minimize the economic and health burdens associated with mental health care. Managers must continue support mental health in nurses to help them to provide the best care to women and guide them well toward stress management.

Nurse managers must be involved in preparing and training nurses in different health care facilities to be influencers in the community. This training must involve competencies in cultural awareness, networking, inter-professional communication and psychosocial assessment of nonworking women during crises such as the COVID-19 pandemic (Suprapto & Lalla, 2021). These competencies will facilitate nurses' participation in the policymaking process that targets the mental health of working and nonworking women.

Sustainable public health and workplace policies that address women's mental health will not be achievable unless we have transformational health leadership that is coordinated across community partners and leaders. Nurse managers should have a voice in health policy decision-making, as well as being engaged in implementation efforts related to early assessment and management of stress among nonworking women.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest relating to this work.

ETHICS STATEMENT

This study was approved by the Research Ethics Committee at Ministry of Health in the country (MOHAP/DXB/SU BC/No 6 I 2O1 7) and the Research Ethics Committee at the principal investigator's institution (REC/15/11/P007). This study was conducted in accordance with the Declaration of Helsinki. Informed-written consent was obtained from all participants before enrolment in this study. All participants who provided saliva samples and accompanying information were de-identified by assigning arbitrary numbers to ensure their anonymity. Participants were notified of the results of their cortisol levels through their private email addresses provided to the research team.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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