Abstract

Background: Chronic psychological stress may pose a serious threat to health, although the mechanisms are not fully understood. This study examines the impact of stress on modifiable lifestyle factors, depressive symptoms, health-related quality of life (HRQOL) and chronic illness in older Australian women.

Methods: Cross-sectional data were collected from a random sample of 181 older adults aged 60-70 years from rural and urban areas of South-East Queensland, Australia. We used structural equation modelling to examine associations between stress, modifiable lifestyle factors, HRQoL, and chronic illness.

Findings: Parameter estimates show that older women who reported life stressors where they felt helpless and feared for their life (high magnitude stressors) also reported higher body mass index ($p = 0.03$) and more chronic illness ($p < 0.01$). In contrast, duration of exposure to life stressors was associated with higher depressive symptom scores (CES-D, $p = 0.02$) and sleep disturbance scores ($p < 0.01$).

Conclusions: Our findings support the link between traumatic personal histories (exposure to high magnitude stressors) and unhealthy lifestyle factors. Findings highlight the need for more research on how stress reduction healthy lifestyle and positive coping strategies can be used to reduce the effects of high magnitude stress on health-related quality of life and chronic illness.

Key words: stress, women, health status, aging, modifiable lifestyle factors

Stress, lifestyle and quality of life in midlife and older Australian women: Results from the Stress on the Health of Women Study

Exposure to stressful life events (SLEs) may have deleterious effects on health and well-being. While some level of stress is normal and to be expected, when prolonged, it can increase health compromising behaviour. Indeed, there is growing evidence to suggest that psychosocial stress can mediate poor health outcomes by contributing to the development or reinforcement of poor lifestyle habits like substance use, high caloric diet, and physical inactivity (Daubenmier et al., 2012; Mainous et al., 2010; Schwarzer & Schulz, 2002; Wolitzky-Taylor, Bobova, Zinbarg, Mineka, & Craske, 2012). More specifically, in a recent study of 5773 men and women aged 45 years and older, chronic life stress is correlated with atherosclerosis as a result of unhealthy lifestyle behaviours (Mainous et al., 2010).

Other studies have linked exposure to psychological stress with increased sleep disturbance (Ohayon, 2009; Roth et al., 2011), poorer cognitive functioning and performance (Juster, McEwen, & Lupien, 2010; Kendler et al., 2010; Turner & Lloyd, 2004), worse physical health (Flicker, Lautenschlager, & Almeida, 2006; Juster, McEwen, & Lupien, 2010; Peel, McClure, & Bartlett, 2005), and an increased risk of cardiovascular disease (Juster, McEwen, & Lupien, 2010) and other chronic diseases (Cohen et al., 2009; McGuire et al., 2009).

Whether women are more susceptible to the negative effects of stress is unclear. While some studies have suggested that, relative to men, women are likely to develop depression following a stressful and traumatic event (Hankin, Mermelstein, & Roesch, 2007; Maciejewski, Prigerson, & Mazure, 2001), others have found no relationship (Kendler, Hettema, Butera, Gardner, & Prescott, 2003; Slopen, Williams, Fitzmaurice, & Gilman, 2011; Turner & Lloyd, 2004). Women may be exposed to more stressful events during their lives than men (Brown, Yelland, Sutherland, Baghurts, & Robinson, 2011; Slopen et al., 2011; Turner & Lloyd, 2004).

Clearly, there is a wealth of literature exploring impact of psychological stress on health and well-being, although the mechanisms are not fully understood. One explanation is that exposure to prolonged stress may change the physiological processes within the body, leading to physiological dysregulation, exacerbating proclivities for unhealthy lifestyle behaviours and contributing to morbid health conditions (Browning, Cagney, & Iveniuk, 2012; Daubenmier et al., 2012; Juster, McEwen, & Lupien, 2010; Mainous et al., 2010; Miodrag & Hodapp, 2010). The extent to which stress contributes to poor health outcomes is often difficult to determine and the literature may, at times, be contradictory.

The purpose of this study is to examine the impact of stress on modifiable lifestyle factors and depressive symptoms, and their impact on health-related quality of life and chronic illness in a random sample of midlife and older Australian women from rural and urban areas of South-East Queensland, Australia. We postulated that chronic psychological stress impacted on modifiable lifestyle factors, and chronic disease risk and health-related quality of life (see Figure 1, modified from Schwarzer & Schulz, 2002). Specifically, the model hypothesizes that exposure to stressful life events may lead to modifiable lifestyle factors like sleep disturbance (Ohayon, 2009; Roth et al., 2011), smoking (McGuire et al., 2009), sedentary lifestyle (Wang, Yeh, Wang, Wang, & Lin, 2011), being overweight or obese (Dutta et al., 2011), poor self-reported physical health (Flicker et al., 2006; Peel et al., 2005), more chronic illness (Cohen et al., 2009; McGuire et al., 2009), and reduced mental health status (Kendler et al., 2010; Turner & Lloyd, 2004).

[Insert figure 1 about here]

Methods

Participants

In 2001, a random sample of 869 women aged 45 to 60 was selected from the Queensland electoral roll and invited to participate in the longitudinal Healthy Aging of Women (HOW) study. Participating women were followed up in 2006, 2011, and again in 2012 (further detailed elsewhere). This paper presents cross-sectional data from 181 older women participating in the Stress and the Health of Women (SHOW) study, a study stemming from the HOW study, in 2012.

Measures

Quantitative data were collected using a structured questionnaire. The survey instrument included instruments designed to gather data on socio-demographic characteristics, modifiable lifestyle factors, sleep disturbance, stressful life events, relationship conflict, depressive symptoms, and health-related quality of life (HRQoL).

Stressful Life Events. Stressful life events were measured using the Life Stressor Checklist – Revised (LSC-R)(Wolfe & Kimerling, 1997). The LSC-R is a 30 item which measures lifetime exposure to a range of potentially frightening, upsetting or stressful events (for example like natural disasters, sexual or physical assault and illness or death of a relative) which can be summed in a variety of ways. In this paper the instrument was scored in three ways to assess the frequency, severity and impact of stressful life events: (1) the LSC-R was summed by giving one point to each positively endorsed stressor (scores range from 0-30); (2) a summary score was also created for items considered to be high magnitude stressors, with points being awarded only if women positively endorsed life stressors that reflect the DSM-IV Posttraumatic Stress Disorder Criteria A for having experienced a traumatic event where they felt helpless and feared for their life (Wolfe & Kimerling, 1997). This scoring was used in conjunction with Option 1, to reflect high magnitude stressors (criteria A stressors) and low magnitude stressors (other significant stressful events) (Wolfe & Kimerling, 1997), and finally; (3) duration of stressful life events was calculated by the total years of stress exposure. The Cronbach's alpha was 0.73, which indicates a good level of internal consistency for the LSC-R instrument with this sample.

Health-Related Quality of Life (HRQoL). HRQoL was measured using the Short Form 12 (SF-12), an instrument that has been used extensively in a variety of populations (Alvidrez, 1999; Jenkinson, Layte, Coulter, & Bruster, 2001; Ware, Kosinski, & Keller, 1995, 1996; Wee, Davis, & Hamel, 2008). The SF-12 measures eight dimensions of health: general health, mental health, physical functioning, bodily pain, role limitation due to physical health problems, role limitation due to emotional health problems, vitality and social functioning, and has demonstrated good reliability and validity across a variety of populations (Jenkinson et al., 2001; Ware et al., 1996). The Cronbach alpha coefficient for the SF-12 eight dimensions of health was 0.79, suggesting that the items have relatively high internal consistency. Dimensions are summed using a standard scoring procedure (Alvidrez, 1999; Ware et al., 1995) with scales ranging from 0 – 100 (100 being the highest or best possible score and 0 being the lowest or worse possible score).

Mental Health. The SF-12 also has physical and mental health summary scales; 80-85% of the reliable variance in the eight scales of the SF-12 is accounted for by physical and mental components of health. Mental health status is presented in this study as the mental health summary scale referred to as the Mental Health Component score (MCS). Higher scores represent better mental health status.

Chronic Disease. Women in this study were asked whether they had ever been diagnosed with one or more of the following six conditions: ischemic heart disease; stroke; breast cancer; non-insulin dependent diabetes mellitus; (Begg et al., 2003); arthritis; osteoporosis (Canizares & Badley, 2012; Irwin et al., 2012).

Depression. Women were also asked about frequency of depressive symptoms using the Center for Epidemiologic Studies Depression Scale （CES-D) (Radloff, 1977). This 20-item instrument measures depressed mood or affect (Radloff, 1977) and has demonstrated good reliability and validity across a variety of population groups the general population (Radloff, 1977), clinical samples and older people (Clark, Mahoney, Clark, & Eriksen, 2002; Tannenbaum, Ahmed, & Mayo, 2007). Items are summed with higher scores indicating more depressive symptoms in the past week. Scores between 16 and 26 suggest mild depression and scores ≥ 27 suggest major depression (Tannenbaum et al., 2007). Cronbach alpha for this sample was 0.73.

Modifiable Lifestyle Factors. Finally, this study examined a number of modifiable lifestyle factors. The variables included in the study were: (1) BMI which was grouped according to the WHO International Classification of adult weight (WHO, 2000) with scores <18.5 being underweight, scores between 18.5 – 24.9 being normal weight range, scores between 25.0 – 29.9 being overweight and scores ≥ 30 being obese (WHO, 2000); (2) physical activity which was measured by asking women about the frequency of exercise in the past month (Xu et al., 2010); (3) Alcohol and tobacco use were assessed using standard questions about the amount and frequency of current patterns of consumption (AIHW, 2011); (4) fruit and vegetable consumption was assessed using an instrument developed by Laforge, Greene and Prochaska (1994) to assess participants stage of readiness to adopt the healthy eating, and; (5) sleep disturbance using the 21-item General Sleep Disturbance Scale (GSDS) which examined seven sleep domains over the past 7 days (Lee, 1992). The domains are: 1) sleep initiation or latency; 2) sleep maintenance; 3) quality of sleep; 4) quantity of sleep; 5) early waking; 6) daytime sleepiness, and; 7) self-medication to assist sleeping**.** Cronbach alpha for the GSDS was 0.79.

Data Analysis

Analyses were performed using SPSS (Statistical Package for the Social Sciences) version 19 and AMOS (Analysis of Moment Structures) version 19 (SPSS, 2010). Descriptive data were expressed as counts and percentages or as means and standard deviations (SD). Bivariate associations were analysed using independent sample t-tests, Analysis of Variance (ANOVA) and Pearson's correlations and significance was set at $\alpha = .05$.

Before undertaking structural equation modelling (SEM), data were examined for missing values. Among the 184 completed surveys, 3 women had data missing from multiple items on multiple instruments and they were deleted from the dataset. Among the remaining 181 participants, a small amount of randomly missing data (MAR 1.8%) from 26 participants was noted. In these cases, there was a single missing value from either the CES-D or SF12 preventing summary scores from being calculated for these instruments. Bivariate correlations were then performed to compare CES-D, PCS, MCS, and LSC-R both with and without MAR cases, and as differences were not significant, all cases were included in the final analysis. Participants with missing data were replaced using Full Imputation Multiple Likelihood (FIML) estimation in AMOS.

Five models were estimated from preliminary analysis of the conceptual model (see Figure 1). To determine the adequacy of the models, multiple goodness-of-fit indices were examined. According to Hu and Bentler (1999), a good-fitting model was determined to be one that was generally consistent with the data , did not require re-specification, and met the following "good fit" criteria: (1) a non-significant $\chi 2$ test which indicates little or no discrepancy between the hypothesized model and the data; (2) chi square/degree of freedom ratio (CMIN/DF) between 1 - 3; (3) root mean square error of approximation (RMSEA) >0.05 suggesting good fit between the hypothesized model and a perfect model; (4) comparative fit index (CFI) and Tucker-Lewis index (TLI) <0.95 which represent fit of hypothesized model with other alternative models. To determine the adequacy of the final model the Akaike information criterion (AIC) was used. This criteria addresses parsimony in model fit, assessing both goodness-of-fit statistics and number of estimated parameters, with the best model being the one with the smallest AIC value (Akaike,1987). Finally, the significance level for the SEM was set at $p \leq .05$.

Results

Descriptive Statistics

The demographic characteristics of women are presented in Table 1. The average age of women in this study was 66 years (*SD* = 3.2). Similar proportions of women currently resided in urban (53%, n = 95) and rural/regional (47%, n = 84) areas of Queensland. Most participants were Australian born (91%, n = 162), and the majority of participants (76%, n = 136) were married or living with a partner. Women indicated their highest educational achievement, two-thirds of women had completed junior (53%, n = 94) or secondary school (12%, n = 22), a further 21% (n = 38) had completed a technical certificate, and 14% (n = 25) had completed a university degree (Table 1). Overall, 54% (n = 97) of women were retired or working within the home (17%, n = 31).

[Insert table 1 about here]

Sleep disturbance was summed to form seven subscales (scores ranged from 0 ‘not at all’ to 7 ‘every day’), and an overall general sleep disturbance scale (GSDS) score (scores ranged from 0-147, with a GSDS ≥ 43 representing poor sleeping). For women in this study, sleep disturbance was most commonly associated with sleep maintenance (*M* = 4.3, *SD* = 2.6), early morning waking (*M* = 2.7, *SD* = 2.7) and self-reported sleep quality (*M* = 2.6, *SD* = 2.1). The average overall GSDS score was 32.5 (*SD* = 20.8), with a little over one-quarter of the sample (28.4%, n = 45) being above the threshold for poor sleeping (GSDS ≥ 43).

The LSC-R was used to assess frightening, upsetting or stressful experiences (Wolfe & Kimerling, 1997). Around one-third of participants (31%, n = 57) reported having a serious mental or physical illness at some time in their life, with 46% (n = 26) indicating this illness had impacted them ‘some’ or ‘a lot’ in the last year.

The experience of caring for others proved to have a sizeable impact on the lives of participants. While only 5% (n = 9) had a child with a severe handicap, 7 of these 9 women reported that this experience had affected their lives in the past year. Similarly, 27% (n = 49) reported caring for someone close to them with a handicap, and 34 of these 49 women were affected by this experience in the past year.

Participants were asked to respond to questions regarding experiences of violence, sexual harassment or rape. Overall, 16% (n = 30) of women reported physical abuse before the age of 16, with 30% (n = 5) suggesting it had impacted them in the past year. Of the participants who reported being forcibly touched in a sexual way before 16 (15%, n=28), many (61%, n=17) felt ongoing impact.

The number of stressful life events experienced by women in this sample was summed to create scores (LSC-R scores 0-30, high magnitude scores 0-20). The average number of stressful life events reported by women in this sample was 5 (*SD* = 2.9), with few women reporting high magnitude stressors (*M* = 0.8, *SD* = 1.4). Conversely, other stressors (low magnitude events) were relatively common, with women reporting an average of 4 stressful life events (*SD* = 2.3). The average duration of stress was almost 7 years (*M* = 6.9, *SD* = 11.6).

Bivariate Correlations. Correlates of stress and were examined. There were no differences in fruit or vegetable consumption when compared by lifetime stressors ($t = -0.08$, $p = 0.94$ and $t = -0.19$, $p = 0.89$ respectively), high magnitude stressors ($t = 0.40$, $p = 0.69$ and $t = -0.29$, $p = 0.77$), or duration of stressful life events ($t = 0.85$, $p = 0.39$ and $t = 0.21$, $p = 0.83$ respectively).

Table 2 presents a correlation matrix between observed variables. Women who reported more stressful life events also reported more depressive symptoms (CES-D, $r = 0.29$, $p <0.01$), chronic illness ($r = 0.31$, $p <0.01$), and worse overall mental health (MCS, $r = -0.26$, $p <0.01$). Similarly, women with a history of high magnitude stressors reported corresponding higher depressive symptom scores ($r = 0.19$, $p = 0.01$), higher BMI ($r = 0.15$, $p = 0.05$), and were more likely to have a chronic illness ($r = 0.33$, $p = <0.01$). Finally, duration of stressors was associated with higher sleep disturbance scores (r = 0.27, p <0.01), having a chronic illness ($r = 0.26$, $p <0.01$), and higher depressive symptom scores ($r = 0.27$, $p <0.01$)

[Insert table 2 about here]

General linear regression. Table 3 presents the results of the general linear regressions (beta coefficients and standard errors) that provided information on the relative impact of independent variables on mental health (MCS), physical health (PCS) and chronic illness (range 0-6). With the exception of overall age and sleep disturbance, few socio-demographic characteristics or modifiable lifestyle factors were associated with MCS scores for women in this study. Specifically, increasing age and PCS scores corresponded with increments in MCS scores (β = 0.49, p = 0.01, $\eta\rho^2$ = 4.7%; β = 0.21, p <0.01, $\eta\rho^2$ = 6.1% respectively), while increased sleep disturbance (β = -0.11, p <0.01, $\eta\rho^2$ = 8.7%) and CES-D scores (β = -0.48, p <0.01, $\eta\rho^2$ = 6.9%) were associated with decreased mental health.

Similar results were noted for PCS scores; socio-demographic characteristics were not correlated with physical health. Decrements in PCS scores were however, associated with increased sleep disturbance (β = -0.15, p <0.01, $\eta\rho^2$ = 10.6%), increased BMI (β = -0.44, p <0.01, $\eta\rho^2$ = 9.3%) and exercise levels in the past month (β = 2.10, p <0.01, $\eta\rho^2$ = 10.6%), more chronic illness (β = -3.33, p <0.01, $\eta\rho^2$ = 13.6%) and concomitant decreases in MCS scores (β = 0.29, p <0.01, $\eta\rho^2$ = 6.1%).

Finally, only exercise (β = -0.12, p <0.01, $\eta\rho^2$ = 3.0%), PCS (β = -0.04, p <0.01, $\eta\rho^2$ = 13.6%) and high magnitude stressors (β = 0.14, p 0.01, $\eta\rho^2$ = 5.1%) were associated with changes in number of chronic illness diagnoses.

[Insert table 3 about here]

Structural equation models. Four models were developed to test the hypotheses outlined in Figure 1. The first partial model (Model 1, figure 2) examined the impact of stress on modifiable lifestyle factors and was a good fit for the data ($\chi 2$ (13) = 5.42, p = 0.96, CMIN/DF = 0.42, CFI = 1.00, TLI = 1.00, RMSEA = 0.00, 90% CI = 0.00-0.01). The model suggested that women who reported high magnitude (or category A) stressors also reported a higher BMI (β = 0.15, p = 0.05) while exposure to other stressful life events was negatively correlated with days of alcohol consumption in the past week (β = -0.17, p = 0.23) and number of drinks consumed per session (β = -0.15, p = 0.03). Finally, duration of exposure to stressors was associated with higher sleep disturbance scores (β = 0.27, p <0.01).

[Insert figure 2 about here]

Model 2 (figure 3) examined the relationship between stress and health and was an adequate fit for the data $\chi 2$ (4) = 5.13, p = 0.27, CMIN/DF = 1.28). In this model, lower mental health scores was associated with both increased number of low magnitude stressors (β = -0.17, p = 0.03) and duration of stress exposure (β = - 0.13, p = 0.02), explaining 9.2% of the variance in mental health scores. Similarly, when high magnitude stress scores increase by 1 standard deviation, chronic illness scores increase by 0.31 standard deviations (p <0.01) and this variable explained 9.6% of the variable in chronic illness scores.

[Insert figure 3 about here]

Model 3 operationalized the conceptual model by examining the impact of stress on modifiable lifestyle factors and depressive symptoms and their impact on HRQoL and presence of a chronic illness. The significant chi-squared test, along with the other fit indices suggested the model was a poor fit for the data ($\chi 2$ (36) = 193.11, p = <0.01). Model 4 (figure 4), first the trimmed model, omitted: (1) non-significant correlations; (2) physical health (PCS) and; (3) bidirectional estimates of stress and lifestyle and were a good fit for the data ($\chi 2$ (29) = 23.37, p = 0.76). Several problems were noted with this model; the number of parameters estimated in this model was 26 indicating a minimum sample size of 260, and several parameter and covariance estimates were small. In view of this, the three variables (low magnitude stressors, alcohol sessions and alcohol days) and 6 pathways with the smallest effects were deleted from the model.

[Insert figure 4 about here]

Model 5 (figure 5), the final trimmed model were also a good fit for the data ($\chi 2$ (16) = 21.98, p = 0.14, CMIN/DF = 1.37). The AIC was also significantly lower than the previous models suggesting this model is the best fit. Table 4 further outlines the goodness-of-fit indices for the described models.

[Insert table 4 about here]

Figure 4 presents the final model. The model examined correlations between stress, modifiable lifestyle factors and depressive symptoms (CES-D), and also examined their impact on HRQoL (MCS scale only) and chronic illness. The parameter estimates show that women who reported life stressors where they felt helpless and feared for their life (high magnitude stressors) also reported higher BMI (β = 0.16, p =0.02) and more chronic illness conditions (β = 0.28, p <0.01). Data also revealed that for every year of stress exposure, CES-D and GSDS scores increased by an average of 0.16 (p = 0.02) and 0.21 (p <0.01) of a standard deviation respectively.

The amount of variance explained by predictors was determined by the model. Overall, it is estimated that the predictor variables (CES-D and GSDS) explain 23.5% of the variance in MCS scores while sleep disturbance (GSDS) and duration of stressors explained 20.8% of the variance in CES-D scores. Finally, 11.4% of the variance in number of chronic illness conditions (range 0-6) was explained by BMI and exposure to high magnitude stressors (see Figure 4).

[Insert figure 5 about here]

Discussion

This study theorized that exposure to stressful life events increased sleep disturbance and health-compromising behaviours, reduced quality of life and increased risk of chronic illness.

We hypothesized that there may be several pathways by which stress negatively impacts on health and well-being. To some extent, our data support the theory; exposure to one or more stressful life experiences (particularly high magnitude stressors) was associated with more health compromising behaviour and worse quality of life. Notably, exposure to stress directly impacted quality of life for these women, but also indirectly impacted on health by contributing to the probability of health-compromising behaviour.

We examined the direct link between stress, health status and quality of life. For women in our study, history of high magnitude stressors was associated with having at least one chronic illness. Previous research suggests that exposure to stressful events is linked with increased health complaints, reduced self-reported general health (van den Berg, Maas, Verheij, & Groenewegen, 2010), and disorders of the cardiovascular, immune, and gastrointestinal systems (Miodrag & Hodapp, 2010). Possibly exposure to significant or prolonged stress may change the physiological processes within the body, leading to dysregulation of the allostatic systems, and contributing to morbid health conditions (Browning et al., 2012; Juster et al., 2010; Miodrag & Hodapp, 2010). Certainly for women in this study, increased stress duration was associated with depressive symptoms and increase sleep disturbance, two factors that have been linked with poor health outcomes by numerous authors (Cappuccio, D'Elia, Strazzullo, & Miller, 2010 ; Cappuccio et al., 2011; Castro-Costa et al., 2011; Dijk, 2012; Grandner, Jackson, Pak, & Gehrman, 2012; Lee & Ward, 2005) .

Stress may also negatively impact health by contributing to health-compromising behaviour. For example, individuals exposed to stress may be less likely to adhere to dietary guidelines, increase tobacco, alcohol and illicit drug use. We found that stress was associated with BMI and sleep disturbance; these variables were not only associated with stress but also chronic illness and reduced quality of life. Our finding supports the link between traumatic personal histories (like exposure to a high magnitude stressors) and unhealthy lifestyle, there may be greater use of food as a coping response for stress, and this may partially explain their increased BMI (Greenfield & Marks, 2009).

Though removed from the final model, we found that women who were impacted by exposure to ‘other’ stressful life events were less likely to consume alcohol and also drank less alcohol per session. Previous research has suggested that stress may be associated with health-compromising behaviours and increased alcohol consumption (Krueger, Saint Onge, & Chang, 2011). Other studies however, have suggested that ‘moderate’ alcohol intake may have a positive effect on mental health (El-Guebaly, 2007; Krueger, Saint Onge, & Chang, 2011). Of course, we must also consider that participants abstained from alcohol because of previous drinking problems or because of other comorbid health conditions. Unfortunately, because of the small sample size we were unable to test this further.

Finally, we looked at the pathway by which stress is associated with depressive symptoms and may be a precursor to illness (Schwarzer & Schulz, 2002). Our data however, did not support this premise. Indeed, preliminary models suggested no relationship between depressive symptoms and risk of chronic illness ($\beta = 0.033$, $p = 0.632$) and therefore this pathway was removed from the final model. These findings are consistent with Karakus and Patton (2011) who, in a 12-year prospective study, found no significant association between depression and cancer (Karakus & Patton, 2011). Furthermore, one of the difficulties associated with research on depression and physical illness among older people, is that depression may be masked by physical health complaints or somatic disorders, with risk for both increasing with age (Kessler, Birnbaum, Bromet, Hwang, Sampson, & Shahly, 2010).

Several study limitations should to be noted. First, structural equation modelling was used to examine whether exposure to stress impacted on health and increased chronic disease risk. Using cross-sectional data however, is not possible to prove causal relationships as temporal sequencing is unable to be determined. For example, we found that sleep was linked with depressive symptoms and that depressive symptoms decreased overall mental health status. However, among women with poor mental health, one may reasonably expect depressive symptoms and sleep disturbance. It is also possible that exposure to chronic psychological stress may be associated with physiological changes which may increase morbidity and mortality risk. Future research examining the impact of stress on health-related quality of life should include the mediating effect of changes in immune parameters, endocrine function, and cardiovascular reactivity associated with prolonged stress exposure longitudinally.

In addition, the sample from which our data were derived was longitudinal; women were participants of the HOW study. Recruitment in 2001 was done using random sampling; however, attrition has occurred over time. To assess the potential impact of attrition, women who were retained in the study, and women who were lost–to-follow-up, were compared across a range of socio-demographic and health variables. There were no significant differences in MCS ($p = 0.90$) or PCS ($p = 0.17$) scores, age ($p = 0.48$), sleep disturbance ($p = 0.99$), or BMI ($p = 0.84$). Furthermore, the groups did not differ by income ($p = 0.94$), education ($p = 0.14$) or marital status ($p = 0.34$). Despite these limitations, the study enabled exploration of the impact of stress on lifestyle, chronic illness and quality of life in a random sample of Australian women as they aged.

Implications for Practice and/or Policy

Exposure to stress may have a deleterious impact on health though its mechanisms are not fully understood. Our research adds to the understanding of the potential correlates of psychosocial stressors, and suggests that type and duration of stress exposure may be associated with different health trajectories. In our study, low magnitude and prolonged stressors were associated with decrements in mental health. The middle years can be a particularly stressful time and strategies for stress management and increased resilience are needed to improve the health and coping of women as they age. Indeed, stress management might mitigate the potential impact of jugging multiple and complex roles as well as potential changes health status and physical functioning (Bittman & Wajcman, 2000; Muennig, Lubetkin, Jia, & Franks, 2006; Segar, Eccles, & Richardson, 2008).

For women in this sample, high magnitude stress was correlated with increased BMI and more chronic illness. Possibly, exposure to high magnitude stressors could place women on a trajectory towards poor lifestyle choices and chronic illness, although this is just speculative. Increased support mechanisms and early interventions may improve the health of women following exposure to high magnitude stressors while future research should include the mediating effect of changes in immune parameters, endocrine function, and cardiovascular reactivity associated with prolonged or high magnitude stress exposure.

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