Culture and symptom reporting at menopause

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The purpose of the present paper is to review recent research on the relationship of culture and menopausal symptoms and propose a biocultural framework that makes use of both biological and cultural parameters in future research. Medline was searched for English-language articles published from 2000 to 2004 using the keyword ‘menopause’ in the journals—Menopause, Maturitas, Climacteric, Social Science and Medicine, Medical Anthropology Quarterly, Journal of Women’s Health, Journal of the American Medical Association, American Journal of Epidemiology, Lancet and British Medical Journal, excluding articles concerning small clinical samples, surgical menopause or HRT. Additionally, references of retrieved articles and reviews were hand-searched. Although a large number of studies and publications exist, methodological differences limit attempts at comparison or systematic review. We outline a theoretical framework in which relevant biological and cultural variables can be operationalized and measured, making it possible for rigorous comparisons in the future. Several studies carried out in Japan, North America and Australia, using similar methodology but different culture/ethnic groups, indicate that differences in symptom reporting are real and highlight the importance of biocultural research. We suggest that both biological variation and cultural differences contribute to the menopausal transition, and that more rigorous data collection is required to elucidate how biology and culture interact in female ageing.

Key words: culture/local biology/menopause/methodology/symptom reporting

Introduction

Cross cultural research on menopause has its foundations in an anthropological study of menopausal women in Northern India (Flint, 1975) and in a series of surveys sponsored by the International Health Foundation (Boulet et al., 1994) under the leadership of Dr Pieter Van Keep, who set out to document variations among countries in women’s reporting of the menopausal transition. These surveys collected information on general health and on attitudes towards ageing and the menopause, but their primary focus was on age at menopause and menopausal symptom patterns. Since these early surveys, interest in the relationship between culture and the menopausal experience has broadened, but a focus on menopausal age and subjective reporting of symptoms remains central.

Over the past decade there have been several comprehensive reviews on the subject of culture and menopause, many of which have focused on symptom reporting (Flint and Samil, 1990; Lock, 1998; Gold, 2000; Obermeyer, 2000; Avis et al., 2001; Collins, 2002). Virtually all of the research cited in these reviews has been motivated by one of two rather different objectives. In the first approach, taken by the majority of researchers, an assumption is often made that biological changes associated with menopause are, in effect, universal, and that variation in the subjective experience of menopause, notably in what counts as menopausal symptoms and how they are reported, can be largely explained by language differences, culturally shaped expectations about the menopausal transition, and more generally by concerns about female ageing and associated changes in social roles (Boulet et al., 1994; Obermeyer et al., 1999; Sommer et al., 1999; Adler et al., 2000; Zeserson, 2001). In much of this research, culture is equated in an unproblematic way with nationality, and is inserted into analyses as an independent variable.

Differences in symptom reporting among women are suggested to be artefacts of differences in symptom sensitivity or a tendency to under-report, due to lack of education or else embarrassment (Boulet et al., 1994). On the other hand, researchers who acknowledge that differences in symptom reporting may indeed reflect variation in the menopausal experience (Kaufert, 1984, 1990; Kaufert et al., 1988; Avis and McKinlay, 1991; Zeserson, 2001) remain concerned about methodological differences that make comparison difficult and chronic...
weaknesses in research design and reporting including: (1) instrument (questionnaires administered by interview or mail); (2) recall time frame (retrospective reporting of age at menopause and symptom recall from 2 weeks to 1 year or ‘ever’, particularly problematic as symptom recall of over 2 weeks is likely to be inaccurate); (3) menopausal status analysis categories (inclusion of surgical menopause, assignments of perimenopausal status); (4) choice of symptoms and focus on ‘menopause’ versus ‘midlife health’; and (5) language (complexity involved in translating medical terminology and everyday terms that describe bodily symptoms).

The second, less common approach, is one in which biological and socio/cultural variables are assumed to interact in complex ways that are as yet rather poorly understood (Lock, 1993; Martin et al., 1993; Avis et al., 1997, 2001; Collins, 2002). These ‘biocultural’ analyses (Beyene, 1986) seek explicitly to overcome the limitations imposed by a methodology in which a marked duality between biology and culture is structured into the project. Our position is that differences in symptom reporting are not epiphenomena, layered over the facts of biology, but rather result from the interaction of biological and cultural influences on women’s menopausal experience. In the latter part of this paper we lay out a theoretical framework for biocultural research on menopause, discuss recent research findings on the role of phytoestrogens in Japanese diets and their effects on symptom reporting at menopause as illustrative of the complexity that confronts researchers, and provide examples of research that should serve as models for future research.

Before proceeding further, a cautionary note is necessary in connection with the concept of culture. In the global situation with which we are confronted today, culture must be recognized as an entity that is fluid and not necessarily bounded by geographical, national, or ethnic demarcations. It is important to actively inquire about self-assigned cultural affiliation(s) and what this means for individual women. Moreover, it is a mistake to assume that everyone participates equally in the values associated with the dominant culture with which they formally identify themselves—this too needs to be teased apart. For example, although it has been postulated that urban women, with exposure to North American culture’s valuation of youth, would have more negative attitudes toward menopause, a recent study of Iranian women found the opposite. The authors suggest instead that rural women in Iran placed higher priority on fertility (and thus have more negative attitudes toward the end of menopause) than did their urban counterparts (Khademi and Cooke, 2003). Research of this kind demonstrates that the influence of cultural expectations on attitudes toward menopause (and thus indirectly on menopausal experience) may be quite complex.

An initial decision to conduct a Cochrane style review (Alderson et al., 2004) had to be discarded as too few studies satisfied our criteria of having a large sample randomly selected from the general population, a well-validated instrument to measure depression and general health status, and sufficient power to detect significant differences in symptom reporting between women from different ethno-cultural communities. Adopting a more open and less restrictive approach to reviewing the literature on symptom reporting at menopause, we excluded studies based on small clinical samples, those with a primary focus on the use of HRT, and those that had not discriminated between women with ‘natural’ menopause as distinct from menopause that was surgically induced. Reviewing the European and North American literature, we focused on studies set up to examine differences in symptom reporting between women from different racial/ethnic groups or that had examined the relationship between menopausal symptom reporting and cultural variables. [The Study of Women’s Health Across the Nation (SWAN) is a prime example of an American study committed to recruiting women from different racial/ethnic communities and to exploring the impact of cultural differences on symptom reporting.] To ensure that our review of research done outside Europe and North America was complete, we first compared our list of studies against those included in two very comprehensive reviews on culture and menopause (Obermeyer, 2000; Collins, 2002) on the relationship between culture and symptom reporting. As their reviews dealt only with material published up to the year 2000, we then used Medline to search the journals Menopause, Maturitas, Climacteric, Social Science and Medicine, Medical Anthropology Quarterly, Journal of Women’s Health, Journal of the American Medical Association, American Journal of Epidemiology, Lancet and British Medical Journal for any additional articles on the menopausal symptom experience of women living outside North America and Europe that might have been missing from our lists and that were published in 2000–2004.

This paper is divided into four parts: Part I summarizes the factors that have been shown by various studies to contribute to differences in the menopausal experience. This is followed by a review of the major problems and challenges that have arisen as menopause researchers have tried to transfer to other settings definitions and methodologies initially developed in North America and Europe. Part II comprises a review of research on age and vasomotor symptom reporting published in the last few years that combines a systematic examination of socio/cultural variables with documentation of biological variation. In Part III we set out findings from biological anthropology and reproductive ecology that highlight the way in which biological variation must be taken into account in addition to cultural differences and then in Part IV highlight several cross-cultural studies including the authors’ research in Japan and North America in order to demonstrate the importance of using a multidisciplinary, longitudinal approach to researching menopause.

Part I: Factors contributing to variation in the menopausal experience

Comprehensive reviews that cover research on the relationship between culture and menopause show without exception that the socio/cultural organization of the course of life in specific geographical locations profoundly affects the meanings and experience of menopause (Gannon, 1985; Beyene, 1989; Du Toit, 1990; Flint and Samil, 1990; Lock, 1993, 1998; Obermeyer, 2000; Avis et al., 2001; Collins, 2002). Factors hypothesized to play a role in the experience of menopause (and quality of life during this period) include: culturally-influenced behaviours such as diet (Albertazzi et al., 1998; Mei et al., 2001; Nagata et al., 2001a,b; Messina and Hughes, 2003), smoking (Whiteman et al., 2003) and exercise (Dennerstein et al., 1993); cultural attitudes towards and expectations about the menopause (Martin,
1988; Avis and McKinlay, 1991; Davis, 1997; Sommer et al., 1999), which can be heavily influenced by medicalization (Kaufert and Gilbert, 1986; Bell, 1987; Kaufert and Lock, 1997; Sievert, 2003); meanings assigned to menopause, such as whether it is recognized as natural and normal, deviant, or as an illness (Estok and O’Toole, 1991); previous symptomatology and prior health condition (Avis et al., 1997); past or current reproductive health (Collins and Landgren, 1995); mother’s experience of menopause (e.g. hot flushes) (Staropoli et al., 1998); attitudes toward childrearing and women’s roles (Sanchez Perruca et al., 1989); marital status (Avis et al., 2004); relationships with husbands/partners and their attitudes toward symptoms of menopause (Robinson, 1996); social support (Berg and Taylor, 1999) and the extended family (Rousseau and McCool, 1997); social status, socio-economic status (Avis et al., 2003), education (Dennerstein et al., 1993; Avis et al., 1997), career and religious beliefs. For example, many women may not seek medical assistance because they believe that menopause, like puberty, involves natural changes that are part of development and ageing (Woods and Mitchell, 1999). With the support of healthy lifestyles, social support of friends and family, symptoms are often manageable and thus medical intervention may not be necessary (Hvas, 2001; Hvas et al., 2003).

However, culture, in the form of lifestyle choices (e.g. diet, reproductive behaviour, smoking) can also modify the underlying biology of the menopausal experience. Using a lifespan approach, Leidy has argued that although variation in age at the last menstruation is confined to an arrow spectrum, it is nevertheless significant and is influenced by family history. She notes: ‘Genetically, parents pass to their daughters the parameters for number of oocytes and/or rate of atresia. Behaviourally, a mother’s activity while pregnant affects the ovarian store her daughter possesses at birth. From birth until menopause the environment and behaviour of the individual affects her own ovarian stores’ (Leidy, 1994). Diet, age at menarche, reproductive history, use of oral contraceptives or other medication and smoking history—to name the most obvious variables—are all implicated in age at menopause and also potentially in symptomatology. In other words, it is important to consider how culture affects the body over the entire lifespan and not simply focus on the brief time period around the end of menstruation. Interactions among genetics, environment, culture and aspects of everyday life, including parity, socio-economic status (Avis et al., 2003), education (Dennerstein et al., 1993; Avis et al., 1997), reproductive hormones and history (Whiteman et al., 2003), smoking, BMI and exercise (Schwingl et al., 1994), contribute over the lifespan to the production of bodies that eventually become menopausal, with significant differences among them.

Methodological issues in menopausal research
The definition of menopause used by the majority of researchers and clinicians as well as by most women in North America, Europe and Australasia, equates menopause with the end of menstruation. Seen in a broader historical context, this definition is relatively recent. The changes associated with ageing and menopause vary both historically and across cultures (Lock, 2002). The current medical model emerged in the mid 20th century, is not accepted everywhere, and does not ‘fit’ well with local accounts of female midlife, professional and popular, in most parts of the world. Rather than being defined by a single event—the last menses—the menopausal transition is understood as a process, part of the phenomenon of ageing, and is associated with both social and biological changes.

There can be no argument that female reproductive senescence is universal and that the last menstrual cycle takes place in a relatively narrow range of ages [although ethnic and environmental differences have been noted, suggesting that even this fundamental transition may be influenced by culture (Bromberger et al., 1997) and environmental factors (Gold et al., 2001; Ku et al., 2004), as well as genetics]. Once the focus of attention is shifted to symptom reporting at menopause, data collection and the interpretation of findings become exceedingly complex. For example, it is not sufficient to ask if a woman is still menstruating. One must establish why menstruation has ceased: whether due to surgery, medications or chemotherapy; co-morbidity; chronic stress or shortage of food (as is the case in many developing countries); pregnancy and/or lactational amenorrhoea.

Research findings from many locations indicate that the majority of women pass through the menopausal transition with relatively little or no discomfort (Lock, 1993). Survey research in the USA and Canada with large samples of women aged 45–55 who are representative of the general population adds substantial support to this finding (McKinlay et al., 1992; Kaufert et al., 1998a,b). In a review, Obermeyer (2000) notes that while few women report major, long-lasting discomfort, paradoxically, in virtually all societies that have been investigated, the overall image of menopause is associated with unpleasant symptoms. Findings also show that people everywhere attach both positive and negative meanings to the end of menstruation, although few studies inquire about positive aspects (Hvas, 2001). Qualitative research makes clear the unavoidable ambivalence so often associated with the end of reproductive life, the implications of which vary enormously depending upon local attitudes towards ageing in general, older women in particular and their place in society.

Part II: Review of recent research on age at menopause and symptom reporting
Age at menopause
While the main focus of this review is symptom reporting at menopause, much research has focused on age at menopause (Gold et al., 2001), which may influence long-term disease risk and mortality in women (Jacobsen et al., 2003), and thus the experience of menopause. The last 5 years have seen the publication of several large surveys from outside English-speaking Western countries including several countries in Asia and the Middle East. The highest reported mean menopausal ages were reported in Italy (50.9 years, n = 4300) (Meschia et al., 2000), Iran (50.4 years, median 49.6 years, n = 8194) (Mohammad et al., 2004) and Slovenia (50.4 years, median 52.03 years, n = 58) (Sievert et al., 2004). Mean menopausal ages between 47 and 50 years were reported for the following populations: Koreans living in Korea (49.3 ± 3.5) (Ku et al., 2004), Lebanese
(49.3 median) (Reynolds and Obermeyer, 2001), Singaporean (49.1) (Chim et al., 2002), Korean emigrants to China (48.9 ± 3.1) (Ku et al., 2004), Greek (48.7 ± 3.8) (Adamopoulos et al., 2002), Moroccan (48.4 median) (Reynolds and Obermeyer, 2003), Mexican (48) (Malacara et al., 2002), Han Chinese in Taiwan (48) (Fuh et al., 2001) and Turkish (48 ± 4.2) (Ozdemir and Col, 2004). The lowest reported average menopausal age came from Turkey (45.8 ± 4.2) (Biri et al., 2005). Asia and the Middle East are over-represented in published reports of the last 5 years, with little data from Latin America or Africa. Most studies report mean age, but a few report median age. Sample size and length of time post-menopause (i.e. retrospective reporting of menopausal age) may be severe limitations in many studies. Most of the reviewed research equates culture with nationality, and thus in reporting the results we also reproduce this problematic limitation. The large SWAN study, while conducted solely in the USA, includes five ethnic groups and has studied associates of age and menopause and many factors (Gold et al., 2001). In the above studies the following factors were positively associated with age at menopause (Table I): age at menarche, menstrual bleeding length (>5 days), BMI, marriage and parity, prior oral contraceptive use, mother’s and sister’s age at menopause. The relationship between age at menopause and factors such as education and rural–urban residence varied by population. Smoking was consistently negatively associated with age at menopause. Socio-economic status, unemployment and history of heart disease were also negatively associated with age at menopause in several studies.

**Menopausal symptom reporting**

Identifying the symptoms that are most bothersome and troublesome to women during the menopausal transition and distinguishing between those that are due to hormonal changes as opposed to having ageing- or socially-related aetiology, are

<table>
<thead>
<tr>
<th>Factors</th>
<th>Result</th>
<th>Ethnic group/country</th>
<th>Age</th>
<th>n</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at menarche</td>
<td>+</td>
<td>Turkey</td>
<td>50–65</td>
<td>360</td>
<td>Ozdemir and Col (2004)</td>
</tr>
<tr>
<td>Menstrual bleeding length (&gt;5days)</td>
<td>+</td>
<td>Lebanese</td>
<td>45–55</td>
<td>259</td>
<td>Reynolds and Obermeyer (2001)</td>
</tr>
<tr>
<td>BMI</td>
<td>+</td>
<td>Korean (KK) and Korean emigrants to China (KK)</td>
<td>50–65</td>
<td>2192</td>
<td>Ku et al. (2004)</td>
</tr>
<tr>
<td>Education</td>
<td>+</td>
<td>Turkey</td>
<td>50–65</td>
<td>360</td>
<td>Ozdemir and Col (2004)</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>SWAN (Singapore: Chinese, Malay and Indian)</td>
<td>40–60</td>
<td>495</td>
<td>Chim (2002)</td>
</tr>
<tr>
<td></td>
<td>−</td>
<td>Korean (KK) and Korean emigrants to China (KK)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
</tr>
<tr>
<td>Unemployment</td>
<td>−</td>
<td>SWAN (Turkey)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
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<tr>
<td>Socio-economic status</td>
<td>−</td>
<td>Korean (KK) and Korean emigrants to China (KK)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
</tr>
<tr>
<td>Separation/widowed/divorced</td>
<td>+</td>
<td>Lebanese</td>
<td>45–55</td>
<td>259</td>
<td>Reynolds and Obermeyer (2001)</td>
</tr>
<tr>
<td>Parity</td>
<td>+</td>
<td>Italian</td>
<td>55</td>
<td>4300</td>
<td>Meschia et al. (2000)</td>
</tr>
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<td></td>
<td>+</td>
<td>SWAN (Turkey)</td>
<td>50–65</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
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<tr>
<td>Prior oral contraceptive use</td>
<td>+</td>
<td>SWAN (Turkey)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
</tr>
<tr>
<td>Mother’s age at menopause</td>
<td>−</td>
<td>Turkish</td>
<td>50–65</td>
<td>360</td>
<td>Ozdemir and Col (2004)</td>
</tr>
<tr>
<td>Sister’s age at menopause</td>
<td>+</td>
<td>Turkish</td>
<td>50–65</td>
<td>360</td>
<td>Ozdemir and Col (2004)</td>
</tr>
<tr>
<td>Rural–urban residence</td>
<td>Urban &gt; rural</td>
<td>Mexican; Guanajuato (median ethnic Amerindian/Mayan)</td>
<td>45–60</td>
<td>2081</td>
<td>Malacara et al. (2002)</td>
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<td></td>
<td>Urban &gt; rural</td>
<td>Mexican; Yucatan (highest ethnic Amerindian/Mayan)</td>
<td>45–60</td>
<td>2543</td>
<td>Malacara et al. (2002)</td>
</tr>
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<td></td>
<td>Urban &gt; rural</td>
<td>Mexican; Coahuila (lowest ethnic Amerindian/Mayan)</td>
<td>45–60</td>
<td>8194</td>
<td>Mohammad et al. (2004)</td>
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<tr>
<td>Japanese ethnicity</td>
<td>+</td>
<td>SWAN (Turkey)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
</tr>
<tr>
<td>Heart disease history</td>
<td>−</td>
<td>SWAN (Turkey)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
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<td>Smoking</td>
<td>−</td>
<td>Korean (KK) and Korean emigrants to China (KK)</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
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<td></td>
<td>−</td>
<td>Greek</td>
<td>40–55</td>
<td>14260</td>
<td>Gold et al. (2001)</td>
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<td></td>
<td>−</td>
<td>Lebanese</td>
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<td></td>
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<td>SWAN (Turkey)</td>
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<td>Gold et al. (2001)</td>
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</table>

\* + = positively related with age at menopause; − = negatively related with age at menopause.

\*b The SWAN includes Caucasian, African-, Hispanic-, Chinese- and Japanese-Americans.
crucial for researchers and for clinical care and public health policy. Women often report symptoms such as anxiety and headaches at menopause, but such reporting is by no means limited to women alone, as one Dutch study showed (van Hall et al., 1998). Not only do middle-aged men report similar symptoms at approximately the same rates as do women but so do younger and older women. In Japan, the symptom reported more than any other during the perimenopause is shoulder stiffness (Lock, 1993), but this symptom is reported by a similar percentage of men, as well as younger people (Fujita et al., 2000). The end of menstruation is an event of considerable significance for some women, and a tendency exists to attribute physical and psychological symptoms of all kinds to this experience (Bromberger et al., 1992). This is not to deny that feelings of anxiety and depression are real and significant, but such symptoms are usually secondary to the end of menstruation, and can be associated with broader familial and socio-cultural events, often of long duration, or with concern and stereotypes about the menopausal experience that are conflated with the end of menstruation. Today, for example, as a result of the wide public dissemination of medical literature about the perimenopause it is common for women in Europe and North America to believe that they will suffer memory loss at menopause. While estrogen is essential to neurological functioning (Silva et al., 2001), claims that memory loss is directly associated with lowered estrogen levels at the end of menstruation have not been substantiated (Kesslak, 2002; Kritz-Silverstein and Barrett-Connor, 2002); moreover both men and women experience memory impairment as they age so that this can be regarded as 'normal'.

Which symptoms constitute menopausal symptoms vary widely between populations and studies (Dennerstein et al., 2002). For example, several studies carried out in Thailand generated four different symptom lists and thus different constellations of menopausal symptoms (Table II). Symptoms included in the Thai checklists range from eight vasomotor and psychological symptoms (Chompootweep et al., 1993) to 17 vasomotor, physical and psychological symptoms (Chirawatkul and Manderson, 1994), and some studies also included urinary tract and vaginal symptoms (Sukwatana et al., 1991; Punyabhote et al., 1997), fracture (Sukwatana et al., 1991) and lack of sexual desire (Chirawatkul and Manderson, 1994). A meta-analysis of 7 factor-analysis studies has shown that vasomotor symptoms appear to be robustly associated with the menopausal transition (Greene, 1998), although older men have also been reported to experience hot flushes (Spetz et al., 2003). Drawing on findings from the SWAN in the USA, Avis et al. (2001), using factor-analysis, have shown that vasomotor symptoms consistently cluster together separately from psychological and psychosomatic symptoms. The SWAN is the latest and largest of epidemiological studies of the menopause, following the Massachusetts Women’s Health Study (Avis and McKinlay, 1991; McKinlay et al., 1992), and the Healthy Women Study which included Caucasians and African-Americans (Matthews et al., 1994a,b; Bromberger et al., 1997), and other studies (Samsoe et al., 1985; Dennerstein et al., 1993; Schwingl et al., 1994; Collins and Landgren, 1995; Kuh et al., 1997; Staropolii et al., 1998; Wilbur et al., 1998).

The rewards in terms of increased understanding of the menopausal transition are gradually becoming evident as a result of a series of papers emerging from the SWAN, a longitudinal, multi-site, multi-ethnic (including non-Hispanic Caucasian, African-American, Hispanic, Japanese-American and Chinese-American) community sample of over 16000 women aged 40–55 years when screened for the longitudinal cohort, which consisted of over 3300 women aged 42–52 years at baseline (Sowers et al., 2000).

Regression analyses showed significant differences in symptom reporting across the ethnic groups, and differences in reporting on the basis of menopausal status. After controlling for age, education, general health and economic stressors, it was found that Caucasian women reported significantly more symptoms in all, notably psychosomatic symptoms (including ‘tense’, ‘depressed’, ‘irritability’, ‘forgetfulness’ and ‘headaches’), than did the other groups (Avis et al., 2001). However,
African-American women reported the most vasomotor symptoms, although their reporting varied considerably by site (Gold et al., 2004). Chinese and Japanese-Americans reported significantly fewer symptoms than did Caucasians, African-Americans, or Hispanics. The researchers conclude that it is not possible to define a single syndrome on the basis of symptomatology associated with declining estrogen levels. Further, they argue that variation in subjective symptom reporting among ethnic groups cannot be set aside as a methodological artefact (Avis et al., 2001).

Two consistent symptom factors emerged from analyses across ethnic groups: vasomotor and psychological/psychosomatic symptoms (Avis et al., 2001). These results are in agreement with earlier studies including the cross-sectional and longitudinal Manitoba and Massachusetts studies which pioneered the use of a general symptom list and factor-analyses of the data (Kaufert et al., 1988; Lock et al., 1988; Avis et al., 1993). Japanese- and Chinese-Americans consistently reported fewer symptoms (including vasomotor) compared to Caucasian women, while African-Americans reported more vasomotor symptoms and vaginal dryness (Gold et al., 2004). Vasomotor and other symptoms were positively associated with BMI, difficulty paying for basic needs and smoking, and negatively associated with physical activity. These results suggest that lifestyle, race/ethnicity and socio-economic status affect symptoms in this age group (Gold et al., 2000). Age at menopause of Japanese-American women was significantly later than that of Hispanic, non-Hispanic White, African-, or Chinese-American women (Gold et al., 2001, 2004).

Relative to non-Hispanic Caucasians, African-American, Japanese-American and Chinese-American women had lower odds of experiencing mood symptoms including feeling blue, nervous or irritable (Bromberger et al., 2003). African-American women had a more positive attitude towards menopause than Hispanic or non-Hispanic White women, and Japanese- and Chinese-Americans expressed the most negative attitudes (Sommer et al., 1999). Compared with non-Hispanic White women, Chinese- and Japanese-American women were less likely to say that sex was very important, whereas African-American women were the most likely to say that sex was important and to report having sexual intercourse more than once a week (Cain et al., 2003).

The SWAN considered various lifestyle factors that may influence the observed differences in symptom reporting. In contrast to studies that have reported low levels of recreational physical activity among African-American and Hispanic women, no significant difference was found between the SWAN ethnic groups in relation to physical activity, but this may be because a global question (comparing an individual’s relative physical activity to that of other women their age) was used (Sternfeld et al., 2000). Serum sex steroid, FSH and sex hormone-binding globulin (SHBG) levels varied by ethnicity, but appear to be highly confounded by ethnic disparities in body size (Randolph et al., 2003). Consumption of the soy isoflavone genistein was not associated with vasomotor symptoms in any ethnic group (Gold et al., 2004), but median intake was 4-fold lower (5.4 mg/day, interquartile range 10.1 mg) in these Japanese-Americans than the average intake of 23.2 mg/day among Japanese living in Japan (Kimira et al., 1998). Nevertheless, premenopausal Japanese-Americans with higher genistein intake had higher bone mineral density (Greendale et al., 2002).

The SWAN, with its longitudinal design and relatively large sample sizes, provides important information on ethnic differences in the USA, but some sources of bias should be noted. Recruitment of some ethnic groups proved difficult, resulting in potential biases of subpopulations. Two subpopulations, Japanese-Americans and Chinese-Americans, are likely to be second and third generation, and thus more similar to non-Asian Americans, as evidenced by higher vasomotor symptoms and lower dietary isoflavone intake compared to Japanese living in Japan. (Other ethnic groups, such as Vietnamese, might represent populations of first generation immigrants that should be included in future studies.) Finally, as large numbers of women have quit HRT in the wake of results from the HERS/I/II and Women’s Health Initiative (Rossouw et al., 1995; Hulley et al., 1998; McDonough, 2002; Randolph, 2002; Rossouw et al., 2002; Manson et al., 2003), another source of bias may be introduced into the results of longitudinal studies carried out in the USA and elsewhere (Nozaki et al., 2004; Paine et al., 2004), as post-menopausal women begin to experience symptoms delayed due to HRT use.

Cross-cultural vasomotor symptom reporting

Anthropological research has consistently shown that the prevalence of vasomotor symptom reporting, notably hot flushes and night sweats, is not distributed equally either between or among populations of peri- and post-menopausal women. Beyene carried out research among rural Mayans living in the Yucatan, Mexico, where women have numerous pregnancies and extended cycles of amenorrhoea associated with prolonged lactation and malnutrition and found no reporting of either hot flushes or cold sweats. In contrast, Greek peasant women, whom she also studied, reported symptoms similar to those commonly reported across northern Europe (Beyene, 1986).

Findings from research carried out in India (Flint, 1975), Indonesia (Flint and Samil, 1990; Boulet et al., 1994), among Africans living in Israel (Waltlisch et al., 1994), in Taiwan (Yeh, 1989; Boulet et al., 1994), Hong Kong (Boulet et al., 1994; Haines et al., 1994), Japan (Lock, 1993; Melby, 2005a,b), Singapore (Boulet et al., 1994; McCarthy, 1994), China (Tang, 1994; Shea, 1998), Korea (Boulet et al., 1994), Thailand (Chompoontwee et al., 1993; Chirawatkul and Manderson, 1994) and Malaysia (Ismael, 1994), reveal lower reporting of hot flushes and night sweats compared to North American and European populations, although there is considerable variation in prevalence among these studies.

Boulet et al. (1994), on the basis of research in seven South-East Asian countries, showed that headaches, dizziness, anxiety, irritability and other non-specific symptoms were commonly associated by the women in their study with the menopausal transition. Boulet and her associates argue that such symptom reporting should be understood as ‘a form of communication’ on the part of women, and speculate that vasomotor distress may be ‘translated’ by them into culturally meaningful non-specific symptoms that are associated with feelings of psychological distress. The assumption in making such interpretations is that when subjective reporting does not coincide with the findings...
anticipated by the researchers then women are, in effect, misrepresenting their symptom experience.

In one study in Thailand (Punyabothra et al., 1997), and another in the Philippines (Ramoso-Jalbuena, 1994), prevalence of vasomotor symptom reporting was similar to findings for European countries, and the International Health Foundation study of seven South-East Asian countries found that a little over half of the respondents in Malaysia and Philippines reported hot flushes (Boulet et al., 1994). In Nigeria (Okonofua et al., 1990), Ghana (Kwawukume et al., 1993) and Tanzania (Moore and Kombe, 1991), respectively, 30, 50 and 80% of the women studied reported hot flushes. One third to one half of women surveyed in countries in the Arab world reported them (Rizk et al., 1998; Obermeyer et al., 1999), and in Turkey 74% of surveyed women had experienced such symptoms (Neslihan Carda et al., 1998). A review of literature published in the last 4 years found population rates of hot flushes ranging from 15.1 to 61% (Fuh et al., 2001; Obermeyer et al., 2002); however, comparability is limited by differences in recall periods (2 weeks versus 1 month versus since age 40 (Chim et al., 2002)), symptom inclusiveness [hot flushes only (Lam et al., 2003) or vasomotor symptoms (Joffe et al., 2002)], age range [42–52 years (Gold et al., 2004) to a range from less than 30 to greater than 71 years old (Pan et al., 2002)] and distribution across menopausal status groups (Table III). For example, 24% of Slovenian women experienced a hot flush in the past 2 weeks, but 55% have experienced a hot flush at least once in their lives (Sievert et al., 2004). A population of premenopausal and early perimenopausal Japanese-Americans had a vasomotor symptom rate of 34.4% in the previous 2 weeks (Gold et al., 2004), compared to a 2 week hot flush rate of 22.1% among Japanese living in Japan (the majority of whom were perimenopausal) (Melby, 2005a). Another study of primarily post-menopausal Japanese living in Japan had a symptom rate of 46.6%, but recall period was not reported (Anderson et al., 2004). These examples illustrate the difficulties and limitations of comparing symptom rates and identifying relevant factors without first controlling for methodological differences.

An understanding of the cross-cultural differences in symptom reporting requires data on factors influencing the occurrence and experience of hot flushes. A recent review reported that smoking was a consistent risk factor for hot flushes, and factors such as hormone levels, body size, tubal ligation, surgical menopause and race/ethnicity may also be associated with hot flushes (Whiteman et al., 2003). Factors identified as influencing vasomotor symptoms in recent studies (2000–2004) are summarized in Table IV. Some of the factors that have been found to positively associate with reporting of vasomotor symptoms include: age; menopausal status after adjustment for age (with peri- and post-higher than premenopausal; though relative rates of per- or post-menopausal symptom reporting vary between studies); environmental variables such as ambient temperature and smoking; diet (coffee consumption and egg consumption as a child); FSH; and other comorbidities. Factors with mixed results (positive and negative correlations in different studies) include: BMI and education. Factors that were negatively associated with

<table>
<thead>
<tr>
<th>Population symptom rate</th>
<th>HF or V* Recall period</th>
<th>n</th>
<th>Age</th>
<th>Menopausal status (% of non-surgical population)</th>
<th>Ethnic group/nationality</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.1 HF</td>
<td>2 weeks</td>
<td>1329</td>
<td>40–54</td>
<td>55.5</td>
<td>28.7</td>
<td>15.8</td>
</tr>
<tr>
<td>17.6 HF</td>
<td>Since age 40</td>
<td>495</td>
<td>40–60</td>
<td>40.9</td>
<td>28.5</td>
<td>30.6</td>
</tr>
<tr>
<td>22.1 HF</td>
<td>2 weeks</td>
<td>140</td>
<td>45–55</td>
<td>27.1</td>
<td>52.9</td>
<td>20.0</td>
</tr>
<tr>
<td>23.3 HF</td>
<td>NR</td>
<td>978</td>
<td>40–60</td>
<td>41.4</td>
<td>17.7</td>
<td>40.9</td>
</tr>
<tr>
<td>24.0 HF</td>
<td>2 weeks</td>
<td>58</td>
<td>32.7–85.5</td>
<td>22.4</td>
<td>10.3</td>
<td>67.2</td>
</tr>
<tr>
<td>26.2 HF</td>
<td>2 weeks</td>
<td>583</td>
<td>45–55</td>
<td>29.8</td>
<td>44.0</td>
<td>26.2</td>
</tr>
<tr>
<td>28.9 V</td>
<td>2 weeks</td>
<td>218</td>
<td>42–52</td>
<td>62.3</td>
<td>37.7</td>
<td>0.0</td>
</tr>
<tr>
<td>34.3 V</td>
<td>2 weeks</td>
<td>198</td>
<td>42–52</td>
<td>57.4</td>
<td>42.6</td>
<td>0.0</td>
</tr>
<tr>
<td>36.6 V</td>
<td>2 weeks</td>
<td>1418</td>
<td>42–52</td>
<td>53.1</td>
<td>46.9</td>
<td>0.0</td>
</tr>
<tr>
<td>37.8 V</td>
<td>1 month</td>
<td>476</td>
<td>40–60</td>
<td>38.7</td>
<td>29.6</td>
<td>31.7</td>
</tr>
<tr>
<td>38.0 HF</td>
<td>NR</td>
<td>386</td>
<td>$30–71</td>
<td>58.3</td>
<td>58.3</td>
<td>41.7</td>
</tr>
<tr>
<td>39.0 HF</td>
<td>2 weeks</td>
<td>36</td>
<td>40–65</td>
<td>NR</td>
<td>NR</td>
<td>NR</td>
</tr>
<tr>
<td>44.7 HF</td>
<td>NR</td>
<td>868</td>
<td>40–60</td>
<td>9.8</td>
<td>21.5</td>
<td>68.8</td>
</tr>
<tr>
<td>46.5 V</td>
<td>2 weeks</td>
<td>750</td>
<td>42–52</td>
<td>49.8</td>
<td>50.2</td>
<td>0.0</td>
</tr>
<tr>
<td>46.6 HF</td>
<td>NR</td>
<td>829</td>
<td>40–60</td>
<td>20.2</td>
<td>15.3</td>
<td>64.5</td>
</tr>
<tr>
<td>49.0 HF</td>
<td>1 month</td>
<td>271</td>
<td>45–55</td>
<td>48.0</td>
<td>7.4</td>
<td>35.1</td>
</tr>
<tr>
<td>49.4 V</td>
<td>2 weeks</td>
<td>239</td>
<td>42–52</td>
<td>56.5</td>
<td>43.5</td>
<td>0.0</td>
</tr>
<tr>
<td>55.0 HF</td>
<td>Ever</td>
<td>58</td>
<td>32.7–85.5</td>
<td>22.4</td>
<td>10.3</td>
<td>67.2</td>
</tr>
<tr>
<td>61.0 HF</td>
<td>1 month</td>
<td>238</td>
<td>45–55</td>
<td>30.7</td>
<td>22.3</td>
<td>47.1</td>
</tr>
</tbody>
</table>

NR = not reported.

*a*HF = hot flush; V = vasomotor symptoms.

*b*Only premenopausal and early perimenopausal women included in this study.

*c*Rate among post-menopausal women only.

*d*Cases of surgical menopause (261 Australian and 79 Japanese) were included in the reported rate.

*e*Pre- and perimenopausal women combined.
M.K. Melby, M. Lock and P. Kaufert

Table IV. Factors influencing vasomotor symptoms identified in recent studies (2000–2004)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Resulta</th>
<th>Ethnic group/country</th>
<th>Age</th>
<th>n</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Menopausal status</td>
<td>+</td>
<td>USA</td>
<td>40–60</td>
<td>476</td>
<td>Joffe et al. (2002)</td>
</tr>
<tr>
<td>Menopausal status</td>
<td>+</td>
<td>Mexican</td>
<td>45–60</td>
<td>7632</td>
<td>Malacara et al. (2002)</td>
</tr>
<tr>
<td>Menopausal status</td>
<td>+</td>
<td>Han Chinese/Taiwan</td>
<td>40–54</td>
<td>1329</td>
<td>Fuh et al. (2001)</td>
</tr>
<tr>
<td>Menopausal status</td>
<td>+</td>
<td>Singaporean</td>
<td>40–60</td>
<td>495</td>
<td>Chim et al. (2002)</td>
</tr>
<tr>
<td>Menopausal status</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Body size</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavier weight at age 18</td>
<td>+</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>BMI</td>
<td>–</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>BMI</td>
<td>+</td>
<td>Mexican</td>
<td>45–56</td>
<td>7632</td>
<td>Malacara et al. (2002)</td>
</tr>
<tr>
<td>BMI</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>+</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>Smoking—passive</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schooling</td>
<td>–</td>
<td>Mexican</td>
<td>45–60</td>
<td>7632</td>
<td>Malacara et al. (2002)</td>
</tr>
<tr>
<td>Education years</td>
<td>+</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee consumption</td>
<td>+</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>Eggs consumed as child</td>
<td>+</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>Soy product intake</td>
<td>–</td>
<td>Japanese</td>
<td>35–54</td>
<td>1106</td>
<td>Nagata et al. (2001a,b)</td>
</tr>
<tr>
<td>Hormones</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FSH</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Reproductive history</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Months breastfeeding last child</td>
<td>–</td>
<td>Mexican</td>
<td>40.8–66.7</td>
<td>67</td>
<td>Sievert et al. (2002)</td>
</tr>
<tr>
<td>Premenstrual symptoms</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Other health</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived stress</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Over-the-counter pain medications</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Any comorbidities</td>
<td>+</td>
<td>SWANb</td>
<td>42–52</td>
<td>3302</td>
<td>Gold et al. (2004)</td>
</tr>
<tr>
<td>Rural–urban residence</td>
<td>Rural higher in two of three areas</td>
<td>Mexican</td>
<td>45–60</td>
<td>7632</td>
<td>Malacara et al. (2002)</td>
</tr>
</tbody>
</table>

a + = positively related to vasomotor symptoms; – = negatively related to vasomotor symptoms.
b The SWAN includes Caucasian, African-, Hispanic-, Chinese- and Japanese-Americans.
c Peri- and/or post-menopausal women versus premenopausal women.

Vasomotor symptoms include: estradiol (E₂); months breastfeeding last child. While these studies have identified factors that may influence vasomotor symptoms, the direction and extent of effect may vary between populations and individuals. Thus systematic data collection on factors influencing vasomotor symptoms is warranted.

Much better standardization of research methodologies is called for before firm conclusions can be drawn on the basis of studies such as those cited above. Sample sizes are often small, include widely different age ranges, and several were created out of clinical populations, introducing considerable bias. Sensitivity to the complexity of linguistic expressions (Zeserson, 2001) and translation of bodily terms across languages is often absent. Women who have undergone surgical menopause are not always placed in a separate category for the purposes of analysis. This is problematic because such women often show different symptom reporting (Gold et al., 2000; Keenan et al., 2003). Very often women are asked to recall what may have happened 5 or even 10 years previously. Hot flush frequencies are reported for the previous 2 weeks, 1 month, since menopause or age 40, or ‘ever’, depending on the study. Further bias is introduced if, as is often the case, symptom reporting by women is not stratified by their actual menopausal status (something that is particularly difficult to establish in ethnic groups in which multi-parity is the norm).

Analysis categories and relative proportions of menopausal status subpopulations may also influence the reported symptom prevalence. For example, a recent detailed analysis of a Japanese non-clinical population reported rates of hot flushes of 24.3% for perimenopausal women, but 18.2 and 42.1%, respectively, among early and late perimenopausal women (Melby, 2005a). The latter rate is similar to the hot flush prevalence observed in an Australian population in late perimenopausal and early post-menopausal women (Melby, 2005a). The latter rate is similar to the hot flush prevalence observed in an Australian population in late perimenopausal and early post-menopausal women (Melby, 2005a). The latter rate is similar to the hot flush prevalence observed in an Australian population in late perimenopausal and early post-menopausal women (Melby, 2005a). The latter rate is similar to the hot flush prevalence observed in an Australian population in late perimenopausal and early post-menopausal women (Melby, 2005a). The latter rate is similar to the hot flush prevalence observed in an Australian population in late perimenopausal and early post-menopausal women (Melby, 2005a). The latter rate is similar to the hot flush prevalence observed in an Australian population in late perimenopausal and early post-menopausal women (Melby, 2005a).
of isoflavones (Guthrie et al., 2000), a level comparable to Japanese intake. Unfortunately, in a recent Japanese-Australian study, although data were collected on early and late perimenopausal status, they are not reported separately (Anderson et al., 2004). Furthermore, while the SWAN study has collected data on these perimenopausal groups (Avis et al., 2001), symptom rates are reported by ethnic group (all menopausal status groups combined) and by menopausal status groups with early and late perimenopause analysed separately (but with all ethnic groups combined) (Gold et al., 2000). Because of the large differences in sample sizes between ethnic groups, this means that the late perimenopausal group consists of approximately 85% African-Americans and non-Hispanic Caucasians, with Japanese, Chinese and Hispanic women comprising the remainder. Although adjusted odds ratios are reported, symptom rates by menopausal status groups, separated by ethnic group, are not, rendering comparisons with other studies’ symptom rates difficult.

Due to serious methodological limitations, a meta-analysis of the literature is impossible at this time. Nevertheless, the research to date suggests that there is considerable variation in reporting of vasomotor symptoms across cultures that cannot be explained away as simply due to culturally conditioned inattention or methodological problems. The continuum from relatively high rates of vasomotor symptom reporting in North American Caucasians and African-Americans to low rates in countries like Japan or no reporting of symptoms among rural Mayan women demonstrates that the experience of the perimenopause is not universal.

**Part III: Transition to a biocultural approach**

The findings cited above in connection with reporting of vasomotor symptoms and age at menopause, when combined with a lifespan approach to the body, suggest that research into menopause should be designed to take biological parameters into consideration including diet and smoking, BMI and reproductive ecological variables such as age at menarche and parity. In addition, psychological variables, including high levels of stress associated with lifestyles, as well as social variables including education, family structure, income and urban or rural residence, should all be included in the analysis. Cultural values associated with ageing and expectations about the menopausal transition should also be taken into consideration; interviews should be conducted in the first language of the informant with an awareness of the specific idioms used in any given language in connection with the end of menstruation and associated symptoms. Furthermore, to what extent menopause is medicalized is crucial to the interpretation of data. It is clear that co-operation across disciplines is required for this type of research.

**Biological anthropology and reproductive ecology**

Biological anthropology and reproductive ecology have made important contributions to our understanding of human reproductive biology by highlighting the influence of ecological and cultural factors on fertility and chronic disease. In the subsequent discussion of how biology and culture entwine to produce local (individual) experience and knowledge, we use the concept of local biology that highlights the dialectic between, and the interdependence of, culture and biology, and thus the latter’s plasticity (Lock, 1993). Marked biological variation among humans in hormonal profiles, reproductive function and symptomatology throughout the reproductive lifespan exists (Panter-Brick et al., 1993; Worthman et al., 1993; Campbell and Wood, 1994; Ellison, 1994; Panter-Brick and Ellison, 1994; Short, 1994; Vitzhum, 1994; Voland, 1998; Wiley, 1998). For example, low luteal phase progesterone levels (Ellison et al., 1993a,b) characterize women in many non-Western ‘natural fertility’ populations, a pattern that has been linked to lower nutrition and increased workload (Ellison et al., 1993a,b; Panter-Brick et al., 1993; Worthman et al., 1993; Panter-Brick and Ellison, 1994; Wood, 1994; Ellison, 1995, 1996; Bentley et al., 1998). Parity, workload and nutritional status may greatly affect ovarian function, and these variables may explain much of the cross-cultural variation as well as exposure to environmental chemicals such as smoking and consumption of soy isoflavones. For example, in the SWAN, serum sex steroids, FSH and SHBG levels vary by ethnicity, but were highly confounded by ethnic differences in BMI (Randolph et al., 2003). Cross-sectional analysis of the SWAN data found that menstrual cycle characteristics varied by age, BMI and ethnicity (Santoro et al., 2004). Another study found that menstrual cycle length varied significantly between Caucasian and Asian women (Liu et al., 2004). Post-industrialized populations in North America and Western Europe (with low parity, relatively sedentary lives and high levels of nutrition) appear to represent an extreme on the continuum of variation in ovarian function, a fact which may relate to the epidemiology of breast and ovarian cancer (Ellison et al., 1993a,b; Eaton et al., 1994), and possibly also the epidemiology of menopausal symptoms.

A higher incidence of reproductive cancers in North American and Western European populations compared to Asian, African or Eastern European populations (Trowell and Burkitt, 1983; Yu et al., 1991) is associated with lower parity, resulting in higher cumulative lifetime exposure to gonadal steroids, particularly estrogens (Henderson et al., 1993; Marshall, 1993; Eaton et al., 1994). This pattern spreads as developing countries adopt Western diet and habits (Adlercreutz, 1990), with modification by use of oral contraceptives. Moreover, although first generation immigrants generally exhibit an incidence rate typical of their country of origin, second generation immigrants often assume the risk of their host country (Shimizu et al., 1991).

Japanese women are of particular interest because their reproductive hormonal profiles and cancer risk resemble women in less developed countries whereas their ecology is more similar to that of the more developed countries (Parkin, 1989; Eaton et al., 1994; Ferlay et al., 2004). They exhibit the low rates of reproductive cancers found in natural fertility populations in spite of the lower parity, later marriage age, higher number of menstrual cycles, higher caloric consumption and decreased workload typical of industrialized nations (JMHLW, 2003a,b). Circulating estrogen levels are low compared to levels in North American women (Goldin et al., 1986; Parkin, 1989; Key et al., 1990; Shimizu et al., 1990), although comparisons of hormone levels between populations often do not control for factors such as smoking, BMI and herbal/dietary exposures. Nevertheless genetic differences are unlikely to be responsible for these differences since the incidence of reproductive cancers...
approaches U.S. rates when Japanese women emigrate to the U.S. (Shimizu et al., 1991; Maskarinec et al., 2002). Japanese women have low levels of menopausal symptoms (Lock, 1993) as well as breast, ovarian and endometrial cancer (Parkin, 1989) compared to North American women and Japanese living in Hawaii, suggesting that environmental factors rather than solely genetic factors may be involved (Tham et al., 1998). Furthermore, the prevalence of vasomotor symptoms among Japanese-Americans (34.3%) is higher than perimenopausal Japanese living in Japan (13.5%) (Lock, 1993), though still slightly lower than the 36.6% of Caucasian-Americans in the SWAN (Gold et al., 2004). These results suggest that cultural differences may primarily result from local biologies, i.e. biology modified by local cultural and environmental influences.

Cultural influences on local biology: role of diet

The choice of what to eat and how to prepare it is profoundly cultural and is recognized as playing an important role in many aspects of health, from cancer to cardiovascular health and osteoporosis. Lifestyle factors such as exercise and diet (i.e. energy expenditure and caloric intake) are known to influence health and reproductive functioning, but the effects of specific dietary compounds such as phytoestrogens have been largely ignored until recently. Following concerns about the use of HRT at menopause, isoflavones are increasingly being investigated as dietary compounds such as phytoestrogens have been largely ignored until recently. Following concerns about the use of HRT at menopause, isoflavones are increasingly being investigated as an alternative to HRT, and despite a lack of conclusive data (Kronenberg and Fugh-Berman, 2002; Valtuena et al., 2003; Huntley and Ernst, 2004), the North American Menopause Society has issued a statement supporting the use of isoflavone supplementation in some cases (NAMS, 2004).

From an epidemiological perspective, populations, such as the Japanese, which consume high amounts of isoflavones in the form of soy, also have documented low levels of reproductive-related cancers and menopausal symptoms. The Japanese diet is unique in including a high proportion of soy, which contains relatively large amounts of the isoflavones daidzein and genistein (Mazur, 1998). Intestinal bacteria convert isoflavones into weakly estrogenic compounds that can influence sex hormone production, metabolism and biological activity, intracellular enzymes, protein synthesis, growth factor action, malignant cell proliferation, differentiation, cell adhesion and angiogenesis (Adlercreutz and Mazur, 1997). Recent studies suggest that equol, a metabolite of daidzein, is particularly bioactive, and may account for much of the estrogen-mediated effects of soy and isoflavones (Setchell et al., 2002).

Phytoestrogens are widely believed to exert protective effects on the reproductive system (Punnonen et al., 1987; Horn-Ross, 1995; Murkies et al., 1996; Tanaka et al., 1999; Murtney et al., 1999; Nakayama et al., 1999; Veltuena et al., 2003; Huntley and Ernst, 2004), the cycle (Lu et al., 1996). In post-menopausal American women, soy phytoestrogens have been found to decrease LH secretion (Van Thiel et al., 1991) and hot flushes (Murkies et al., 1995; Albertazzi et al., 1998; Whitten and Naftolin, 1998), but not all studies have been able to demonstrate a difference from the normal decline in symptoms over time (Murkies et al., 1995; Brzezinski and Debi, 1999) or placebo (Burke et al., 2003; Tice et al., 2003). Overall, randomized controlled studies on the effects of isoflavones on menopausal symptoms have been inconclusive due to limitations of small sample sizes and short-term treatment. Observational studies of Japanese women, which have produced more consistently positive results (Nagata et al., 2001a,b), have been larger in size and have focused on women consuming soy over long periods of time, although self-selective factors may affect intake and outcomes. Effects in populations with habitual dietary soy intake (Ho et al., 2003) may differ from those populations in the West where extracted isoflavones are ingested over a limited time period. In post-menopausal Japanese women (Nagata et al., 1999) and in a community-based prospective study (Nagata et al., 2001a,b), hot flushes were inversely associated with soy and isoflavone intake.

Disparities between epidemiological data and clinical data may result in part from the following: small sample sizes and large placebo effect in many clinical studies; developmental influences of chronic soy consumption versus short-term interventions; other components of soy foods that are beneficial such as peptides (Kurzer, 2003); populational differences in gut microflora and equol-producing ability; and isoflavone source. In most intervention studies, equol-producing ability is not assessed, and subpopulations are not separated for analyses. Recent data suggest that only individuals capable of metabolizing...
the isoflavone daidzein into equol may receive significant health benefits, and thus populations must be analysed separately by microflora and metabolic characteristics (Setchell et al., 2002). Significant results are likely to be obscured when subpopulations are analysed together, particularly in those studies carried out among Western populations in which only approximately 30% are equol producers (Setchell et al., 2003) compared to Japanese populations where 50–60% of menopausal women are equol producers (S. Watanabe, personal communication, 2004). Furthermore, many menopausal intervention studies use isoflavones derived from clover (as opposed to soy), which has a much lower ratio of daidzein to genistein than soy germ, and thus results in lower levels of equol in equol producers (Watanabe et al., 2005).

Part IV: Exemplary case studies of biocultural studies of menopause

The results of several recent studies support the need for a move to interdisciplinary research. In this section we review: (1) one of the first biocultural studies of menopause, conducted among Mayan women in Mexico; (2) a recent cross-cultural study between Japan and Australia; (3) a cross-cultural study between Japan and North America utilizing similar, comparable methodology with recent data from Japan for a longitudinal comparison.

Menopause among Maya in Yucatan, Mexico

In a project carried out by a multidisciplinary team that followed up on the earlier study by Beyene (1989), in a sample of over 228 Mayan women whose average age at menopause was 44.3 (range 18–80 years, 118 post-menopausal women), endocrine changes at menopause were very similar to those of North American women. As in the earlier study, no hot flushes were reported (except very occasionally after migration to an urban environment) (Martin et al., 1993; Beyene and Martin, 2001). Plasma, urinary and vaginal levels of estrogens neither relate neatly with subjective reporting of hot flushes (Freedman, 2001) nor do measured rates of sternal skin conductance, sweating, peripheral vasodilation, or deregulation of core body temperature (Freedman, 2001; Sievert et al., 2002). Clearly considerable mediation takes place between measurable physiological changes, subjective experience and the reporting of symptoms, some of which may be accounted for by as yet poorly understood biological pathways (Kronenberg, 1990; Ginsburg and Hardiman, 1994). It is reasonable to speculate, for example, that with urban migration and education women might experience hot flushes more frequently as a result of dietary changes or due to a more sedentary lifestyle. In addition, cultural expectations, local values and language may also be implicated, although it would be entirely inappropriate to reduce reporting of debilitating hot flushes entirely to changes in attitudes and education.

While self-report of hot flushes may be influenced by language and culture, osteoporosis can be objectively assessed by measurement of bone mineral density. Among Mayan women, bone mineral density declines with age to values that are on average lower than those for American women, but no fractures were detected even though some \( n = 32 \) were 20 years post-menopausal (Beyene and Martin, 2001). Thus some combination of environment, diet and lifestyle must be contributory.

Martin et al. (1993) documented a population of post-menopausal Mayan women who, despite having similar endocrinology to North American populations and experiencing age-related bone demineralization, did not report hot flushes and did not have a high incidence of osteoporotic fractures. In contrast, Sievert et al. (2002) found that a number of urban Mexican women reported and demonstrated hot flushes (by sternal skin conductance) (though some reported but did not have measurable hot flushes and vice versa).

Australian and Japanese Midlife Women’s Health Study

The relationships among menopausal status, country of residence and symptoms were examined in 886 Australian and 848 Japanese women (aged 40–60 years) (Anderson et al., 2004). Surveys including data on menopausal symptoms (using the Greene Climacteric Scale), menstrual history and sociodemographics were mailed to randomly selected populations in both countries with response rates of 58 and 56% in Australia and Japan, respectively. More than half of the women were post-menopausal, 14.5% were perimenopausal and 12.3% were premenopausal. In both cultures similar increases in prevalence of depression, somatic symptoms and vasomotor symptoms were observed in the perimenopause. Statistically significant differences were observed in psychological symptoms, somatic symptoms and sexual symptoms by menopausal status but not by country of residence. Statistically significant differences in vasomotor symptoms were observed by menopausal status and country of residence. Australian women experienced more night sweats than Japanese women, but the prevalence of hot flushes was not statistically different. Vasomotor, psychological and somatic symptoms decreased after menopause in Australian women, with only sexual symptoms continuing. In Japanese women, somatic, psychological and sexual symptoms remained high after menopause. Rates of symptom reporting in this study were higher than those found in other studies of Japanese general populations (Lock, 1993; Melby, 2005a), and may be due to historical changes, geographical differences, differences in recall period (i.e. 2 week recall period in Lock and Melby and unspecified period in the above study), inclusion of cases of surgical menopause in symptom rate data, participation bias due to low participation rates (i.e. participation rates could have been higher among symptomatic women, resulting in a study population with higher symptom rates) and differences in the ways symptom terms were translated [i.e. the Australian and Japanese Midlife Women’s Health Study (AJMWHS) reduced cultural bias by making the English and Japanese surveys consistent, but as several researchers have noted, Japanese hot flush terminology is more detailed and not easily translated into English (Lock, 1993; Zeserson, 2001; Melby, 2005a)].

An earlier paper by the same authors compared symptoms among 712 Australian and 1502 Japanese women aged 46–60 years old. Reported hot flush rates did not differ significantly between the two countries nor between menopausal status groups in either country (Anderson et al., 2004). The latter result is particularly surprising, as almost all studies have found significantly higher rates in peri- and post-menopausal women compared to pre-menopausal women.
Japanese women, at 11.5%, was low, corroborating their reports about lack of severity of hot flushes.

Japanese reporting in connection with feeling ‘blue’ or depressed is low and not associated with menopausal status, since it is highest among premenopausal women. Canadian reporting, although higher than the Japanese, also showed little change across menopausal status. These different patterns of reporting argue strongly against any simple causal link between declining endogenous estrogen levels and reporting of depression.

It is well known that Japanese women currently enjoy the longest life expectancy in the world—a mean of 85.33 years in 2003 (JMHLW, 2003a,b). The incidence of breast cancer (age-standardized world rates) is about one third of that in North America (Ferlay et al., 2004), and the incidence of osteoporosis for Japanese women is less than half that of Caucasian women in North America, even though Asian women on the whole have a lower bone density (Ross et al., 1991). The present research also showed that only 28% of Japanese respondents suffer from a chronic health problem (diabetes, allergies, asthma, arthritis, high blood pressure), as opposed to 45% of Manitoban women and 53% of Massachusetts women. Taken together these figures suggest that middle-aged Japanese women enjoy somewhat better health than do those in North America.

Japanese women who were around 50 years of age when this study was done were born at the beginning of the Second World War, and many experienced nutritional depravation as very small children. However, virtually none of them have smoked; alcohol and coffee consumption is low, and the diet is low in fat and rich in soybeans and vegetables. Soybeans are a source of phyto-estrogens and may well contribute at least in part to the lower symptom reporting of hot flushes among Japanese women (Lock, 1993). So too may the herbal teas that many women drink, some of them also rich in phytoestrogens. This cohort of women have, as part of their daily lives, always done considerable exercise and weight bearing. Given dietary changes in Japan, this picture is very likely to change as succeeding generations of Japanese women in their turn become middle aged.

Twenty years later, results from field research in 2001–2003 (Melby, 2005a) suggest the 2 week prevalence rates of hot flushes have more than doubled compared to the rates reported by Lock, perhaps in part due to lifestyle changes such as westernization of diet and/or medicalization of ko¬nenki; however, the prevalence remains lower than that of Japanese- (and Caucasian-) American women (Gold et al., 2004). In this recent study 140 women aged 45–55 years old inclusively were selected from a general population of women who had not undergone gynaecological surgery or used hormones. The prevalence of any type of hot flush was 22.1% (24.3% for perimenopausal women, but 42.1% for late and only 18.2% for early perimenopausal women) and night sweats and sudden sweating were reported by only 6.4 and 8.6% of the participants, respectively (Melby, 2005a). Furthermore, in a factor analysis of symptoms, night sweats were not associated with hot flushes (Melby, 2005b).

In the intervening years between Lock’s and Melby’s research in Japan, considerable medicalization of menopause has occurred (Kaufert and Lock, 1997). Könenki has been given extensive coverage in the popular press (Zeserson, 2001) to the extent that...
most people (even men and younger women) now discuss the
difficult time at könennki, understand that hormones are involved,
and associate hot flushes as well as irritability with this period of
life. The westernization and medicalization of menopause is
embrodied in the language in the terms hotto furasshu and horu-
mon baransu (hormone balance) that often appear in the media
(Zeserson, 2001). Given the increased attention to könennki, it is
not surprising that reporting of vasomotor symptoms has
increased among Japanese women. However, it is significant that
despite the medicalization and media attention, rates of vasomo-
tor symptoms among Japanese women continue to be consider-
ably lower than among Caucasian and Japanese Americans
(Gold et al., 2004). The medicalization of könennki parallels the
westernization of the diet as well as lifestyle changes that are
reflected in the increase of obesity, diabetes, cancer and
cardiovascular disease (Kato et al., 1987; Kodama et al., 1991;
Tominaga and Kuroishi, 1997; Yamada et al., 1997).

Könennki is often characterized as a time when the body ‘loses
its balance’ (Lock, 1993), and is attributed by Japanese to both
cultural and biological causes. With medicalization, Japanese
women now talk about ‘hormone balance’, but notably they
rarely mention ‘estrogen depletion’ as is sometimes discussed in
the North America. Given the problematic assumptions about
the benefits of estrogen replacement therapy, the Japanese focus
on ‘hormone balance’ may prove to be a more biologically accu-
rate view.

An argument can be made that the healthy longevity of
Japanese women be attributed in large part to the relatively even
distribution of wealth in Japanese society and equal access to
good health care and social benefits, added to which is universal
public education of a high quality, and a long tradition of both
public and familial investment in preventive medicine. These
conditions are without doubt much more important in contribut-
ing to the good health of middle-aged Japanese women than are
any shared cultural beliefs that they have. In addition, it seems
highly likely that the Japanese diet—low in fat, high in protein
and plant estrogens—plays an important role in low symptom
reporting at the end of menstruation, and in longevity. Genetics
may, of course, also make a contribution.

Some additional findings of interest come from the research
of Jean Shea with 400 Chinese women. Shea used methods
readily comparable with those used in the comparative project
reported above. Vasomotor symptom reporting among the
Chinese women in this study is low and resembles that of the
Japanese sample discussed above. However, the overall symp-
tom reporting of the Chinese women is considerably higher than
the Massachusetts, Manitoba and Japanese samples, leading
Shea to conclude that sweeping generalizations about East Asia
should be avoided (Shea, 1998).

Conclusions

Research into culture and menopause has undergone several
transitions over the years. In the first phase, cultural differences
in symptom reporting and the subjective experience of meno-
pause were noted. Research then proliferated to document first,
if these differences were ‘real’, and second how culturally related factors might account for them. In the bulk of this
research, culture is conceived as layered over an invariant
biological base. More recently, research such as the SWAN and
that carried out in Asia and elsewhere has made it clear that
even when the contribution of culture to menopause is investi-
gated with care a great deal of variation is left unaccounted for.

In virtually all research paradigms, menopause has been
detached from the rest of life, particularly what precedes it.
Most research on menopause begins at the earliest in the late
premenopause, and often ignores reproductive and dietary his-
tory that may be expressed/manifested in the menopausal body.
Models need to be developed of the interaction between biologi-
cal and cultural factors across the lifespan that influence the
menopausal experience. Clearly more interdisciplinary, metho-
dologically-rigorous research is required before comparative
meta-analyses can be done. Elucidation of systematic patterns is
crucial but so too is attention to specific contexts. Further, cohort
effects need careful scrutiny, such as the menopausal women
studied by Lock who were born during world war II, compared
to those currently being studied by Melby who have experienced
a greater degree of westernization of diet and medicalization of
menopause.

Obermeyer has argued that we need longitudinally designed
studies using standardized questionnaires and an agreed-upon
definition of menopause in order to carry out good cross cultural
work (Obermeyer et al., 1999). However, it is important to
acknowledge that, when researching symptom reporting an
agreed upon definition of menopause would essentially be some-
thing that is imposed on women everywhere in order to achieve
apparent objectivity. In reality, many problems would result with
data interpretation, as has already repeatedly been the case, and
many findings of variation are ruled out as inauthentic because
they are assumed to be culturally produced. There is no univer-
sal menopausal entity or experience waiting to be exposed
through systematic inquiry (although the end of menstruation is,
of course, universal). Systematization and rigorous analyses are
needed, but these will lead us, not to the essence of menopause,
but to what is relevant for comparative purposes.

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