

Constructing a standard climacteric scale

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Abstract

Issues relating to the design of scales and their psychometric properties are discussed in the context of constructing a standard measure of core climacteric symptoms. Seven factor analytic studies of climacteric symptoms are examined to determine whether or not there is sufficient consensus across studies to permit agreement on the symptom content and the structure of such a scale. It is argued that these factor analytic studies do indeed contain sufficient consensus on the basis of which a standard climacteric scale can be constructed. Such a scale is described. © 1998 Elsevier Science Ireland Ltd. All rights reserved.

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1. Introduction

Climacteric research has long suffered from the lack of a standard instrument to measure the range of symptoms most commonly experienced by women at that time of their lives. It is a long recognised problem, highlighted by Jaszmann [1] at the Fourth and by Utian [2] at the Sixth International Congress on the Menopause.

In the absence of a standard instrument, individual researchers have tended to draw up their own ad hoc measures. These usually consist of lists of ‘menopausal’ symptoms, subjectively selected, arbitrarily classified and rated merely present or absent, the resulting measure being poorly scaled and of unknown psychometric

properties. The oft cited and seminal study by Neugarten and Kraines [3] of ‘menopausal symptoms in women of various ages’, published over 30 years ago, is an early example of this practice—a practice which still persists even in more recent times [4,5].

Alternatively, others have relied on the use of existing standard scales. While, in the context of the research objectives, such scales may be quite appropriate, they must be used with care since they have been designed for use with other types of populations, such as psychiatric patients. In this respect the Hamilton Rating Scales of Clinical Anxiety and Depression [6,7] and the Beck Depression Index [8,9] have proved to be the most widely used. Another popular measure is the Gen-

eral Health Questionnaire [8,9], an instrument designed to measure psychiatric morbidity in general population samples.

This scale contains one item on hot flushes, one on sweating and six relating to sleep difficulties, a complaint which among climacteric women is generally thought by clinicians to be due to night sweats. It is little wonder therefore that the indiscriminate use of the GHQ results in a spuriously high psychiatric morbidity rate (47%) among perimenopausal women in the general population [10].

The only 'menopause specific' symptom measure in current use is the outdated Blatt/Kupperman Index, which because of its inadequate psychometric properties and archaic wording, has now been seriously discredited [11]. The major criticism of this scale is that the summation of diverse symptoms to yield a total 'menopause' symptoms index is without meaning. At this point it is appropriate to distinguish between the terms climacteric and menopause. Climacteric refers to a transitional phase in the life span during which a woman gradually moves from being reproductive to non-reproductive. As well as biological implications it also has social and psychological ones [12]. The menopause, the final cessation of menses, is a more circumscribed event occurring within the longer climacteric phase and is a sign that a particular biological point has been reached in the transitional climacteric process. The climacteric being a multi-faceted phenomenon, it follows that symptoms occurring during that time may come from different domains, have differing aetiologies and should consequently be categorised and measured separately from each other and not totalled to yield a single score as they are in the Blatt/Kupperman

Table 1

Desired psychometric properties of a standard climacteric scale

Principles of scaling:	Symptom content Symptom scoring Symptoms classification Factor analysis
Reliability:	Test retest Split half
Validity:	Concurrent Predictive Construct
Normative data for:	Age Menopausal status

Index. This issue will be developed later in this paper. In the meantime let us turn to the broader issues of test construction.

2. Principles of test construction

To be regarded as having adequate psychometric properties, a measure should fulfil, to some extent, the four major principles of test construction listed in Table 1.

At the outset, it is essential that an instrument be initially constructed according to the principles of scaling. This means that the items included in the measure and the way they are categorised should be determined in some objective way and that the scoring system be both objective and sensitive. One way of doing this is by the use of factor analysis. This is more fully discussed in Section 3.

The reliability of the measure should then be established. That is, it should be shown to

Table 2
Summary of seven factor analyses of climacteric symptoms

First author	Country	Population	Sample size	Number of symptoms	Number of factors
Greene (1976) [14]	Scotland	Clinical	50	30	3
Indira (1980) [15]	India	Clinical	105	30	3
Kaufert (1981) [16]	Canada	General	148	18	4
Mikkelsen (1982) [17]	Norway	General	139	21	6
Abe (1984) [18]	Japan	Clinical	114	17	6
Hunter (1986) [19]	England	General	682	36	7
Holte (1991) [20]	Norway	General	1886	24	5

Table 3
Factors generated in seven factorial studies of climacteric symptoms

Greene	Indira	Kaufert	Mikkelsen	Abe	Hunter	Holte
Vasomotor	Vasomotor	Vasomotor	Vasomotor	Vasomotor	Vasomotor	Vasomotor
Somatic	Somatic	Somatic 1	Somatic	Somatic	Somatic	Somatic
Psychological	Psychological	Psychological	Mood	Neurotic	Depression	Mood
		Somatic 2	Nervousness	Heart	Anxiety	Nervousness
			Urinary problems	Sensory	Cognitive	Urogenital
			Shortness of breath	Insomnia	Sleep	
					Sex	

measure the characteristic it is supposed to measure, consistently over time and in different settings. The reliability of a measure is greater if it consists of several related items. The common practice in climacteric research of reporting data in terms of responses to single symptoms will therefore lead to unstable results.

The measure should be valid. That is, it should be a true measure of the characteristic being assessed. Concurrent validity involves a measure being validated against some other measure of the variable, for example a diagnosis reached by a psychiatrist on the basis of a clinical interview. Other concurrent measures may be a behavioural or physiological manifestation of the condition. Predictive validity means validating the measure against some future outcome, such as response to treatment or in the case of some psychological tests of ability, future performance in a work or educational setting. Full concurrent and predictive validity are often difficult to establish in practice within a single study. In general, a properly constructed measure establishes its validity over time by demonstrating its value, utility, sensitivity and its hypothesised relationship to other variables in a variety of different types of studies, settings and populations. This is construct validity, which provides the measure with a theoretical rationale.

Finally, there should be adequate normative data which, in the context of the menopause, means that mean scores and their distribution should be available for women of different menopausal status and of different age groups.

For a practical account of the application of the principles of test construction to clinical problems readers are referred to Peck and Shapiro [13].

3. Factor analysis

As indicated above, the first step in any endeavour to develop a standard measuring instrument in a field where practice varies, is to achieve a consensus as to which symptoms should be included in the scale and how they should be categorised.

One way of doing this, in an objective way, is to use the mathematical technique of factor analysis to more clearly delineate those symptoms thought to constitute the syndrome or condition.

Factor analysis is a multi-variant mathematical technique traditionally used in psychometrics to construct measures of psychological characteristics such as intellectual and personality traits. Later, it was adapted by clinical psychologists and psychiatrists to develop scales to measure conditions, such as anxiety and depression, which present with multiple and varied symptomatology. In this context the technique involves analysing the intercorrelations among large numbers of symptoms in order to identify which symptoms cluster together to form groups or factors. This allows one to delineate the different facets of the symptom picture and to identify those symptoms which are an essential part of the syndrome and those which are not. The relationship between a symptom and a factor is measured by a correlation co-efficient, known as a factor loading.

It is then possible to construct an instrument to measure different aspects of the symptom picture on the basis of the way symptoms cluster together and on the size of their factor loading.

Table 4
Symptoms agreed by at least three factorial studies

Vasomotor	Somatic	Psychological	
		Anxiety	Depression
Hot flushes	Pressure or tightness in head or body	Feeling tense or nervous	Feeling unhappy or depressed
Night sweats	Muscle and joint pains	Attacks of panic	Loss of interest in things
	Parts of body feel numb/tingling	Heart beating quickly or strongly	Irritability
	Headaches	Excitable	Crying spells
	Feeling dizzy or faint	Difficulty in sleeping	Feeling tired or lacking in energy
	Breathing difficulties	Difficulties in concentrating	
	Loss of feeling in hands/feet		

4. Factor analytic studies of climacteric symptoms

The first factor analytic study of symptoms presented by women during the climacteric was carried out by Greene [14], for the purpose of constructing a comprehensive measure of the multi-faceted and wide ranging symptom picture presented by climacteric women. The resulting scale consisted of three separate sub-scales measuring vasomotor, somatic and psychological complaints. This study was quickly followed by six other similar factor analytic studies of similar types of symptoms [15–20]. In this section all seven factor analytic studies will be compared to determine if there is sufficient consensus among them to allow the construction of a communal and comprehensive measure of climacteric symptoms.

The basic methodology of these seven factorial studies is summarised in Table 2. Despite the apparent wide variation in the methods used in these studies, there is in fact a remarkable consensus in their findings in regard to which symptoms should be included in such a measure and how they should be categorised.

4.1. Symptoms categorisation

Table 3 shows the factors generated in each of the seven studies, the name of the factor being that used by each author to label the symptom clusters emerging from his or her study. The following points should be noted:

1. A unanimous finding and one that is per-

haps not surprising, is that vasomotor symptoms form a small cluster on their own, totally independent from all other symptoms.

2. There is total agreement that a number of symptoms cluster together to form a general somatic or perhaps psychosomatic factor, again independent from all other symptoms. It is not surprising that the presenting complaints of menopausal women should contain a large somatic component.

3. A third group of symptoms cluster to form a general psychological factor which in three studies (Mikkelsen, Hunter, Holte) sub-divides into two further factors, one representing anxiety, the other depressed mood.

4. In four studies additional factors have been extracted. These are specific factors and tend to arise when a few symptoms relating to a specific area are included, such as Mikkelsen's urinary factor, Hunter's cognitive factor and Abe's heart factor. In other studies these symptoms tend to be subsumed within the main psychological or somatic factors.

The general consensus, therefore, seems to be that climacteric symptoms fall into three major independent groups, although the psychological group may be further sub-divided into an anxiety and a depressed mood component. It should be noted that a common three factor structure emerges regardless of whether the sample is from a clinical or general population.

The logic of factor analysis is that each of these four facets of the climacteric syndrome is conceptually distinct, each may have its own separate

aetiology and therefore each should be measured independently. This results in the generation of a symptom profile for each subject.

4.2. Symptom selection

Having established the optimum number of factors to be included in a scale, the next step is to determine which symptoms should be included. As the object of the exercise is to achieve a standard and agreed instrument, some criterion for the selection of symptoms for the final scale must be applied. The criterion adopted in this paper is to select only symptoms found to have a factor loading > 0.35 in three or more studies. Applying this criterion to all seven factorial studies yields the list of symptoms shown in Table 4, grouped within their respective categories. Of these 20 symptoms, 10 (50%) had a factor loading > 0.35 in six or seven of the studies, a further seven (35%) had a factor loading in four or five of the studies leaving only three symptoms meeting the minimum requirements of agreement by three studies. This indicates a very high degree of concurrence regarding the 20 symptoms shown in Table 4.

4.3. Standardisation of the wording of symptoms

Many of the symptoms included in these factor analytic studies, although worded slightly differently, appear to refer to the same complaint. In these instances a single phrase has been used in Table 4 to capture the common essence of the similar sounding complaints. As an example of a psychological symptom, 'feeling tense or nervous' has been used to cover 'feeling tense, wound up' (Hunter, Greene) 'nervousness' (Mikkelsen, Abe, Holte) and 'nervous tension' (Kaufert). As an example of a somatic symptom, 'feeling dizzy or faint' has been used to cover 'dizzy spells' (Hunter, Indira), 'dizziness' (Mikkelsen, Kaufert, Holte) and 'vertigo' (Abe).

5. Construction of a standard climacteric scale

It has been argued in this paper that it is possible to construct a measure of climacteric symptoms

based on objective scientific principles. On the basis of the foregoing examination of factorial studies it follows that such a measure should consist of at least three separate sub-scales—one to measure vasomotor symptoms, one somatic symptoms and one psychological symptoms, although the last named may be further subdivided to measure anxiety and depressed mood. It should be noted that factorially derived scales result in symptom measures which are conceptually separate and independent, each with perhaps its own aetiology or aetiologies. This does not, however, exclude the possibility that, in certain populations or under certain circumstances, such measures may correlate with each other.

The symptom content should be as shown in Table 4, since there is a high degree of consensus on these particular symptoms across all studies. Most authors of factorial studies have rated individual symptoms in terms of severity. Therefore, it is appropriate that this should also be retained in any standard measure, as it will also increase the sensitivity of the scale. The common practice in climacteric research of rating a symptom as simply present or absent is insensitive as it fails to take into account the severity of the complaint which can vary considerable from woman to woman.

The finalised scale is shown in Appendix A. This is similar in lay out and content to the scale originally constructed by Greene [14] on the basis of the first factor analysis, but has been modified in the light of the findings from the six subsequent factor analyses. These modifications are as follows:

1. Sixteen of the 21 symptoms of the original scale have been retained, four of those omitted having been replaced by symptoms achieving consensus from the other factor analytic studies.

2. The wording of four other symptoms has been modified in accordance with the standardisation of wording described above.

3. The single measure of psychological symptoms of the original scale has been broken down to yield two further measures, anxiety and depressed mood.

4. An additional item on loss of sexual interest has been added. This is intended as a 'probe' item to be followed up by more appropriate and sensitive evaluation of problems in that area [21].

To reiterate a point made earlier in this paper, the use of the term 'climacteric' in the title of the scale signifies that these symptom clusters may occur at any time throughout the climacteric, are not necessarily confined to the time of the menopause and may have differing aetiologies.

The scale described in this paper is intended specifically to be a brief and standard measure of core climacteric symptoms or complaints to be used for comparative and replicative purposes across different types of studies whether they are medical, psychological, sociological or epidemiological in nature. Depending on the purpose of the research and the research questions, which in theory driven research would consist of a number of hypotheses, this scale would be supplemented by other measures assessing characteristics of climacteric women relevant to these hypotheses. These might include measures of such characteristics as sexuality [21], clinical depression [22], quality of life [23] and well being [24], or measures to assess some of the symptoms included in the scale in greater depth, such as vasomotor symptoms or insomnia.

Finally, construct validity, including sensitivity of the scale described in this paper has been and is being established in a number of ongoing research studies [25–28].

Copies of the scale and guide are available from the author on request.

References

- [1] Jaszmann L. A plea for a uniform menopausal index. Fourth International Congress on the Menopause, Orlando, Abstract 14, 1984.
- [2] Utian W. Menopause, sex hormones and quality of life. Sixth International Congress on the Menopause, Bangkok, Abstract 160, 1990.
- [3] Neugarten BL, Kraines R. Menopausal symptoms in women of various ages. *Psychosom Med* 1965;27:266–73.
- [4] Bungay G, Vessay M, McPherson C. Study of symptoms in middle life with special reference to the menopause. *Br Med J* 1980;281:181–3.
- [5] Koster A, Davidsen M. Climacteric complaints and their relation to menopausal development—a retrospective analysis. *Maturitas* 1993;17:155–66.
- [6] Dennerstein L, Burrows GD, Hyman G, Sharpe K. Hormone therapy and affect. *Maturitas* 1979;1:247–59.
- [7] Channon LD, Ballanger SE. Some aspects of sexuality and vaginal symptoms during the menopause and their relation to anxiety and depression. *Br J Med Psychol* 1986;59:173–80.
- [8] Campbell S, Whitehead M. Oestrogen therapy and the menopausal syndrome. *Clin Obstet Gynaecol* 1977;4:31–47.
- [9] Schneider M, Brotherton P, Hailes J. The effect of exogenous oestrogen on depression in menopausal women. *Med J Aust* 1977;2:162–3.
- [10] Ballanger CB. Psychiatric morbidity and the menopause: screening of general population sample. *Br Med J* 1975;3:344–6.
- [11] Alder E. The Blatt Kupperman Menopausal Index: a critique. *Maturitas*, 1998;29:19–24.
- [12] Greene JG. The Social and Psychological Origins of the Climacteric Syndrome. Aldershot (Hants) and Brookfield (Vermont): Gower, 1984.
- [13] Peck D, Shapiro C. *Measuring Human Problems: A Practical Guide*. Chichester: Wiley, 1990.
- [14] Greene JG. A factor analytic study of climacteric symptoms. *J Psychosom Res* 1976;20:425–30.
- [15] Indira SN, Murthy VN. A factor analytic study of menopausal symptoms in middle aged women. *Indian J Clin Psychol* 1980;7:125–8.
- [16] Kaufert P, Syrotuik J. Symptom reporting at the menopause. *Soc Sci Med* 1981;15:173–84.
- [17] Mikkelsen A, Holte A. A factor analytic study of climacteric symptoms. *Psychiatr Soc Sci* 1982;2:35–9.
- [18] Abe T, Suzuki M, Moritsuka T, Botan Y. Statistical factor analysis and cluster analysis in the aetiology of climacteric symptoms. *Tohoku J Exp Med* 1984;143:481–9.
- [19] Hunter M, Battersby R, Whitehead M. Relationships between psychological symptoms, somatic complaints and menopausal status. *Maturitas* 1986;8:217–28.
- [20] Holte A, Mikkelsen A. The menopausal syndrome; a factor analytic replication. *Maturitas* 1991;13:193–203.
- [21] McCoy NL. Methodological problems in the study of sexuality and the menopause. *Maturitas* 1998;29:51–60.
- [22] Gath D. The assessment of depression in peri-menopausal women. *Maturitas* 1998;29:33–39.
- [23] Wiklund I. Methods of assessing the impact of climacteric complaints on quality of life. *Maturitas* 1998;29:41–50.
- [24] Dennerstein L, Smith AMA, Morse C. Psychological well-being, mid-life and the menopause. *Maturitas* 1994;20:1–11.
- [25] Alder E. The effect of hormone replacement therapy on psychological symptoms. In: Wijma K, von Schoultz B, editors. *Reproductive Life*. Lancaster: Parthenon, 1992:359–64.
- [26] Alder EM, Bancroft J, Livingstone J. Estrodiol implants, hormone levels and reported symptoms. *J. Psychosom Obstet Gynecol* 1992;13:223–35.
- [27] Derman RJ, Dawood MY, Stone S. Quality of life during sequential hormone replacement therapy—a placebo controlled study. *Int J Fertil* 1995;40:73–8.
- [28] Ulrich L, Barlow DH, Sturdee DW, Vessey M. Quality of life and patient preference: the UK Kliofem multicentre study experience. FIGO Congress, Copenhagen, Abstract P86. 48, 1997.

Appendix A

THE GREENE CLIMACTERIC SCALE

NAME: DATE:

NUMBER:

Please indicate the extent to which you are bothered at the moment by any of these symptoms by placing a tick in the appropriate box.

SYMPTOMS	Not at all	A little	Quite a bit	Extremely	Score 0-3
1. Heart beating quickly or strongly					
2. Feeling tense or nervous					
3. Difficulty in sleeping					
4. Excitable					
5. Attacks of panic					
6. Difficulty in concentrating					
7. Feeling tired or lacking in energy					
8. Loss of interest in most things					
9. Feeling unhappy or depressed					
10. Crying spells					
11. Irritability					
12. Feeling dizzy or faint					
13. Pressure or tightness in head or body					
14. Parts of body feel numb or tingling					
15. Headaches					
16. Muscle and joint pains					
17. Loss of feeling in hands or feet					
18. Breathing difficulties					
19. Hot flushes					
20. Sweating at night					
21. Loss of interest in sex					

P (1-11) =

A (1-6) =

S (12-18) =

D (7-11) =

V (19-20) =

S (21) =