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Concordance of Retrospective and Prospective Reporting of Menstrual Irregularity by Women in the Menopausal Transition

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Abstract

Objectives—1) Compare retrospective self-report of irregular and skipped periods by women in the menopausal transition to information recorded concurrently on calendars; 2) Describe how participants' definitions of irregularity and skipping affected reporting.

Methods—The sample was 161 women who returned **both** complete menstrual calendars and questionnaires in any year between 1997 and 2002. Irregular and skipped periods documented on menstrual calendars were compared with self-reports. Data were z-score adjusted for repeated observations in women and analyzed using Cohen's kappa.

Results—Agreement between calendar and questionnaire reporting of cycle irregularity was weak ($kappa = .192$). Participants' definitions of irregularity and skipping differed markedly from those of the researchers. Agreement about skipping was stronger overall and increased after a definition of skipping was provided to study participants ($kappa$ pre-definition = .597; post-definition = .765). Counts of skipped cycles led to the greatest differences between researchers and participants.

Discussion—Accuracy of self-reports of menstrual cycle irregularity or skipping is not sufficient without explanations about what is meant by those terms. Researchers and clinicians who solicit information from women about menstrual cycle patterns need to define explicitly the phenomenon of interest to insure accurate information.

Keywords

menopause; menstrual cycle; data collection; data reporting; menstrual irregularity; skipped cycles

INTRODUCTION

The menopausal transition (MT) occurs over a period of years and is marked by distinct stages¹. Staging the MT is based on information collected about a woman's menstrual cycle bleeding, either asking the woman to keep a menstrual cycle calendar or asking her to recall, retrospectively, changes in menstrual bleeding patterns. Gathering accurate information about changing menstrual cycle patterns is an important part of the study of the MT². Accurate information about menstrual cycle changes is also important for clinical purposes, e.g., making assessments about normal versus abnormal bleeding.

Attempts have been made to discern the accuracy of prospective records and retrospective recall. Comparing the difference between concurrent and retrospective reporting, a study of reported changes in health showed that prospectively measured changes were significantly

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associated with retrospectively measured changes for seven of eight scales examined³. Study authors concluded that relying on both methods of reporting may improve the reliability of measurement of change over time.

Specific to women experiencing the MT, Bean, Leeper, Wallace, Sherman, & Jagger⁴ examined the accuracy of women's recall of mean cycle length and variability during natural menopause by comparing recalled with recorded data provided by a sample of 40 women in age cohorts 40–49 and 50–59, a subset of women in Treloar's Menstrual and Reproductive History study. The women recorded menstrual cycle patterns as they occurred but were not asked to recall the information until they had been in the study at least five years. Recall was assessed by interview, at which time each woman was asked to categorize her yearly menstrual cycle pattern for each year she menstruated as: regular, give or take two days variation in her typical menstrual cycle length; somewhat regular, but rarely more than one week variation; totally variable (more than 7 days) and unpredictable. Women in the 40–49 year old cohort were accurate 50% of the time; those in the 50–59 year old cohort were accurate 23% of the time. When interviewed, no woman reported her cycles as totally variable despite numerous cycles recorded as such⁴. Since the recall period was at least five years this could be the result of relying on memory over such an extended time frame. Dennerstein and Helmes⁵ pointed out that the length of the recall period can lead to data inaccuracy and strongly recommended a prospective design when change over time is of primary concern.

Prospective design accuracy is influenced by the clarity of explanation of the phenomenon to the person collecting the data. When comparing research criteria of MT stage with self-reported stage for 1179 women experiencing natural menopause, 29 percent of the women disagreed with the researcher's classifications, suggesting that women's ratings may be influenced by other factors. Of all the changes that happen during the MT, the menstrual changes may not be the most important to the women themselves⁶. This may be the reason that in both the Melbourne Women's Midlife Women's Health Project (MWMHP) and the Study of Women's Health Across the Nation (SWAN), retrospective self-report of menstrual cycle changes was not found to be a reliable measure of actual changes^{7,8}.

While previous studies have shown discrepancies between reported and recorded data, none have investigated the differences in terms of the women's understanding of the phenomenon they were asked to report or the processes used to respond to research questions. Because longitudinal studies like the MMWHP, SWAN and the Seattle Midlife Women's Health Study (SMWHS) monitor changes over time, data are available to study more precisely this phase of women's lives. The purposes of the present study were to:

1. Compare retrospective self-report of irregular and skipped menstrual cycles by women in the MT to the information recorded concurrently on menstrual cycle calendars.
2. Describe how participants' definitions of menstrual cycle irregularity and skipping affected reporting.

METHODS

Sample

The data for these analyses are part of a larger longitudinal study, the Seattle Midlife Women's Health Study. The original population-based sample was obtained by telephone screening of all households in urban census tracts selected for mixed ethnicity and income between early 1990 and early 1992. Women were eligible if they were between the ages of 35 and 55, had a uterus and at least one ovary, had at least one menstrual period within the past 12 months, were not pregnant or lactating, and could read and understand English. In the households contacted

(11,222), 1428 women were between the ages of 35 and 55 and screened for eligibility. After screening, 820 women were eligible, 200 declined to participate, and 620 were scheduled for an in-person interview administered by a trained registered nurse interviewer. Five hundred eight women kept the interview appointment and completed the interview, 82% of the 620 initially scheduled. After the interview, participants who agreed to participate in the study provided data annually with written health questionnaires and menstrual cycle calendars. The calendars were kept concurrently and the questionnaires administered early in the following year asking participants about the previous year.

Calendar documentation was used to classify women into a specific MT stage using the method of Mitchell, Woods and Mariella⁹ in which the transition was divided into three stages: early, middle, and late based on menstrual cycle pattern changes. Irregularity was defined as more than six days absolute difference between any two consecutive menstrual cycles during the reference year. A skipped cycle was defined as double the modal cycle length or more for the reference year. Cycle length was defined as the time from the first day of bleeding up to and including the last day before a new onset of bleeding. In the absence of a modal cycle length, a population-based cycle length of 29 days was used⁹.

Upon analyzing several years of data collection, a discrepancy between calendar recorded and questionnaire reported skips of menstrual cycles was noted. To determine if participants defined skips or irregularity differently than the researchers, a question asking for each woman's definition of skip was included in the 1998 questionnaire, one about irregularity was included in the 1999 questionnaire. To facilitate accurate reporting, the study definition of skipping was included in the 1999 questionnaire and every year thereafter. The analyses reported here use data beginning with calendar year 1997. At that time 228 women were enrolled in the study.

Women were excluded from the current analyses if they were taking estrogen or progesterone, diagnosed with disorders of the reproductive tract, or postmenopausal, or if they did not complete either the menstrual cycle calendar or the health questionnaire in any one year between 1997 and 2002. Corresponding prospective and retrospective data was required for comparison purposes. A completed menstrual cycle calendar was one that had information filled in monthly. (See Figure 1 for an example.) A completed questionnaire was one in which the participant answered all the questions relevant to the study purposes.

Measures

The measures used for this study were the menstrual cycle calendars and the annual health questionnaire.

Menstrual Cycle Calendars—Study participants were asked to record bleeding and spotting days as they occurred. If no bleeding was recorded for an entire month or more, women were asked to record 'No Bleeding'. Likewise, if they forgot to record, they were asked to note that. Figure 1 shows a sample menstrual cycle calendar.

Health Questionnaires—The annual health questionnaires provided data on participant report of occurrence of menstrual irregularity or skipped periods as well as number of skipped periods, if applicable. Participants were informed that periods and cycles were not the same thing and provided definitions of each. Periods referred to menstrual flow and cycles to how often the period occurred, i.e., the number of days from the start of one period to the start of the next. However, women may not have differentiated between the meanings of the words but rather used them interchangeably when filling out the items on the questionnaire.

Participant reports of irregular cycles: To compare self report of irregularity to the calendar data, we asked participants to compare the usual regularity of the past year to the previous year on a Likert-type scale with answers ranging from 1, 'a lot more regular', to 5, 'a lot more irregular'.

To assess what women meant by irregularity, we asked two open-ended questions in 1999, 'When you are asked if your cycles are irregular, what does irregularity mean to you? What are irregular menstrual cycles like?' The answers were coded into categories reported in Table 2.

Participant reports of skipped cycles: Each health questionnaire contained a yes/no question about whether the participant was skipping periods. If answered in the affirmative, a follow-up question asked the number of periods skipped. To assess what women meant when they reported skipping periods, we asked two open-ended questions, 'How do you tell whether you skipped a period or not?' and in parentheses afterwards, 'What has to happen before you say you skipped?' Responses were coded into categories and are reported later. In early 2000 (when querying about 1999) and each year thereafter, the study definition of a skipped cycle was provided after the general question about whether the participant was skipping or not.

Data Analysis

Crosstabulations were used to measure the agreement between the prospective and retrospective reports of the occurrence of menstrual irregularity, the presence or absence of skipped periods, and the recorded numbers of skipped periods. Z-score adjustments were made to correct for repeated observations of the same woman across study years. Crosstabulations were evaluated using Cohen's kappa. A kappa of .70 or greater indicates satisfactory reliability between reporting methods. SPSS 12.0 was the software package used for statistical analysis.

RESULTS

One hundred sixty-one women met the study requirements and provided 670 pieces of matched data (calendar with questionnaire) over the six years of data collection. Applying the study definitions of skipping and irregularity to the menstrual calendar data, 89 women were skipping cycles, 103 were experiencing irregular cycles without skipping and 69 were regularly cycling. Since each of the MT stages persists over a period of two to three years on average, it was possible that a participant who was regular in 1997 would have become irregular and then begun skipping sometime before 2002 and thus would be counted in both the irregular cycle and skipping cycle groups across more than one year. This was true for 82 women. The number of participants in each stage by year is shown in Table 1.

Participants had a mean age of 46.7 years (standard deviation (SD) = 4.4), 15.9 years of education (SD = 2.5), and a median family income of \$42,000 (SD = \$17,500). Most (88%) of the participants were currently employed, 68% married or partnered, 24% divorced or separated, and 5.7% never married or partnered. Women described themselves as follows: 5.8% African American, 7.0% Asian American, 84.4% Caucasian, 0.4% Hispanic, and 2.4% mixed ethnicity.

Agreement between calendar-recorded and questionnaire-reported irregularity

The analysis of agreement between calendar-recorded and questionnaire-reported menstrual cycle irregularity is reported in Table 3. Questionnaire responses of 'somewhat more irregular' or 'a lot more irregular' were considered equivalent to a calendar classification of irregularity. As can be seen, there were many more calendar-recorded than questionnaire-reported

occurrences of irregularity. The kappa statistic reflected lack of agreement between the two reporting methods ($kappa = 0.192$).

Responses of all participants in 1999 who responded to the question about what irregularity meant to them ($n=129$) shed light on the data for the subset of participants. Ninety percent of the responses fell into four categories-- three (70%) described variation in the menstrual cycle pattern and one (19%) described irregularity in menstrual cycle flow amount or duration. Fifty-four women (42%) gave more than one answer, for a total of 198 responses. Sixty-one percent of these 54 participants described both changes in days between periods and changes in flow amount and duration as indicating irregularity. Results are summarized in Table 2.

Agreement between calendar-recorded and questionnaire-reported skipping

The association between calendar-recorded and questionnaire-reported skipped cycles is reported in Table 4. The agreement between these two forms of data collection is higher than for irregularity, $kappa = .711$. Reporting accuracy increased after participants were given the study definition of skipping (Pre-definition $kappa = .597$; post-definition $kappa = .765$).

Actual numbers of calendar-defined and questionnaire reported skips between 1997 and 2002 were then compared. Forty-four percent of the defined and reported skips were in concordance with one another. In 1998, when the participants were asked how they defined skipped periods, 62% considered a period skipped if there was no bleeding for a month or a bit over, but less than two months. Other responses included 'no bleeding' with no specific time frame mentioned and 'refer to calendar' with no reference to criteria used to determine skipping when referring to the calendar. Nearly two-thirds of the women thought a skipped cycle referred to a more compressed time between menstrual cycles than was used in the study.

Calendar recording of menstrual bleeding

As an inquiry into why retrospective and concurrent reporting of skipped cycles might differ, the calendars were examined for participant recording of an entire month as 'no bleeding'. For example, one bleeding episode might have ended January 31 and another begun March 1. The participant would then have marked February as 'no bleeding'. To determine whether a month marked 'no bleeding' was counted as a skipped period when filling out the health questionnaire, the number of months marked 'no bleeding' on each woman's calendar was compared with the number of self-reported skips. The percent agreement between months marked 'no bleeding' on the calendar and months self-reported as skipped cycles ranged from 52% to 73% across the six years reported. As a follow-up, current study participants were queried as to whether they consulted their menstrual cycle calendars when completing their annual health questionnaire. Seventy women responded and 62 of them, or 89%, stated that they did consult their calendar when answering questions about their menstrual cycle in the annual health questionnaire.

DISCUSSION

This study examined prospective menstrual calendar recording with retrospective reporting of menstrual cycle irregularity and skipping on a year by year basis during the MT. Because retrospective questions about menstrual irregularity and skipping are often used to screen for entry into studies of this phase of life, it is important to know how well this retrospective approach reflects actual bleeding patterns. Likewise, health care providers need accurate information about pattern to adequately assess irregular bleeding and to inform patients about expected changes in menstrual cycle patterns over the course of the MT. At present, there is uncertainty about the best way to obtain information about menstrual cycle pattern changes during the MT.

Agreement on calendar-recorded and questionnaire-reported irregularity was weak. Irregularity meant more than changes in cycle patterns to study participants. Nineteen percent of the women described cycle duration as the length of the bleeding flow, the menses. Only 12% defined irregularity in terms of cycle days, the length of time between the beginning of one cycle and the beginning of the next. It seems reasonable to conclude that a cycle length difference of seven days, the cut point of the SMWHS definition of irregularity, would not be a significant marker of menstrual cycle changes for many women. Combined with a general expectation that menstruation occurs every 28 days, or 'monthly', a more pronounced unpredictability was required for women to describe a cycle as irregular.

Treloar and colleagues have commented on women's tendencies to report their cycles as 'regular' even when keeping a calendar that indicated otherwise¹⁰. They suggest this is because women may use the term 'regular' because they do not know a better answer to give, perceive their own pattern as normal, or 'regular', and report that sense of normality¹⁰. One of the women in the study expressed this perspective when stating that she only started using her calendar to answer the questionnaire data once she started skipping periods (in 2004). "Before that I was perfectly regular so had no need to remember irregular times." According to the study criteria of irregularity she had been irregular for three years, since 2001. Nearly all the participants referred to their calendar to answer retrospective questions about changes in menstrual cycle patterns.

In contrast, the agreement between calendar and questionnaire-reported skipping was strong. Perhaps this indicates that women know when they are skipping periods and may even come to expect it after a certain amount of repetition. In addition, reporting accuracy increases by providing precise information about what is being asked (rates gradually increased each year after women were provided the research definition of skipped cycles). Perhaps accuracy would improve further if the definition of skipping was reinforced over time verbally by research assistants when interacting with participants as well as by including the definition on the calendar where women could see it as they recorded bleeding. Reinforcement of the definition might lead to more accurate retrospective reporting.

While we think this study provides important insight into discrepancies between retrospective and prospective reporting and ways to decrease them, there are two limitations which may affect generalizability of results. First, this study sample was predominantly white, middle class and well educated. How these findings would translate to other populations remains to be tested. However, having conducted in person interviews about menstrual cycle changes with women in the MT, Wise, Krieger, Zierler and Harlow¹¹ did not believe that reporting errors differed by any indicators of socioeconomic position. Second, keeping a menstrual cycle calendar was a requirement of participation in the study. Self-report accuracy might be lower without having calendars as a memory recall device since most women reported using their calendars when answering the questions about irregularity and skipping. What is not known, however, is how many of these women would have kept track of their menstrual cycles on a calendar anyway, and just happened to use the ones provided by the study because they were required to turn them in every year.

In summary, accuracy of self-reported occurrence of menstrual cycle irregularity or skipping of periods is not likely to occur without sufficient explanation of what is meant by the research or clinical use of those terms. After women were provided with a definition of skipping, agreement (as reflected in the kappa) improved from .597 to .765. The agreement might have been higher if the definition were repeated more often and in different ways over time.

It does not seem far-fetched to assume that, if told the importance of accurately recording menstrual bleeding to determine progress through the MT, many women would carefully

monitor their cycles. Maintenance of an accurate record of menstrual bleeding, as recommended by Treloar, has many advantages for women, regardless of age¹². At the very least it allows for a conversation with a health care provider about what bleeding pattern is usual for a particular woman. An understanding of usual pattern allows for a better assessment of pattern change and interpretation of what those changes might mean.

Providing women with the research or clinical definition used to define MT stages would increase the accuracy of their self-report. The correctness of the answer to a research or clinical question depends in large part on the clarity and precision of the question¹³. To ensure investigator and participant concordance in understanding research concepts, questions must be designed to include clear definitions. The challenge for menopause researchers and clinicians is to clearly frame the question.

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Conflict of interest None

Informed Consent

When enrolled, all participants were provided with information on any risks or benefits associated with the study. Signed consent forms, approved by the University of Washington's Institutional Review Board, are stored in locked file cabinets in the research office.

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Year 1997 MENSTRUAL CYCLE RECORD IDNO 1522

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN						B ²	B ⁴	B ²	S																						
FEB																										B ²	B ³	B ²	B ²		
MAR	B ¹	S																													
APR					B ¹	B ²	B ³	B ²	B ²	S	S																				
MAY																															
JUN																															
JUL																															
AUG																															
SEP	B ¹	B ³	B ²	B ¹	S																										
OCT																															
NOV	B ²	B ¹	S																												
DEC																															

For every day you spot or bleed enter an S or B in the appropriate square. Record a 1, 2, 3 or 4 next to every B day.
 (1: light flow, 2: moderate, 3: heavy, 4: very heavy/flooding)
 For any month no bleeding or spotting occurs write in NO BLEEDING.
 If you forget to record for a month write in FORGOT TO RECORD.

Figure 1.
Menstrual cycle calendar

Table 1Number of participants by year (N = 161)[‡]

<i>Year</i>	<i># Regular Cycles</i>	<i># Irregular Cycles</i>	<i>#Skipping Cycles</i>	<i>Total N</i>
1997	61	53	26	140
1998	56	55	28	139
1999	46	43	38	127
2000	27	37	37	101
2001	18	32	37	87
2002	11	30	35	76

[‡] Column totals $\neq$ n as women may move between categories from year to year. Row totals also $\neq$ n as participants were added as they became irregular or began skipping and dropped if no longer met study criteria.

Table 2
SMWHS participant definitions of irregularity (N = 129)

<i>Definition</i>	<i>N</i>	<i>%</i>
<i>Unpredictable periods</i> (no regular schedule, inconsistent numbers of days between)	64	32
<i>No monthly period</i> (i.e. period occurs either more or less than once a month)	51	26
<i>Periods vary by a specific number of days</i> (from expected start date)	24	12
<i>Change in flow amount or duration</i>	38	19
<i>Other</i> (e.g. bleeding or spotting between periods et al.)	21	11
<i>Total responses</i>	198 [‡]	100

[‡]Fifty-four women provided more than one response

Table 3

Agreement (Cohen's kappa) between calendar-recorded and questionnaire-reported irregularity 1997–2002 (N = 103)*

	Prospective irregularity		Yes	Total
	No	Yes		
Retrospective irregularity	No	385	187	572
	Yes	35	63	98
	Total	420	250	670

kappa = 0.192

* 103 women provided data. Numbers in the table reflect the occurrences of irregularity documented on calendars (prospective) and in the health questionnaire (retrospective) for the entire 6 year study period.

Table 4

Agreement (Cohen's kappa) between calendar-recorded and questionnaire-reported skipped cycles 1997–2002 (N = 89)*

	Prospective skips		Yes	Total
	No			
Retrospective skip	No	391	11	402
	Yes	78	190	268
	Total	469	201	670

$\kappa = .711$

* 89 women provided data. Numbers in the table reflect the occurrences of skipped cycles documented on calendars (prospective) and in the health questionnaire (retrospective) for the entire 6 year study period.