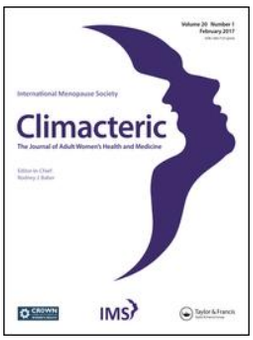

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ORIGINAL ARTICLE

An extended Menopause Rating Scale II: a retrospective data analysis

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ABSTRACT

Objective: This study aims to discuss a statistically reasonable inclusion of additional questions in the Menopause Rating Scale II (MRS II) for daily use in clinical practice.

Methods: Retrospective data analysis was performed (cantonal ethics committee No. 2016-01179). The MRS II was extended with the parameters 'changes in weight', 'headaches', 'skin changes', 'changes in hair growth', 'hair loss', and whether therapy was desired. Data from 419 women seeking medical advice in our menopause center were collected between April 2009 and April 2017. Cronbach's alpha was used to measure internal consistency of the extended questionnaire.

Results: For the conventional MRS II ($N = 340$ of 419, 81.1%), the internal consistency measured with Cronbach's alpha increased from 0.805 to 0.820 considering 'changes in weight' ($N = 237$, 56.6%), to 0.815 considering 'headaches' ($N = 247$, 58.9%), and to 0.815 considering 'skin changes' ($N = 236$, 56.3%) if these additional parameters were added separately. Cronbach's alpha increased from 0.805 to 0.835 ($N = 224$, 53.5%) if these parameters were added at once. Desire for therapy varied between 42.1% for 'changes in hair growth' ($N = 38$, 9.1%) and 60.6% for 'hair loss' ($N = 33$, 7.9%).

Conclusion: We suggest including the items 'changes in weight', 'headaches', and 'skin changes' in the MRS II as our results show even higher internal consistency with these symptoms and as the wish for therapy was high.

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Menopause Rating Scale; extended Menopause Rating Scale II; menopause; climacteric syndrome; menopausal hormone therapy

Introduction

Up to 80% of women suffer from climacteric symptoms and up to 42% rate their symptoms as 'very severe' with a significant impact on quality of life[1,2]. Increasing life expectancy leads to a growing group of postmenopausal patients. Maintaining women's health during and after menopause, last but not least to limit the burden of national economies, is mandatory. Therefore, the European Menopause and Andropause Society published a position statement to optimize health care in postmenopausal patients[3]. As intensity varies in different women, assessment of symptoms in a standardized manner is essential in order to guide treatment options. Different instruments for the measurement of climacteric symptoms have been developed.

The Menopause Rating Scale II (MRS II) is well established in daily practice as well as in research. It was developed in the 1990s to enable comparison of discomfort over time or between different groups of women and to estimate differences pre and post treatment. This self-administrative rating scale consists of 11 items, which are assessed on a 5-point scale from 0 to 4 points ('no complaints' to 'severe complaints'). It can be divided into a psychological subdomain, a somato-vegetative subdomain, and a urogenital subdomain. Originally composed in German, the questionnaire was first translated into English and then into other languages so that there are now 25 language versions available[4,5]. Several studies demonstrated a high reliability and validity of the MRS II[4,6].

However, in daily clinical practice, additional complaints such as 'changes in weight', 'headaches', 'skin changes', 'changes in hair growth', and 'hair loss' are often observed. Different studies show the importance of these symptoms during the menopausal transition and early postmenopause. Headache and skin changes occur more frequently during the menopausal transition and early postmenopause. The biologic activity of the hair follicle is different in premenopausal and postmenopausal women. Many women complain about an increase of body mass index with also an impact on life satisfaction[7–11]. But only few scientific works including these additional questions in postmenopausal questionnaires exist[2,12].

The International Menopause Society states that 'the option of MHT [menopausal hormone therapy] is an individual decision in terms of quality of life and health priorities as well as personal risk factors. MHT should not be recommended without a clear indication for its use'[13], but the indication for treatment of postmenopausal symptoms is not well defined. One indication can be the patient's perception of symptoms and wish for treatment[2].

The aim of our work was to test the inclusion of five additional symptoms ('changes in weight', 'headaches', 'skin changes', 'changes in hair growth', and 'hair loss') in the MRS II to receive a more extensive alternative to the conventional

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MRS II for daily use in clinical practice and to explore the demand for treatment.

Methods

Data from 419 women who filled out the extended MRS II during their baseline medical consultation at the Menopause Center, Gynaecologic Endocrinology and Reproductive Medicine at the University Women's Hospital in Bern, Switzerland between April 2009 and April 2017 were retrospectively analyzed. All women aged $\geq$ 40 years seeking medical advice for menopausal complaints were included. Data regarding patient characteristics, medical history, medication, and climacteric symptoms, including the extended MRS II, were collected. To extend the MRS II, a conventional MRS II was enhanced with the symptoms 'changes in weight', 'headaches', 'skin changes', 'changes in hair growth', and 'hair loss'. The rating system stayed exactly the same as in the conventional MRS II. Additionally, the women could tick a box if, at the moment, therapy was desired or not. As Bern is located in the German-speaking part of Switzerland and therefore German is the main language, we used the German version of the questionnaire.

Statistical analysis was performed with SPSS Statistics (version 25). Cronbach's alpha was used to measure internal consistency of the extended MRS II[14]. It was first calculated for the conventional MRS II, and then the additional symptoms were added one by one to analyze changes in Cronbach's alpha. Finally, analysis was performed for the complete extended MRS II. Cronbach's alpha was compared between the extended MRS II and the conventional MRS II. The study was approved by the cantonal ethics committee (No. 2016-01179) and reported according to the STROBE statement (see www.strobe-statement.org). For retrospective studies from electronical patient records, the cantonal ethics committee does not require written informed consent from patients.

Results

Cohort characteristics

During their baseline medical consultation because of climacteric symptoms, 419 women filled out the extended MRS II between April 2009 and April 2017. In total, 146 out of 419 (34.8%) women rated all of the additional symptoms. The mean age was 51.3 years (standard deviation [SD] = 7.4; $N = 419$ of 419, 100%). The personal history showed that, according to the Stages of Reproductive Aging Workshop + 10 criteria, 49.0% of the women were postmenopausal whereas 14.7% were in the late menopausal transition, 19.9% were in the early menopausal transition, and 16.4% were premenopausal ($N = 341$, 81.4%). Other descriptive data are presented in Table 1.

The fluctuating case numbers are due to the fact that not all patients completed the whole extended MRS II.

Conventional Menopause Rating Scale II parameters

Table 2 presents the rating of all parameters in absolute and relative values from the conventional MRS II as well as the total score and the different subscores. 'Sleep problems' and 'hot flushes, sweating', with a mean of 2.1 points (SD = 1.3; $N = 413$, 98.6%) and 2.0 points (SD = 1.3; $N = 413$, 98.6%), reached the highest average, whereas 'bladder problems' and 'heart discomfort', with a mean of 1.0 points (SD = 1.1; $N = 403$, 96.2% and SD = 1.0; $N = 401$, 95.7%), seemed to be the least severe complaints.

The relative values expressed in percentages illustrate the rating of the symptoms in proportion to the maximum possible points.

Additional Menopause Rating Scale II parameters

Table 3 presents the mean for all of the additionally included parameters. 'Changes in weight' and 'skin changes' reached the highest means, with 1.6 points (SD = 1.3; $N = 299$, 71.4%) and 1.5 points (SD = 1.2; $N = 297$, 70.9%), whereas 'changes in hair growth' and 'hair loss' had a mean of 0.7 points (SD = 1.0; $N = 297$, 70.9%) and 0.8 points (SD = 1.1; $N = 305$, 72.8%), respectively. The relative values show the mean values as a percentage of the maximum possible points.

Table 4 presents the non-parametric Spearman rho correlation of the MRS II total score/subscores and the additional parameters. 'Changes in weight' (0.383 for the total score,

Table 1. Cohort characteristics.

Parameter	N	*Mean (±SD) or* N *(%) of women*
Body mass index (kg/m^2)	396	25.2 (±5.2)
Age (years) at menopause (final menstrual period)	166	46.9 (±6.1)
Current intake of CHC	419	85 (20.3)
Current intake of POP/POC	212	9 (4.2)
Current use of IUD	213	36 (16.9)
Current intake of estrogen-only MHT	418	106 (25.4)
Current intake of combined MHT	416	86 (20.7)
Current intake of progestogen-only MHT	412	100 (24.3)
Hysterectomy	419	67 (16.0)
Unilateral adnexectomy	418	26 (6.2)
Bilateral adnexectomy	238	14 (5.9)
Current intake of *Cimicifuga racemosa* extract Ze 450	333	42 (12.6)
Current intake of concomitant medication	418	358 (85.6)

CHC, combined hormonal contraceptives (combined oral contraceptive pill, ethinylestradiol/etonogestrel, ethinylestradiol/norelgestromin); IUD, intrauterine device (levonorgestrel); MHT, menopausal hormone therapy; POC, progestogen-only contraception (etonogestrel, medroxyprogesterone acetate); POP, progestogen-only pill (desogestrel); SD, standard deviation.

Table 2. Descriptive data analysis of MRS II parameters, total score, and subscores with relative values.

MRS II parameter/score	N	*Mean*	*SD*	*Median*	*Mean relative % (maximum = 100%)*	*SD relative % (maximum = 100%)*
Somato-vegetative subscore	419	6.6	3.4	6.0	41.4	21.2
Sleep problems	413	2.1	1.3	2.0	53.5	32.1
Hot flushes, sweating	413	2.0	1.3	2.0	49.3	33.2
Joint and muscular discomfort	409	1.7	1.4	2.0	41.3	34.5
Heart discomfort	401	1.0	1.0	1.0	25.0	25.8
Psychological subscore	419	6.4	4.2	6.0	39.7	26.1
Physical and mental exhaustion	410	1.9	1.3	2.0	47.5	31.7
Depressive mood	410	1.8	1.3	2.0	43.8	32.3
Irritability	409	1.6	1.3	1.0	40.5	31.6
Anxiety	406	1.2	1.3	1.0	30.5	31.5
Urogenital subscore	419	3.7	2.9	3.0	30.4	24.4
Sexual problems	385	1.6	1.5	1.0	40.8	36.6
Dryness of vagina	405	1.3	1.4	1.0	32.5	35.4
Bladder problems	403	1.0	1.1	1.0	23.8	28.2
Total score	419	16.6	8.2	17.0	37.8	18.5

MRS II, Menopause Rating Scale II; SD, standard deviation.

Table 3. Descriptive data analysis of additional MRS II parameters with relative values.

MRS II parameter	N	*Mean*	*SD*	*Median*	*Mean relative % (maximum = 100%)*	*SD relative % (maximum = 100%)*
Changes in weight	299	1.6	1.3	2.0	40.0	32.1
Skin changes	297	1.5	1.2	1.0	36.3	30.1
Headaches	310	1.3	1.3	1.0	33.5	33.5
Hair loss	305	0.8	1.1	0.0	19.5	27.7
Changes in hair growth	297	0.7	1.0	0.0	18.3	24.4

MRS II, Menopause Rating Scale II; SD, standard deviation.

Table 4. Non-parametric Spearman rho of the total score/subscores and the additional symptoms.

MRS II score	*Parameter*	N	*Correlation coefficient*	p-*Value*
Total score	Changes in weight	299	0.383	<0.001
	Skin changes	297	0.314	<0.001
	Headaches	310	0.394	<0.001
	Hair loss	305	0.199	<0.001
	Changes in hair growth	297	0.226	<0.001
Somato-vegetative subscore	Changes in weight	299	0.418	<0.001
	Skin changes	297	0.287	<0.001
	Headaches	310	0.350	<0.001
	Hair loss	305	0.172	0.003
	Changes in hair growth	297	0.168	0.004
Psychological subscore	Changes in weight	299	0.291	<0.001
	Skin changes	297	0.172	0.003
	Headaches	310	0.352	<0.001
	Hair loss	305	0.221	<0.001
	Changes in hair growth	297	0.209	<0.001
Urogenital subscore	Changes in weight	299	0.179	0.002
	Skin changes	297	0.318	<0.001
	Headaches	310	0.178	0.002
	Hair loss	305	0.078	0.175
	Changes in hair growth	297	0.170	0.003

MRS II, Menopause Rating Scale II.

$p < 0.001$), 'skin changes' (0.314 for the total score, $p < 0.001$), and 'headaches' (0.394 for the total score, $p < 0.001$) tend to show a higher correlation than 'hair loss' (0.199 for the total score, $p < 0.001$) and 'changes in hair growth' (0.226 for the total score, $p < 0.001$).

Further, Table 5 compares a lower MRS II total score (≤16 points) and higher MRS II total score (≥17 points) with the mean of the additional symptoms. This shows a significant correlation of a higher MRS II total score and a higher rating of the additional symptoms 'changes in weight' ($p_U < 0.001$), 'skin changes' ($p_U < 0.001$), 'headaches' ($p_U < 0.001$), and 'changes in hair growth' ($p_U = 0.004$). As 17 points is the median of the total score, this serves as a cut-off point to distinguish between a lower MRS II total score and a higher MRS II total score.

Internal consistency of the extended Menopause Rating Scale II

To measure internal consistency, Cronbach's alpha was calculated for the conventional MRS II and reached 0.805 ($N = 340$, 81.1%). If the additional parameters were added one by one, Cronbach's alpha increased for the parameters

'changes in weight' (0.820; $N = 237$, 56.6%), 'headaches' (0.815; $N = 247$, 58.9%), and 'skin changes' (0.815; $N = 236$, 56.3%). The increase implies a higher internal consistency when adding these three symptoms.

If the same three symptoms are added at the same time, Cronbach's alpha is improved to 0.835 ($N = 224$, 53.5%) (Table 6).

To ensure that results were not biased by incomplete questionnaires, analysis was repeated including only the complete data sets ($N = 146$, 34.8%). This confirmed the previous results. Cronbach's alpha increased if the symptoms 'changes in weight' (from 0.810 to 0.812), 'headaches' (from 0.810 to 0.821), and 'skin changes' (from 0.810 to 0.814) were added. It also confirmed that Cronbach's alpha increased from 0.810 to 0.829 if these three symptoms were added to the conventional MRS II.

Wish for treatment

Figure 1 shows the percentage of women who expressed a wish for treatment for the different symptoms of the MRS II in correlation to the rating of these complaints. Only the women reporting the corresponding symptom could express a wish for therapy. Most women desired a therapy for 'physical and mental exhaustion' (70.9%; $N = 86$, 20.5%), 'sexual problems' (67.5%; $N = 77$, 18.4%), and 'joint and muscular discomfort' (66.2%; $N = 68$, 16.2%), whereas for 'heart discomfort' only 23.2% ($N = 56$, 13.4%) of the patients wished to be treated. Patients' preferences for treatment did not correspond with the rating of the intensity of the symptoms. For example, 60.6% ($N = 33$, 7.9%) of the patients wished the symptom 'hair loss' to be treated although the reached average was only 0.8 points (SD = 1.1; $N = 305$, 72.8%).

Table 5. Lower MRS II total score (≤16 points) and higher MRS II total score (≥17 points) compared with the mean of the additional symptoms.

Parameter	*MRS II total score*	N	*Mean (SD)*	p_U-*Value*
Changes in weight	≤16	140	1.19 (1.20)	<0.001
	≥17	159	1.96 (1.26)	
Skin changes	≤16	137	1.12 (1.07)	<0.001
	≥17	160	1.74 (1.24)	
Headaches	≤16	146	0.92 (1.20)	<0.001
	≥17	164	1.71 (1.35)	
Hair loss	≤16	144	0.66 (1.10)	0.013
	≥17	161	0.89 (1.10)	
Changes in hair growth	≤16	139	0.57 (0.90)	0.004
	≥17	158	0.87 (1.02)	

A total score of 17 points is the median and therefore used as a cut-off point to distinguish between lower MRS II total score and higher MRS II total score.
MRS II, Menopause Rating Scale II; SD, standard deviation.

Discussion

This retrospective data analysis found that internal consistency of the MRS II improved when the parameters 'changes in weight', 'headaches', and 'skin changes' were added one by one and all at once. In contrast, the parameters 'changes in hair growth' and 'hair loss' did not improve internal consistency. Importantly, the fluctuating case numbers did not alter the results.

This analysis also found that the proportion of women desiring a therapy was high: for 10 out of 11 symptoms of the conventional MRS II, more than 50% of patients wished a treatment. For the additional symptoms in the extended MRS II, more than 40% of the women expressed a wish for treatment. Interestingly, our data show a discrepancy between the severity of discomfort and the wish to treat the symptom for both the conventional MRS II and the additional parameters.

Different studies showed the importance of the additional symptoms included in our extended version of the MRS II for quality of life. A study with a random sample of 1551 women aged 45–60 years showed that 'headache' occurred in 91.7% of the women. The authors also found that 87.6% of the study population experienced the symptom 'dry skin' and 83.1% 'patches of darker or lighter skin'; 76.5% of the women suffered from 'weight gain'. For the three items 'headache', 'dry skin', and 'patches of darker or lighter skin', the percentage of the affected women was higher in postmenopausal women than in premenopausal women[8]. In postmenopausal women, decreasing estrogen levels are believed to exacerbate the aging of the skin[9]. Also, the prevalence of self-assessed sensitive skin in perimenopausal and postmenopausal women was found to be high, especially when experiencing a high intensity of menopausal symptoms. The most reported symptoms were dryness (54%), itching (46%), and redness (36%)[15]. Furthermore, climacteric hormonal changes may aggravate skin diseases such as psoriasis[16]. Another cross-sectional study including 182 women aged 40–65 years, of which 55.5% were postmenopausal, showed an increased body mass index in 47.3% and abdominal obesity (waist circumference > 88 cm) in 57.7% of the women. The authors found a correlation between increased body mass index and decreased quality of life[10]. These data highlight the enormous impact of these symptoms on women's daily life.

Table 6. Cronbach's alpha for conventional MRS II and additional parameters.

Item	N	*Cronbach's alpha*	*Cronbach's alpha without additional item*
MRS II	340	0.805	–
+ Changes in weight	237	0.820	0.813
+ Headaches	247	0.815	0.808
+ Skin changes	236	0.815	0.812
+ Changes in hair growth	242	0.804	0.809
+ Hair loss	246	0.798	0.806
+ Changes in weight + headaches + skin changes	224	0.835	–

MRS II, Menopause Rating Scale II.

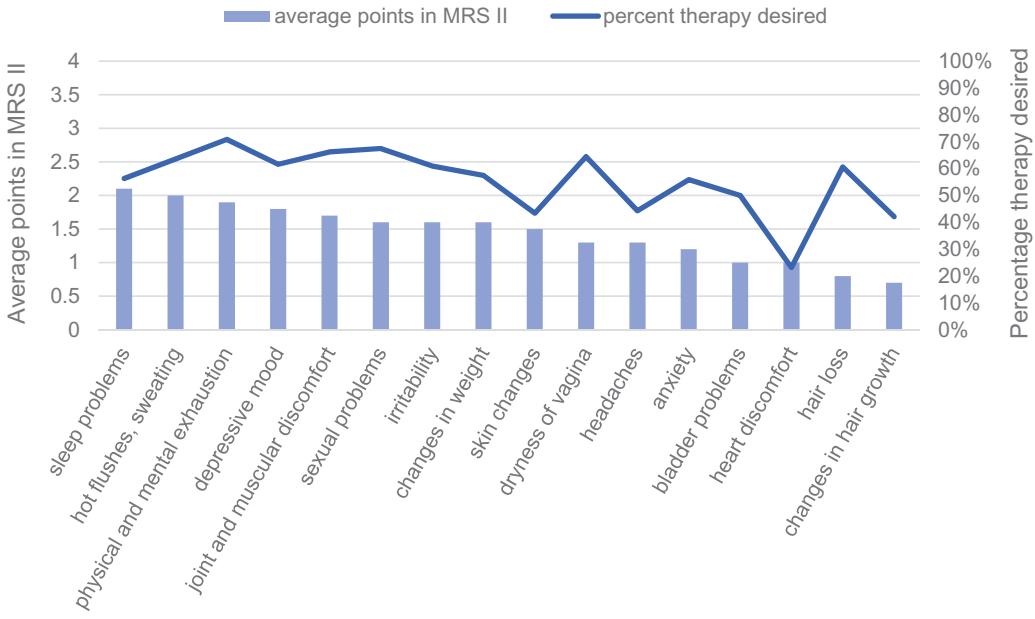

Figure 1. Average points for extended Menopause Rating Scale II (MRS II) parameters compared to the corresponding percentage value for therapy wish.

However, only few studies exist that examined the inclusion of supplementary symptoms in existing menopausal questionnaires. The only study we are aware of that includes one of the additional parameters in the MRS II showed that the symptom 'headache' was, with an occurrence of 88.8%, even more common than all other symptoms of the conventional MRS II[12].

Our analysis indicates by the improvement of Cronbach's alpha when including the three additional symptoms 'changes in weight', 'headaches', and 'skin changes' that these parameters increase the internal consistency of the questionnaire. Their integration into the MRS II should be discussed. In contrast, the addition of 'changes in hair growth' and 'hair loss' seems less reasonable because they do not increase Cronbach's alpha and would extend the questionnaire without much benefit. The non-parametric Spearman rho calculations as well as the comparison of a lower MRS II total score and a higher MRS II total score with the mean of the additional symptoms maintain the findings that these additional symptoms can support the statement of the MRS II.

In our cohort, a high proportion of women desired a treatment for their climacteric symptoms. This finding is in line with the results published recently by Blümel *et al.*[2]: 427 women aged 40–59 years and without MHT filled out the MRS II with an additional question about their treatment wish. A total 88.5% of the women believed they required treatment for any of the 11 symptoms. The more severe the women rated the symptoms, the higher was their treatment wish. The authors could find a cut-off score of 14 points on the MRS to detect 90% of women perceiving that they require treatment[2]. In contrast, our study shows a discrepancy between the rating of the symptoms and therapy wish. In another study, Carpenter *et al*. showed that hot flashes/night sweats and disturbed sleep were the menopausal symptoms with the highest priority for women to alleviate, whereas heart palpitations reached the lowest priority[17]. These aspects should be further investigated. However, all three studies show the high demand for treatment and, therefore, the importance of the question about the individual wish for therapy.

We are aware that our study has some limitations due to the retrospective design. As women of the sample group voluntarily seeked medical advice for menopausal complaints there may be selection bias and somehow severity of symptoms could be overrated compared to the general population. This could also be a reason for our mean age at the final menstrual period being quite low. Furthermore, the study was not adjusted to patients' medication intake. Therefore, the type of medication and duration were heterogeneous. Also, the Study of Women's Health Across the Nation data showed that there were racial/ethnic differences, for example, in vasomotor symptoms[18]. As our study was conducted in the German part of Switzerland there may be difficulties in generalizing specific symptoms.

Last, there were fluctuating case numbers as not every patient filled out the extended MRS II completely ($N = 146$ of 419, 34.8%). Nevertheless, our adjusted statistical analysis produced similar results.

There is a large body of evidence that women attending menopause clinics have a variety of symptoms. It is still a matter of debate which symptoms may be explained by endocrine changes. Indeed, each symptom by itself is not an official indication for MHT. This is true for most items of the original MRS II and also for the items added by us. However, as a whole, the climacteric syndrome which can be assessed by validated questionnaires such as the MRS II is an indication for MHT. We thus believe that a systematic assessment of symptoms is mandatory to guide treatment decisions and to allow an objective measurement of treatment outcome.

The extended MRS II could be a patient-centered assessment tool for menopause clinics.

Despite the aforementioned limitations, our results are transferable to daily clinical practice where women with heterogeneous medication are voluntarily seeking medical advice. This is the first study we are aware of that analyzes inclusion of these additional symptoms in the MRS II. Moreover, we systematically collected data from a large cohort of consecutive patients.

Conclusion

We suggest including the items 'changes in weight', 'headaches', and 'skin changes' in the MRS II as our results show even higher internal consistency of the questionnaire with these symptoms. The rate of women considering that these complaints require a therapy varied from 42.1% ($N = 38$, 9.1%) to 60.6% ($N = 33$, 7.9%), which underlines the importance of systematic ascertainment in daily clinical practice. Physicians should also be aware of the discrepancy between the rating of the climacteric symptomatology and the wish for treatment.

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Potential conflict of interest The authors declare that they have no competing interests in respect to the presented study.

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Data availability statement

Data not available as further publications from the data set are in preparation.

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