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RESEARCH

Menopausal symptoms and equestrian participation: the perceived impact on confidence, motivation and riding behaviour

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Abstract

Background Menopause significantly affects female athletic participation, yet its specific impact on the equestrian community remains under-researched. Aims Examine how menopausal symptoms impact female equestrians' confidence, motivation and riding behaviour.

Methods Exploratory, cross-sectional, multi-method survey design was employed. Data were collected via an online questionnaire distributed across social media equestrian groups ($N = 613$; mean age = 53.07 ± 0.27 years). Quantitative data were analysed using Pearson's chi-square tests of independence with Cramér's V, to assess effect size. Benjamini–Hochberg corrections and adjusted residuals were applied where appropriate. The associations between variables were further examined using Spearman's Rank correlation. Qualitative data from open-ended responses were analysed using reflexive thematic analysis.

Results A total of 605 participants (98..7%) reported experiencing at least one menopausal symptom, with overall symptom burden highest among women aged 45–54 years. After Benjamini–Hochberg correction for multiple comparisons (FDR = 0.05), significant age-related associations remained for brain fog, vasomotor symptoms (VMS), and anxiety. Sleep and genitourinary symptoms showed no significant differences across age groups. Importantly, 66.9% of riders ($n = 410$) reported feeling less confident when riding during the menopausal transition. Qualitative analysis identified five higher-order themes describing how women navigated these changes: (1) cognitive appraisal, (2) cognitive restructuring, (3) emotional responses, (4) physical functional decline, (5) cognitive functioning and distortions.

Conclusion Menopausal symptoms significantly affect a female equestrian's confidence, physical decline, and psychological well-being. These findings highlight an urgent need for coaches and sports associations to develop targeted support, training, and education strategies to safely retain female participation and protect rider identity throughout this midlife transition.

Keywords Perimenopause · Menopause · Postmenopause · Equestrians · Participation · Confidence

Introduction

Equestrianism is a female-dominated sport; within the United Kingdom, approximately one million regular riders are female, representing around twice as many participants as male riders (British Equestrian, 2024). Unlike many sports, participation in riding can span well into the senior years. Compared to men, women have gender specific biological challenges, which may influence their continued participation in sport. These challenges are commonly conceptualised as the three Ms: menstruation, maternity, and menopause. Each brings distinct hormonal, physiological, cognitive and emotional challenges [1, 2].

Among these transitions, menopause transition represents a major reproductive and endocrine transition, culminating in reproductive senescence [3], which typically occurs at approximately 51 years of age in the UK [4]. The number of women reaching menopausal age is increasing rapidly worldwide. By 2050, adults aged 50 years and over are expected to be the fastest-growing demographic globally, with a projected increase of 70%, particularly among women

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[53, 55] . Despite this demographic increase and the fact that women now spend one-third of their lives postmenopause [5], menopause remains poorly understood.

The menopause transition comprises three phases: perimenopause, menopause, and postmenopause, and typically occurs approximately 12 months after the last menstrual cycle, marking the end of perimenopause and the onset of postmenopause [6]. Perimenopause is characterised by hormonal alterations, notably a decline in oestradiol (E2), progesterone (P4) and inhibin resulting from a reduction in ovarian follicle numbers [7]. In response to this lack of ovarian feedback, follicle-stimulating hormone (FSH) and luteinising hormone (LH) levels gradually increase, eventually leading to reproductive senescence [3, 8].

Although menopause is primarily associated with reproductive ageing, many commonly reported menopausal symptoms have been linked to neurocognitive and psychological changes [3]. These include vasomotor symptoms (VMS), pain, brain fog, and sleep disturbances [3, 9, 10]. Furthermore, symptoms frequently co-occur in distinct clusters, which may intensify their overall impact [11, 4]. Menopausal symptoms affect over 80% of women, with approximately 20% experiencing them severely [12], with many symptoms persisting into the postmenopausal years [3]. Consequently, the cumulative burden of these symptoms may have important implications for the health, well-being, and quality of life of female equestrians.

In addition to the more commonly reported symptoms, menopause is associated with other physiological changes that are less visible, the 'silent side effects' of menopause. These include a decline in brain white matter volume (WMV) and grey matter volume (GMV), as well as in muscle mass and bone mineral density (BMD) [13–15]. It has been proposed that these changes may contribute to neurological disorders, sarcopenia, and osteoporosis [13, 14, 16].

Physiological, cognitive, and emotional challenges associated with menopause may significantly impact participation in equestrian sport. Menopause is a pivotal time for women, and the perception of menopause may be disempowering, as they see their bodies going through many changes [17]. These changes can affect self-esteem, confidence and their rider identity [18]. There is also a cultural narrative of horse riders as robust and resilient [18], a perception that may be compromised by menopause and the symptoms riders must contend with.

Consequently, menopause symptoms may significantly impair a rider's athletic performance. For instance, cognitive decline can affect memory, processing speed, and reaction times [19]. Musculoskeletal changes may be associated with declines in grip strength, balance, and coordination, all of which can directly affect riding ability and safety [10, 20, 21, 22]. Beyond the physical limitations, some may also be problematic and visible, which some riders may find embarrassing, particularly given Western society's negative attitudes towards ageing [23]. Ultimately, these physiological and cognitive shifts are all influential variables required to maintain a harmonious horse-rider relationship. They can impair the rider's ability to be in synchrony with the horse, maintain balance, and adapt to the horse's movements [22].

Considering the physical and cognitive demands of equestrianism, rider safety is paramount. Meredith and Stigson [20] reported that older female riders have an increased risk of serious injury, experiencing a higher proportion of fractures than other age groups. Given the potential effects of menopausal symptoms on physical and cognitive functioning, further research is needed to understand better how menopause may influence rider safety. Accordingly, further research is required to examine the relationship between menopausal symptoms, equestrian participation, confidence, and safety.

This study aims to 1) gain an insight into the challenges that menopausal riders face daily, and 2) understand the personal and perceived impact of menopause symptoms on quality of life, well-being, and participation in equestrian activities. Riders' experiences of the impact of menopause and its potential influence on their participation in equestrian sport will be explored via a multi-method survey. Based on previous research [9, 11, 24, 25, 26], we hypothesised:

H1 *Increasing age would be associated with an intensification of menopausal symptoms.*

H2 *The prevalence of specific menopausal symptoms would differ between the age groups, demonstrating the variation in experiences of menopausal symptoms.*

H3 *That some symptoms may co-occur, revealing underlying clusters.*

H4 *A higher menopausal symptom burden would be associated with lower self-confidence, motivation and decreased engagement in riding activities.*

Methods

Sample size estimation and justification

This study was exploratory; therefore, a sensitivity analysis was conducted, to determine the smallest effect the study could reliably detect with the sample size we collected [27]. G*Power was used to run this sensitivity analysis [28]. The analysis was specified for the chi-square test of association between age groups and symptom report ($df = 7$; eight age groups by symptom presence), with an alpha level of

0.05, a power of 0.95, and a final sample size of $N = 613$. Because not all groups were the same size, G*Power based its calculations on the average group size. The sensitivity analysis showed that the study could detect a minimum effect size of $w = 0.19$. Agreeing to Cohen's [29] recommendations, for w, where 0.1 is small, 0.3 is medium and 0.5 is large, this represents a small to medium effect indicating the sample was sufficiently large enough to detect associations of this size or larger. A second sensitivity analysis was specified for the Spearman's Rank correlations (r_s) used to examine associations between symptoms, functional decline and participation. This indicated that the sample was sufficient to detect a minimum correlation of $r_s = 0.145$, which represents a small effect under Cohen's criteria indicating the sample was large enough to detect correlations of this size or larger.

Study design

The study employed an exploratory, cross-sectional, multi-methods approach, collecting responses via an online questionnaire. The target population comprised female equestrians currently experiencing the menopausal transition (perimenopause) or who had undergone natural menopause (postmenopause). The questionnaire consisted of five sections and thirteen questions. Qualitative and quantitative data were collected from the questionnaire to provide a richer understanding of the influence of menopause on the female rider population.

The questionnaire was shared online via Facebook with Equestrian groups for two weeks, from 23 January 2025 to 4 February 2025, enabling access to the target audience and optimising reach. A self-selecting, non-probability sampling method was used. Participants gave consent through a question in the first section of the survey. All participants remained anonymous, and the data collected were confidential throughout the study. The inclusion criteria were female equestrians in the menopausal transition (perimenopause) or postmenopause who had undergone natural menopause.

The questionnaire investigated the impact of the menopausal transition (perimenopause) and postmenopause on female equestrians, specifically examining how associated physical and psychological symptoms influenced sports participation, performance, and rider confidence. The questions were a mix of multiple-response and open-response, and the questionnaire was designed to take no longer than fifteen minutes to complete. In section one, the questions pertained to the riders' ages and the disciplines they rode. Section two examined the effect of menopause on riding habits. Section three detailed the symptoms the riders experienced. Section four outlined any additional training the riders participated in. Section five addressed the riders' thoughts on the knowledge and support provided by coaches and instructors for menopausal riders. A copy of the questionnaire is presented in Supplementary Information 1.

Piloting of the questionnaire

The questionnaire was based on and underpinned by previous research [30, 31, 25, 32]. To ensure the questions were understandable and the layout flowed, and to estimate the time to complete the questionnaire, the questionnaire was pilot tested on $n = 2$ within the target age group. This enabled us to gather feedback and, if required, review and revise the questions and layout prior to the start of the study.

Data screening

Responses from the questionnaire were screened prior to inclusion to verify consent and ensure adherence to inclusion criteria. Responses meeting the inclusion criteria were then exported from Microsoft Forms into a Microsoft Excel spreadsheet (2025).

Data analysis

The dataset was initially grouped by age in 5-year increments (34–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74), which allowed comparisons to be made during periods where symptoms are reported to peak [33, 34]. Descriptive statistics were then reported as percentages for each age group, including rider participation demographics and symptoms, in a cross-tabulation. In addition, Pearson's Chi-Square (χ^2) test of independence was applied to examine whether the association between age and self-reported symptoms was statistically significant and to determine how this affected rider participation. Cramér's V was calculated to indicate the strength of association, with effect sizes inferred from values of 0.10, 0.30, and 0.50, corresponding to small, medium, and large effect sizes, respectively [29].

Due to the larger cross-tabulation tables, the Benjamini-Hochberg (B-H) procedure was applied to control the false discovery rate (FDR) [35], and adjusted residuals were applied where appropriate. Adjusted Residuals (ARs) were used to isolate true group differences and identify which specific age groups and symptoms contributed to the significant differences [36]. Cells with an AR value equal to or exceeding ± 1.96 were considered significant [37]. Using this threshold addressed the risk of overall Type I errors across multiple comparisons and controlled for false positives. Additionally, as some group frequencies fell below 5, Fisher–Freeman–Halton exact tests with Monte Carlo estimation were employed to ensure significance values remained reliable despite small cell sizes [54]. All quantitative data were analysed using IBM SPSS Statistics (Version

29), with a significance level of $\alpha = 0.05$ (95% confidence interval).

The qualitative data from the open-ended questions were analysed using Reflexive Thematic Analysis, following Braun and Clarke's [38, 39] six-phase framework. An inductive approach was adopted, whereby patterns and meanings were derived directly from participants' responses rather than guided by a pre-existing theoretical framework.

Data familiarisation was achieved through repeated reading of responses. Initial coding was conducted manually, with relevant sections of text highlighted and labelled, resulting in 17 initial codes. These codes were then iteratively reviewed and organised into broader patterns of meaning, which were developed into five overarching themes.

To enhance reflexivity and analytical rigour, the developing coding structure and final themes were reviewed and refined in collaboration with the co-authors (SJH, CVU, and PJT).

Reflexivity statement

Reflexivity was considered throughout the thematic analysis, with particular attention given to the coder's postmenopausal status, age, and equestrian knowledge. Personal lived experience and familiarity with the study context may have influenced the interpretation of the qualitative data [40]. To enhance analytical rigour and minimise potential bias, coding decisions, theme development, and data interpretation were regularly discussed with the co-authors, who brought different professional and personal perspectives to the analysis [41].

Results

Age, participation, health, and lifestyle

There were $N = 618$ survey respondents, of whom $n = 617$ consented to their data being included in the research project, and $n = 613$ met the inclusion criteria for the data analysis. The mean age was 53.07 ± 0.27 years, with an age range of 34 to 74 years. In terms of equestrian activities, rider participation ranged from 82.5% for leisure riding to 2.8% for endurance competition. Some riders reported participating in multiple disciplines (Table 1).

Regarding health and lifestyle, the majority of participants did not take HRT (59.9%). Furthermore, less than half of respondents (47.1%) reported engaging in additional exercise, with walking identified as the most common activity (63%). Finally, less than half (43.1%) reported having an instructor; of those, most felt supported by their instructor (68.9%), while nearly a third did not (31.1%).

Table 1 Rider age in years and participation

Demographic	Category	Frequency
Age (years)	34–39	16 (2.6%)
	40–44	50 (8.2%)
	45–49	110 (17.9%)
	50–54	179 (29.2%)
	55–59	157 (25.6%)
	60–64	76 (12.4%)
	65–69	18 (2.9%)
	70–74	7 (1.1%)
Rider participating by discipline	Dressage	199 (32.5%)
	Endurance	17 (2.8%)
	Eventing	52 (8.5%)
	Leisure riding	506 (82.5%)
	Show jumping	95 (15.5%)
	Other	77 (12.6%)

Quantitative data

Age and symptoms

A total of 605 participants (98..7%) reported experiencing at least one menopausal symptom, with the distribution and density of total self-reported menopausal symptoms across participant age categories shown in Fig. 1. Pearson's chi-square tests indicated significant associations between age group and pain, brain fog, vasomotor symptoms (VMS), memory loss, and anxiety (Supplementary Table 1). However, following Benjamini–Hochberg correction for multiple comparisons (FDR = 0.05), only brain fog, VMS, and anxiety remained statistically significant. Sleep and genitourinary symptoms showed no significant differences across age groups.

Cramér's V values indicated that brain fog (V = 0.23), VMS (V = 0.20), and anxiety (V = 0.19) demonstrated the strongest associations with age, although these effect sizes were small to medium. Pain (V = 0.15) and memory loss (V = 0.15) demonstrated weaker associations.

Examination of the adjusted residuals (AR) identified the age groups that contributed most strongly to these associations (Supplementary Table 1). Anxiety was significantly concentrated among riders aged 40–44 years (AR = 2.4), while brain fog was most prevalent among riders aged 45–49 years (AR = 2.4). Vasomotor symptoms demonstrated a marked peak in the 60–64-year age group (AR = 3.1). Although pain was elevated among riders aged 50–54 years (AR = 2.0), the overall association between pain and age group did not remain significant following correction for multiple comparisons.

The highest symptom burden was observed among women aged 45–54 years. Participants within this age range

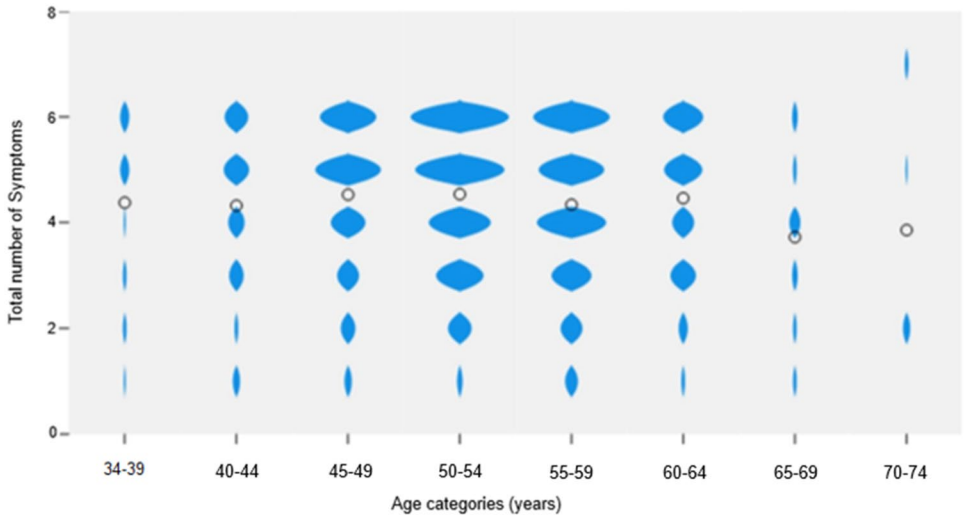

Fig. 1 Violin plot displaying the distribution and density of total self-reported menopausal symptoms across participant age categories

reported more symptoms than both younger (< 45 years) and older (> 55 years) age groups (Fig. 1). In contrast, symptom distributions were narrower, and median symptom counts were lower in the younger and older cohorts, suggesting that symptom burden peaked during the menopausal transition, then declined after age 55 years, with a slight increase again in the 60–64 years age group.

Age and physical changes

A total of 62.3% of participants reported physical changes, including declines in balance, coordination, or muscle strength. Pearson's Chi-squared tests revealed that declines in balance and muscle strength did not vary significantly across age groups, whereas declines in coordination demonstrated a statistically significant association with age (Table 2). Cramér's V indicated a small-to-medium association.

Examination of the adjusted residuals (AR) indicated that a decline in coordination was significantly concentrated among riders aged 50–54 (AR = 2.7), and a decline in strength was significantly concentrated among the riders aged 65–69 (AR = 2.0), whereas younger riders aged 40–44 reported significantly fewer balance issues than expected (AR = −2.0).

Table 2 Descriptive statistics and inferential statistics for the age of participants and reported physical changes

Participant demographics & physical changes	Decline in balance	Decline in coordination	Decline in strength
	n %	n %	n %
34–39	4 (25.0%) [−0.1]	7 (43.8%) [1.8]	6 (37.5%) [−1.0]
40–44	7 (14.0%) [−2.0]	10 (20.0%) [−0.8]	21 (42.0%) [−1.1]
45–49	26 (23.6%) [−0.6]	25 (22.7%) [−0.5]	47 (42.7%) [−1.5]
50–54	52 (29.1%) [1.1]	57 (31.8%) [2.7]	92 (51.4%) [0.7]
55–59	41 (26.1%) [0.1]	33 (21.0%) [−1.2]	78 (49.7%) [0.1]
60–64	23 (30.3%) [0.9]	18 (23.7%) [−0.2]	40 (52.6%) [0.6]
65–69	4 (22.2%) [−0.4]	1 (5.6%) [−1.9]	13 (72.2%) [2.0]
70–74	2 (28.6%) [0.2)	0 (0.0%) [−1.5]	5 (71.4%) [1.2]
$X^2_{(7)}$	5.82[a]	15.91[a]	9.68[a]
P	.564	.024	.203
Cramér's V	0.10	0.16	0.13
Total	159 (25.9%)	151 (24.6%)	302 (49.3%)

[a]Cells have expected counts less than 5

n number of participants within that age category, % percentage of participants within that age category who reported experiencing the symptom, *AR* adjusted residual. Adjusted residuals greater than ± 1.96 indicate cells contributing significantly to the overall χ^2 statistic. The total baseline population across all categories was *N* = 613

The rider's psychological and emotional effects on riding habits

Examining the rider's psychological and emotional effects on riding habits, Pearson's Chi-square test indicated no significant association with age group and considered stopping riding, stopped competing, not as confident, and not affected (Table 3). However, there was a statistically significant association between age and riders considering stopping competing. Cramér's V test indicated this relationship had a small effect.

The AR values indicated that these psychological impacts were most evident in younger age cohorts (Table 3). The thought of giving up competition was significantly concentrated among riders aged 34–39 (AR = 3.2) and 45–49 (AR = 2.0). Furthermore, the age group (34–39 years) was also significantly more likely to consider stopping riding altogether (AR = 2.3). In contrast, riders in the 40–44 age bracket were significantly more likely to report that their riding habits were completely unaffected (AR = 2.1).

The relationships between menopausal symptoms and reported physical decline

Spearman's Rank Order Correlation was conducted to examine the relationships between menopausal symptoms and reported physical decline (Supplementary Table 2). The assessment indicated that while most of these symptoms were linked to one another, the actual relationships were weak to moderate.

The strongest correlation was observed between declines in balance and coordination (r_s 0.45, $p < 0.01$), indicating a moderate-to-strong association. Declines in balance were also moderately associated with declines in muscle strength ($r_s = 0.30$, $p < 0.01$).

The cognitive and psychological symptoms, including memory loss, had a medium-strength correlation with anxiety ($r_s = 0.32$, $p < 0.01$). Brain fog also correlated most significantly with anxiety ($r_s = 0.26$, $p < 0.01$), memory loss ($r_s = 0.21$, $p < 0.01$), and a decline in coordination ($r_s = 0.20$, $p < 0.01$). In contrast, VMS and urinary incontinence demonstrated the weakest and fewest significant relationships with other symptoms across the age groups.

The effects of menopausal symptoms, riding participation, and confidence outcomes

A second Spearman's rank-order correlation examining the effects of menopausal symptoms on participants' riding habits (Supplementary Table 3). The assessment indicated that riders who considered stopping riding altogether showed significant associations with most symptoms. Among those, the strongest were declines in balance ($r_s = 0.19$, $p < 0.01$), memory loss ($r_s = 0.18$, $p < 0.01$), and muscle strength ($r_s = 0.17$, $p < 0.01$), though these relationships were statistically weak.

Table 3 Descriptive statistics and inferential statistics for the age of participants, riding participation, and confidence outcomes

Participant demographics	Considered stop riding	Considered stop competing	Stopped competing	Not as confident	Not affected
	n %	n %	n %	n %	n %
34–39	7 (43.8%) [2.3]	5 (31.3%) [3.2]	1 (6.3%) [−0.6]	9 (56.3%) [−0.9]	1 (6.3%) [−0.8]
40–44	9 (18%) [−0.5]	4 (8.0%) [−0.2]	4 (8.0%) [−0.7]	30 (60.0%) [−1.1]	11 (22.0%) [2.1]
45–49	24 (21.8%) [0.3]	15 (13.6%) [2.0]	10 (9.1%) [−0.6]	71 (64.5%) [−0.6]	11 (10.0%) [−0.9]
50–54	40 (22.3%) [0.6]	17 (9.5%) [0.4]	20 (11.2%) [0.2]	118 (65.9%) [−0.3]	20 (11.2%) [−0.7]
55–59	33 (21.0%) [0.1]	8 (5.1%) [−1.9]	17 (10.8%) [0.0]	109 (69.4%) [0.8]	22 (14.0%) [0.6]
60–64	11 (14.5%) [−1.4]	5 [6.6%) [−0.7]	10 (13.2%) [0.7]	54 (71.1%) [0.8]	10 (13.2%) [0.2]
65–69	2 (11.1%) [−1.0]	0 (0.0%) [−1.3]	2 (11.1%) [0.0]	15 (83.3%) [1.5]	1 (5.6%) [−0.9]
70–74	1 (14.3%) [−0.4]	0 (0.0%) [0-.8]	2 (28.6%) [1.5]	4 (57.1%) [−0.6]	1 (14.3%) [0.1]
$X^2_{(7)}$	8.76[a]	18.95[a]	3.86[a]	5.79[a]	6.76[a]
p	.269	.013	.807	.575	.449
Cramér's V	0.12	0.18	0.08	0.10	0.11
Total	127 (20.7%)	54 (8.8%)	66 (10.8%)	410 (66.9%)	77 (12.6%)

[a]Cells have expected counts less than 5

n number of participants within that age category, % percentage of participants within that age category who reported riding participation, and confidence outcomes, AR adjusted residual. Adjusted residuals greater than ± 1.96 indicate cells contributing significantly to the overall $\chi 2$ statistic

The total baseline population across all categories was N = 613

Looking at competitive habits, stopping competition was only significantly associated with memory loss ($r_s = 0.15$, $p < 0.01$). Meanwhile, riders who reported feeling less confident in the saddle were significantly linked to anxiety ($r_s = 0.16$, $p < 0.01$) pain ($r_s = 0.16$, $p < 0.01$), and memory loss ($r_s = 0.14$, $p < 0.01$). The group of participants who reported that their riding habits were completely unaffected showed significant negative correlations. Among those, the strongest were memory loss ($r_s = -0.23$, $p < 0.01$), pain ($r_s = -0.21$, $p < 0.01$), and anxiety ($r_s = -0.21$, $p < 0.01$), indicating that riders who felt unaffected experienced fewer symptoms overall.

Qualitative data

The thematic analysis (Supplementary Table 4) identified 17 lower-order themes, which were synthesised into five higher-order themes capturing how women interpret and negotiate the menopausal transition within equestrian sport.

Cognitive appraisal

Cognitive appraisal reflects how participants judged whether menopausal changes were manageable within their equestrian activities or deemed them as a threat. Several riders described withdrawing from certain activities and altering their riding habits to mitigate perceived risks. Equally, others reframed these age-related changes as manageable challenges, enabling them to continue participating in equestrian activities.

“…Avoid hacking on busy roads as get anxious” (ID No. 16, Age 52).

“…stopped riding but now compete in hand showing” (ID No. 46, Age 61).

> Sold horse and bought old quiet pony. Stopped jumping, dressage, long distance riding and now only do small local familiar hacks, stopped galloping and rarely canter, avoid windy weather in case of spooks, avoid slippery tracks, avoid hacking with young riders that might go fast, no longer ride unfamiliar or young horses- only my old trusted quiet pony. (ID No. 95, Age 54)

“…makes risk assessment part of everyday life” (ID No. 242, Age 67).

Cognitive restructuring

Menopause symptoms directly alter a woman's self-perception. To counter this, several riders adopted cognitive restructuring to continue participating in equestrian activities, actively reframing their time with horses as a pleasurable, therapeutic lifeline that preserved their mental health.

"…Riding has become more important and a lifeline to combat depression" (ID No. 384, Age 60).

“…keeps me sane! My happy place” (ID No. 36, Age 52).

“…Muscled through with protection” (ID No. 78, Age 59).

"…Made me more determined to ride to keep up my fitness and well-being. I have just quit rugby because I am now too weak, but I am intending to do more riding" (ID No. 243, Age 51).

Emotional responses

Participants described emotional shifts and mood changes that affected their riding experiences. These responses included emotional reactivity, reduced motivation, and anxiety about potential accidents or injury. These emotional experiences influenced when, where, and how participants chose to ride.

“…I found I lost my enthusiasm to do much and that included wanting to ride” (ID No. 73, Age 60).

"…I would snap at my instructor whenever I got out of my comfort zone. I was horrid" (ID No. 191, Age 56).

“…Lack of motivation to do anything” (ID No. 441, Age 47).

“…more fear of falling off, as I no longer bounce” (ID No. 480, Age 57).

Physical functional decline

The physiological shifts of menopause frequently result in a measurable functional decline, primarily affecting strength, muscle tone, and pelvic floor integrity. Riders noted that these physical limitations directly compromised their functional capabilities in the saddle, leading to physical and emotional discomfort during routine tasks.

“…Don’t have the energy, fitness or strength to ride like I could before menopause” (ID No. 29, Age 53).

“…Weak bladder causes physical and emotional discomfort” (ID No. 85, Age 49).

“…I have trouble mounting from the ground these days as I’ve lost a lot of strength in my legs” (ID No. 302, Age 56).

“…Avoiding lessons/competing due to symptoms of menopause; can't ride when on a period as I need to change clothes” (ID No. 432, Age 48).

Cognitive functioning and distortions

Some participants reported declines in cognitive performance during menopause, indicated primarily by memory lapses and brain fog. Furthermore, negative self-perceptions linked to menopausal weight gain generated cognitive distortions regarding physical suitability for the sport, undermining rider confidence.

"…Find it hard to remember courses and dressage tests" (ID No. 386, Age 49).

"…stopped riding due to large weight gain caused by menopause and felt I was too heavy for my horse, so not ridden in a year" (ID No. 454, Age 54).

"…Struggled with weight, which has knocked my confidence" (ID No. 319, Age 55).

Discussion

The purpose of this study was to examine the impact of menopause on equestrians and their participation in riding activities. The findings indicate that most participants experienced one or more menopausal symptoms, highlighting a substantial symptom burden within this population. Symptom burden increased with age, peaking in midlife before declining thereafter, suggesting a non-linear relationship between age and menopausal experience. In addition, symptoms tended to cluster, indicating that menopausal experiences are multifaceted rather than isolated. A notable finding was the impact of menopause on rider confidence: approximately two-thirds of participants (66.9%) reported feeling less confident. The present findings are broadly comparable to those of Bradley & Mills [42], who reported a 75% decrease in confidence.

Reduced confidence was associated with greater menopausal symptom burden and, for some riders, was linked to considerations of reducing participation, withdrawing from competition, or stopping riding altogether. These findings suggest that menopause may have important implications for both the physical and psychological aspects of equestrian participation. The qualitative findings provide further insight into these experiences, highlighting how menopausal symptoms influenced riders' confidence, emotional well-being, and decisions regarding ongoing participation in equestrian activities.

The qualitative data enabled a more detailed exploration of the psychological and emotional aspects of the menopausal transition. Research in this area has traditionally focused on health-related outcomes, with limited attention given to the experiences of menopausal women within equestrian sport [24]. A recent study by Bradley and Mills [42] reported that menopause influenced riding confidence, participation, and the wider equestrian experience. Whilst the present findings are broadly consistent with this emerging evidence, direct comparison should be interpreted cautiously due to differences in analytical approaches, study design and reporting methods. Crucially, the present study adds a rigorous statistical layer by using the Benjamini–Hochberg correction and Adjusted Residuals. This approach controls for false positives and isolates true differences between age groups, providing a highly reliable baseline for this research area.

Beyond these statistical parameters, the qualitative data also highlighted the positive aspects of the equestrian experience. Despite these challenges, participants also described the positive role that horses played in supporting their well-being during menopausal transition. Midlife is a challenging time for women with menopausal transition and, for some, also the changes in family structure with children leaving home [43]. The companionship of horses may help navigate these changes, as many consider their horse to be a confidant and a form of escapism from the busy world [44, 45], a notion supported by several participants in the study.

The quantitative findings demonstrated an increasing burden of symptoms from the ages of 45 to 54, followed by a decline thereafter. This stage in a woman's life is often referred to as the "window of vulnerability" that typically affects women between this age range and is characterised by the onset of depression and anxiety [6, 46]. Evidence suggests that depression is significantly linked to physiological and hormonal fluctuations of menopause, with increased symptom burden, relating to a higher risk of depression [6, 11]. The increasing symptom burden identified in this study, together with changes in equestrian participation, may contribute to poorer psychological well-being among female equestrians.

Although the present research highlights a higher burden of symptoms between the ages of 45 and 54, the clustering of symptoms appears to extend across all stages of menopause. Hwang et al. [46] reported a significant association between depression, anxiety, VMS and disturbed sleep, which is consistent with the present study. The current study identified significant age-related associations for brain fog, VMS, anxiety, pain, and memory loss, although only brain fog, VMS, and anxiety remained significant following the B-H procedure for multiple comparisons. Cray et al. [11] explored symptom clustering across the stages of menopause. The study found that, despite some variations in cluster symptoms, a consistent pattern of mood, pain, and VMS elements was present at each stage of menopause. In addition, as these clusters became more distinctive, insomnia and fatigue intensified, cognitive function declined, and symptoms of pain emerged, suggesting an association between symptoms that influence the onset and severity of others [3, 9].

The menopausal transition can be a tumultuous phase characterised by heterogeneous and multifaceted symptoms [3, 10]. As previously discussed, symptoms frequently co-occur in distinct clusters. Hormonal changes during menopause have been associated with alterations in mood, cognition, and physical functioning, which may contribute to these symptom patterns [3, 10, 47]. Such changes may affect rider safety and performance, potentially altering reaction

times, cognitive performance, emotional regulation, and musculoskeletal function, as previously discussed [10, 19, 21, 22]. These effects may influence confidence, motivation, and participation in equestrian activities, highlighting the importance of increasing awareness and support for menopausal women within the equestrian community.

Beyond these challenges, the menopausal transition may represent both a window of vulnerability and a window of opportunity for female equestrians [46, 48]. Whilst symptom burden, reduced confidence, and cognitive challenges may create barriers to participation, this life stage also presents an opportunity for targeted coaching interventions, education, and support strategies to maintain rider confidence, safety, and long-term engagement in equestrian activity.

These present findings have important practical implications for equestrian coaches and instructors working with menopausal and postmenopausal women. Attention should be given to riders reporting reduced confidence, as confidence emerged as a key factor influencing participation and competitive engagement. Considering the observed associations among menopausal symptoms, confidence, and participation, greater awareness of menopause in equestrian settings may facilitate supportive conversations and appropriate adaptations to training and competition. Increased knowledge may also encourage women to seek support, reduce the stigma surrounding menopause, and encourage midlife women to remain engaged in equestrian activities throughout the menopausal transition.

Limitations

While the current findings provide valuable insights into the impact of menopausal symptoms on female equestrians, several limitations should be acknowledged. First, the study utilised a cross-sectional design. The cross-sectional nature of the study prevents conclusions regarding causality or changes in symptom burden over time. This snapshot of how participants felt when completing the questionnaire may significantly change in the future. Longitudinal research would provide greater insight into how menopausal symptoms and equestrian participation change throughout the menopausal transition.

In addition, the study relied exclusively on self-reported menopausal symptoms and did not incorporate objective physiological measures. Consequently, symptom experiences could not be verified against biological indicators, which may have influenced the accuracy of symptom classification and severity reporting. The data may also be subject to recall bias, particularly among postmenopausal participants reconstructing past symptom experiences. In addition, general response bias cannot be ruled out.

Crucially, the self-selecting recruitment method via Facebook equestrian groups likely introduced a pronounced volunteer bias. This bias is strongly evidenced by the extremely high symptom prevalence reported in this sample (98..7%). Individuals experiencing severe or highly impactful menopausal symptoms may have been significantly more motivated to participate in a study explicitly addressing menopause, thereby over-representing the true symptom burden within the wider community.

Additionally, because of the characteristics of online convenience sampling, the study participants may not be fully representative of the wider equestrian population, potentially limiting the generalisability of the findings. Comparison with national equestrian demographic data suggests that the sample was not fully representative of the broader equestrian community. As with many online surveys, participation was restricted to individuals who chose to respond and who had access to social media. Furthermore, the sample was predominantly White British, limiting the cultural diversity of the data. Given the under-representation of ethnic minority groups within both the study sample and equestrian research more broadly, caution should be exercised when generalising these findings across different cultural and ethnic populations.

Reflexivity was considered throughout the thematic analysis, with particular attention to the coder's postmenopausal status, age, and equestrian knowledge, which may have influenced the interpretation of the qualitative data. To enhance the credibility of the analysis, themes and interpretations were regularly discussed with the wider research team, who brought diverse perspectives to the data.

Finally, while caution should be exercised when generalising findings beyond equestrian sport, Physiological, cognitive, and emotional challenges associated with menopause are not unique to this cohort. Therefore, certain aspects of these findings may be transferable to the broader menopausal population, particularly women engaged in farming, agricultural sectors, or other demanding outdoor and physical industries.

Directions of future research

To gain a more complete understanding of this midlife transition, future research must adopt a more inclusive approach. Demographic characteristics such as marital status, education, and socioeconomic background are important and have been shown to influence symptom severity. Similarly, women from ethnic backgrounds have been reported to suffer higher levels of symptoms than white women.

Furthermore, neurodivergent women are underresearched, especially in relation to how menopause impacts their population. Individuals who are neurodivergent have differences in brain structure and functioning, and it is plausible that the symptoms of menopause may be intensified in this population, especially in relation to executive function

and emotional regulation. Future qualitative research should incorporate questions about demographic variables, including marital status, education, socioeconomic background, ethnicity, neurodiversity, and symptom severity, as well as lifestyle habits. These considerations for future research would deepen understanding of the midlife transition, incorporating focus groups and interviews to yield greater insight into the perceived impact of menopause.

Practical implications

There is currently limited guidance available for coaches and instructors working with women during the menopausal transition and postmenopausal. The Long-Term Athlete Development (LTAD) model provides a framework for understanding lifelong participation in sport with 7 stages [49]. Stage 7 does not focus on specific development, but rather on maintaining lifelong participation in sport and physical activity [50]. In the coaching context, the practical implications proposed here focus on maintaining rider confidence and safety, supporting continued participation, and adapting training where appropriate, all of which may be important for promoting lifelong engagement in equestrian activity.

Conclusion

The findings of this study demonstrate that menopausal symptoms are associated with changes in confidence, participation, and riding behaviour among female equestrians. Symptom burden was highest in midlife (45–54 years), with evidence of symptom clustering and significant associations between symptom experience and riders' confidence and engagement in equestrian activities.

This study contributes insight into an under-researched area by highlighting how menopausal experiences interconnect with participation in a physically demanding sporting environment. It extends understanding of the relationship between physiological and psychological changes during midlife and continued engagement in equestrian activity.

Overall, the findings emphasise the importance of recognising menopause as a factor influencing confidence and participation in sport, with implications for how women's continued involvement in equestrian activities is understood.

- Coaches and instructors should develop an awareness of the stages of menopause, the typical age at which perimenopause begins, and the range of physical, cognitive, and psychological symptoms that may occur throughout the menopausal transition
- Coaches and instructors should be aware that menopausal symptoms may influence rider confidence, emotional regulation, and physical capabilities, potentially affecting performance and participation.
- Understand that changes in confidence, motivation, or reduced competitive engagement may reflect symptom burden rather than reduced commitment or ability.
- There should be an open and non-stigmatising environment allowing for discussing menopause, which may support continued participation in equestrian sport.
- Adapting training or lesson formats, having strategies in place during periods of physical or psychological distress, may help riders remain active and involved in sport.
- Be aware of the physical decline which may occur during and postmenopause and implement training strategies that may assist in counteracting these.

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Data availability The data supporting the findings of this study have been deposited in the University of Lancashire Research Repository and are accessible via the following DOI: https://doi.org/10.17030/uclan.data.00000647. Upon request. The dataset contains no identifiable participant information. Additional information is available from the corresponding author, JP, upon reasonable request. The datasets generated and analysed during the current study are available within the article and its supplementary files. The study questionnaire is provided in Supplementary Information 1, while detailed statistical calculations, Spearman's correlations, and the thematic analysis framework are provided in Supplementary Information 2.

Declarations

Conflict of interest The authors declare no competing interests.

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