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Footwear preferences among emergency and outpatient nurses: Implications for preventing work-related musculoskeletal disorders

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ABSTRACT

Background: Nurses engage in physically demanding activities that increase the risk of work-related musculoskeletal disorders (WRMSDs). Appropriate footwear selection is an important preventive strategy.
Objective: This study aimed to identify and compare footwear preferences between nurses working in the emergency installation (EI) and outpatient installation (OI).
Methods: A descriptive quantitative study was conducted with a population of 158 nurses from a public hospital in Indonesia, comprising 93 EI nurses and 65 OI nurses. Using purposive sampling, 125 nurses participated. Data were collected through a structured questionnaire and analyzed descriptively.
Results:The most frequently selected footwear characteristics were comfort and cushioning (108 nurses, 44.4%), appropriate size (106 nurses, 41.6%), and durability for daily activities (104 nurses, 35.3%). Notable differences emerged between groups. Outpatient installation (OI) nurses placed greater emphasis on design (43.3%), cushioning (87.9%), weather resistance (65.2%), and foot protection (65.2%) compared with emergency installation (EI) nurses (33.3%, 84.7%, 59.3%, and 62.7%, respectively). Conversely, EI nurses demonstrated a stronger preference for high-quality, higher-priced footwear (72.4%) than OI nurses (47.2%).
Conclusion: Nurses prioritize footwear that fits well, is comfortable, cushioned, safe, durable, and reasonably priced. While cushioning and comfort emerged as the most important factors overall, differences in preferences between EI and OI nurses highlight the need for occupational health policies that consider unit-specific requirements. Promoting appropriate footwear may help reduce WRMSD risk and improve nurse well-being.

Keywords: footwear; nurses; emergency; outpatient; workplace; ergonomics

INTRODUCTION

Nurses are integral to the healthcare system, playing a vital role in delivering high-quality care to individuals, families, and communities (Anwar & Anzward, 2021). Within hospital settings, they are central to ensuring the continuity of patient care,

Nursing and Healthcare Practices

- *Nurses should prioritize comfortable, cushioned, and well-fitted footwear to reduce the risk of Work-Related Musculoskeletal Disorders (WRMSDs), particularly during long shifts and physically demanding tasks.*
- *Footwear preference varies by work setting; therefore, occupational health policies should consider unit-specific needs (e.g., emergency vs. outpatient) when designing interventions to prevent musculoskeletal strain.*
- *Healthcare institutions should promote the use of footwear that balances comfort, durability, and safety features (such as non-slip soles and foot protection) as part of overall strategies to support nurse well-being and injury prevention.*

encompassing nursing interventions, medical treatments, and supportive services. Nurses provide 24-hour care, addressing patients' essential needs, administering medications, performing interventions, and assisting with daily activities throughout hospitalization (Muin et al., 2020).

In the course of their duties, nurses frequently engage in strenuous activities such as attending to patients' needs, manually lifting patients, and providing mobility assistance for extended periods, often with limited opportunities for rest (Chappel et al., 2017). These physically demanding tasks place significant strain on the upper and lower extremities, back, and neck, thereby increasing the risk of musculoskeletal disorders (Aleid et al., 2021). Musculoskeletal disorders (MSDs) are defined as injuries or conditions affecting the muscles, nerves, joints, cartilage, and spinal structures (Centers for Disease Control and Prevention, 2023). When these conditions are directly linked to occupational activities, they are classified as work-related musculoskeletal disorders (WRMSDs). WRMSDs can lead to acute or chronic pain, psychological stress, and restricted mobility, ultimately reducing nurses' quality of life (Putri & Maisa, 2019). In the workplace, these conditions may impair performance, increase absenteeism, and even contribute to nurses leaving the profession. Furthermore, WRMSDs negatively affect productivity and professional attitudes, which in turn compromises the quality of care, patient safety, and overall satisfaction (Naoum et al., 2022).

WRMSDs are a common occupational health problem among healthcare workers, with nurses being the most vulnerable due to the high physical demands of their profession, which significantly increase the risk of injury (U.S. Bureau of Labor Statistics, 2020). A recent systematic review reported consistently high prevalence rates of WRMSDs across healthcare professions, with lower extremity disorders being particularly common among nurses (Jacquier-Bret & Gorce, 2023). The most frequently reported musculoskeletal complaints include pain in the ankles (86.7%), lower back (86.7%), neck (86.0%), shoulders (85.0%), lower legs (84.7%), and upper back (84.3%) (Krishnan et al., 2021).

The high prevalence of WRMSDs in the lower extremities is largely attributed to the nature of nursing tasks (Ribeiro et al., 2017). Nurses typically spend long hours standing or walking considerable distances during their shifts (Chappel et al., 2017). Maintaining proper ergonomic posture is therefore essential to reducing the risk of injury (Maulina et al., 2023). Conversely, unergonomic postures and movements—such as slouching, leaning on one leg, or improper spinal alignment—can contribute to the development of MSDs, jeopardizing both the health and occupational safety of nurses (Aleid et al., 2021; Katuuk & Karundeng, 2019).

One strategy to maintain proper body ergonomics and reduce musculoskeletal problems in the lower extremities is the selection of appropriate footwear (Stolt et al., 2018). Evidence shows a strong association between footwear comfort and musculoskeletal symptoms: 72% of nurses reporting low footwear comfort experienced foot and heel pain, compared with only 28% of those reporting high comfort (Getie et al., 2021). Similarly, low footwear comfort was independently linked to foot and heel pain ($p = 0.002$) (Tojo et al., 2018). Anderson et al. (2017) further emphasized that selecting suitable footwear, combined with knowledge of foot health, can mitigate the impact of repetitive WRMSDs among workers. Thus, comfortable and ergonomically designed

Fitria, N., Karisa, P., Oktaviana, M., Salimah, Y., Lailannufa, Z., Azzahra, S. L., Apriandini, S. N., Sulaeman, N. A. (2025). Footwear preferences among emergency and outpatient nurses: Implications for preventing work-related musculoskeletal disorders. *The Journal of Palembang Nursing Studies. 4(2)*. 60-70. http://dx.doi.org/10.55048/jpns158

footwear plays an important role in preventing lower extremity WRMSDs in nurses. However, research on nurses' footwear preferences in Indonesia remains limited. Therefore, this study aimed to analyze footwear preferences among nurses in outpatient installation (OI) and emergency installation (EI) settings and to compare differences between the two groups.

METHODS

Design

The research design of this study employed a cross-sectional approach with descriptive quantitative methods. This design was selected to allow the researchers to capture a snapshot of nurses' footwear preferences at a single point in time and to describe patterns and differences between groups without manipulating variables. A descriptive quantitative design is particularly appropriate for identifying characteristics, behaviors, and perceptions within a defined population, providing baseline data that can inform further analytical or experimental research.

Sample and Setting

The study population comprised 158 nurses working in the OI (n = 93) and EI (n = 65) at a general hospital in West Java, Indonesia. Using a purposive sampling technique, 125 nurses were recruited, yielding a response rate of 79.11%. Non-participation was primarily due to nurses being on leave during data collection, having a prior diagnosis of musculoskeletal conditions, or declining to participate. This sampling method was deemed appropriate to ensure that respondents met the study's inclusion criteria and represented the target population relevant to the research objectives.

Variable

The variables observed in this study included footwear preferences as the main variable of interest, assessed across several characteristics (comfort, size, cushioning, durability, safety, and price). Work unit (EI or OI) served as the grouping variable for comparison between nurses.

Instruments and Data Collection

The instruments used in this study consisted of two parts: a demographic questionnaire and a footwear criteria questionnaire. The demographic questionnaire collected baseline information such as age, sex, years of employment, career level, and history of WRMSDs. The footwear criteria questionnaire was adapted from the six main criteria for good footwear proposed by Yang and Deng (2022), which include basic shape, comfort, safety, functionality, durability, and price. Each criterion was operationalized into specific items that allowed participants to indicate their preferences regarding footwear characteristics relevant to their work setting. The questionnaires were distributed electronically via Google Forms, and data collection was carried out over a one-week period to ensure accessibility and adequate response time for participants.

Data Analysis

After data collection was completed, responses were tabulated and analyzed using SPSS version 27. Descriptive statistics, including frequencies and percentages, were calculated to summarize demographic characteristics and to describe nurses' preferences regarding footwear criteria. This approach was appropriate for the descriptive design, allowing the identification of patterns and distributions within the study population.

Ethical Consideration

This study received ethical approval from the Ethics Committee of Padjadjaran University (Letter No. 32/UN6.KEP/EC/2023). All participants were provided with an explanation of the research protocol and subsequently gave their informed consent by signing a consent form prior to participation.

RESULTS

Demographic Characteristics

Of the 158 eligible nurses, 125 participated in the study (response rate 79.11%), consisting of 66 OI nurses and 59 EI nurses. The majority were female (n = 89, 71.2%) and in the late adult age group of 35–54 years (n = 89, 71.2%). Most nurses had more than 10 years of work experience (n = 106, 84.8%), while smaller proportions had 6–10 years (n = 6, 4.8%) or 1–5 years (n = 13, 10.4%) of service. In terms of career level, most were Clinical Nurse (CN) III (n = 74, 59.2%), followed by CN II (n = 35, 28.0%), CN I (n = 15, 12.0%), and CN IV (n = 1, 0.8%). A large proportion of participants (n = 88, 70.4%) reported experiencing WRMSDs. Additionally, two-thirds (n = 83, 66.4%) believed

Table 1. Demographics and descriptive characteristics of nurses (n= 125)

Characteristics	n	%
Installation		
Outpatient Installation	66	52.8
Emergency Installation	59	47.2
Sex		
Male	36	28.8
Female	89	71.2
Age (years)		
< 35	18	14.
35 – 54	89	71.2
> 55	18	14.4
Employment Length (years)		
1 – 5	13	10.4
6 – 10	6	4.8
> 10	106	84.8
Career Level		
Clinical Nurse Level I	15	12
Clinical Nurse Level II	35	28
Clinical Nurse Level III	74	59.2
Clinical Nurse Level IV	1	0.8
Work-related musculoskeletal disorders		
Yes	88	70.4
No	37	29.6
Is there a correlation between footwear quality and foot pain?		
Yes	83	66.4
No	42	33.6

there was a correlation between footwear quality and foot pain.

Nurse's Perceptions About Footwear Selection

In terms of overall footwear preferences (Table 2), the most frequently selected characteristics were correct size (41.6%), soft and cushioned soles (44.4%), and durability for high activity (35.3%). Additional considerations included color (16.9%), fashionable design (17.3%), and shoe shape (24.3%). Comfort was reflected in preferences for ease of donning and doffing (24.7%), lightweight design (30.9%), and cushioning. Safety features were also important, with nurses selecting protective (32.3%), well-fitting (31.5%), and non-slip footwear (36.3%). Functional aspects such as weather resistance (26.4%), resistance to rough surfaces (19.7%), and durability (18.6%) were noted, while price was a significant factor, with most preferring standard-priced (53.1%) footwear, although a substantial proportion also valued higher-priced footwear for its quality (46.9%).

Comparisons between OI and EI nurses (Table 3) revealed some differences in priorities. OI nurses reported more musculoskeletal complaints (75.8%) than EI nurses (64.4%) and were more likely to consider color, design, weather resistance, and shoe age when selecting footwear. Both groups emphasized correct size (over 90%) and cushioning, with only minor differences in comfort preferences. Safety criteria such as foot protection, form fitting, and non-slip features were similarly valued, although OI nurses more frequently selected all safety options (88.6% vs. 81.8%). EI nurses, however, were more inclined to choose footwear resistant to high activity

Table 2. Nurses' footwear characteristics selection (n= 125)

Characteristics	n	%
Basic Shapes		
Fashionable Design	106	41.6
Suitable Size	43	16.9
Color	44	17.3
Form	62	24.3
Comfort		
Easy to take off and put on	60	24.7
Lightweight Footwear	75	30.9
Soft and Cushioned Footwear	108	44.4
Safety		
Protects the feet	80	32.3
Form Fitting	78	31.5
non-slip	90	36.3
Footwear Function		
Weather resistant	78	26.4
High activity resistant	104	35.3
Rough surfaces resistant	58	19.7
Durable	55	18.6
Price		
Standard price	43	53.1
Expensive for high quality	38	46.9

(84.7%) and showed a stronger preference for higher-priced, high-quality shoes (72.4% vs. 47.2% in OI). Overall, while both groups prioritized comfort, fit, and safety, OI nurses leaned more toward aesthetic and functional considerations, whereas EI nurses favored durability and premium quality.

DISCUSSION

The demanding work characteristics of nurses, including prolonged periods of providing direct care interventions, place them at risk for lower limb musculoskeletal disorders, which can adversely affect both daily functioning and professional quality of life (Stolt et al., 2017). In Australia, for example, more than half of nurses reported experiencing foot and ankle pain, with 20% indicating that the pain interfered with their daily and work activities. Beyond occupational demands, individual foot self-care also plays a protective role against musculoskeletal disorders (MSDs) in the lower extremities (Stolt et al., 2018). Because the feet and ankles serve as the body's primary support during standing and walking, maintaining their health is as important as caring for other body systems. Safe and comfortable footwear is integral to foot health and has been recognized as a preventive measure against lower limb MSDs (Sánchez-Sáez et al., 2019), whereas inappropriate footwear increases the risk of injury and discomfort (Menz & Bonanno, 2021).

Workload patterns differ between emergency and outpatient nurses, further shaping their risk for MSDs. Emergency nurses spend more than half of their shifts standing (55%), in addition to time spent sitting (29%), walking (16%), and frequently kneeling or crouching (Chappel et al., 2020; Ou et al., 2021). Their tasks often include triaging patients, performing urgent interventions, restocking supplies, and transferring patients, which involve physically demanding activities such as pushing wheelchairs, moving beds, and manually assisting patients (Chappel et al., 2020; Ou et al., 2021). Outpatient nurses also face heavy workloads, including patient assessments, triage, and administrative tasks, often combined with extended working hours, all of which contribute to a high risk of

Table 3. Footwear characteristics selection group by installation (n= 125)

	OI		EI	
Characteristics	**n**	**%**	**n**	**%**
Work-related musculoskeletal disorders				
Yes	50	75.8	38	64.4
No	16	24.2	21	35.6
Is there a correlation between footwear quality and foot pain?				
Yes	41	62.1	42	71.2
No	25	37.9	17	28.8
Basic Shapes				
Suitable Size	56	93.3	50	92.6
Color	23	38.3	20	37
Fashionable Design	26	43.3	18	33.3
Form	32	53.3	30	55.6
Select all (4 references)	18	51.4	16	48.5
Comfort				
Easy to take off and put on	30	45.5	30	50.8
Lightweight footwear	39	59.1	36	61
Softness and Cushioned Footwear	58	87.9	50	84.7
Select all (3 references)	27	77.1	27	81.8
Safety				
Protect the Feet	43	65.2	37	62.7
Form Fitting	41	62.1	37	62.7
Non-slip	48	72.7	42	71.2
Select all (3 references)	31	88.6	27	81.8
Footwear Function				
Weather Resistant	43	65.2	35	59.3
High Activity Resistant	54	81.8	50	84.7
Rough Surface Resistant	32	48.5	26	44.1
Durable	31	47	24	40.7
Select all (4 references)	26	74.3	20	60.6
Price				
Standard Price	24	66.7	19	65.5
Expensive for high quality	17	47.2	21	72.4
Select all (2 references)	5	14.3	11	33.3

n, number of participants; OI, outpatient installation; EI, emergency installation

WRMSDs.

Findings from this study indicate that both groups demonstrated high awareness of appropriate footwear selection to prevent foot and ankle MSDs (66.4%). Awareness was slightly higher among EI nurses (71.2%) compared with OI nurses (62.1%). This discrepancy is particularly noteworthy given that the prevalence of MSDs was greater among OI nurses, with nearly three-fourths reporting musculoskeletal complaints—10% higher than their EI counterparts. These results highlight the need for health education programs focused on foot health and appropriate footwear selection as preventive strategies. Importantly, many nurses in this study recognized the importance of foot care only after developing musculoskeletal complaints, underscoring the necessity of early prevention to preserve their quality of life (Stolt et al., 2018).

Basic Shape

The two most highly concerned characteristics of footwear in this study are the size and the basic shape of the footwear. Ill-fitting footwear, whether it is too tight or too big, has been reported to cause foot pain, numbness, muscle fatigue, and deformities (Stolt et al., 2018). One of the aspects of comfort regarding footwear is the fit, or how the footwear stays on the wearer's feet. In an explorative study, it was found that loose fitted footwear is viewed as unsafe, leading to the curling of the toes in an effort to keep them in place (Anderson et al., 2017). The form of footwear around the forefoot was essential to decreasing pressure around the toes. Footwear with a round toe has been shown to exert the least pressure around the medial aspect of the toes, while pointed footwear had the least pressure on the lateral toes (Branthwaite et al., 2013). Specialized anthropometric footwear, designed to fit individual foot shape, have been found to reduce lactic acid levels in nurses with high workload (Fitria, Ibrahim, et al., 2023). In addition, anthropometric footwear promotes positive outlook in comfort and safety of the footwear and its effect towards nurses on-job performance, decreasing pain and muscle fatigue (Fitria, Karisa, et al., 2023).

Comfort and Cushioning

Comfort is a central consideration in footwear selection. Menz and Bonanno (2021) defined comfort as "the state of being physically relaxed and free from pain, although the mere absence of pain does not fully constitute the positive state of being comfortable." Cushioning is one of the most important elements contributing to this perception. Comfortable footwear should be soft rather than rigid, with midsole cushioning commonly used to conform to the shape of the foot and enhance the sensation of comfort. Studies have shown that footwear with softer midsoles is generally perceived as more comfortable. Among workers required to stand for prolonged periods, however, a combination of softer materials under the heel and forefoot with firmer support under the arch was preferred (Anderson et al., 2017). Cushioning not only improves comfort but also helps reduce plantar pressure, thereby lowering the risk of pressure injuries and foot-related musculoskeletal disorders (MSDs). Nevertheless, excessively soft midsoles may compromise stability and increase the risk of falls (Jellema et al., 2019; Lane et al., 2014).

Beyond cushioning, adequate structural support is essential to sustain body weight and maintain proper posture of both the lower extremities and the spine (Blanchard et al., 2022). Support that accommodates individual foot alignment is critical for injury prevention. Foot arch geometry varies considerably; individuals with high- or low-arched feet are more prone to injury than those with normal arches (Nilsson et al., 2012). For these populations, footwear with contours tailored to foot structure can help minimize injury risk. Research has further shown that among workers with prolonged standing demands, insoles with harder midfoot materials are often rated as more comfortable. Such insoles reduce pressure under the hallux and metatarsophalangeal joints while increasing pressure distribution across the medial midfoot ($p < 0.05$), thereby enhancing comfort (Anderson et al., 2021).

Given these findings, customized footwear for individuals with high or low arches is ideal but often cost-prohibitive. Semi-customized footwear has emerged as a practical alternative, offering comparable benefits at lower cost. Studies indicate that semi-custom footwear performs similarly to custom-made shoes in reducing eversion velocity and excursion, maintaining comfort, and controlling rearfoot motion (Zifchock & Davis, 2008). Thus, semi-custom designs present a feasible and cost-effective option for occupational settings where nurses and other professionals are exposed to prolonged standing and walking.

Ease of Donning and Doffing

The ease of donning and doffing—how quickly and comfortably footwear can be put on and removed—is an essential consideration in active occupational settings such as nursing. Nurses frequently transition between tasks that require rapid mobility, making footwear that is easy to manage highly desirable. Footwear that does not remain securely in place or lacks proper fastening and adjustment mechanisms is often perceived as uncomfortable and impractical (Stolt et al., 2018).

Adjustment mechanisms also influence usability. Laces, while providing secure fastening, are often considered inconvenient in fast-paced environments where efficiency is critical. In contrast, footwear with open-back designs or slip-on features offers greater accessibility and ease of use (Anderson et al., 2017). However, while open-back footwear enhances convenience, it may compromise

stability and safety, highlighting the importance of balancing accessibility with ergonomic support and protection.

Findings from this study further support these perspectives. A considerable proportion of nurses emphasized ease of donning and doffing as an important comfort criterion, with 24.7% selecting footwear that was easy to put on and remove. When analyzed by work setting, both outpatient installation (OI) and emergency installation (EI) nurses placed notable importance on this factor, with EI nurses (50.8%) slightly more likely than OI nurses (45.5%) to prioritize this preference. These results highlight that, in addition to comfort and protection, the practicality of footwear design plays a significant role in meeting the functional demands of nursing practice.

Safety

The safety of footwear is closely linked to the materials used in its construction, particularly the upper portion. The upper material serves as the primary barrier against potential hazards in the clinical environment, including infectious substances and sharp objects. To provide adequate protection, the material must not only be durable but also soft and compliant with the natural contours of the foot, ensuring both safety and comfort (Melvin et al., 2019). In this regard, the choice of appropriate upper materials plays a dual role—safeguarding nurses from occupational risks while minimizing discomfort during prolonged use.

Findings from this study showed that safety-related criteria were highly valued by nurses. Approximately 32.3% selected footwear that offered protective coverage, 31.5% prioritized a secure fit, and 36.3% emphasized the importance of non-slip soles. When analyzed by work setting, outpatient installation nurses were slightly more concerned about protective features (65.2%) than emergency installation nurses (62.7%). Notably, non-slip footwear was equally prioritized across both groups (72.7% OI and 71.2% EI), underscoring the critical importance of slip resistance in nursing environments where rapid movement and exposure to fluid spills are common. These results highlight the essential role of safety-focused footwear features in reducing the risk of occupational injuries while maintaining functional usability in high-demand healthcare settings.

Function

Ideal footwear must be designed not only for comfort but also for functionality, incorporating features such as appropriate cushioning, adequate support, breathable and porous materials, and lightweight construction (Anderson et al., 2021). For nurses who perform physically demanding tasks, functional aspects of footwear are especially critical to sustaining endurance and preventing musculoskeletal strain. Previous studies have emphasized that the basic shape of footwear, ensuring a proper fit to the wearer's feet, is a primary determinant of selection (Fitria, Ibrahim, et al., 2023). In addition, nurses often prioritize footwear that is lightweight, safe, comfortable, durable, resistant to intensive activities, environmentally friendly, and affordable (Fitria, Karisa, et al., 2023). These combined attributes underscore the multidimensional nature of footwear functionality in relation to occupational safety and performance.

The present study examined footwear preferences among nurses working in emergency and outpatient settings—two clinical environments characterized by high workloads and prolonged physical activity. While these findings provide valuable insight into occupationally relevant footwear choices, their applicability may be limited in other nursing specializations where physical demands differ. Furthermore, the analysis did not fully capture the eco-friendly dimension of footwear identified by Yang and Deng (2022), which includes considerations related to resource efficiency and material sustainability. The absence of this component represents a limitation in assessing the comprehensiveness of footwear preferences among nurses. Future research should explore this aspect in greater depth, while also evaluating other emerging footwear characteristics that may enhance comfort, safety, and durability, ultimately contributing to the prevention of musculoskeletal disorders in the nursing workforce.

Strengths and Limitations

This study contributes to the understanding of footwear preferences among nurses by focusing on two clinical settings with particularly high physical demands, namely emergency and outpatient installations. Examining these environments provides valuable and context-specific insights into occupational footwear considerations where the risk of

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musculoskeletal disorders is greatest. The use of a structured questionnaire developed from established criteria (Yang & Deng, 2022) also strengthens the validity of the findings and enables comparisons with existing research. Despite these strengths, the study is limited by its descriptive design, which does not allow for causal inferences between footwear characteristics and musculoskeletal outcomes. The reliance on self-reported data may also introduce potential bias. Future research using analytical or longitudinal approaches is necessary to explore causal relationships and broaden the generalizability of the findings across diverse nursing populations.

CONCLUSION

This study found that nurses' footwear preferences centered on comfort, safety, non-slip properties, durability, a well-fitting basic shape, and reasonable price. Among these, softness and cushioning were the most frequently selected features. Differences were also observed between outpatient and emergency nurses in their footwear preferences, reflecting the unique physical demands of each clinical setting. While the focus on emergency and outpatient nurses provides valuable insights, the findings may not be fully generalizable to other nursing specializations. Given the high workload and physical activity demands in these settings, the selection of safe and comfortable footwear is essential to support nurses' occupational health and reduce the risk of work-related musculoskeletal disorders. Research on footwear in nursing practice remains limited, and this study contributes to expanding knowledge in both nursing and sports medicine. Ultimately, these findings may help guide nurses in selecting appropriate footwear that supports their well-being and professional performance.

Declaration of Interest

The authors declare no competing interest.

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Data Availability

The datasets used and analyzed in the current study are available from the corresponding author (NF) upon reasonable request.

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