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Neurosurgery Career Preferences Compared to Other Medical Specialties among Turkish Students

Türkiye'deki Öğrencilerin Nöroşirürji ve Diğer Uzmanlık Kariyer Tercihlerinin Karşılaştırılması

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Abstract

Aim: This study aimed to investigate the thoughts of medical faculty students in Türkiye about neurosurgery and the reasons for the low neurosurgery exam results.

Methods: Between 2014 and 2021, the lowest and highest the Examination for Specialty in Medicine (ESM) scores of eight hundred students who started neurosurgery residency in 14 exam periods in Türkiye were determined. The scores of the other 39 specialties in the same exams were also determined, and they were compared with neurosurgery scores. Eight quotas for Aerospace Medicine and Medical Ecology and Hydroclimatology with insufficient data were excluded from the study. One hundred eighty-nine quotas and scores for military health services and ninety-three for international students were excluded as their scores are calculated differently. Moreover, in the 2022-2023 academic year, a survey was conducted with the students of 12 medical faculties in all geographical regions in Türkiye. 3590 students participated in the study. Participants answered 11 questions about career choices and neurosurgery.

Results: The mean neurosurgery ESM score was 53.3±1.31. It was seen that 21.8% (n=223) of the 1023 neurosurgery quotas were not preferred. The ranking of neurosurgery scores for ESM was between 29th and 36th among 40 specialties. The average scores of neurosurgery in metropolitan city faculties were significantly higher than in other university hospitals and institutional hospitals (p = 0,008, p = 0,002; respectively).

Keywords: Neurosurgery, Medical Students, Internship and Residency, Career Choice

Anahtar Sözcükler: Nöroşirürji, Tıp Öğrencileri, İntörnlük ve Asistanlık, Kariyer Seçimi

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The average age of 3590 students who answered all questions in the survey was 22.4. 44% were women (n=1578), and 56% were men (n=2012). Students were less interested in surgical specialties in their senior year (p=0.004). While those considering a career in neurosurgery were 22.3% in the first two years, this rate decreased to 6.3% in the last two years (p<0.001). The rate of those who wanted residency programs in metropolitan cities was 90.5%. University hospitals were preferred more than training and research hospitals affiliated with the Ministry of Health in all branches (p=0.039). Three-quarters of the students had negative opinions about the neurosurgery specialty.

Conclusions: The reasons why neurosurgery is a less favored specialty are financial gain, negative thoughts about work-life balance and course difficulty. To get more successful students to choose neurosurgery, the successful students in the first grades should be targeted, and neurosurgery should be well introduced.

Özet

Amaç: *Bu çalışmada Türkiye'deki tıp fakültesi öğrencilerinin beyin cerrahisi hakkındaki düşüncelerinin ve nöroşirürji TUS sonuçlarının düşük olmasının nedenleri araştırıldı.*

Yöntem: *2014-2021 yılları arasında Türkiye'de 14 Tıpta Uzmanlık Sınavı (TUS) döneminde nöroşirürji ihtisasına başlayan sekiz yüz öğrencinin en düşük ve en yüksek puanları belirlendi. Diğer 39 branşın aynı sınavlardaki puanları da belirlenerek nöroşirürji puanları ile karşılaştırıldı. Hava ve uzay hekimliği ile tıbbi ekoloji ve hidroklimatoloji için açılan sekiz kontenjan verilerin yetersizliği nedeniyle çalışma dışında tutuldu. Askeri kadrolar için açılan 189 kontenjan ve yabancı uyruklu öğrenciler için açılan 93 kadro puanları farklı yöntemlerle hesaplandığı için çalışmaya alınmadı. Ayrıca 2022-2023 öğretim yılında, Türkiye' deki tüm coğrafi bölgelerden 12 tıp fakültesi öğrencileri ile anket yapıldı. Çalışmaya 3590 öğrenci katıldı. Katılımcılar kariyer tercihleri ve nöroşirürji ile ilgili 11 soru cevapladılar.*

Bulgular: *Ortalama nöroşirürji TUS puanı 53,3±1,31 idi. 1023 beyin cerrahi kontenjanının %21,8' inin (n=223) hiç tercih edilmediği görüldü. TUS nöroşirürji puan sıralaması 40 branş arasında 29 ile 36. sıralar arasındaydı. Büyükşehirlerdeki fakültelerde nöroşirürji ortalama puanları diğer üniversite hastaneleri ve kurumsal hastanelere göre anlamlı olarak yüksekti (sırasıyla p=0,008, p=0,002).*

Anketin tamamını cevaplayan 3590 öğrencinin ortalama yaşı 22,4 idi. Katılımcıların %44' ü kadın (n=1578) ve %56' sı erkekti (n=2012). Öğrencilerin son yıllarında cerrahi uzmanlıklara daha az ilgi gösteriyordu (p=0,004). Nöroşirürji kariyeri düşünenlerin oranı ilk iki yıl öğrencilerinde % 22,3 iken son 2 yıl öğrencilerinde % 6,3' e düştüğü görüldü (p<0,001). Büyük şehirlerde asistanlık yapmak istediğini belirtenlerin oranı %90,5' ti. Tüm branşlarda Üniversite Hastanelerinin, Sağlık Bakanlığı'na bağlı Eğitim ve Araştırma Hastanelerine göre daha çok tercih edildiği görüldü (p=0,039). Öğrencilerin dörtte üçü, nöroşirürji uzmanlığı hakkında negatif düşüncelere sahipti.

Sonuç: *Nöroşirürjinin daha az tercih edilen bir uzmanlık dalı olmasının nedenleri arasında iş-yaşam dengesine ilişkin olumsuz düşünceler ve öğrenme zorluğu yer almaktadır. Daha başarılı öğrencilerin beyin cerrahisini seçmesi için birinci sınıftan itibaren başarılı öğrenciler hedeflenmeli ve nöroşirürji iyi bir şekilde tanıtılmalıdır.*

INTRODUCTION

Well–trained doctors are required in every step of health services. Financial opportunities, prestige, job satisfaction, job opportunities in the city center, and desire for an academic career are considered the most important factors in career planning after graduation (1). In Türkiye, The Examination for Specialty in Medicine (ESM) is held twice a year in April and September. Students choose hospitals (Faculty of Medicine or Ministry of Health Training and Research Hospitals) and departments according to their scores. ESM is perceived as an important step in shapingstudents' futures. Students expressed

that they would shape their career concerning the ESM score that they get rather than considering their dreams, interests, and talents (2).

Neurosurgery is seen by students as an important part of the general medical curriculum (3). Although medical faculty students are highly interested in neurosurgery in their first two years, this rate is very low for senior students (2). Neurosurgery is one of the most developing departments thanks to recent technological improvements (4). Today, neurosurgeons perform endoscopic, endovascular, radiosurgery and stereotactic minimally invasive procedures besides microsurgery (5-8). Concordantly, neurosurgery should be preferred more, but it is not in Türkiye.

In this study, the reasons why neurosurgery residency is preferred by students who have low exam success have been researched based on their ESM scores and surveys with medical faculty students.

METHODS

This study was approved by the local university scientific research ethics committee with the number 21301.

Determination of ESM Scores

The lowest and the highest ESM scores of the medical students who started their neurosurgery residency during 14 ESM held between 2014-2021 were determined from the lists published on the official website of the Student Selection and Placement Center. Eight quotas for Aerospace Medicine and Medical Ecology and Hydroclimatology with insufficient data were excluded from the study. In addition, one hundred eighty-nine quotas and scores for Military health services and ninety-three for international students were excluded as their scores are calculated differently.

The scores of the students who were eligible to have residency training in other 39 departments were identified and compared with the scores of the students who were eligible to study at the neurosurgery department. Additionally, the scores of the candidates who were admitted to the neurosurgery departments of public medical schools were compared with the those of inistry of Health and other instutions' scores. The scores of the neurosurgery departments of 11 public university medical schools (Istanbul, Cerrahpasa, Marmara, Ankara, Hacettepe, Gazi, Ege, Dokuz Eylul, Cukurova, Uludag, and Akdeniz) in 6 metropolitan cities (with a center population of 1.5 million and above) were also compared with the scores of the other 39 specialties of the same medical schools. The scores of neurosurgery clinics of high and low prestigious medical schools were also compared.

Survey with Students

In the 2022-2023 academic year, an online survey was conducted with the students of 12 medical faculties in all geographical regions in Türkiye. 3590 students participated in the study. Participants answered 11 questions. What grade are they in? Which specialization are they interested in? The cities they prefer (6 metropolitan cities and others), whether they will choose a university hospital or a training and research hospital affiliated to the Ministry of Health, whether they will choose according to their ESM score. If they do not get enough points for the department they want, do they choose another specialization? Whether they would prefer a neurosurgery career, their thoughts on neurosurgery, and whether it was necessary to study a lot to gain a neurosurgery specialization.

Statistycal Analysis

The F test was used to evaluate the distribution characteristics of countable variables, which were compared with Student's t-tests. The Mann–Whitney U test was used for ordinal variables. The chi-square test was used to

compare qualitative data. A p-value of <0.05 was considered significant.

RESULTS

ESM Scores

Between 2014 and 2021, it was observed that a total of 1023 neurosurgery quotas were opened during the 14 ESM periods (Figure 1). The average ESM score of the candidates who preferred neurosurgery residency was 53.3±1.31. When all ESM results were evaluated, there were only 6 departments (pediatrics, general surgery, pediatric surgery, anatomy, thoracic surgery, and emergency medicine) with an average below neurosurgery (Figure 2). It was seen that 21.8% of the neurosurgery quotas were not preferred. However, all quotas of 6 metropolitan cities medical faculties were preferred.

Neurosurgery scores were compared with the scores of other medical specialties in all instutions. It was determined that neurosurgery was preferred in the 29th and 36th ranks among 40 specialties. (Table 1). Six metropolitan cities medical faculties were evaluated separately, neurosurgery ranked 22nd and 32nd. The scores of 30 students who were entitled to neurosurgery residency medical faculties in metropolitan cities were above 65. The scores of 9 students who won the neurosurgery departments of other university hospitals and other instutions were above 65. There were only 3 students who preferred neurosurgery with over 70 points.

There was no difference between the average scores of neurosurgery departments of all universities and other instution's (p = 0,607). On the other hand, neurosurgery scores of metropolitan cities medical faculties were found to be significantly higher than other university hospitals and other instutions'. (p = 0,008, p = 0,002; respectively.)

Survey Results

The average age of 3590 students who answered all questions in the survey was 22.4. 44% were women (n=1578), and 56% were men (n=2012). The distribution of the students according to the classes was homogeneous (Figure 3). As their classes progressed, it was discovered that the interest in surgical specialties decreased. It was observed that this rate, which was 64.2% for the students in the first two years, decreased to 48.4% for the students in the last two years (p=0.004). While their interest in neurosurgery was 22.3% in the first two-year students, it decreased to 6.3% in the senior students (p<0.001). The ratio of female/male to those who wanted neurosurgery was 1.1/7.

The rate of those who want to reside in metropolitan cities was 90.5 percent (Table 2). University hospitals were preferred more than training and research hospitals affiliated with the Ministry of Health in all specialties (p=0.039).

40.4% of the students thought that they would prefer residency according to their ESM score, and 63.2% of the students thought that it was not necessary to study hard for neurosurgery ESM score. Three-quarters of them had negative thoughts about neurosurgery (tiring, lack of time for family, low income, etc.). 63.2% of all participants thought that neurosurgery was not introduced well enough at the university.

DISCUSSION

In Türkiye, neurosurgery specialization is preferred by students with low scores on the exam. Neurosurgery is not adequately introduced to students, and students thought that there was no need to study much because neurosurgery earned low ESM scores. Neurosurgery departments of medical faculties in metropolitan cities are preferred with higher scores. However, the popularity of neurosurgery was lower in these faculties compared to other departments. The students seem to have a higher tendency to choose specialties that promise to have better living comfort (9). In this study, the specialties

preferred by the students having the highest scores are dermatology, radiology, physical therapy and rehabilitation, ophthalmology, and plastic and aesthetic surgery. It was stated in a similar study conducted in France that ophthalmology, radiology, cardiology, and dermatology are the most preferred specialties although neurosurgery is not one of the least preferred specialties (10).

It was found that one-fifth of the neurosurgery quotas were almost unfilled. Supporting this data, it has been stated that neurosurgery is one of the three least preferred specialties according to a study conducted on 182 senior students (11). According to Takeda et al. (12), neurosurgery is the specialty that makes one the most fulfilled in life but includes the least scientific orientation. Among the reasons why neurosurgery is the less favored specialty, there are negative thoughts such as lifestyle, work-life balance, course difficulty, and period of study (13).

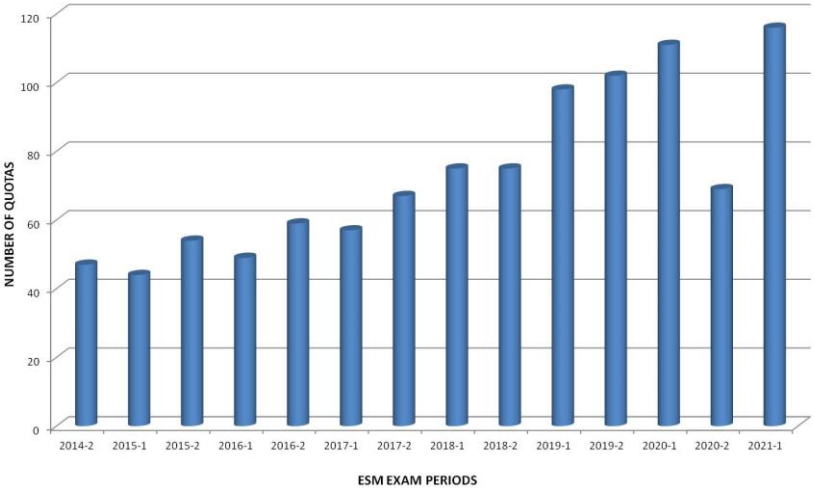

Figure 1. The Number Of Neurosurgery Quotas Opened During Exam Periods

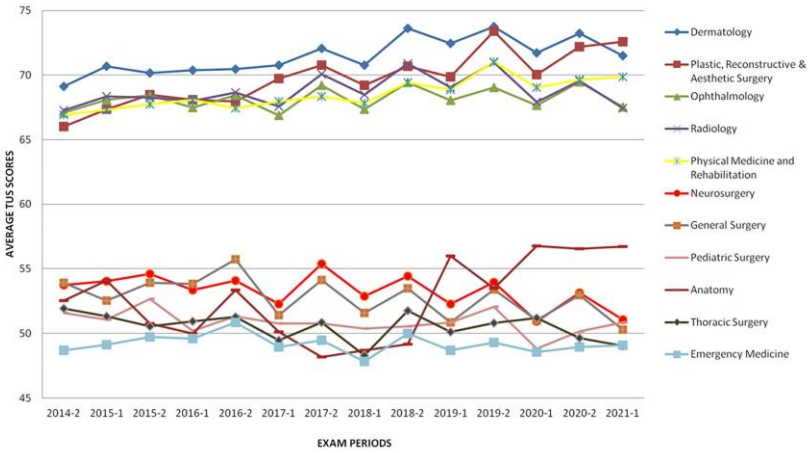

Figure 2. Comparison of Neurosurgery Specialization and the Highest and Lowest Five Specialization Average Points According to the Results of the Exams Held in Türkiye Between 2014-2021

Tablo 1. The Specialties with Lower Scores Than the Average Neurosurgery Scores in the Fourteen Examinations for Specialty in Medicine in 2014-2021.

2014-2	2015-1	2015-2	2016-1	2016-2	2017-1	2017-2	2018-1	2018-2	2019-1	2019-2	2020-1	2020-2	2021-1
Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery	Neurosurgery
Pediatrics	Cardiovascular Surgery	Family Medicine	Thoracic Surgery	Anatomy	Histology and Embryology	Family Medicine	Cardiovascular Surgery	General Surgery	Pediatric Surgery	Anatomy	Pediatrics	General Surgery	Pediatrics
Anatomy	General Surgery	General Surgery	Pediatric Surgery	Pediatric Surgery	General Surgery	General Surgery	Medical Pharmacology	Pediatrics	General Surgery	General Surgery	Gynecology and Obstetrics	Pediatrics	Pediatric Surgery
Family Medicine	Family Medicine	Physiology	Anatomy	Thoracic Surgery	Pediatric Surgery	Pediatrics	Histology and Embryology	Histology and Embryology	Pediatrics	Pediatrics	Pediatric Surgery	Pediatric Surgery	General Surgery
Thoracic Surgery	Thoracic Surgery	Pediatric Surgery	Emergency Medicine	Emergency Medicine	Anatomy	Cardiovascular Surgery	General Surgery	Gynecology and Obstetrics	Gynecology and Obstetrics	Gynecology and Obstetrics	Emergency Medicine	Thoracic Surgery	Emergency Medicine
Pediatric Surgery	Pediatric Surgery	Anatomy			Thoracic Surgery	Physiology	Pediatrics	Thoracic Surgery	Thoracic Surgery	Pediatric Surgery		Emergency Medicine	Thoracic Surgery
Emergency Medicine	Emergency Medicine	Thoracic Surgery			Emergency Medicine	Thoracic Surgery	Pediatric Surgery	Pediatric Surgery	Emergency Medicine	Thoracic Surgery			
		Emergency Medicine				Pediatric Surgery	Gynecology and Obstetrics	Physiology		Emergency Medicine			
						Emergency Medicine	Physiology	Emergency Medicine					
						Anatomy	Anatomy	Anatomy					
							Thoracic Surgery						
							Emergency Medicine						

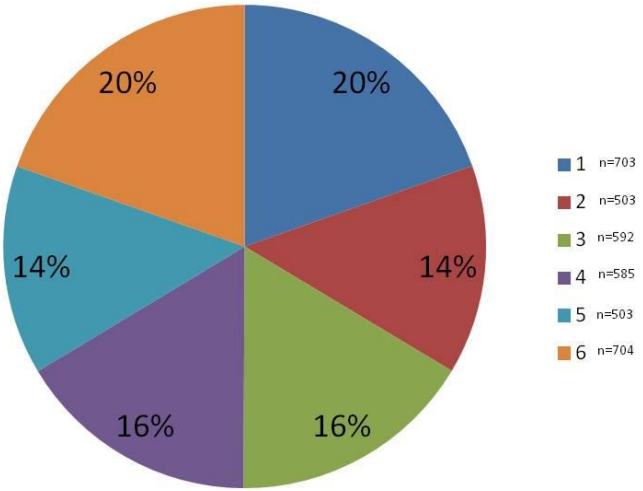

Figure 3. Distribution of the Students Participating in the Survey by Medical School Class

Tablo 2. Career Preferences of Medical Students

		n	%
Metropolitan city preferences	**Yes**	3252	90.5
	No	338	9.5
Hospital preferences	**University**	2026	56.5
	Ministry of Health	1564	43.5
Prefer residency according to ESM score	**Yes**	1451	40.4
	No	2139	59.6
Necessary to study for neurosurgery score	**Yes**	1318	36.8
	No	2272	63.2
Negative opinions about the neurosurgery	**Yes**	2743	76.3
	No	847	23.7

ESM=Examination for Specialty in Medicine

Balogun et al. (14) stated that senior students mostly had an unfriendly teaching environment for neurosurgery. According to Akhigbe et al. (15) on 3rd, 4th, and 5th-grade students in Ireland, most students state that neurosurgical education is inadequate, the period of study is long, neurosurgical diseases have bad outcomes, and neurosurgery may prevent family life.

For today's student generation, keeping a work-life balance and getting adequate training are primary factors affecting career preferences (16). In our study, three-quarters of the students had negative thoughts about neurosurgery. "Flexible lifestyle"and "acceptable working hours" are the most important factors affecting career preference (2). Accordingly, Burford et al. (13) poor

lifestyle and work-life balance remain the most important factors deterring students from a pursuing career in neurosurgery. Yu et al. (17) researched the differences between orthopedists' and neurosurgeons' lives in China. According to this study, neurosurgeons have a lower marriage rate, higher divorce rate, longer working hours, and lower annual income. Additionally, neurosurgeons state that they are not so pleased with their career preferences and feel more burned out.

Health policies in Türkiye might bring about these results. It is known that in the last decade, medical doctors in Türkiye have migrated due to low wages and increasing violence (18). Yavuz et al. (19) compared the 2007 and 2015 ESM scores and found a clear tendency to move away from clinical specialties. Inadequate government support, lack of trained personnel, lack of equipment and safety concerns, are just some of the factors that increase the gap between neurosurgical care in high-income and low-income countries (20). Although there are adequately trained personnel and equipment in Türkiye, other factors may be the reason why neurosurgery is less preferred.

We found out that the department of neurosurgery at the universities in metropolitan cities was preferred by the students who got relatively higher scores. These cities have more social facilities than the other cities. Even though almost all training and research hospitals affiliated with the Ministry of Health are in metropolitan cities, they are preferred by low-scoring students. The students could be concerned about not having a sufficient education at these hospitals. Rivière et al. (10) stated the selection of a city or a hospital could be explained by the scientific reputation of training services (reference and competence centers, clinical or scientific publications, etc.), the quality of practical training, and social facilities in that city. Choosing faculties may be related to perceived quality of education, institutional history, faculty resources and location (21).

In our study, it was determined that while students in their first and second years preferred surgical specialties, this rate decreased in their last year. Especially the students choosing surgical specialties make this decision in the first two grades by 80%, and awareness of neurosurgery is low in this group (17). Several models have been developed to increase successful students' interest in neurosurgery and preclinical students have been targeted (22-26). Zuckerman et al. (23) organized neurosurgery electives for the first and second-grade students. In this course, lectures were given by senior professors who were experts in the area. It was seen that the rate of choosing neurosurgery as a career, the belief in a higher quality of life, the possibility of being a neurosurgeon, and having a family at the same time increased significantly. On the other hand, the belief about the difficulty of neurosurgery training has not changed. Kashkoush et al. (24) organized a different program with preclinical students to increase their interest in neurosurgery. In this program, there were studies such as stitching workshops, didactic workshops with instructors at lunch (neuroradiology, skull base surgery, deep brain stimulation, etc.) research and preparing scientific papers. As a result, the number of successful students choosing neurosurgery as a career increased. Thanks to the scholarships given to the students interested in neurosurgery by the national neurosurgical society in recent years, it is seen that participation in scientific studies has increased rapidly (25). To increase student participation in neurosurgery, the American Association of Neurological Surgeons (AANS) began allowing medical schools to create AANS Medical Student Divisions. As a result, with the participation of students, the number of chapters, which was 12 in 2014, increased to 121 in 2019 (26).

Neurosurgery is mostly preferred by males (27). In this study, the rate of females who wanted to be neurosurgeons was significantly low. The reasons have been reported as concerns about work-life balance, gender inequality and lack of female mentorship (28). The number of women choosing neurosurgery specialties has increased in our country. However, the rate is about 5% even when residents are included. In Brasil, it is correlatively 5.5% and in the United States of America, it is 17% (28-30). When the instructor of the same gender communicated with the eager students, the rate of women choosing neurosurgery increased (31).

A limitation of this study is that this study was conducted by interviewing only a limited number of students and evaluating ESM results; neurosurgeons and residency students were not included in the study. The exam results and students' opinions show us that an average ESM score is adequate to be accepted to a limited number of university neurosurgery departments in metropolitan cities and low scores are adequate for others.

CONCLUSIONS

For neurosurgery to be a specialty that is preferred by more successful students, the faculty members in all medical schools should have some duties. These duties are to alleviate their lifestyle concerns, emphasize neurosurgeon satisfaction rates, deal with their concerns about course difficulty, explain their impacts on the patients, and expand awareness of research opportunities and potentials. To do that, preclinical students who are successful in their first years should be targeted, programs for eager students should be prepared, and experienced instructors (same gender, if possible) should come together with the students in a strong role. By taking into consideration of the new generation of students, a healthy work-life balance should be supported, communication opportunities should be enhanced by including social media, and feedback should be encouraged. These programs could be organized with the help of branch societies and rectorates. Besides, attempts should be made for neurosurgeons earn the money they deserve.

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Ethical Approval

This study was approved by the local university scientific research ethics committee with the number 21301. We informed the participant students about the aim and the scope of the study and obtained written informed consent. The survey was anonymous, and no personal information that allows the identification of the subjects was used.

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Conflict of Interest

The authors declare no conflict of interest.

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