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Cross-cultural adaptation, reliability and validity of the Turkish version of the Goal Content for Exercise Questionnaire

Egzersiz için Hedef İçeriği Anketi'nin Türkçe versiyonunun kültürler arası adaptasyonu, güvenilirliği ve geçerliliği

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ABSTRACT

Aim: The aim of the study was to demonstrate the cross-cultural adaptation, reliability and validity of the Turkish version of the Goal Content for Exercise Questionnaire (GCEQ).

Materials and Methods: A prospective and cross-sectional study was carried out with 100 healthy young individuals. Participants were assessed with GCEQ. One week later, 39 individuals refilled the GCEQ. Reliability was evaluated with the Intraclass correlation coefficient (ICC) and Cronbach's α coefficient. Construct validity was determined by correlational and explanatory factor analysis. The cut-off value of GCEQ was discriminated with the Receiver Operating Characteristic (ROC) curve. On the other hand, the minimum detectable change (MDC_{95}) and Standard error of measurement (SEM_{95}) values of the GCEQ were calculated.

Results: A total of 100 individuals (21.1±2.9 years, 72% female) were included in the study. The alpha coefficient was >0.80 for the total and sub scores (except for the image sub score). On the other hand, all scores were scored above 0.80 in ICC analysis. The SEM_{95} and MDC_{95} values of the GCEQ were 4.83 and 13.3, respectively. The GCEQ total score had a correlation coefficient of >0.50 with all other sub scores (r=0.55 to 0.80, p<0.01). On the other hand, the sub scores' correlation with each other was below 0.80 within the scope of discriminant validity (r=0.15 to 0.73). According to the exploratory factor analysis results, the GCEQ had a 4-factor structure. The cut-off value of the GCEQ was determined as 109.4.

Conclusion: The Turkish version of the GCEQ is a valid and reliable scale for healthy individuals. In addition, the SEM_{95}, MDC_{95} and cut-off values of the GCEQ were determined to provide clinicians and physiotherapists with norm values for individuals' physical activity orientations.

Keywords: Exercise, goal content, reliability, self-determination, Turkish version, validity.

ÖZ

Amaç: *Çalışmanın amacı, Egzersiz için Hedef İçeriği Anketi'nin (EHİA) Türkçe versiyonunun kültürler arası adaptasyonunu, güvenilirliğini ve geçerliliğini ortaya koymaktır.*

Gereç ve Yöntem: *100 sağlıklı genç bireyle prospektif ve kesitsel bir çalışma yapıldı. Katılımcılar EHİA ile değerlendirildi. Bir hafta sonra, 39 kişi EHİA'yı yeniden doldurdu. Güvenilirlik, sınıf içi korelasyon katsayısı (ICC) ve Cronbach'ın α katsayısı ile değerlendirildi. Yapı geçerliliği korelasyonel analiz ve açıklayıcı faktör analizi ile belirlendi. EHİA'nın kesme değeri, ROC eğrisi ile belirlendi. Öte yandan, EHİA'nın minimum saptanabilir değişiklik (MDC_{95}) ve Standart ölçüm hatası (SEM_{95}) değerleri hesaplanmıştır.*

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Bulgular: *Çalışmaya toplam 100 birey (21,1±2,9 yıl, %72 kadın) dahil edildi. Toplam ve alt puanlar için alfa katsayısı >0,80 idi (görüntü alt skoru hariç). Öte yandan, ICC analizinde tüm puanlar 0,80'in üzerinde puanlandı. EHİA'nın SEM_{95} ve MDC_{95} değerleri sırasıyla 4,83 ve 13,3 idi. EHİA toplam puanının diğer tüm alt skorlarla >0,50 korelasyon katsayısı vardı (r=0,55 ile 0,80; p<0,01). Öte yandan, ayırıcı geçerliliği kapsamında alt puanların birbirleriyle korelasyonu 0.80'in altındaydı (r=0,15 ile 0,73). Açıklayıcı faktör analizi sonuçlarına göre EHİA 4 faktörlü bir yapıya sahipti. GCEQ'nun cut-off değeri 109,4 olarak belirlendi.*

Sonuç: *EHİA'nın Türkçe versiyonu sağlıklı bireyler için geçerli ve güvenilir bir ölçektir. Ayrıca, EHİA'nın SEM_{95}, MDC_{95} ve cut-off değerleri, klinisyenlere ve fizyoterapistlere bireylerin fiziksel aktivite yönelimlerinin norm değerleri sağlamak için belirlenmiştir.*

Anahtar Sözcükler: *Egzersiz, geçerlik, güvenirlik, hedef içeriği, otonomi, Türkçe versiyon.*

INTRODUCTION

Regular physical exercise provides an essential contribution to individuals in terms of musculoskeletal, somatosensory, cardiopulmonary and immune systems (1). Considering its positive effects, individuals conduct exercise a part of their lives within the scope of various internal and external goals (2). Young individuals tend to carry out physical exercise on various bases, including physical, social and psychological (3, 4). However, it has been marked that these reasons have not been sufficiently and comprehensively addressed until recently.

Sebire et al. addressed the internal and external causes of physical exercise within the scope of self-determination theory. These results provided inferences about the target content of individuals' exercise habits (5). In the self-determination theory, individuals' internal and external goal content was considered a predictor of people's behavioral quality and psychological well-being (6). This theory proposes that people could self-determine for the sake of the relevant goal when their three basic psychological needs are met, namely competence, connectivity, and autonomy. Individuals have noticed parameters such as sociability, appearance, health and skills as targets to provide the necessary motivation during physical exercise (6, 7). A current study revealed that the intrinsic exercise goal is affected by higher need satisfaction and autonomous motivation (8). Also, a recent study underlined that among the exercise goals, contact and the perception of challenges are at the forefront in adolescents. On the other hand, appearance and recreation were expressed to be more important in young adults. According to current data, young individuals exercise less compared to four years ago. In other words, it is commented that the frequency of exercise decreases in young adults (9). One of the possible consequences of this situation is that the prevalence of Body Mass Index (BMI) has increased significantly in the last ten years (10). In this respect, the relationship between the BMI of individuals and the exercise target content should be addressed with sensitivity and sensitivity measurements. Because the fact that individuals accomplish the exercise for a purpose independent of the parameter may bring about possible changes in their BMI. Therefore, it is essential to investigate a critical aspect of the exercise goal content holistically (5, 11, 12).

In order to monitor target content in exercise, Sebire et al. developed a new Patient Reported Outcome Measure (PROM) "Goal Content for Exercise Questionnaire (GCEQ)" in 2008. The authors aimed to observe the exercise orientation of individuals in terms of “social affiliation, image, health management, social recognition, and skill development”, taking into account the theory of self-determination. In this way, it would be possible to observe for what purpose individuals exercise more physically, behaviorally and psychologically (5). Physical exercise benefits many pathological conditions and healthy individuals provided that frequency, duration, intensity and intensity are adjusted regularly (11, 13). Considering that individuals' exercise orientations can also affect their exercise habits, barriers and participation, it is essential to address individual exercise goal inferences (14, 15). GCEQ has been adapted to English (original development study) (5), Spanish (16) and Portuguese (17). To our knowledge, the Turkish translation, cultural adaptation, validity and reliability of the study have not been demonstrated. The aim of our study is to determine the cross-cultural adaptation, reliability and validity of the GCEQ.

MATERIALS and METHODS

Translation and Adaptation Process

After obtaining permission from the developer of the scale (Simon J. Sebire) for the translation and cultural adaptation of the questionnaire into Turkish, procedures were carried out in 5 steps according to international directions (18, 19). In the first step, the questionnaire was translated from English to Turkish independently by two academics (whose mother tongue is Turkish) who are experts in English. In the second step, the commission of four academicians examined the two translations, taking into account the cultural characteristics of the Turkish language and society, and converted them into a single translation with consensus. Third, the questionnaire was translated into Turkish by an academic whose mother tongue is English and speaks Turkish expertly. The translation committee re-examined the draft questionnaire in the fourth step, revealing its final pre-pilot form. In the fifth step, the comprehensibility of GCEQ was examined in a pilot study. Twenty healthy individuals interpreted the comprehensibility of the questionnaire items with a Likert-type scale. Then, after the final reviews of the expert committee, the final version of the Turkish GCEQ was created (Appendix 1).

Sample Size Estimation

The sample size was determined by considering methodological recommendations and minimum requirements for statistical analysis. First, it was determined that at least 100 individuals would be sufficient in the study, according to the population recommendation (five times the number of items in the questionnaire) (20). Second, sample size calculation (G*Power 3) (21) was conducted based on correlational analysis norm values in Sebire's development study (5). R^2 and effect size was confined as 0.26 and 0.50, respectively. At least 48 individuals were required with 99% power and 0.05 alpha margin of error. On the other hand, in the calculation constructed for the test-retest analysis; considering the “minimum acceptable reliability (ICC) (ρ0) 0.60, Expected reliability (ICC) (ρ1) 0.90, significance level (α) 0.05, power (1 - β) 0.99, and 10% drop out”, at least 36 individuals were required to be re-assessed (22, 23).

Study Design

A prospective and cross-sectional study was carried out with 100 individuals. The study sample comprised students in the Department of Physiotherapy and Rehabilitation at Ege University. Inclusion criteria for the study were (1) students older than 18 years, (2) who received undergraduate and graduate education (3) native Turkish-speaker. Exclusion criteria were (1) morbid obese individuals and (2) students with chronic disease. The socio-demographic and physical characteristics of the individuals were questioned with the initial evaluation form. The Turkish version of the GCEQ was administered twice at a one-week interval. “The study was carried out in accordance with the ethical principles and the Helsinki Declaration. Written consent was obtained from the patient that medical data can be published. The study protocol was approved by the ethics committee of Ege University (Decision Number: 21-5T/75).”

Goal Content for Exercise Questionnaire

The questionnaire consists of 20 items and has been shown to include five low-grade factors and two high-grade factors. GCEQ have a 7”-point Likert scale (1 = not at all important; 4 = moderately important; 7 = very important)”. The items were then divided into five categories: “social affiliation, health management, image, social recognition, and skill development” (5).

Statistical Analysis

“IBM SPSS Statistics Version 25” was used for statistical analysis. Data analysis was presented as mean, standard deviation, and percentage. The conformity of the data to the normal distribution was evaluated with the “Shapiro-Wilk and Kolmogorov-Smirnov tests”. A 95% confidence interval and 0.05 statistical significance were taken into account.

The “Cronbach's alpha coefficient” was used to evaluate the subscores and total score of the GCEQ. In cases where the alpha value was between 0.70 and 0.95, it was concluded that the scale subscores and the total score could consistently address the relevant issue (24). “Intraclass Correlation Coefficient (ICC)” was used to evaluate test-retest reliability. ICC shows excellent reproducibility above 0.80 (25). “Standard Error of Measurement (SEM_{95}) and Minimal Detectable Change (MDC_{95})” were calculated with the following formulas.

$MDC_{95} = 1.96 * SEM_{95} * \sqrt{2}$.

$SEM_{95} = SD * \sqrt{}(1\text{-}ICC)$ (26)

In the evaluation of construct validity, correlational analysis was performed within the

scope of convergent and discriminant validity. In cases where the correlation of the subscale between the total score was above 0.50, the correlation value is considered high within the scope of convergent validity (27). On the other hand, the correlation coefficients of the subscores' relationship with each other were expected to be lower than 0.80 within the scope of discriminant validity (28). Validity was also analyzed by exploratory factor analysis. The factor structure of GCEQ was compared with the development study and other versions. In addition, the eigenvalues of the items were presented with a scree plot. The Receiver Operating Characteristic (ROC) curve of the GCEQ was analyzed according to the median BMI of the individuals. The cut-off value of the GCEQ was determined by considering the sensitivity and specificity values.

RESULTS

A total of 100 individuals (21.1±2.9 years, 72% female) were included in the study. The Body Mass Index (BMI) of the sample was 21.5±3.9 kg/m2. The majority of the subjects (83%) were Bachelor's students. Most frequent (73%) residency was home, and 64% of individuals lived with their families (Table-1). After five stages of cultural adaptation of GCEQ, there was no need for linguistic modification. The alpha coefficient was >0.80 for the total and subscores (except for the image subscore). The Cronbach's alpha coefficient for the image subscore was 0.77. On the other hand, all scores were scored above 0.80 in ICC analysis. The SEM_{95} and MDC_{95} values of the GCEQ were 4.83 and 13.3, respectively (Table -2). The GCEQ total score had a correlation coefficient of >0.50 with all other subscores (r=0.55 to 0.80, p<0.01). On the other hand, the subscores' correlation with each other was below 0.80 within the scope of discriminant validity (r=0.15 to 0.73) (Table-3). According to the exploratory factor analysis results, the GCEQ had a 4-factor structure (Table-4, Figure-1). The cut-off value of the GCEQ regarding the median BMI grouping on the ROC curve was determined as 109.4 (Figure-2).

Table-1. The physical and demographical characteristics of the sample.

n:100	**Total**
Age (years, mean±SD)	21.1±2.9
Weight (kg)	61.7±11.2
Height (cm)	168.9±8.1
BMI (kg/m^2, mean±SD)	21.5±3.0
Gender (n, %)	
Female	72 (72.0)
Male	28 (28.0)
Degree (n, %)	
Bachelor student	82 (82.0)
Master student	18 (18.0)
Residency (n, %)	
House	73 (73.0)
Dormitory	27 (27.0)
Residents (n, %)	
Family	64 (64.0)
Friends	17 (17.0)
Alone	19 (19.0)

SD: standard deviation, n: number of patients, %: Percent, BMI: Body Mass Index

Table-2. Mean scores and reliability of the Goal Content for Exercise Questionnaire.

n:100	Test (X±SD)	Retest (X±SD)	Cronbach α	ICC (95% CI)	SEM_{95}	MDC_{95}
Social affiliation	16.4±6.1	17.2±5.4	0.841	0,804	2.70	7.48
Image	21.2±4.5	20.9±5.2	0.773	0.943	1.07	2.97
Health management	25.1±3.3	25.0±3.1	0.891	0.938	0.82	2.27
Social recognition	15.9±6.9	15.7±7.0	0.905	0.915	2.04	5.65
Skill development	23.2±4.5	23.3±4.5	0.865	0.968	0.80	2.23
GCEQ total score	101.9±19.6	102.2±19.7	0.918	0.940	4.82	13.3

X: mean, SD: standard deviation, n: number of patients, GCEQ: Goal Content for Exercise Questionnaire, ICC: Intraclass Correlation Coefficient, SEM_{95}: Standard Error of Measurement, MDC_{95}: Minimal Detectable Change

Table-3. Construct validity of the Goal Content for Exercise Questionnaire.

n: 100	Social affiliation	Image	Health management	Social recognition	Skill development	GCEQ total score
Social affiliation	n/a	0.434**	0.238**	0.673**	0.514**	0.800**
Image	0.434**	n/a	0.441**	0.580**	0.545**	0.766**
Health management	0.238**	0.441**	n/a	0.150	0.732**	0.558**
Social recognition	0.673**	0.580**	0.150	n/a	0.343**	0.800**
Skill development	0.514**	0.545**	0.732**	0.343**	n/a	0.756**
GCEQ total score	0.800**	0.766**	0.558**	0.800**	0.756**	n/a

**: p<0.01, GCEQ: Goal Content for Exercise Questionnaire, n/a: not applicable

Table-4. Factor loadings of the Goal Content for Exercise Questionnaire.

n: 100	Factor 1	Factor 2	Factor 3	Factor 4
Item 1	0.249	0.086	0.129	**0.737**
Item 2	0.143	0.400	**0.780**	0.020
Item 3	0.082	**0.818**	-0.036	0.129
Item 4	**0.798**	-0.011	0.367	0.173
Item 5	0.154	**0.659**	0.270	0.377
Item 6	0.392	0.252	0.088	**0.679**
Item 7	0.171	0.429	**0.765**	-0.019
Item 8	0.049	**0.829**	0.315	0.067
Item 9	**0.812**	0.037	0.123	0.262
Item 10	0.134	0.511	0.080	**0.678**
Item 11	**0.710**	0.034	-0.040	0.472
Item 12	**0.764**	0.114	0.240	-0.156
Item 13	0.062	**0.844**	0.165	0.022
Item 14	**0.855**	0.120	0.135	0.126
Item 15	0.138	0.384	**0.620**	0.395
Item 16	**0.779**	0.029	-0.010	0.390
Item 17	0.403	0.026	**0.727**	0.181
Item 18	0.042	**0.831**	0.219	0.063
Item 19	**0.759**	0.102	0.126	0.098
Item 20	0.008	**0.722**	0.235	0.344

n: number of patients, Factor 1: Social recognition Factor 2: Health management, Factor 3: Image, Factor 4: Social affiliation, Extraction method: principal component analysis; rotation method: varimax with Kaiser normalization.

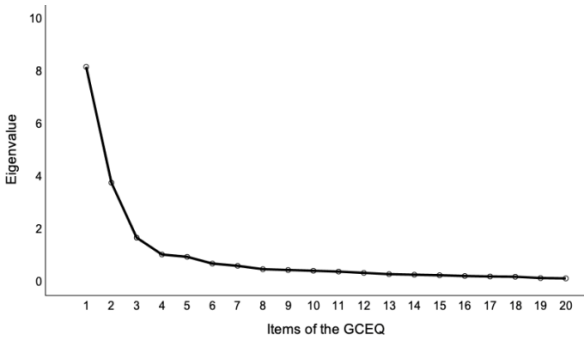

Figure-1. Scree plot for the Goal Content for Exercise Questionnaire items.

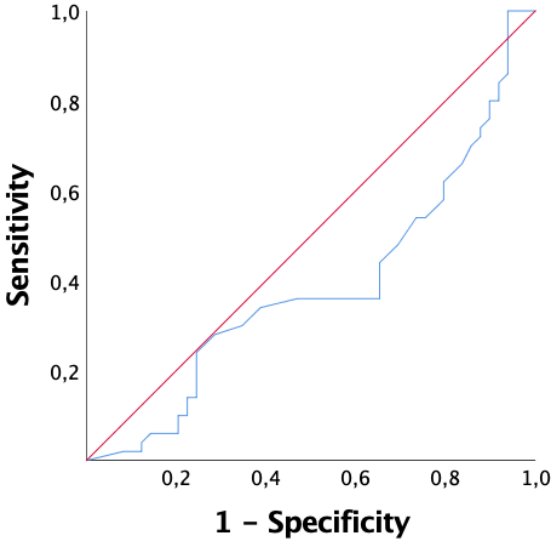

Figure-2. Receiver Operating Characteristic (ROC) curve of the GCEQ.

DISCUSSION

The current study aimed to determine the cultural adaptation, validity and reliability of the Turkish version of the GCEQ. GCEQ evaluates exercise target content of individuals with Self Determination Theory (5). There has been no unique PROM equivalent to GCEQ until now. GCEQ would provide a significant contribution to the literature in order to observe the physical activity tendencies of native individuals living in Turkey. According to our analysis results, GCEQ was found to be a valid and reliable scale in young, healthy individuals. In addition, the SEM_{95}, MDC_{95} and cut-off values of the GCEQ were determined to provide clinicians and physiotherapists with norm values for individuals' physical activity orientations. This questionnaire has additional essence in terms of some psychometrics not included in other versions (English, Spanish, Portuguese and Malay) (5, 16, 17, 29).

First, our study carried out standard procedures for translation into Turkish. The translation of the GCEQ did not require significant modifications for cultural adaptation (19). Individuals were aged 18-73 years in the development study (5). Other versions analyzed the psychometric properties of GCEQ in university students (16, 17, 29). This situation can be considered from two perspectives. Adapting the validity and reliability of GCEQ to the general population ensures that different populations can use the questionnaire reliably. However, examining the psychometric properties of the homogenous sample, including young adults, older people or other clinical populations, is essential, especially for SEM_{95}, MDC_{95}, and cut-off analyses (26). Constructing the sample homogenous would directly affect the standard deviation; therefore, the outcome of these calculations would be changed. In this respect, we evaluated university students in our sample to provide harmony with version studies (16, 17, 29).

The first of our reliability analyzes was the internal consistency analysis. In our study, alpha values of all subscores and total scores were found to be between 0.70 and 0.95. Terwee et al. state that alpha values in this range are sufficient for internal consistency (24). Besides, GCEQ had an internal consistency of over 0.80 for “social affiliation, health management, social recognition and skill development” subscores. For the image subscore, the alpha was 0.77, indicating less consistency. This result may suggest that items related to the "image" subscore should be handled with more subscores in some cases. In particular, it was considered that these questions could be converted into two different categories, such as improving the body's BMI or improving only a specific body part in order to provide psychological ego satisfaction (30). Another analysis was test-retest reliability. Considering that healthy young individuals do not have cognitive problems, the test-retest reliability was expected to be above 0.80. Terwee et al. stated that the test-retest interval between 2 and 14 days is appropriate (24). In our study, an interval of one week was preferred. It was observed that individuals who expressed the same physical condition provided similar results in two different measurements.

MDC value of the GCEQ (13.3) is an essential parameter for observing the level changes of individuals. It can be communicated that an increase of 13.3-unit points in the exercise targets of individuals can create a statistically significant change in the individual (26). On the other hand, the cut-off value was calculated as 109.4. It can be interpreted that individuals above this value are able to perform the exercise for the sake of purpose at a sufficient level in terms of "social affiliation, image, health management, social recognition, and skill development" from the target content (31).

In the validity analysis, primarily convergent and discriminant validity were discussed. The total score of the questionnaire was expected to be highly correlated with the subscores (28). Because subscores are included as a component in the total score calculation, it was expected to have a high level of correlation in direct proportion. The highest degree of correlation with the total score of the GCEQ was social affiliation and recognition, with 0.80. In other words, it was regarded that these two parameters most representative of the exercise goal of young, healthy individuals focused on the phenomenon of sociability (32). This outcome may suggest that young people are applied exercise in terms of sociability rather than physical benefits. On the other hand, image and skill carried second place with a correlation coefficient of approximately 0.70. Another remarkable result was health management, the lowest exercise target with a coefficient of 0.55. It was determined that young, healthy individuals did not primarily exercise to improve their health. On the other hand, within the scope of discriminant validity, subscores and total scores of the questionnaires are expected to have a lower correlation coefficient of less than 0.80. Our results were consistent with a low correlation, as expected. The lowest correlation was between health and sociability parameters. In other words, the exercise target contents related to the health of individuals whose sociability goals are more prominent were also low, as expected. Physical activity training and public service announcements may consider these results (33).

Contrary to expectations, our factor analysis results were in a 4-factor structure, not a 5-factor structure. Items 5 and 20 (related to skill) are included in the health subscore. This situation constructed us to consider that individuals believe skills and health perceptions within the same concept. In addition, in the image factor, it was determined that item 15 (related to skill) took place, while item 12 (related to the image) was lacking. It demonstrates that the concepts of image and skill are comprehended together by young individuals. In general, the thought that the strengthening of the muscles may have provided the increase in the skill with the image may have led to this situation. In the social recognition factor and social affiliation, items 11 and 16 created conceptual confusion. This concern has led to the conclusion that social affiliation and recognition subscores should not be considered independently of each other. Also, in social affiliation, it has been demonstrated that the item 10 (skill) score is assumed as an intertwined concept. Confirmatory factor analysis could also be considered in future studies to rule out these situations (5, 17).

In the development study, Sebire et al. confirmed the 5-factor structure of the GCEQ relative to exploratory and confirmatory factor analysis (5). The 5-factor structure was also psychometrically proven in version studies (16, 17, 29). The original aspect of our study is that Cronbach alpha, test-retest reliability, convergent and divergent validity, SEM_{95}, MDC_{95} and cut-off values were revealed for the first time in the Turkish version. It is essential to specifically examine psychometrics in homogeneous groups, primarily because of the population difference between the development study and other versions.

One of the limitations of the study belongs to sample age. Young, healthy individuals consisted of our study population. Re-administering the validity and reliability of the questionnaire in other age groups maybe more efficient. Second, a responsiveness analysis could not be performed due to the unavailability of monitorization. According to "COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN)" and how to select an outcome measurement instrument COSMIN, responsiveness is one of the critical psychometrics of PROM (34). Finally, correlational analysis with the Turkish version of the questionnaire on exercise barriers and quantification would further reveal the construct validity of the GCEQ (35).

CONCLUSIONS

The Turkish version of the GCEQ is a valid and reliable scale for healthy individuals. In addition, the SEM_{95}, MDC_{95} and cut-off values of the GCEQ were determined to provide clinicians and physiotherapists with norm values for individuals' physical activity orientations.

Conflict of Interest: The authors report no conflict of interest.

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