The Validation of the Dental Undergraduates' Preparedness Assessment Scale (Du-Pas) and The Evaluation of the Effect of Integrated Clinical Practices on the Knowledge and Experience of Final Year Dental Students Using Du-Pas

Halenur Altan[1,a], Müzeyyen Dilşah Demiray[1,b,*], Büşra Almas[1,c], Ahmet Altan[2,d], Ali Rıza Tunçdemir[3,e]

[1]Department of Pediatric Dentistry, Faculty of Dentistry, Necmettin Erbakan University, Konya, Turkiye.
[2]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Necmettin Erbakan University, Konya, Turkiye.
[3]Department of Prosthetic Dentistry, Faculty of Dentistry, Necmettin Erbakan University, Konya, Turkiye.
*Corresponding author

Research Article

ABSTRACT

Objectives: The Dental Undergraduates Preparedness Assessment Scale (DU-PAS) is a 50-item, two-part tool designed to assess final-year dental students' knowledge, attitudes, and skills. This study aimed to validate the Turkish version of DU-PAS and evaluate the impact of traditional versus integrated clinical education on students' knowledge, experience, and self-confidence.

Materials and Methods: This study was conducted in two phases. In the first phase, the Turkish adaptation and validation of DU-PAS were completed by administering the scale to 272 final-year dental students via Google Forms. In the second phase, 53 students from Necmettin Erbakan University Faculty of Dentistry completed DU-PAS before and after their integrated clinical internship. Additionally, the Akın Self-Confidence Scale was administered before the internship, and the data were analyzed in relation to DU-PAS scores. Internal consistency was assessed using Cronbach's alpha and item-total correlation coefficients. Paired t-tests were used to compare DU-PAS scores before and after the internship.

Results: Items with factor loading differences below 0.1 or loading on multiple factors were excluded from the scale. Specifically, items 6, 7, 12, 17, 18, 26, 29, 31, 46, and 50 were removed. Items 13 and 15 were excluded as they formed a single-item factor. Items 27 and 28 were also removed due to low internal consistency. After item removal, the final validated version consisted of 35 items. A positive correlation was found between students' DU-PAS and self-confidence scores.

Conclusions: The Turkish version of the Dental Undergraduates Preparedness Assessment Scale was validated following item removal. The original 50-item scale was reduced to 35 items. It was observed that the self-confidence levels of final-year dental students were lower before the integrated internship compared to after its completion. The findings suggest that the integrated clinical internship positively contributed to students' self-confidence.

Keywords: Dentistry, final-year student, preparedness, self confidence, validation

Diş Hekimliği Öğrencileri- Hazırbulunuşluk Değerlendirme Ölçeğinin (DU-PAS) Türkçe Validasyonu ve Entegre Klinik Uygulamalarının Son Sınıf Diş Hekimliği Öğrencilerinin Bilgi ve Deneyim Düzeylerine Etkisinin DU-PAS Ölçeği ile Değerlendirilmesi

Araştırma Makalesi

ÖZET

Amaç: Diş Hekimliği Lisans Öğrencilerinin Hazırlık Değerlendirme Ölçeği (DU-PAS) son sınıf öğrencilerin bilgi, tutum ve becerilerini değerlendirmek için kullanılan iki bölümlü, elli sorudan oluşan bir psikometrik ölçektir. Çalışmamızda Diş Hekimliği Öğrencileri- Hazırbulunuşluk Değerlendirme Ölçeği'nin (DU-PAS) Türkçe geçerliliği doğrulanacak; geçerliliği doğrulanan DU-PAS kullanılarak geleneksel ve entegre klinik eğitim modelinin diş hekimliği son sınıf öğrencinin bilgi, deneyim ve özgüvenlerine etkisi karşılaştırılacaktır.

Gereç ve Yöntemler: Çalışmamız iki basamakta gerçekleştirildi. Birinci basamakta DU-PAS ölçeğinin geçerlilik-güvenirliği, kültürel adaptasyonu yapılan ölçeğin 272 son sınıf öğrencisine Google Form üzerinden uygulanmasıyla gerçekleştirildi. İkinci aşama ise Necmettin Erbakan üniversitesi diş hekimliği fakültesi öğrencilerin entegre stajı öncesi ve sonrası özgüvenleri ve DU-PAS ilişkisi ölçüldü. Ayrıca, entegre staj öncesinde Akın Öz Güven Ölçeği uygulanmış ve elde edilen veriler DU-PAS ile ilişkilendirildi. Ölçeğin iç tutarlılığını analiz etmek için Cronbach alfa katsayısı ve madde-toplam korelasyon katsayıları kullanıldı. DU-PAS puanlarının staj öncesi ve sonrası karşılaştırılması için bağımlı t-testi uygulandı.

Bulgular: İlk analiz sonucunda bir maddenin iki farklı faktör altında yer alması faktör analizi için kabul edilebilir bir durum olmadığından ve bir maddenin farklı faktörler altındaki değerleri arasındaki farkın 0,1'den küçük olması durumuna ölçekten çıkartılması gerekmektedir. M6, 12, 17, 18, 26, 29, 31, 46, 50,7 maddeleri birden fazla faktör altından yer aldığı için ölçekten çıkarılmıştır. Madde 13 ve madde 15 ise tek maddeli bir faktör oluşturdukları için ve tek maddeli bir faktör olamayacağından ölçekten çıkarılmıştır. Madde 28 ve madde 27 ise ikisi birlikte bir faktör oluşturmakta ve oluşan faktörün Cronbach's alfası düşük güvenirlikte olduğu için bu maddelerde ölçekten çıkarılmıştır. Özgüven ile hazırbulunuşluk arasında pozitif korelasyon vardır.

Sonuçlar: Diş Hekimliği Öğrencileri- Hazırbulunuşluk Değerlendirme Ölçeği madde çıkarma yapılarak Türkçe diline valide edilmiştir. 50 maddde olan ölçek 35 maddeli şekilde kullanılabilmektedir. Diş hekimliği son sınıf öğrencilerinin entegre stajı öncesi özgüvenleri entegre stajı sonrasından daha düşük olduğu görülmüştür. Entegre stajının özgüveni olumlu yönde etkilediği elde ettiğimiz sonuçlar arasındadır.

Anahtar Kelimeler: Diş hekimliği, hazırbulunuşluk, özgüven, son sınıf öğrencisi, validasyon.

a halenuronat@gmail.com   0000-0003-3648-5989   b demiraydilsah@gmail.com   0000-0002-5683-3314
c balmas48@gmail.com   0009-0002-5964-2756   d dt.ahmetaltan@gmail.com   0000-0003-2041-6364
e alirizatuncdemir@gmail.com   0000-0002-6114-3369

Introduction

Because of its unique structure, dental applications encompass various aspects such as teaching and learning, instructor-student relationships, patient expectations, clinical outcomes, and complex materials and methods.[1] Every dentist strives to deliver painless dental treatments with minimal discomfort for their patients. Experts in the field agree that dentistry entails irreversible procedures and the management of patients' emotional behaviors. Unlike other healthcare professions, dental students often confront invasive and irreversible procedures.[2]

Graduate dentists need not only clinical competence but also strong adaptive skills suited for the 21st century to effectively serve society. Clinical, scientific, and environmental skills form essential components of the dental curriculum, as they enable students to engage with their patients empathetically, allowing them to better understand their oral health status and needs.[3] Research indicates that when healthcare providers possess effective communication skills, patient satisfaction increases, adherence to treatment recommendations improves, and patient anxiety and complaints related to malpractice decrease.[4-6] Therefore, it is essential to incorporate courses and internships into the curriculum that focus on enhancing dental students communication skills with patients.

Deficiencies in graduates' critical thinking skills have been observed, with reports indicating that students struggle to explain treatment options to their patients. This issue is believed to stem from a lack of experience and an inability to integrate their knowledge gained in dental clinics.[7,8] Additionally, the presence of various departmental clinics within dental faculties, each with its own evaluation criteria and conditions, restricts students' treatment planning skills.[9]

Dental curricula today differ in design, utilizing traditional, integrated, or a combination of both approaches. The traditional curriculum focuses on pre-clinical basic sciences and clinical experiences, offering practical training in later years.[10] However, this model primarily relies on lectures, which can make it difficult for students to grasp the interconnectedness of subjects within a discipline-based education.

In contrast, the integrated curriculum combines various disciplines according to related fields and subjects. In our country, different educational models are being developed to enhance dental education.[11] The traditional model may not adequately address the new educational needs arising from rapid changes in the field. Since many challenges encountered in dental treatment span multiple disciplines, there is a

growing trend towards an integrated approach in both theoretical and clinical education. The goal of this integration is to help students view the larger picture, rather than just learning isolated aspects of their studies.

Health services aim to solve the problems of healthy/sick individuals in the shortest time, which is one of the obligations to have problem-solving skills. In this way, how the problem-solving process will be realized in order to provide quality care and achieve the intended goals as soon as possible should be provided to dental students. When the literature was examined, no study was found to evaluate the self-confidence and professional knowledge skills of final dental students trained with the integrated clinical model.

Self-confidence is one of the essential factors for communicating successfully with patients. Akın introduced the Akın Self-Confidence scale to the literature because of his study with 796 high school students to evaluate students' self-confidence levels validly and reliably.[12] The General Dental Council has developed standards for the appropriate and transparent assessment of dental undergraduate education. The Dental Undergraduates Preparedness Assessment Scale (DU-PAS) is a two-part, fifty-question psychometric scale used to assess final students' knowledge, attitudes, and skills.[13,14] With our study, we aim to introduce the DU-PAS scale to the Turkish literature and to measure the effect of the integrated clinical model on the practical deficiency and the acquisition of communication skills by the Akın Self-Confidence Scale.

Material and Method

Our study, conducted at Necmettin Erbakan University Faculty of Dentistry, Department of Pedodontics, was approved by Necmettin Erbakan University Faculty of Dentistry, Ethics Committee for Non-Drug and Non-Medical Device Research (2022/17-124), and was conducted by the principles specified in the Declaration of Helsinki.

Study Design

This study is a prospective scale study. The study was conducted in two steps; first step is cultural adaptation and cultural validation of DU-PAS and second step is the effects of the integrated clinical education model on the knowledge, experience and self-confidence scale is on the final-year dentistry students participants will be administered using the Turkish validated DU-PAS and Akın self-confidence scale. Permission to use and adapt the Dental Undergraduates Preparedness Assessment Scale (DU-PAS) was obtained from the author prior to conducting the study.

In adapting a scale to another culture, a group at least 5-10 times larger than the number of scale items should be reached.[15] In this study, the number of scale items was 50. In validating the DU-PAS, the aim was to adapt the 50 items in the scale to at least 250 final year dental students, with 5 samples for each item. The first-step validation of the DU-PAS scale was conducted with a total of 272 final-year dental students who completed the survey via Google Forms.

Two dentist experts (endodontics and restorative dentistry) with an advanced level of English translated the English version of the scale into Turkish. The scale translated into Turkish was translated back into English and re-evaluated by two experts (pediatric dentist and endodontics). The final version was edited by three dentists and applied to 30 students for comprehensibility (Table 1). Following the pilot administration of the DU-PAS scale to 30 students, minor modifications were made to improve clarity and cultural relevance. These changes were incorporated into the final version used in the main study. The study was completed with 272 final-year dental students. For cultural validation, this number includes all students who completed the scale, excluding those from Necmettin Erbakan University Faculty of Dentistry. Therefore, the sample represents a convenience group of final dental students from various faculties, except for the researchers' own institution. The 30 students who participated in the pilot study were not included in the final analysis sample to avoid potential bias arising from prior exposure to the scale.

Table 1: Final Version of the Cultural Adaptation, Validation, and Reliability of Turkish Version DU-PAS

	Questions	0	1	2	3
	PART A				
1	Hastalarımdan eksiksiz anamnez alabiliyorum.				
2	Kapsamlı klinik ağız muayenesi yapabiliyorum.				
3	Uygun dental radyografileri belirleyebiliyorum.				
4	Periapikal radyografi çekebiliyorum.				
5	Bite-wing radyografi çekebiliyorum.				
6	Dental radyografilerdeki standart bulguları yorumlayabiliyorum.				
7	Ortodonti gerektiren hastaların tedavi ihtiyaçlarını değerlendirebiliyorum				
8	Hastalarımın tüm tedavi ihtiyaçlarını karşılayan kapsamlı bir tedavi planı oluşturabiliyorum.				
9	Hastalarımın bireysel koşullarına göre bir dizi tedavi seçeneği sağlayabiliyorum.				
10	Hastalarıma farklı tedavi seçeneklerinin avantaj ve dezavantajlarını açıklayabiliyorum.				
11	Herhangi bir tedaviye başlamadan önce hastalarımdan geçerli bir onam alabiliyorum.				

12	Hastaların tedavi seanslarını uygun bir sırayla gerçekleştirebiliyorum.				
13	Hastalarıma uygun şekilde ilaç reçete edebiliyorum.				
14	Inferior alveol sinir bloğunu etkili bir şekilde uygulayabiliyorum.				
15	Uygun yöntemlerle ameliyat gerektirmeyen periodontal tedavi uygulayabiliyorum.				
16	Diş çürüklerini etkili bir şekilde temizleyebiliyorum.				
17	Dişleri diş rengi dolgularla uygun şekilde restore edebiliyorum.				
18	Dişleri amalgam dolgularla uygun şekilde restore edebiliyorum.				
19	Tek köklü dişlerde endodontik tedaviyi uygun şekilde yapabiliyorum.				
20	Çok köklü dişlerde endodontik tedaviyi uygun şekilde yapabiliyorum.				
21	Diş koruma prensiplerini kullanarak uygun kron tedavisi sağlayabiliyorum.				
22	Mekanik olarak sağlam bölümlü protezler sağlayabiliyorum				
23	Mekanik olarak sağlam protezler sağlayabiliyorum.				
24	Ameliyat gerektirmeyen diş çekimlerini uygun şekilde yapabiliyorum.				
	PART B	**0**	**1**	**2**	**3**
25	İnsanların tedavilerinden beklentilerini yönetebileceğimi hissediyorum.				
26	Hastalarımı dental ihtiyaçları için öz bakımı teşvik etmeye motive edebileceğimi hissediyorum.				
27	Tedavilerimde kişisel sınırlarımın farkındayım.				
28	Gerektiğinde akademik danışman ve meslektaşlarımdan yardım istemek konusunda kendimi rahat hissediyorum.				
29	Karmaşık tedavi ihtiyaçları olan hastaları uygun şekilde sevk edebiliyorum.				
30	Ağız kanserlerinden şüphelenilen hastaları sevk etme konusunda kendime güveniyorum.				
31	Öğrenme ihtiyaçlarımı karşılamak için klinik uygulamalarım üzerinde düşünürüm.				
32	Diş hekimliği pratiğimi destekleyen bilimsel ilkeler hakkında yeterli bilgiye sahibim.				
33	Kanıta dayalı bir yaklaşım kullanarak yeni dental materyalleri ve ürünleri değerlendirmek konusunda kendime güveniyorum.				
34	Uygulamamı etkileyebilecek araştırma sonuçlarını yorumlama konusunda kendime güveniyorum.				
35	Klinik pratiğimde kanıta dayalı bir yaklaşım kullanıyorum.				
36	Hastalarımla etkili bir iletişim kurabileceğimi hissediyorum.				
37	Hastalarımın diş tedavisinden beklentilerini ifade etmeleri için fırsat veriyorum.				
38	Hastalarla etkili iletişimin önündeki engelleri uygun şekilde ele almak konusunda kendime güveniyorum.				
39	Girişimsel işlemlerin potansiyel risklerini hastalara anlatmak konusunda kendime güveniyorum.				
40	Meslektaşlarımla uygun şekilde iletişim kurmak konusunda kendime güveniyorum.				
41	Endişeli hastaları uygun davranış teknikleri ile yönetme konusunda kendime güveniyorum.				
42	Uygun diş tedavisi sağlamak için çocukların davranışlarını yönetebiliyorum.				
43	Diş hekimliği ekibinin etkin bir üyesi olarak sorumluluklarımı yerine getirebiliyorum.				
44	Klinik notlarımın kayıtlarını eksiksiz tutarım.				
45	Klinik randevu planlamasının kısıtlamaları dahilinde çalışabilirim.				
46	Devam eden mesleki gelişimim için sorumluluk alıyorum				
47	Diş hekimi olarak yasal sorumluluklarımın farkındayım.				
48	Hastalarımla ilişkilerimi profesyonel düzeyde tutarım.				
49	Meslektaşlarımın uygunsuz davranışları hakkında endişelerimi dile getirebileceğimi hissediyorum.				
50	Hasta gizliliğini korumak için uygun önlemleri alıyorum.				

Administration of DU-PAS Scale and Akın Self-Confidence to Final Dental Students

In the second step, the final dentistry students who did their internship in the integrated clinic of Necmettin Erbakan University Faculty of Dentistry. Fifty-three final-year students were included in this study, and informed consent forms were obtained. The DU-PAS were administered twice: once immediately before the start of the integrated clinical internship (6 weeks) and again immediately after its completion. The Akın self confidence scale was used before the integrated internship. Both administrations were conducted online via Google Forms, consistent with the procedure used in the first step of the study.

The participants were asked to complete the demographic information form, including age, gender, and educational status. Then, each of them was administered the 33-item Akın Self-Confidence Scale developed by Akın[14] consisting of 2 subcategories: intrinsic self-confidence and extrinsic self-confidence (Appendix 1). The items of this scale are written in the form of a 5-point Likert: (1) never, (2) occasionally, (3) often, (4) usually, (5) always) type rating scale. By dividing the total score obtained from the scale by the number of items, a conclusion can be reached about the self-confidence level of the individual. On the Akın Self-Confidence Scale, a score below 2.5 indicates low self-confidence, between 2.5 and 3.5 indicates moderate self-confidence and 3.5 and above indicates high self-confidence. It was determined that the items in the first factor of the scale (17 items) were primarily related to the self-confidence of individuals towards themselves. This factor was handled under the name of internal self-confidence. Since the items loaded on the second factor (16 items) were mainly related to individuals' self-confidence towards their external environment and social life, this factor was called external self-confidence (Appendix 1).

The validated Dental Undergraduates Preparedness Assessment Scale was applied to learn and evaluate their thoughts about their professional competencies. The scale consists of two subgroups: Part A (24 items) investigating preparedness for clinical procedures and Part B (26 items) investigating preparedness related to cognition, communication, and professionalism skills. For part A, I have no experience (0-Zero); I can do it with verbal or practical input from a colleague (1-One); I can do it on my own, independently (2-Two). For part B, I have no experience (0-Zero); mostly (1-One); always (2-Two). The total DU-PAS score was calculated by summing the scores of all items in both parts of the scale. Each item was scored on an ordinal scale, and higher scores indicated greater preparedness.

2.3. Statistical Analysis. The scale structures were analyzed using explanatory factor analysis. In exploratory factor analysis, the principal component analysis method was used for factor extraction, and the Varimax method was used for rotation. Cronbach's alpha and item-total correlation coefficients were used to analyze the scale's internal consistency. The paired-t test was used to compare the before and after DU-PAS scores.

Appendix 1. Akın Self-Confidence Scale

Bu anketlerden elde edilen sonuçlar bilimsel bir çalışmada kullanılacaktır. Sizden istenilen bu ifadeleri okuduktan sonra kendinizi değerlendirmeniz ve sizin için en uygun seçeneğin karşısına çarpı (X) işareti koymanızdır. Her sorunun karşısında bulunan;(1) Hiçbir zaman (2) Nadiren (3) Sık sık (4) Genellikle ve (5) Her zaman anlamına gelmektedir. Lütfen her ifadeye mutlaka TEK yanıt veriniz ve kesinlikle BOŞ bırakmayınız. En uygun yanıtları vereceğinizi ümit eder katkılarınız için teşekkür ederim.	Hiçbir Zaman	Nadiren	Sık Sık	Genellikle	Her Zaman
1 Kendimi başarılı bir insan olarak görürüm.	1	2	3	4	5
2 Başkalarının yanında heyecanımı kontrol edebilirim.	1	2	3	4	5
3 Seçimlerimde başkalarına bağımlı değilimdir.	1	2	3	4	5
4 Yaşamdaki zorluklarla baş edebilirim.	1	2	3	4	5
5 Benim için aşılamayacak sorun yoktur.	1	2	3	4	5
6 Başkalarının görüşlerine saygı gösteririm.	1	2	3	4	5
7 Problemlerimin üstesinden gelebileceğime inanırım.	1	2	3	4	5
8 Sosyal etkinliklere katılmaktan çekinmem.	1	2	3	4	5
9 Verdiğim kararların arkasında dururum.	1	2	3	4	5
10 Kendi kendime yetebileceğime inanırım.	1	2	3	4	5
11 Aktif birisi olduğumu düşünürüm.	1	2	3	4	5
12 Öz-eleştiri yapabilirim.	1	2	3	4	5
13 Anlamadığım konularda başkalarına soru sorabilirim.	1	2	3	4	5
14 Yeni girdiğim ortamlara uyum sağlarım.	1	2	3	4	5
15 Kendimle barışık bir insanım.	1	2	3	4	5
16 Gerektiğinde sonuna kadar hakkımı savunurum.	1	2	3	4	5
17 İstediğim şeyleri elde etmek için mücadele edebilirim.	1	2	3	4	5
18 Kendimi rahat bir şekilde ifade edebilirim.	1	2	3	4	5
19 Kendimi ve başkalarını olduğu gibi kabul ederim.	1	2	3	4	5

20	Çevremde yeteri kadar güvenebileceğim insan vardır.	1	2	3	4	5
21	Sorumluluk almaktan çekinmem.	1	2	3	4	5
22	Diğer insanların eleştirilerini anlayışla karşılayabilirim.	1	2	3	4	5
23	Sıkıntılı anlarımda bile olumlu düşünmeye çalışırım.	1	2	3	4	5
24	Ön plana çıkmaktan korkmam.	1	2	3	4	5
25	Başarısız olduğumda hemen pes etmem.	1	2	3	4	5
26	Başka insanlarla kolaylıkla iletişim kurabilirim.	1	2	3	4	5
27	Değerli birisi olduğuma inanırım.	1	2	3	4	5
28	Kolay arkadaş edinebilirim.	1	2	3	4	5
29	Düşüncelerimi ifade ederken başkalarından çekinmem.	1	2	3	4	5
30	Kolay karar verebilirim.	1	2	3	4	5
31	Sosyal bir insan olduğuma inanırım.	1	2	3	4	5
32	Kendimi severim.	1	2	3	4	5
33	Başka insanların övgülerini hak ettiğime inanırım.	1	2	3	4	5

Results

The Dental Undergraduates Preparedness Assessment Scale has 50 items in total. The validation results consists of two parts: descriptive statistics and the total correlation of each item. Descriptive statistics and item-total correlation coefficients of the items of the scale are presented in Table 2. Cronbach's alpha value of the scale was 0.925, and the scale was obtained with high reliability. In addition, item-total correlations should be 0.2 and above. When the item total correlation coefficients were analyzed, item 5 was removed from the scale because its item total correlation coefficient was below 0.2.

In exploratory factor analysis, the principal component analysis method was used for factor extraction, and the Varimax method was used for rotation. As a result of the first analysis, it is unacceptable for an item to be included under two factors for factor analysis. If the difference between the values of an item under different factors is less than 0.1, it should be removed from the scale. Items M6, 12, 17, 18, 26, 29, 31, 46, 50,7 were removed from the scale because they were under more than one factor. Item 13 and item 15 were removed from the scale because they formed a single-item factor, and there cannot be a single-item factor. Item 28 and item 27 together form a factor, and the Cronbach's alpha of the factor formed is low reliability, so these items were removed from the scale. The results obtained from the repeated analyses after a total of 15 items were removed from the scale together with the item analysis are presented in Table 3. After removing these items, the CMR value was 0.880, and Bartlett's test chi-square value was 3980.290 (p<0.001). These values reveal the suitability of the data set for factor analysis. In the 35-item scale, it was found that all of the extraction values were 0.3 and above, and all of the diagonal values in the anti-image correlation matrix were above 0.5. As a result of the analysis, a seven factor structure was revealed. With seven factors, 58.58% of the total variance is explained.

All item-total correlations of the scale items were obtained as 0.3 and above. Cronbach's alpha of factor 1 was 0.880, factor 2 was 0,795, factor 3 was 0,835, factor 4 was 0,81, factor 5 was 0,751, factor 6 was 0,663, and factor 7 was 0,615.

According to the obtained Cronbach's alpha coefficients, factor 1, 3, and 4 sub-dimensions were highly reliable. Factors 2, 5, 6, and 7 were highly reliable (Table 4).

According to Tukey's summability test, it was analyzed whether the scale was summable or not, and as a result of the test, it was found that the scale was not in a summable structure (F=252,016; p<0.001). It is understood that each dimension should be evaluated within itself, and there is no general evaluation. According to Hotelling's T2 test, it is understood that the items in the scale form different sub-dimensions. In other words, it is understood that it is not a one-dimensional scale (F=31.878; p<0.001).

In the second step, 53 Necmettin Erbakan University (NEU) Faculty of Dentistry final-year students were administered the DU-PAS and Akın Self-Confidence Scale. The comparison of pre- and post-intervention DU-PAS scores revealed a statistically significant increase in students' clinical preparedness. The mean DU-PAS score before the internship was 125 ± 19.1 (Min-Max: 70–140), whereas the mean score after the internship increased to 134 ± 13.2 (Min-Max: 78–149) (Table 5). The reduction in standard deviation in the post-test also suggests a more consistent level of preparedness among students, which may reflect the unifying effect of structured clinical exposure. A paired-sample t-test revealed a statistically significant increase in readiness scores following the intervention (p = 0.002), indicating that the training had a positive effect on students' readiness.

Figure 1 illustrates the individual changes in readiness scores of final-year dental students before and after the integrated clinical internship, stratified by self-confidence levels. The majority of students demonstrated an increase in their readiness scores following the training. This upward trend was observed across all confidence levels, though the degree of improvement varied. Students with high self-confidence (blue lines) generally started with higher baseline scores and showed consistent improvements. Moderate-confidence students (orange lines) exhibited a wider range of improvement, with several individuals showing substantial gains. The few students with low self-confidence (red lines) displayed limited change, and in some cases, minimal or no increase.

Table 2. Item Analysis and Reliability Results of DU-PAS

	Mean	S.D.	Item-total correlation	Cronbach's Alpha (α) if item deleted	Cronbach's Alpha (α)
m1	1.931	0.295	0.278	0.925	
m2	1.775	0.436	0.361	0.924	
m3	1.672	0.494	0.307	0.925	
m4	1.901	0.347	0.294	0.925	
m5	1.473	0.824	0.124	0.928	
m6	1.798	0.421	0.370	0.924	
m7	1.088	0.658	0.349	0.925	
m8	1.386	0.533	0.489	0.923	
m9	1.573	0.533	0.537	0.923	
m10	1.733	0.460	0.446	0.924	
m11	1.928	0.288	0.301	0.925	
m12	1.805	0.425	0.465	0.924	
m13	1.183	0.578	0.377	0.924	
m14	1.912	0.309	0.307	0.925	
m15	1.809	0.448	0.277	0.925	
m16	1.928	0.288	0.426	0.924	
m17	1.878	0.372	0.425	0.924	
m18	0.870	0.905	0.258	0.927	
m19	1.912	0.309	0.410	0.924	
m20	1.374	0.671	0.373	0.924	
m21	1.599	0.584	0.435	0.924	
m22	1.298	0.657	0.449	0.924	
m23	1.386	0.613	0.444	0.924	
m24	1.794	0.424	0.342	0.924	
m25	1.382	0.525	0.566	0.923	0.925
m26	1.550	0.506	0.444	0.924	
m27	1.672	0.486	0.522	0.923	
m28	1.508	0.566	0.348	0.924	
m29	1.302	0.623	0.519	0.923	
m30	0.683	0.750	0.497	0.923	
m31	1.550	0.536	0.574	0.922	
m32	1.118	0.530	0.521	0.923	
m33	0.859	0.694	0.473	0.923	
m34	1.042	0.651	0.526	0.923	
m35	1.195	0.610	0.525	0.923	
m36	1.691	0.471	0.570	0.923	
m37	1.748	0.452	0.524	0.923	
m38	1.626	0.500	0.602	0.922	
m39	1.592	0.508	0.626	0.922	
m40	1.691	0.487	0.527	0.923	
m41	1.527	0.530	0.563	0.923	
m42	1.309	0.510	0.526	0.923	
m43	1.592	0.523	0.506	0.923	
m44	1.382	0.573	0.468	0.923	
m45	1.366	0.583	0.510	0.923	
m46	1.573	0.540	0.561	0.923	
m47	1.374	0.617	0.432	0.924	
m48	1.546	0.514	0.440	0.924	
m49	1.263	0.669	0.431	0.924	
m50	1.630	0.529	0.398	0.924	

Table 3. Explanatory Factor Analysis Results of DU-PAS

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Extraction	Anti-image correlation coefficient
m38	0.822							0.724	0.918
m36	0.775							0.674	0.921

m41	0.734							0.638	0.918
m40	0.674							0.540	0.907
m39	0.673							0.578	0.924
m37	0.643							0.504	0.914
m43	0.540							0.430	0.941
m42	0.531							0.479	0.927
m25	0.482							0.508	0.922
m11		0.737						0.628	0.810
m14		0.735						0.601	0.809
m16		0.710						0.612	0.904
m1		0.677						0.574	0.806
m4		0.599						0.566	0.755
m19		0.597						0.541	0.907
m24		0.478						0.358	0.887
m33			0.805					0.702	0.851
m34			0.795					0.735	0.856
m32			0.704					0.596	0.898
m30			0.668					0.579	0.915
m35			0.637					0.588	0.923
m23				0.858				0.786	0.753
m22				0.839				0.767	0.766
m20				0.680				0.528	0.823
m21				0.678				0.578	0.901
m8					0.652			0.575	0.875
m9					0.644			0.582	0.921
m2					0.633			0.537	0.844
m10					0.616			0.547	0.887
m3					0.585			0.407	0.900
m44						0.750		0.695	0.859
m45						0.636		0.604	0.884
m47						0.558		0.511	0.903
m49							0.691	0.619	0.875
m48							0.652	0.613	0.849
Eigen value	4.893	3.467	3.267	2.870	2.568	1.811	1.627		
VER	13.979	9.907	9.333	8.200	7.338	5.173	4.650		
CEVR	13.979	23.886	33.220	41.419	48.757	53.930	58.580		

VER: Variance Explanation Ratio, CEVR: Cumulative Explained Variance Ratio Kaiser-Meyer-Olkin: K-M-O=0.880; Bartlett's Test (X2=3980.290; p<0.001)

Table 4. Reliability Result of DU-PAS

		Mean	S.D.	Item-Total correlation	Cronbach's Alpha (α) if item deleted	Cronbach's Alpha (α)
	m25	1.378	0.523	0.531	0.875	
	m36	1.700	0.467	0.687	0.862	
	m37	1.756	0.447	0.585	0.870	
	m38	1.626	0.500	0.749	0.856	
Factor 1	m39	1.593	0.507	0.661	0.864	0.880
	m40	1.693	0.486	0.613	0.868	
	m41	1.522	0.529	0.699	0.860	
	m42	1.304	0.507	0.566	0.872	
	m43	1.596	0.521	0.543	0.874	
	m1	1.930	0.295	0.534	0.768	
	m4	1.901	0.345	0.469	0.780	
	m11	1.930	0.282	0.601	0.758	
Factor 2	m14	1.916	0.304	0.622	0.752	0.795
	m16	1.930	0.282	0.645	0.750	
	m19	1.912	0.309	0.505	0.773	
	m24	1.795	0.422	0.404	0.805	
Factor 3	m30	0.680	0.747	0.594	0.818	0.835

	m32	1.118	0.523	0.618	0.810	
	m33	0.864	0.693	0.695	0.784	
	m34	1.037	0.653	0.713	0.780	
	m35	1.195	0.603	0.591	0.814	
	m20	1.372	0.679	0.489	0.842	
Factor 4	m21	1.606	0.579	0.583	0.794	0.817
	m22	1.296	0.655	0.738	0.719	
	m23	1.380	0.613	0.767	0.709	
	m2	1.777	0.434	0.498	0.714	
	m3	1.679	0.491	0.417	0.742	
Factor 5	m8	1.394	0.533	0.528	0.703	0.751
	m9	1.580	0.530	0.606	0.671	
	m10	1.730	0.461	0.544	0.698	
	m44	1.380	0.570	0.508	0.523	
Factor 6	m45	1.369	0.581	0.495	0.539	0.663
	m47	1.388	0.616	0.423	0.639	
Factor 7	m48	1.554	0.513	0.460	---	0.615
	m49	1.277	0.667	0.460	---	

S.D. : Standard Deviation, Hotelling's T(2) test (F=31.878; p<0.001), Tukey's addivity test (F=252.016; p<0.001), Genel Cronbach's alfa=0.909

Table 5. Comparison of DU-PAS Scores Before and After Integrated Internship

DU-PAS (Before)		DU-PAS(After)		
Mean±S.D	**Min-Max**	**Mean±S.D**	**Min-Max**	p
125+-19.1	70-140	134+-13.2	78-149	0.002*,ˣ

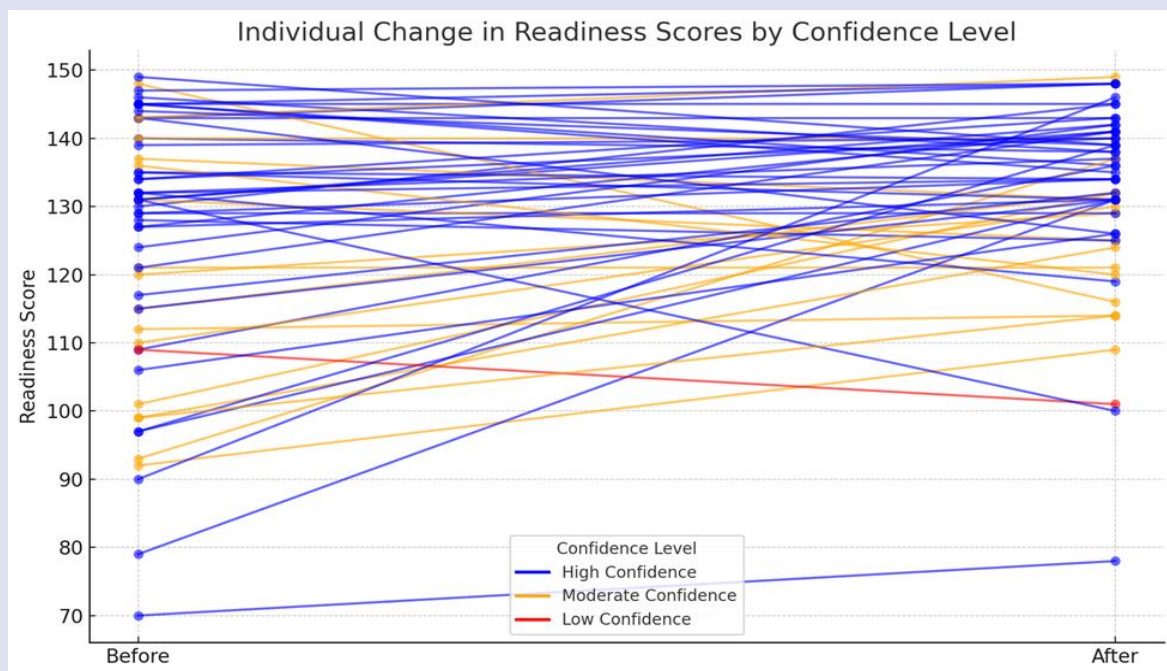S.D Standart Deviation, *Statistically significant, ˣ Paired t-test

Figure 1. The individual changes in readiness scores of final-year dental students before and after the integrated clinical internship, stratified by self-confidence levels

Discussion

Scales developed based on universal measurement principles, sampling methods, and conceptual frameworks of those cultures. Therefore, it is essential to conduct validity and reliability studies before using a scale in different cultural and linguistic contexts.[16] We conducted a cultural adaptation, validation, and reliability analysis of the DU-PAS. In the next phase, we compared the impact of an integrated clinical education model on final-year dental students' knowledge and experience using the validated DU-PAS, and assessed their self-confidence using the Akın Self-Confidence Scale.

In our country, dental education consists of a series of courses and practical applications that provide the theoretical foundations and clinical skills necessary for professional practice. This education spans five years and begins after high school. The first three years focus on pre-clinical education, where students engage in theoretical coursework and laboratory practice, along with introductory courses in medical sciences and clinical dentistry. During this time, students develop a foundational understanding of medicine and enhance their manual skills. The final two years are dedicated to clinical education, which includes advanced theoretical courses in clinical medical sciences and clinical dentistry. These courses are essential for dentists throughout their professional careers.[17,18]

The DU-PAS scale is structured into five main categories: (1) clinical skills competence, (2) theoretical knowledge, (3) professional attitudes and behaviors, (4) communication skills, and (5) ethical and legal issues. Each category contains a range of questions designed to assess the students' levels of preparedness. The students' responses are evaluated using a specific scoring system. The total scores indicate each student's overall level of preparedness. Our study's findings also suggest that the scale includes more dimensions.

In validated Turkish DU-PAS, 'I am able to interpret standard findings on dental radiographs.', "I am able to perform patients" treatment sessions in an appropriate sequence.', 'I am able to restore teeth appropriately with tooth-colored fillings.', 'I am able to restore teeth appropriately with amalgam fillings.', 'I feel I can motivate my patients to promote self-care for their dental needs.', 'I am able to refer patients with complex treatment needs appropriately. ', 'I reflect on my clinical practice to meet my learning needs.', 'I take responsibility for my ongoing professional development.' 'I take appropriate measures to protect patient confidentiality.', 'I am able to assess the treatment needs of patients requiring orthodontics.' 'I am able to perform non-surgical periodontal treatment with appropriate methods.', 'I am aware of my personal limitations in my treatments.', 'I feel comfortable asking for help from academic advisors and colleagues when necessary.' They were determined as items that could not be categorized in the DU-PAS scale.

In a study assessing the preparedness of final-year dental students in Turkey, it was found that the scores of Turkish students (75.68%) were higher than those of students from the United Kingdom (74%) and Pakistan (61.1%), but lower than those from Malaysia (79.5%).[19] In our study, when we measured the self-confidence of participating students using the Akın Self-Confidence Scale, we discovered that the majority exhibited moderate and high self-confidence. Furthermore, the DU-PAS scores, which assess preparedness, indicated that several factors could influence these scores. These include the need to access, prepare, and negotiate multiple canals in posterior teeth, challenges posed by complex anatomy, and inadequate access. Such difficulties can lead to complications in applying rubber dams, taking

radiographs, and performing endodontic procedures on multi-rooted teeth. Consequently, these challenges may negatively impact students' self-confidence and suggest a need for appropriate measures to help students strengthen their endodontic skills.[19]

The final version of the Turkish DU-PAS Scale consists of 35 items and was applied to Necmettin Erbakan University Faculty of Dentistry students before and after the integrated clinic. There was a positive change before and after the integrated clinic internship in the preparedness scale applied to NEU final dental students. It was observed that after the integrated clinic, students' knowledge about diagnosis and treatment on their own and their ability to practice increased. The primary and secondary objectives of this study are to help dental students more effectively connect basic scientific concepts from their curriculum to clinical practice through an integrated clinical model. Additionally, this model enables students to manage patient care holistically, enhancing their problem-solving skills.

The strength of the study is that DU-PAS was validated in Turkish to improve the dental curriculum. This will help to identify students' weaknesses in dental practice. The study's limitations are that more final students or dentistry faculty have integrated internships. There is a need for studies in which students are evaluated not only by self-assessment scales but also by supervisors or educators.

Conclusions

DU-PAS has been validated in Turkish through item extraction. The 35-item version of the scale, derived from the original 50 items, has been shown to be valid and reliable for use within the Turkish population. This study represents the first validation of the DU-PAS scale to Turkish and introduces it to the literature. It was observed that the self-confidence of final dental students before the integrated internship was lower compared to their confidence after completing the internship. Important finding of this study is that the integrated internship positively affects dental students' preparedness after integrated intership.

Conflict of Interest Statement

The authors declare no conflict of interest.

Acknowledgements

References

1. Altan H, Almas B. Clinical evaluation of different types of injection systems and comparison of pain acceptance in palatal anesthesia in pediatric patients: a randomized controlled split-mouth study. J Dent Anesth Pain Med 2025;25(3):191.
2. Albino JE, Young SK, Neumann LM, Kramer GA, Andrieu SC, Henson L, Horn B, Hendricson WD. Assessing dental students' competence: best practice recommendations in the performance assessment literature and investigation of

current practices in predoctoral dental education. J Dent Educ 2008;72:1405-1435.

3. Ali K, Slade A, Kay EJ, Zahra D, Chatterjee A, Tredwin C. Application of Rasch analysis in the development and psychometric evaluation of dental undergraduates preparedness assessment scale. Eur J Dent Educ 2017;21(4):e135-e141.

4. Coelho C, Pooler J, Lloyd H. Using patients as educators for communication skills: Exploring dental students' and patients' views. Eur J Dent Educ 2018;22:291–299.

5. COPDEND. Copdend standards for dental educators. Manchester: The UK Committee of Postgraduate Dental Deans and Directors; 2013.

6. Graffam B. Deriving better questions: creating better clinical instruction. Clin Teach 2008;5:98–102.

7. Harden RM, Crosby J. Amee guide no 20: the good teacher is more than a lecturer - the twelve roles of the teacher. Med Teach 2000;22:334-347.

8. Schönwetter DJ, Lavigne S, Mazurat R, Nazarko O. Students' perceptions of effective classroom and clinical teaching in dental and dental hygiene education. J Dent Educ 2006;70:624-635.

9. Bertoli E, Lawson KP, Bishop SS. Dental students' skills assessments: comparisons of daily clinical grades and clinical and laboratory assessments. J Dent Educ 2018;82:417-423.

10. Perry S, Burrow MF, Leung WK, Bridges SM. Simulation and curriculum design: a global survey in dental education. Aust Dent J 2017;62:453-463.

11. Bridges S, Yiu CK, Botelho MG. Design considerations for an integrated, problem-based curriculum. Med Sci Educ 2016;26:365–373.

12. Akın A. Öz-Güven Ölçeği'nin geliştirilmesi ve psikometrik özellikleri. Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi 2007;7(2):167-176.

13. Almahdi H, Alnaeem T, Alshawaf H, Alsubaya A, Hulayqah A, Khars M. Self-perceived preparedness of KFU dental graduates to practice dentistry: a cross-sectional study. Adv Med Educ Pract 2023;14:595-601.

14. Pandarathodiyil AK, Mani SA, Ghani WMN, Ramanathan A, Talib R, Zamzuri AT. Preparedness of recent dental graduates and final-year undergraduate dental students for practice amidst the COVID-19 pandemic. Eur J Dent Educ 2022.

15. Buldur B. Pathways between parental and individual determinants of dental caries and dental visit behaviours among children: validation of a new conceptual model. Community Dent Oral Epidemiol 2020;48(4):280-287.

16. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine 2000;25(24):3186-3191.

17. Hendricson WD, Kleffner JH. Curricular and instructional implications of competency-based dental education. J Dent Educ 1998;62:183-196.

18. American Dental Education Association. ADEA competencies for the new general dentist. J Dent Educ 2017;81:844-847.

19. Altan H, Gönder HY, Demirel E, Altan A, Tunçdemir AR, Zahra D, et al. Readiness for clinical practice: self-perceived confidence of final year dental students in Turkey—a multi-institutional study. MedEdPublish 2024;14:9.