

T.C.
YEDİTEPE UNIVERSITY
INSTITUTE OF HEALTH SCIENCES
DEPARTMENT OF ORTHODONTICS

**EVALUATION OF THE CONFIDENCE OF SENIOR
GRADUATE STUDENTS OF THE DEPARTMENT
OF ORTHODONTICS AND NEWLY GRADUATED
ORTHODONTISTS IN THEIR BASIC KNOWLEDGE**

MASTER'S THESIS

ABDULLAH ZIADEH, MSc

Istanbul-2022

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THESIS APPROVAL FORM

Institute : Yeditepe University Institute of Health Sciences

Programme : Orthodontics

Title of the Thesis : Evaluation Of The Confidence Of Senior Graduate Students Of The Department Of Orthodontics And Newly Graduated Orthodontists In Their Basic Knowledge

Owner of the Thesis: Abdullah Ziadeh

Examination Date : 29 June 2022

This study has been approved as a Master's Thesis in regard to content and quality by the Jury.

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DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

29.06.2022.

Abdullah Ziadeh



ACKNOWLEDGMENTS

First, I would like to thank Allah for always being with me and giving me strength throughout my personal and professional life. I would also like to thank my beloved family, my mother who's always been my biggest supporter and motivator, my father who spent all of his health and wealth for me to succeed, my brother who's always been by my side and last but not least, my amazing and beloved wife, who stood by me through the ups and downs and push me to succeed every single day.

I must always thank my supervisor, Prof. Dr. Feyza Eraydın, for her time and knowledge throughout my postgraduate years to become a successful orthodontist. I also must thank the Yeditepe University personel, Prof. Dr. Bayram Yılmaz, Prof. Dr. Derya Çakan and the academic and supporting staff.

I also want to thank Genc Tod for helping me distribute my questionnaire and the participants, whom without their time and effort in filling the questionnaire, this study will not be possible.

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LIST OF SYMBOLS AND ABBREVIATIONS

AAO	American Association of Orthodontists
AAOF	American Association of Orthodontists Foundation
ABO	American Board of Orthodontic
ANOVA	Analysis of Variance
CAL	Computer-Assisted Learning
CAT	Clear Aligner Therapy
CBCT	Cone-Beam Computed Tomography
CODA	Commission on Dental Accreditation
COMET	Core Outcome Measures in Effectiveness Trials
CONSORT	Consolidated Standards of Reporting Trials
Covid	Coronavirus Disease
CPE	Continued Professional Education
EBD	Evidence-Based dentistry
EBM	Evidence-Based medicine
EBO	Evidence-Based Orthodontics
ERASMUS	European Region Action Scheme for the Mobility of University Students
Genç TOD	Young Turkish Orthodontic Society (Genç Türk Ortodonti Derneği)
IBM	International Business Machines Corporation
NEBEOP	Network of Erasmus Based European Orthodontic Programmes
OSCE	Objective Structured Clinical Examination
P value	Probability Value
PBL	Problem Based Learning

PC	Personal Computer
PCC	Patient Centered Care
PhD	Doctor of Philosophy
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta- Analyses
RCT	Randomized Clinical Trial
SPSS	Statistical Package for the Social Sciences
T test	Hypothesis Test Statistic
TAD	Temporary Anchorage Device
TMJ	Temporomandibular Joint
TOD	Turkish Orthodontic Society (Türk Ortodonti Derneği)
TPC	Touch Panel Computer
UK	United Kingdom
US/ USA	United States of America
VIVA	Viva Voice

ABSTRACT

Ziadeh, Abdullah, 2022. The Evaluation of the Confidence of Senior Graduate Students of the Department of Orthodontics and Newly Graduated Orthodontists in their Basic Knowledge. Yeditepe University Institute of Health Sciences, Department of Orthodontics, Master's Thesis, İstanbul.

The aims of structured, closed-ended (static) questionnaire was to evaluate confidence levels in basic knowledge of postgraduate orthodontic senior graduates and newly graduated orthodontists. The questionnaire adopted in the study is based on the confidence levels of orthodontists and dental students, and it looked on demographics, educational experiences and confidence levels. The study took 254 participants as the study sample size out of 696 total population size. Statistical tests were performed to analyze to examine the relationships between the research variables. Data analysis methods, descriptive statistical methods were used to examine demographic characteristics and difference tests were used to compare scores obtained from data measurement tools with demographic variables. The internal consistency measured by Cronbach alpha was satisfactory in the sample (0.845). When comparison tests were done, no statistically significant relationship was found between the different demographics and the confidence levels of senior graduate orthodontic students and newly graduated orthodontists ($p>0.05$). As a conclusion, senior graduate orthodontic students and newly graduated orthodontists in Turkey are confident with the knowledge they obtained during their studies except in the topic of Clear Aligners, and what was significant is the relations between different variables and their educational experiences. Finally, Turkey has similar trends and issues facing postgraduate orthodontic education and it is worth examining and resolving.

Keywords: Postgraduate orthodontic education, confidence of postgraduate orthodontic students in their knowledge, perspective of postgraduate orthodontic students on their resources.

ÖZET

Ziadeh, Abdullah, 2022. Ortodonti Anabilim Dalı yüksek lisans son sınıf öğrencilerinin ve yeni mezun olan ortodontistlerin temel bilgi ve becerilerine olan güvenlerinin değerlendirilmesi Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Ortodonti Anabilim Dalı, Yüksek Lisans Tezi, İstanbul.

Yapılandırılmış, kapalı uçlu (statik) anketin amacı, ortodonti son sınıf öğrencilerinin ve yeni mezun ortodontistlerin temel bilgilerindeki güven düzeylerini değerlendirmektir. Çalışmada benimsenen anket, ortodontistlerin ve dişhekimliği öğrencilerinin güven seviyelerine dayanmaktadır. Anket değerlendirmesi katılımcıların demografik özelliklerine, eğitim deneyimlerine ve güven seviyelerine odaklanmıştır. Çalışmaya, toplam 696 nüfus büyüklüğünden çalışma örneklem büyüklüğü olarak 254 katılımcı dahil edilmiştir. Araştırma değişkenleri arasındaki ilişkileri incelemek için istatistiksel testler yapılmıştır. Demografik özellikleri incelemek için veri analiz yöntemleri, betimsel istatistiksel yöntemler ve veri ölçüm araçlarından elde edilen puanları demografik değişkenlerle karşılaştırmak için fark testleri kullanılmıştır. Cronbach alfa ile ölçülen iç tutarlılık örneklemde tatmin edici bulunmuştur (0.845). Karşılaştırma testleri yapıldığında, son sınıf ortodonti öğrencilerinin ve yeni mezun ortodontistlerin farklı demografik özellikleri ile güven düzeyleri arasında istatistiksel olarak anlamlı bir ilişki bulunmamıştır ($p>0.05$). Sonuç olarak, Türkiye'deki son sınıf ortodonti öğrencileri ve yeni mezun ortodontistler, 'şeffaf plaklar' konusu dışında öğrenimleri sırasında edindikleri bilgilere güven duymaktadırlar. Daha önce yapılmış çalışmalar da incelendiğinde Türkiye'deki lisansüstü ortodonti eğitiminin karşı karşıya olduğu sorunlar diğer ülkelerle benzerlik göstermektedir.

Anahtar Sözcükler: Lisansüstü ortodonti eğitimi, lisansüstü ortodonti öğrencilerinin bilgilerine olan güveni, lisansüstü ortodonti öğrencilerinin kaynaklara bakış açısı.

1. INTRODUCTION AND PURPOSE

“Education provides a key to the production of the quality, quantity, and diversity of the manpower required [to the advancement of knowledge and improvement of clinical orthodontics]”. With these words CFA Moorrees, et al. underlined the importance of education in general and in orthodontics specifically on 1969 1970. (1)

Probably there is no argument that a successful treatment will not only be based on anatomy, instruments and patient criteria, but will also be heavily reliant on a well-educated and well-skilled practitioner. (2) And a good orthodontic education should be able to provide good delivery of knowledge, skills and morals to the students while they are in their educational years to be proficient and successful in serving their community when they graduate and become certified orthodontists. (3)

All involved personnel (students, educators, faculty members and governments) want to be confident, by knowing, that the education they are involved in is at an accepted high standard and up to the expectations of their communities, that’s why organizations such as The Commission on Dental Accreditation, and similar institutions worldwide, seek to ensure this goal by making sure that programs graduate students who meet their proficiency standards which is set mainly by the amount of skill level obtained at a certain time frame. (4)

The quality of orthodontic care which is indeed based on the quality of orthodontic education was studied by many, such as and not limited to, Behrents and Keim 1991(5), Keith and Proffit 1994 (6), Van de Linden 1996 (7), and they pointed out the factors influencing orthodontic education, such as: (8)

1. A well-educated and well-trained work force at both under- and post-graduate levels, and that they are all improving their skills through CPE and their practice.
2. Good funding for the institutions and educators.
3. Availability of good equipment and a good working environment.
4. Good and sufficient number of diverse cases.

5. Access to up-to-date publications, books and information technology.
6. Legal regulations that won't hamper or affect the education of students by being too much or too little.

To maintain the quality of education, residents and programs should be continuously monitored and updated when needed, while there was no significant correlation between confidence and performance beyond the first year of training, it was noticed that during that time is when most gain in knowledge was obtained. While after the first year there was unjustifiable over- or under-confidence. One interesting finding was that peak skills performance was not always obtained during the third year of training, with more gains shown in diagnosis and evaluation skills than technical skills especially during the first two years of training. Another was that faculty members were not good judges of the expected performance levels nor the proficiency at any year, though there was a relationship with the faculty judgments and confidence levels of students. (4)

There are no benefits of a student understanding a skill without being able to apply it, and that should be recognized with the different wisdoms at each faculty, for example cephalometric tracing is based on landmarks that are well accepted throughout the world, but their readings and how to diagnose and treat that case might differ from one faculty to another.(4)

Another observation is how different skills' proficiency levels go up and down during each phase of any given curricula requires researching different programs and how they structure their curriculums to make sure that gained skills are only improving, and no gained skill is being lost due to decreased time in practicing it.(4)

With many different programs worldwide with different missions and goals, yet there is more and more work to be done to standardize orthodontic education, since programs aim to be recognized by different accreditation bodies in the different countries and continents depending on the community requirements, but all aim to produce orthodontists that will be capable of providing the best care possible to that

community, which is leading to an increased exposure of students to a variety of conditions and procedures. (1)

One positive attempt to standardize orthodontic education that is worth mentioning, the effort made by The ERASMUS Bureau of the European Cultural Foundation of the Commission of the European Communities, it has done so by funding and publishing its 'Three years Postgraduate Programme in Orthodontics: The Final Report of the Erasmus Project', which since then has been reviewed and updated. (9)

They divided orthodontic curricula into eight sections: (9)

1. General biological and medical subjects.
2. Basic orthodontic subjects.
3. General orthodontic subjects.
4. Orthodontic techniques.
5. Interdisciplinary subjects.
6. Management of health and safety.
7. Practice management, administration, and ethics.
8. Extramural educational activities.

They also outlined the goals programs should aspire that their graduates meet, which are: (9)

1. Diagnose of different anomalies.
2. Detect deviations in development.
3. Formulate a treatment plan and predict its course.
4. Evaluate psychological aspects relevant to orthodontics.
5. Conduct interceptive orthodontic procedures.
6. Execute treatment for all types of malocclusions.
7. Collaborate in the interdisciplinary treatment of medically and dentally compromised patients.
8. Assess the need for orthodontic treatment on different levels.
9. Practice orthodontics according to professional and ethical standards.

10. Comprehensively review, understand, and evaluate the literature.
11. Formulate a research hypothesis, design a methodological study, conduct the research, and present the findings.
12. Use available opportunities for improving professional skills and lifelong learning.

Moving now to learning styles which have been researched previously, by and not limited to, Kolb (10), Schon (11), Honey and Mufrod (12) and Hendricson et al (13) who noted that learning style preferences of dental students changed during the years of their education, moving towards preferring more factual and concrete information during postgraduate level, rather than abstract type of information which they prefer usually during undergraduate level, along with the preference of the majority to learning by visualization and sequential styles especially in dental and subsequently orthodontic schools.(14)

There are many different learning styles and it is mostly influenced by the faculty members since orthodontic education is based mainly on an apprenticeship approach between the students and their teachers, yet the problem here is that it does not account for the different and unique individual traits of each student, so it is empirical to involve students and obtain their opinions along with their faculty members in order to develop a better understanding of their situations and, by so, developing a better curricula, teaching methods and an overall learning experience that would produce better trained orthodontists each with their unique strengths. (3)

One method of education for example is Problem Based Learning (PBL), which has yet to be accepted in postgraduate education as it has been in the undergraduate level. It showed to cause more tension among students especially when taken into account how the perception of students differs from the time they enter their program with high expectations and when they realize the struggles and challenges they need to overcome during their educational years. And due to the

inconsistencies in providing PBL there is yet to be a definitive judgment on its benefits and best ways to implement it. (15)

We were only able to find one comprehensive review that researched the different learning styles implemented by orthodontic residents done by Rao et al, this review included only eight studies, which highlights the need for further studies on how orthodontic residents study, and on which premise(s) do they choose a particular learning style over another. (3)

Moving to how students are being assessed, one way is by marks given at an end of an exam, which is argued to be insufficient in assessing students, even though it might be the most widely used, since it assesses the end result of how well a student is read but does not assess how he/she obtained this knowledge nor his/her overall competence while dealing with patients, and it is worth mentioning that until today there is no “Gold Standard” yet to assess students overall, especially in history taking and clinical examination. (16)

The weaknesses of traditional assessment methods, such as written exams, were summarized by Norcini, most notably the low number of variety cases assessment and the limited number of examiners. Archer argued that the best assessment must be a 2-way process, where trainers provide comments and allow trainees to self-reflect and self-monitor which allows them along with their supervisors to put up an action plan suitable for them as a faculty and more importantly as individuals in order for them to develop and grow.(16)

There are several issues facing orthodontic education, one which is most common and important, being the shortage of well-experience full-time faculty members, which makes it important that programs become more effective and efficient in the way they provide their teachings to their students, and one of the theories is that the most effective and efficient curricula are the ones matching the preferences of the students, regardless of the method of teaching, for example whether distance learning or in class, as long as it is based on a well set-up strategy

and its implementation, taking into consideration the differences between one student to another. (14)

Education is a continuously renewed enterprise that includes interactions between educators, students, institutions, industry and more, all aiming to improve the health of patients and their life quality. (1) And learning for adults is a complex and dynamic process which requires more research to figure out the best methods and their blends. (14)

Dental education in general has been found to be very stressful and impacts the psychological health of students (17). It was noted as early as 1978 by Waxler (18), when compared to their medical students counterparts, dental students showed higher levels of psychological signs and symptoms such as anxiety, depression, stress and panic, while even though it varied between various demographics and affected by other factors, yet it was always noted and was significant by reaching “pathological” levels sometimes as reported by Newbury-Birch et al. (19)

Dental and orthodontic education have both been developed around the world with varying strengths from one country to another, along with developments in technology, mechanical engineering, materials and many other aspects, yet one of the main issues facing different orthodontic societies worldwide is inappropriate orthodontic treatment and the incorrect use of clear aligners by general practitioners, which underlined the need that the public should appreciate treatment done by a well-trained specialist. (20)

Another commonality is that worldwide curriculum changes were similar in the last two decades by including more orthodontic related disciplines and topics such as clinical photography, interdisciplinary case treatment, functional treatment, surgical cases, TMJ dysfunctions and practice management, all of which are contributing to the universal curriculum and a world board of orthodontics realities. (21)

Another downfall is the lack of research studying the demographics, graduation requirements of students and the curriculums comprehensively that would

allow for better understanding of the different programs and what & where they need to improve. whether updating the curricula, the program itself or policies to be implemented by the faculty and/or governmental bodies. (22)

The problems postgraduate orthodontic students face when applying and the requirements needed to complete their training are yet to be fully documented and understood, even though the number and types of programs are high and vary around the world. (6)

Orthodontics is the oldest specialty in dentistry with the most graduates per year, yet there is little research on the opinions of orthodontic postgraduate students on their education and goals relative to the research done regarding the opinions of the directors. (23)

2. LITERATURE REVIEW

2.1 History

Orthodontics is the oldest dental specialty with the most graduates per year (23), it has been around since the 18th century, and has evolved as a science since then with its own ups and downs, through its past and current pioneers (24), starting from a “trial and error” in its early days to later become an Evidence-Based science. (25)

Orthodontic education has been around over a century now in the USA, with the well-known pioneer Edward H. Angle opening his own school of Orthodontics in St. Louis in 1900, and he set the standards and emphasized early on the importance of one being highly knowledgeable in growth & development, biomechanics and mechanical skills. (24)

In the 1920s the focus on Orthodontic education shifted towards finding the proper methods while it was still evolving along with dentistry as a whole, and in an address to the New York Society of Orthodontists in 1924 Martin Dewey concluded (25) “There was so much disagreements in dental schools, universities and teachers that it is practically impossible at the present time to agree upon any one definite plan”. (24)

In the 1930s the shift in Orthodontic education became to figure out which type(s) of orthodontic education are effective, especially when Summa and T.W. Sorrels (26) noted the variety types of malocclusion and the complexity that is happening in dentistry respectively, and later in 1936 Spencer R. Atkinson and David W. McLean (27) added their views on additional considerations such as the hormonal and metabolic systems and their disturbances, mastication and the role & relationship of the periodontal ligaments with the malocclusion, and pointed to what they called “simplifying and cheapening”. (24)

The topic of “HOW” to teach orthodontics continued till the next decade, in which Ross (28) stated in 1948 “Orthodontics is a needed health service and the public must be served. Unless the standards of orthodontic practice are raised, the public will suffer” (24) he was a visionary who understood that orthodontists are dealing with the human health and not just moving teeth, he emphasized the importance of several topics and their

relation to orthodontics, such as anatomy, embryology and psychology, he also understood the need for evidence-based learning.

In the 1950s the importance of orthodontics in the undergraduate level, and what dental students should be taught in the field of orthodontics was evaluated and the AAO recommended that dental students should be taught to: (24)

1. Anticipate and detect malocclusions.
2. Prevent and intercept malocclusions when possible.
3. Treat simple cases.
4. Be able to use this knowledge in adjunct to other procedures in dentistry.
5. Know when to refer cases.

In the following decade (1960s) the number of months required to obtain a degree in orthodontics and the size of classes was discussed and an attempt to standardize it was undertaken.

In the 1970s discussions about manpower, the need of a standard curriculum and the adaptation of philosophies were the focus along with the shift towards a patient-centered care (PCC). (29)

Moving to the 1980s we can start to see how economics had its say on orthodontic education, by how schools are able to teach well trained orthodontists and how the income of orthodontic departments became a factor and, in sometimes, maybe a priority. But we also had the ERASMUS Bureau of the European Cultural Foundation of the Commission of the European Communities funding the development of a 3-year curriculum for orthodontic postgraduate education in 1989. The curriculum was created by directors of orthodontic education programs, representing 15 European countries, and it was titled “Three years Postgraduate Programme in Orthodontics: The Final Report of the ERASMUS Project” it was published in 1992, and was updated in 2012 by the Network of Erasmus Based European Orthodontic Programmes (NEBEOP). (9)

Also in the 1980s Computer-Assisted Learning (CAL) started to aid learning, first in diagnosis and treatment planning, and since then its benefits are still under debate since

studies has yet to represent a clear-cut evidence, whether it is beneficial or not, at least by how beneficial CAL is. Rosenberg et al, reported conflicting results after reviewing four studies, while Clark et al, reported no significant difference of CAL, whereas some reported significant advantages of CAL over traditional methods, others in contrast Hobson et al, found that conventional methods to be more superior over CAL. (30)

In the final decade of the past century, it was clear how the mean size of classes was steady, and that more researches were being published (31), it will also be interesting to see if the predictions of H. Barry Waldman came true, where in 1996 he predicted that in the year 2020 the orthodontist to patient ratio will decrease if no additional percentage of patients were accepted. It is worth mentioning the survey done in 1993 “A Survey of the Opinions of Orthodontic Specialist Trainees in the U.K. “which found out that most orthodontic postgraduate students wished to peruse a salaried hospital orthodontic service, 40% of them were not fully funded and that most were not satisfied with their programs. (32) It is also worth mentioning that during this decade, in 1992 to be exact, the first and only study till that time looked at Orthodontic education from the perspective of residents and was published in 1994, while prior to those studies were made to survey the opinions of programs directors. It was then re-done to evaluate changes in 11 years, and the purposes were stated to be: (33)

1. Identify the demographics of residents.
2. Obtains the perspective of residents on their training and goals.
3. Compare the results with the study in 1992.

In the beginning of our current century, the theme of faculty members was again in focus as could be seen in the 2002 editorial by Turpin, and the adaptation in face of change was pointed out by many including and the late great Proffit (34) noted to the advantages provided by the internet and had his recommendations on how to optimize its potentials. Several surveys and researches were done during later years to try and understand where orthodontic education stood and what challenges it, and orthodontics as a profession, is or will face.

In 2009 the Network of Erasmus Based European Orthodontic Programmes (NEBEOP) was founded, with its primary concern being education, it was made of directors or orthodontists assigned by institutes representing 15 EU nations. In its general meeting in 2010 at Portoroz, Slovenia, a taskforce was established under the leadership of Professor JH (Sweden) to come up with new proposals for Orthodontic Education, especially after the big changes seen in diagnostic tools, materials, clinical advancements and the increase in interdisciplinary demands. The mission of the taskforce was to update “Objectives of compulsory elements of theoretical education of orthodontists”, its revision was presented in the general assembly of 2011 in Istanbul, Turkey, and was approved in the general assembly of the following year in Santiago de Compostela, Spain, and it should be mentioned that these were considered as guidelines and recommendations only, not rules since NEBEOP has no legal authority over any society or institution. (9)

It is obvious that Orthodontic Education has changed in the last two decades, some of which were presented by Keim and Sinclair and Lindauer et al, where they noted an increase in clinical time, a decrease in research devoted time, decline of full-time experienced faculty members and a decline in student publications. These changes especially the number of faculty members pushed faculties more towards finding the most effective and efficient methods of teaching. (14,35)

We can see that in the history of orthodontics and its education, how the principles of this science came to evolve from an experimental science to one with evidence, basics and guidelines, how economics and technology could be both beneficial or otherwise harmful, and what challenges orthodontics faced then and now with some crossing the decades.

2.2. Universities

Orthodontics along with dentistry just like any other science has evolved with the emphasis on Evidence-Based practice and Technology, which has led some to search for “Homogenized” treatment modalities, and it can be seen by how some treatment providers will use words such as “align, banded, bonded and so on” as their treatment strategy, but with each patient being different in their own way, which research in growth and development have showed for example, makes it almost impossible to come up with such a

cut-cross methodology, and some have already shown their disagreement with such concept, and so, are arguing for an “Individualized” treatment plan for each patient.(33)

There is a big number of programs worldwide, with various similarities and differences as well, but with governing and certification bodies such as CODA, ABO, The ‘Network of Erasmus Based European Orthodontic Programmes’ (NEBEOP) has created a leadership that helped insure quality and consistency in orthodontic education, by outlining what programs and new orthodontists should aim and aspire towards, and encouraged orthodontists to further expand their knowledge and maintain their excellence. And the observation that the clinical education is the most important factor for residents for choosing their program makes this point of greater importance and this could explain why the vast majority of residents are satisfied or very satisfied with their programs now compared to previous years and decades. (9,23,31)

As mentioned earlier, there are some similarities and trends that are noticed worldwide regarding orthodontic education, such as the increase ratio of females to males which might have a downstream effect on the provision on treatment. (36)

Other similarities noticed with regard to the exposure to different cases during orthodontic postgraduate education is the increased number of patients being treated including growing/mixed dentition patients, which many consider as a key to any good curricula, more and more students are learning and using the pre-adjusted Edgewise bracket system overwhelmingly, and the age of students is older than previous decades. (36) Also there is an increase in surgical cases, TMJ dysfunction management, mini screws and implants placement, low level laser therapy, bleaching and other orthodontic related and interdisciplinary related treatments. (1,21)

Other similarity is the trend toward distance learning, which is widely acceptable between students, especially after the evolution in technology which resolved the issues related to such type of learning. It is also noted that this type of learning while being generally acceptable it is mainly influenced by the educators and their styles of teaching. (10)

These similarities could help explain why the gains and loss of knowledge and skills are similar between different programs, where the most gains are in the first and second year, and could also explain why at the third year not all skills reached proficiency levels. And that could be explained by how residents practice different skills at different times in their programs, for example the first one to two years there is a lot of cephalometric tracing, diagnosis and treatment planning work in compression to the third, and, in some instances, fourth year as well, where the emphasis is on technical skills of the treatment and research writing and publication. (4)

Two issues of concern can be noticed, the first being the increase in tuition fees and the debt of learning, it is shocking to know for example in the US the student debt is \$1.5 trillion –more than the total credit card debts- and of that debt 30% to 40% is for dentistry, where dental student debt has doubled since 2001, and on average, a student is graduating with a debt of \$247000! And this issue has contributed to the second problem facing orthodontic education, which is the decrease in the number of faculty staff and the number of students aiming to pursue a career in academics, it is actually reported to be half or even less of residents that are considering a career in academics. Since private practice provides a better income than working in academics, it is no shock to find out that 90.3% of students favor a career in private practice and a less than third would consider a career in academics. (23,36–38) But this decrease in the number of academics is more complex and has other factors such as the dissatisfaction in the working environment, failed leaderships in the academic settings, lack of time for further career development and the unrealistic paths for promotions among other problems, and it goes without saying that this issue does threaten the quality of orthodontic education which in return will affect the quality of future generations of orthodontists. (1,39)

Another issue that is facing different faculties is the way they assess their students, some are only focused on written exams, while others, and maybe growing, have OSCE, Viva, which is highlighted during thesis defenses prior to graduating, Clinical Evaluations to assess their students along with the written exams, which do have their pros and cons, but most faculties fail to assess their students by understanding their perspectives and what specific issues they might face individually. (4,16,23,40)

2.3 Research

As mentioned before, orthodontics evolved from its early days from a “trial and error” experiments to a science that is becoming more and more based on evidence, and it is worth looking at the state of scientific research in orthodontics, how it evolved and its current status, knowing that many departments require their students to publish a research in a priority field or an ongoing area of research. We should also take into account the interesting finding that even though research opportunities are the least important criteria for residents to choose a school, yet most residents plan to publish their studies in a refereed journal. (23,41) And the only reason for this seemingly contradictory finding is perhaps that residents are more interested in the benefits of publishing in a respected journal than the content and importance of the research itself.

Evidence based medicine (EBM) started sometime in the late 20th century, with it evidence based orthodontics (EBO) as a part of evidence based dentistry (EBD) as a whole evolved, especially in the last 30 years, which makes EBO in particular a still new and evolving field, and while the first Randomized Clinical Trial (RCT) in orthodontics was in 1967 done by Jackson on Class II malocclusions was reported, yet most will associate EBO to the National Institute of Dental and Craniofacial Research in the 80s of the previous century. (41)

Due to the complexity of orthodontics, being multifactorial etiological factors with various treatment options, EBO which mostly deals with outcome assessment, has faced its share of challenges such as the inability of conducting an RCT for all questions faced in orthodontics, and due to that, several different “Hierarchy of Evidence” have been proposed one of which is by Proffit. (41,32)

Three criteria have been established that any nonrandom study needs to fulfill in order to be scientifically accepted to help combat the uncertainty that come with these types of researches, especially when we are faced with a high number of them, and those criteria are:

1. Well-defined patient groups undergoing specific treatment modality to compare between, rather than a wide range of types of patients and different treatments.

2. Reporting all outcomes and findings, not only successful ones.
3. Implementing correct research and publication methods.

Now one may ask, how good is the research in orthodontics? A survey by Madhavji et al found that 59% of orthodontists found the literature to be “conflicting and ambiguous”, also the Cochrane Oral Health Group found out that 17 out of 22 reviews were of low quality and with insufficient evidence, and finally it was estimated that 85% of the overall health research was considered waste due to the lack of assessment and reporting of outcomes. (1,32,42)

There are attempts to resolve these issues, such as the Core Outcome Measures in Effectiveness Trials (COMET) project, the CONSORT and PRISMA guidelines and the “Realist Reviews” proposal by Pawson, all of these are working on reducing the waste in research, standardize criteria and the guidelines and increase information obtained from the vast number of reviews. (1,32,42)

All that being said, it is no wonder that the old assumption that clinicians would be able to interpret the literature after learning the 5 As of evidence based practice (ask, acquire, appraise, apply and audit) was mistaken, since most orthodontist will consult another experienced colleagues due to their poor understanding of evidence-based practice is poor in a number of areas, for example a significant percentage of postgraduate orthodontics students in Europe were unable to identify the appropriate use of the chi-square test. Yet 84.1% believe that evidence-based practice or evidence-based personalized treatment to achieve Class 1 improves patient care and 74% see EBD as essential for their growth. It is also worth mentioning that 82% of orthodontists on The American Association of Orthodontists find that peer-reviewed journals as the best source of evidence. (1,32,42)

It is worth mentioning some statistics found in previous studies, Lars Bondemark (42) found out that:

1. The RCTs accounted for 0.1% of all orthodontic publications in the 1970s and 1980s, and, following this, the proportion of RCTs was increased and amounted to 2.7% over the past decade (2008-2017).

2. The majority of RCTs were of single center design (93.4%) and in 88.3% a parallel-arm design was performed.
3. The United States and United Kingdom endorsed 16.9% and 15.5% of the RCTs, followed by Turkey (11.1%), Brazil (7.0%), Sweden (6.6%), China (5.6%), Italy (5.4%), and Germany (4.1%). Of all RCTs, 74.2% were published in 20 orthodontic journals and 25.8% in 81 non-orthodontic journals.
4. The American Journal of Orthodontics and Dentofacial Orthopedics, Angle Orthodontist, European Journal of Orthodontics and Journal of Orthodontics contributed to 60.2% of all the RCTs.
5. The considerable increase in orthodontic RCTs over the past 50 years implies an increased scientific impact of orthodontic literature.

Ross J. Anninga et al (36) found out that, in another study that reported on research topics, cephalometric studies were 43%, the percentage of research on materials was about 20% and animal-based studies have increased somewhat, and epidemiologic studies, which represented 3% of research in 1993, have shown a considerable increase to 15%.

2.4. Technology

The evolution of technology during this century and the previous one, has and still does have its toll on orthodontics as it does on dentistry in general like medicine and all other aspects of life.

Technology in orthodontics has covered many aspects, from improved diagnosis by introducing cephalometric and panoramic imaging to CBCT. (43) It also provided a platform of “Big Data” and influenced the concept of “Data Mining” not only for practitioners but to institutions and companies as well. (41)

One of the great examples on the benefits of technology, is the American Association of Orthodontists Foundation (AAOF) Craniofacial Growth Legacy Collection which is an AAOF-supported multi-institutional project that utilizes the cloud to collect and share craniofacial images and data for orthodontic research and education. The project gives an online access to longitudinal data on craniofacial development in untreated children with malocclusions of various types for participants worldwide. It also has a

unique source of control samples for validity testing of pre-set beliefs on orthodontic treatment or the failure to treat.(44)

Technology not only assisted in diagnosis but also in treatment due to developments in mechanical engineering, materials and informatics, which is noticeable in TADs and CAT. (20,43)

Technology has also entered to education, as mentioned previously, CAL started in the 1980s, and when pre- and post-intervention tests were made, a higher knowledge gain was noted. Yet its benefits are still in question, even though the trend towards it is on the rise. (30)

Richard Masella and Malcom Meister have proposed the enhancement of technology use for better education, Proffit also proposed establishing a multi-center internet-based curriculum that is built on previous experiments to prove the benefits and feasibility of distance learning, and later in an article by Engilman et al outlined the requirements for such learning. (24)

The increased focus towards distance learning (which undergone a serious test since 2020 due to the Covid-19 pandemic) can be contributed to three reasons:

1. Incorporating locally unavailable elements in instructions giving.
2. Greater cost-effectiveness by more widely available recourses.
3. Better use of faculty.

And with better high-speed internet, connections among universities and institutions and the dual streaming technology, distance learning was able to overcome its major technical obstacles. (10)

Theodore Eliades and Athanasios E. Athanasiou mentioned in their book “Orthodontic postgraduate education: A global perspective” on chapter 16, the benefits and the increasing popularity of e-learning, and the benefits accompanied by it when implemented and used correctly and efficiently. (31) Yet learning achievements and student satisfaction still show little if any difference between distance learning and traditional methods, and it was influenced by the personalities of the instructors and their

teaching styles, and at the same time a relationship was noticed between acceptance of distance learning and an improvement in test scores, which maybe contributed to that orthodontic residents are considered to be highly visual learners. Now there is a shift between comparing the two methods of learning to comparing the different methods of using distance learning itself, especially that most residents state that their access to state-of-the-art technology is good and that they are regular users of it even though only half reported taking web-based courses, which will be interesting to find out the current status of that after the pandemic. (9,10,14)

In a study done by Thomas Stamm et al that shows the benefits of using a tablet PC for theory learning, they stated that “. Students’ expectations concerning the TPC benefit in the orthodontic curriculum improved significantly by using these devices. We showed that the NDE scores of theoretical knowledge increased significantly after TPC deployment whereas the scores of motor skills remained unchanged. The results suggest that using a TPC has a positive learning effect on theoretical knowledge in orthodontics”

2.5. Trends and Issues

It is worth summarizing the current trends and issues facing orthodontics and its education

Trends:

1. The number of orthodontic postgraduation programs has increased with several similarities and differences between them worldwide, from the curricula, teaching methods and ways of assessment. (4,16,23,36,40)
2. Increase number of students in orthodontic programs, with the main factor when choosing a program for them was the clinical education, which could explain why most residents nowadays are either satisfied or very satisfied with their programs, and the least important was research opportunities even though most plan to publish their research in a renowned magazine. (23)
3. The age of students enrolled in orthodontic post graduate programs have increased. (36)
4. More females are enrolled than males. (36)

5. Technology has had its affects both positive and negative on diagnosis, treatment planning, treatment modalities and education and it's still evolving.
6. More residents are spending time in private practices as a method of learning. (22)

Issues:

1. A decrease in the number of qualified faculty members with a lower number of students aiming for an academic career in comparison with the ones aiming for a career in the private sector. (21,36–37)
2. Increase in the fees and student debts associated with higher education in general. (36–38)
3. The large number of research that many of which are conflicting and/or with low evidence. (41,42)
4. Decreased emphasis on quality and types of research being published in comparison to the idea of just publishing an article, which could be the reason why more students are incapable of fully understanding studies on their own. (32,35)
5. The surge of companies and their effect on the researches being done and published.
6. Skills are being gained and lost in different intervals in each program due to the shift in focus from one skill to another during the years of study. (4)
7. High numbers and levels of students facing psychological challenges, ranging from mild to pathologic levels. (17)
8. Many of the general public don't realize the importance of orthodontic treatment done by a trained orthodontist which is making students question the benefits of obtaining a higher degree. (20)

After reviewing the literature available, and to the best of our knowledge, there are no articles that did the following:

1. Studied the confidence of postgraduate orthodontic students in their basic knowledge and skills per topic.
2. Correlate between different demographics/external factors and confidence levels.
3. Study preferred learning style according to each specific topic.

3. MATERIALS AND METHODS

The study design was structured, closed-ended (static), prospective survey study. A questionnaire was created online on www.surveymonkey.com and a link was distributed online to postgraduate orthodontic students and orthodontists by directly and through both Turkish Orthodontic Society (Türk Ortodonti Derneği [TOD]) and Young Turkish Orthodontic Society (Genç TOD). Some participants were called or visited and their answers were filled for them. The study received the ethics approval from Yeditepe University Ethics Committee “T.C. YEDİTEPE ÜNİVERSİTESİ GİRİŞİMSEL OLMAYAN KLİNİK ARAŞTIRMALAR ETİK KURULU”. Ethical Committee approval provided in Appendix 8.1. In this study the Evaluation of the Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge was studied. TOD questionnaire distribution approval Appendix 8.2.

3.1 Population

The population this study decided to examine was, postgraduate orthodontic students in their senior year and orthodontists who graduated within a year who are/were in enrolled in a university in Turkey that is registered at both YÖK and Genç TOD.

After interviewing officials from Turkish Orthodontic Society (Türk Ortodonti Derneği [TOD]) and Young Turkish Orthodontic Society (Genç TOD) it was determined that the number of postgraduate orthodontic students in their senior graduate year and orthodontists who graduated within this year is 696.

3.1.1 Study group

Table 1 shows the minimum sample sizes required for various population sizes and confidence intervals. When we consider the population size of our research that is 696, according to Table 1 (for that $P=Q=0.5$, $d=0.05$), the minimum number of participants that should be reached for the sample size was found to be 254 participants to be in the 95% confidence interval. (45)

Table. 1 Minimum sample sizes required for various population sizes and confidence intervals

Population size	± 0.03 sampling error			± 0.05 sampling error			± 0.10 sampling error		
	(d)			(d)			(d)		
	p=0.5	p=0.8	p=0.3	p=0.5	p=0.8	p=0.3	p=0.5	p=0.8	p=0.3
	q=0.5	q=0.2	q=0.7	q=0.5	q=0.2	q=0.7	q=0.5	q=0.2	q=0.7
100	92	87	90	80	71	77	49	38	45
500	341	289	321	217	165	196	81	55	70
750	441	358	409	254	185	226	85	57	73
1000	516	406	473	278	198	244	88	58	75
2500	748	537	660	333	224	286	93	60	78
5000	880	601	760	357	234	303	94	61	79
10000	964	639	823	370	240	313	95	61	80
25000	1023	665	865	378	244	319	96	61	80
50000	1045	674	881	381	245	321	96	61	81
100000	1056	678	888	383	245	322	96	61	81
1.000.000	1066	682	896	384	246	323	96	61	81
100	1067	683	896	384	245	323	96	61	81

While P reflects the ratio of having a certain property, Q reflects the ratio of having a non-certain property. If there is no P estimate for the population, $P = Q = 0.5$ can be taken, and then the variance ($P * Q$) takes the highest value (.25), thus, we can reach over the largest sample size (Büyüköztürk et al, 2014, s.96). (46)

3.2 Method

The questionnaire was developed from several previous publications, mainly Chadwick et al, August 2016, (47), Keith et al, June 1997(6), Henzi et al, (45), Renison T. (47) and Bruner M. (48). Questionnaire provided in Appendix C.

The questionnaire was divided into 3 main sections, Demographics and personal information, education experiences and Confidence in knowledge respectively, and had 42 questions in total.

Other than the previously mentioned publications that the questionnaire was based on, the first part of the questionnaire after the consent of the participant regarding their demographics, questions from 1 to 3 were based on Anning RJ, Thomson (36).

The second part of the questionnaire about educational experiences, questions from 4 to 14 were based on Mulimani PS. (41).

The final part of the questionnaire on the confidence in knowledge and perspective on resources, questions from 15 onward were based on Will LA. (24), Ghafari JG. (34) and Huggare J, Derringer KA, Eliades T, Filleul MP, Kiliaridis S, Kuijpers-Jagtman A, et al. (9).

To validate the understanding of our questionnaire, we translated the questions from English to Turkish and vice versa through two certified translators, then we tested the questionnaire by interviewing 5 native Turkish-speaking orthodontists and 5 native English-speaking orthodontists, the questions were edited until similar understandings of the questions was reached.

3.3 Statistical Analysis

IBM SPSS 25.0 program was used for all statistical analysis to examine the relationships between the research variables.

Data analysis methods and descriptive statistical methods were used to examine demographic characteristics, while compression tests were used to compare scores obtained from data measurement tools with demographic variables.

First of all, skewness and kurtosis coefficients, and parametric test methods were used for the evaluation of the confidence of senior graduate students of the department of orthodontics and newly graduated orthodontists in their basic knowledge (Table 3. 2). Afterwards, internal consistency analysis was performed and it was discussed whether there was any inconvenience in using the scales in the study.

After examining the socio-demographic profile of the participants, the descriptive analysis results for the overall scale were examined. While examining the differentiation status of the group scores of the variables according to the personal information of the participants, the "independent sample t test" was used in the comparisons of the variables

that provided the normal distribution assumption, and "ANOVA" was used in the comparisons of three or more groups.

Table. 2 Skewness and Kurtosis Values for the Questionnaire of The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge

Scale	N	Skew	Kurtosis
Survey of Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge	254	-1,028	60

Seçer (49) evaluated that the evaluation by looking at the 'skewness and kurtosis' values is a more accurate approach. Tabachnick and Fidell (50) accepted that normal distribution is achieved when skewness and kurtosis values are between +1.50 and -1.50. As a result of the analysis carried out, it was determined that the variables showed normal distribution.

4. RESULTS

4.1 Demographics

In this part of the study, demographic of participants, age, gender, marital status, were examined and presented.

Table 3. Distribution of Age

Age Status		f	%
Age	30 years and younger	174	68,5
	31 years and older	80	31,5
	Total	254	100,0

When the distribution of age was studied, it is was determined that 68.5% of participants are 30 years and younger and 31.5% are 31 years and older. (Table 3).

Table 4. Distribution of Gender

Gender Status		f	%
Gender	Male	100	39,4
	Female	154	60,6
	Total	254	100,0

When the distribution of gender was studied, it was determined that 60.6% of participants are female and 39.4% are male. (Table 4)

Table 5. Distribution of Marital Status

Marital Status		f	%
Marital Status	Married	79	31,1
	Single	175	68,9
	Total	254	100,0

When the distribution of marital status was studied, it was determined that 68.9% of participants are single and 31.1% are married. (Table 5)

4.2 Evaluation of education experiences

In this part of the research, the main factor for participants when choosing a university for orthodontic education, the career preferred after completing orthodontic education, the reason for choosing orthodontics, program enrolled in, class status, type of university enrolled in, total case-load and distribution of research subjects were examined. Descriptive analysis was made for the evaluation of their experiences and presented in tables.

Table 6. Distribution of Main Factors When Choosing a University for Orthodontic Education

The Main Factor When Choosing a University for Orthodontic Education		f	%
The Main Factor When Choosing a University for Orthodontic Education	Reputation	46	18,1
	Location	62	24,4
	Cost	12	4,7
	Clinical Education	73	28,7
	Where I Graduated Dentistry	24	9,4
	Research Opportunity	3	1,2
	Other	34	13,4
	Total	254	100,0

When the distribution of the main factor for choosing a university for orthodontic education was studied, it was determined that 28.7% of participants have clinical education as their main factor, 24.4% location, 18.1% reputation and 13.4% other reasons as the main factor for when choosing a university for orthodontic education. (Table 6). And when each main factor is expected to be selected equally, there is a statistically significant difference $p < 0.05$. (Chi-square suitability test). Responses above expectations are clinical education, location, and reputation, respectively.

Table 7. Distribution of Preferred Career Path After Completion of Orthodontic Education

Preferred Career Path After Completion of Orthodontic Education		f	%
Preferred Career Path After Completion of Orthodontic Education	Clinical Work	165	65,0
	Academic	38	15,0
	Firms	51	20,1
	Total	254	100,0

When the distribution of the preferred career path after completion of orthodontic education was studied, it was determined that 65.0% of participants preferred clinical work, 20.1% preferred firms and 15.0% preferred academic career path after completion of orthodontic education. (Table 7). And when each preference is expected to be chosen equally, there is a statistically significant difference $p < 0.05$. (Chi-square suitability test). The response over expectation is clinical work.

Table 8. Distribution of Reasons for Choosing Orthodontics

Reason for Choosing Orthodontics		f	%
Reason for Choosing Orthodontics	Job Satisfaction	59	23,2
	Lifestyle	49	19,3
	Good Career Structure	48	18,9
	No On-Calls	14	5,5
	Financial Satisfaction	23	9,1
	Dissatisfaction with Dentistry	35	13,8
	Does not include interventional therapies that involve surgery	24	9,4
	Has less focus on medicine and pharmacology than other branches	2	,8
Total		254	100,0

When the distribution of the reason for choosing orthodontics was studied, it was determined that 23.2% of participants chose orthodontics because of job satisfaction, 19.3% due to lifestyle, 18.9% for a good career structure and 13.8% for dissatisfaction with dentistry. (Table 8). And when each main factor is expected to be selected equally, there is a statistically significant difference $p < 0.05$. (Chi-square suitability test) The above than expected answers are job satisfaction, lifestyle, and a good career structure, respectively.

Table 9. Distribution of Programs Enrolled in

Program Enrolled in		f	%
Program Enrolled	PhD	147	57,9
	Masters	23	9,1
	Residency	84	33,1
	Total	254	100,0

When the distribution of the programs enrolled in was studied, it was determined that 57.9% of participants are/were registered in PhD programs, 33.1% in residency programs and 9.1% in master's programs. (Table 9).

Table 10. Distribution of Class Status

Class Status		f	%
Class Status	I Graduated within this year	80	31,5
	Senior Grad	174	68,5
	Total	254	100,0

When the distribution of class status was studied, it was determined that 68.5% of participants are senior graduates and 31.5% graduated within this year. (Table 10).

Table 11. Distribution of Types of University Enrolled in

Types of University Enrolled in		f	%
Types of University Enrolled in	Private	138	54,3
	State	116	45,7
	Total	254	100,0

When the distribution of types of university enrolled in, it was determined that 54.3% of participants are/were enrolled in private universities and 45.7% in state universities. (Table 11).

Table 12. Distribution of Research Subject

	Research Subject	f	%
	Clinical	64	25,0
	Biologic or animal study	38	15,0
	Epidemiologic	37	14,7
Research Subject	Materials	51	20,3
	Cephalometric or radiographic	48	18,7
	Others	16	6,3
	Toplam	254	100,0

When the distribution of research subject was studied, it was determined that 25.0% of participants chose Clinical, 20.3% Materials, 18.7% Cephalometric or radiographic, 15.0% Biologic or animal study, 14.7% Epidemiologic and 6.3% other subjects.(Table 12).And when each research subject is expected to be chosen equally, there is a statistically significant difference $p<0.05$. (Chi-square conformity test) The above than expected answers are clinical, materials, cephalometric or radiographic, respectively.

Table 13. Distribution of Total Case-Load

	Total Case-Load	f	%
	30-60	110	43,3
	60-100	87	34,3
Total Case-Load	100+	57	22,4
	Total	254	100,0

When the distribution of total case-load was studied, it was determined that 43.3% of participants have 30-60 cases, 34.3% have 60-100 cases and 22.4% have 100+ cases. (Table 13)

Table 14. Descriptive Analysis Results for case-load

Measure		N	Min.	Max.	Avr.	SS
How many cases have you treated from start to finish?		254	20	100	59,44	21,39
	Surgical	254	-	10	4,21	2,06
	Syndrom	254	-	8	3,20	1,67
How many cases do you have of the following?	Mixed Dentition	254	2	60	12 ,04	8,61
	Growth Modification	254	2	40	11,34	8,87
	Mini Screws	254	2	50	7,06	7,19
	Clear Aligners	254	-	50	,81	1,44
				f	%	
			Surgical	123	20,19	
			Syndrom	55	9,03	
What types of cases would you like to have more of?	Mixed Dentition			80	13,13	
	Growth Modification			109	17,89	
	Mini Screws			50	8,21	
	Clear Aligners			192	31,52	

The average of the answers given by the participants included in the study to the question of how many cases you have treated as a postgraduate orthodontic student from start to finish was 59.44 ± 21.39 with at least 20 cases and at most 100 cases. (Table 14).

The average of the answers given by the participants included in the study to the following question: How many case do you have of the following, surgical 4.21±2.06 on average with a maximum of 10 cases, syndrome 3.20±1.67 on average with a maximum 8 of cases, mixed dentition 12.04±8.61 on average with at least 2 cases and maximum of 60 cases, growth modification cases 11.34±8.87 on average with at least 2 cases and maximum of 40 cases, mini screw cases 7.06±7.19 on average with at least 2 cases and maximum of 50 cases case, clear aligner cases was 0.81±1.44 on average with a maximum of 50 cases. (Table 14).

4.3 The comparison of age, gender and marital status

In this part of the study, the comparison of age, gender and marital status was examined using chi-square, and the statistical significance level was accepted as 0.05 and presented in tables. In addition, the significant relationships found by the chi-square analysis were examined and the significant relationship between each groups was determined.

Table 15. Comparison of Main Factors in Choosing a University for Orthodontic Education by Age, Gender and Marital Status of Participants

		Reputation		Location		Cost		Clinical Education		Where I graduated from dentistry		Research Opportunity		Other		p
		N=46	%	N=62	%	N=12	%	N=73	%	N=24	%	N=3	%	N=34	%	
Age	30 years and younger	33 _{a, b}	71,7	38 _{b, c}	61,3	11 _a	91,7	55 _{a, b}	75,3	10 _{c, d}	41,7	0 _d	0,0	27 _{a, b}	79,4	,001
	31 years and older	13 _{a, b}	28,3	24 _{b, c}	38,7	1 _a	8,3	18 _{a, b}	24,7	14 _{c, d}	58,3	3 _d	100,0	7 _{a, b}	20,6	
P Value			0,602		0,160		0,111	0,136		0,003*			n.c	0,141		
Gender	Male	18	39,1	22	35,5	5	41,7	32	43,8	8	33,3	1	33,3	14	41,2	*
	Female	28	60,9	40	64,5	7	58,3	41	56,2	16	66,7	2	66,7	20	58,8	
P Value			0,971		0,471		1,000		0,355	0,525			n.c	0,817		
Marital Status	Married	5	10,9	22	35,5	5	41,7	26	35,6	8	33,3	2	66,7	11	32,4	*
	Single	41	89,1	40	64,5	7	58,3	47	64,4	16	66,7	1	33,3	23	67,6	
P Value			0,000*		0,391		0,418	0,324		0,804			n.c	0,866		

Each subscript letter denotes a subset of factor categories whose column proportions do not differ significantly from each other at the .05 level.

%; Column Percentage *As more than 20% of gender and marital status frequencies are below 5, no evaluation was made. There is also a significant difference between the lines where the letters are different.

Our study determined that when reputation is the main factor for choosing a university for orthodontic education, 71.7% of participants are 30 years and younger, 60.9% are women and 89.1% are single, when the main factor is location for choosing a university for orthodontic education, it was determined that 61.3% of participants are 30 years and younger, 64.5% are women and 64.5% are single, when cost is the main factor for choosing a university for orthodontic education, it was determined that 91.7% of participants are 30 years and younger, 58.3% are women and 58.3% are single, when clinical education is the main factor for choosing a university for orthodontic education, it was determined that 75.3% of participants are 30 years and younger, 56.2% are women and 64.4% are single, when where I graduated from dentistry is the main factor for choosing a university for orthodontic education, it was determined that 58.3% of participants are 31 years and older, 66.7% are women and 66.7% are single, when research opportunity is the main factor for choosing a university for orthodontic education, it was determined that 100% of participants are 31 years and older, 66.7% are women and 66.7% are married.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable of age, gender and marital status with the main factor for choosing a university for orthodontic education, (Table 15). Accordingly, a statistically significant relationship was found between the factor for choosing orthodontics and the variables of age and marital status. More than expected participants aged 31 and older chose where I graduated from dentistry as their main factor for choosing a university for orthodontic education ($p < 0.05$). And more than expected single participants chose reputation as their main factor for choosing a university for orthodontic education ($p < 0.05$).

Other statistically significant findings when chi-square independence test or Fisher's exact probability test was used, was in the answers given by participants 30 years and younger. The levels of participants 30 years and younger who chose where I graduated from dentistry as their main factor for choosing a university for orthodontic education was higher than the levels who chose research opportunity ($p < 0.05$). The level of participants 30 years and younger who chose location as their main factor for choosing a university for orthodontic education is less than the levels who chose clinical education, but higher than the ones who chose cost, research opportunity and where I graduated from dentistry ($p < 0.05$). The level of participants 30 years and younger who chose clinical education as

their main factor for choosing a university for orthodontic education was higher than the levels who chose where I graduated from dentistry ($p<0.05$). And the level of participants 30 years and younger who chose no other option as their main factor for choosing a university for orthodontic education is higher than the levels who chose where I graduated from dentistry and research opportunity ($p<0.05$).

Table 16. Comparison of Participants Reasons for Choosing Orthodontics According to Age, Gender and Marital Status

		professional satisfaction		Life style		Good career		No On-Calls		Financial Satisfaction		dissatisfaction with dentistry		Does not include surgery		Less focus on medicine and pharmacology		p
		N=59	%	N=49	%	N=48	%	N=14	%	N=23	%	N=35	%	N=24	%	N=2	%	
Age	30 years and younger	41 _{a,b}	69,5	37 _{a,b}	75,5	31 _b	64,6	13 _b	92,9	17 _{a,b}	73,9	14 _c	40,0	19 _{a,b}	79,2	2 _{a,b,c}	100,0	,004
	31 years and older	18 _{a,b}	30,5	12 _{a,b}	24,5	17 _b	35,4	1 _a	7,1	6 _{a,b}	26,1	21 _c	60,0	5 _{a,b}	20,8	0 _{a,b,c}	-	
P Value		0,813		0,224		0,546		0,071		0,644		0,000*		0,259		-		
Gender	Male	27 _a	45,8	19 _a	38,8	16 _a	33,3	7 _a	50,0	7 _a	30,4	17 _a	48,6	6 _a	25,0	1 _a	50,0	,472
	Female	32 _a	54,2	30 _a	61,2	32 _a	66,7	7 _a	50,0	16 _a	69,6	18 _a	51,4	18 _a	75,0	1 _a	50,0	
P Value		0,251		0,924		0,342		0,412		0,358		0,230		0,130		-		
Marital Status	Married	19 _a	32,2	12 _a	24,5	19 _a	39,6	4 _a	28,6	6 _a	26,1	13 _a	37,1	6 _a	25,0	0 _a	0,0	,676
	Single	40 _a	67,8	37 _a	75,5	29 _a	60,4	10 _a	71,4	17 _a	73,9	22 _a	62,9	18 _a	75,0	2 _a	100,0	
P Value		0,835		0,260		0,159		1,000		0,586		0,406		0,497		-		

%: Column Percentage. There is also a significant difference between the lines where the letters are different.

When the reason for choosing orthodontics was studied, it was determined that participants who chose professional satisfaction are 69.5% 30 years and younger, 54.2% are women and 67.8% are single. The participants who chose lifestyle as the main factor for choosing orthodontics are 75.5% 30 years and younger, 61.2% are women and 75.5% are single. The participants who chose good career structure as the main factor for choosing orthodontics are 64.6% 30 years and younger, 66.7% are women and 60.4% are single. The participants who chose no on-calls as the main factor for choosing orthodontics are 92.9% 30 years and younger, 50.0% are female and 71.4% are single. The participants who chose financial satisfaction as the main factor for choosing

orthodontics are 73.9% 30 years and younger, 69.6% are women and 73.9% are single. The participants who chose dissatisfaction with dentistry as the main factor for choosing orthodontics are 60.0% 31 and older, 51.4% are female and 62.9% are single. The participants who chose does not include surgical interventional treatments as the main factor for choosing orthodontics are 79.2% 30 years and younger, 75.0% are women and 75.0% are single. And the participants who chose less focus on medicine and pharmacology compared to other branches as the main factor for choosing orthodontics all were 30 years and younger, 50.0% were women and all were single.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable of age, gender and marital status with the main factor for choosing orthodontics, no statistically significant relationship was found between the gender and marital status of participants and the reason for choosing orthodontics ($p>0.05$), but a statistically significant relationship was found with age ($p<0.05$), more than expected participants aged 31 and older chose dissatisfaction with dentistry as the reasons for choosing orthodontics. The levels of participants 30 years and younger who chose professional satisfaction as the reason for choosing orthodontics are higher than the levels of participants who chose dissatisfaction with dentistry ($p<0.05$). The levels of participants 30 years and younger who chose lifestyle as the reason for choosing orthodontics are higher than the levels of participants who chose dissatisfaction with dentistry ($p<0.05$). The levels of participants 30 years and younger who chose good career structure as the reason for choosing orthodontics are higher than the levels of participants who chose no on-call ($p<0.05$). The levels of participants 30 years and younger who chose no on-call as the reason for choosing orthodontics are higher than the levels of participants who chose dissatisfaction with dentistry ($p<0.05$). And the levels of participants 30 years and younger who chose financial satisfaction as the reason for choosing orthodontics are higher than the levels of participants who chose dissatisfaction with dentistry ($p<0.05$). The levels of participants 30 years and younger who chose dissatisfaction with dentistry as the reason for choosing orthodontics are higher than the levels of participants who chose does not include surgical interventions ($p<0.05$).

Table 17. Comparison of Preferred Career Path after Completion of Orthodontic Education by Age, Gender and Marital Status of Participants

		Clinical Work		Academics		Firms		p
		N=165	%	N=38	%	N=51	%	
Age	30 years and younger	112a	64,4	24a	13,8	38a	21,8	,500
	31 years and older	53a	66,3	14a	17,5	13a	16,3	
	P value		0,770		0,442		0,302	
Gender	Male	65a	65,0	14a	14,0	21a	21,0	,918
	Female	100a	64,9	24a	15,6	30a	19,5	
	P value		0,992	0,729			0,768	
Marital Status	Married	55a	69,6	12a	15,2	12a	15,2	,416
	Single	110a	62,9	26a	14,9	39a	22,3	
	P value		0,296		0,945		0,191	

?: Row Percentage

When the preferred career path after completion of orthodontic education was studied, it was determined that clinical work was most preferred by 64.4% of participants 30 years and younger, 66.3% of participants aged 31 and over, 65.0% of male participants, 64.9% of female participants, 69.6% of married participants and 62.9% of single participants.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable of age, gender and marital status with the preferred career path after completion of orthodontic education, and no statistically significant relationship was found($p>0.05$).

Table 18. Comparison of the Registered Program of Participants by Age, Gender and Marital Status

		PhD		Master's		Residency		p
		N=147	%	N=23	%	N=84	%	
Age	30 years and younger	104	59,8	16	9,2	54	31,0	,592
	31 years and older	43	53,8	7	8,8	30	37,5	
Gender	Male	61	41,5	15	65,2	52	61,0	,004
	Female	86	58,5	8	34,8	32	39,0	
Marital status	Married	42	53,2	8	10,1	29	36,7	,593
	Single	105	60,0	15	8,6	55	31,4	

%; Row Percentage

When the type of program enrolled in was studied, it was determined that 59.8% of participants 30 years and younger, 53.8% of participants 31 and older, 61.0% of male participants, 55.8% of female participants, 53.2% of married participants and 60.0% of single participants are enrolled in a PhD program.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable of age, gender and marital status with the type of program enrolled in, and it was determined that there was no statistically significant relationship between the age and marital status of the participants and the type of program enrolled in ($p > 0.05$). While a statistically significant relationship was found between the gender of the participants and the registered program ($p < 0.05$). The levels of male participants enrolled in PhD programs are higher than the levels of male participants enrolled in Master's programs and the levels of male participants enrolled in residency programs are higher than the levels of male participants enrolled in Master's programs.

Table 19. Comparison of Orthodontists' Class Status by Age, Gender and Marital Status

		I graduated within this year		Senior Grad		p
		N=80	%	N=174	%	
Age	30 years and younger	31 _a	38,8	143 _b	82,2	,000
	31 years and older	49 _a	61,2	31 _b	17,8	
Gender	Male	33	41,3	67	38,5	,678
	Female	47	58,8	107	61,5	
Marital status	Married	34 _a	42,5	45 _b	25,9	,008
	Single	46 _a	57,5	129 _b	74,1	

%: Column Percentage. There is also a significant difference between the lines where the letters are different.

When the class status was studied, it was determined that 61.2% of the participants who graduated within this year are 31 years and over, 58.8% are women and 57.5% are single, and 82.2% of the senior grads are 30 years and younger, it was determined that ,61.5% of them were female and 74,1% of them were single..

Chi-square independence test or Fisher's exact probability test was used to compare the different variable of age, gender and marital status with the class status, and it was determined that there There was no statistically significant relationship between the gender of the participants and their class status ($p>0.05$). While there was a statistically significant relationship between the age and marital status of the participants and their class status ($p<0.05$). The level of participants 30 years and younger who graduated this year is lower than the level of senior grads and the level of single participants who are senior grads is higher than participants who graduated within this year.

Table 20. Comparison of Types of Universities Enrolled in According to Age, Gender and Marital Status

		Private		State		p
		N=138	%	N=86	%	
Age	30 years and younger	103	59,2	71	40,8	,022
	31 years and older	35	43,8	45	56,3	
Gender	Male	59	59,0	41	41,0	,229
	Female	79	51,3	75	48,7	
Marital status	Married	35	44,3	44	55,7	,031
	Single	103	58,9	72	41,1	

When the type of university enrolled in was studied, it was determined that 56.3% of participants aged 31 and older and 55.7% of married participants were enrolled in a state university, 59.2% of participants aged 30 years and younger, 59.0% of male participants, 51.3% of female participants and 58.9% of single participants were enrolled in a private university.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable of age, gender and marital status with the type of university enrolled in, there was no statistically significant relationship between the gender of participants and the type of university they are enrolled in ($p > 0.05$). While a statistically significant relationship was found between the age and marital status of participants and the type of university they are enrolled in ($p < 0.05$). The levels of participants aged 30 years and younger enrolled in a private university are higher than those of participants enrolled in a state university and the levels of married participants enrolled in a private university are lower than the levels of participants enrolled in a state university.

Table 21. Comparison of the Total Case-Load According to the Type of University Enrolled in

			Number of cases			Total	P Value
			30-60	60-100	100+		
Type of University Enrolled in	Private	Count	99	33	6	138	0,000*
		%	71.70%	23.90%	4.30%	100.00%	
	State	Count	11	54	51	116	
		%	9.50%	46.60%	44.00%	100.00%	
		Count	110	87	57	254	
		%	43.30%	34.30%	22.40%	100.00%	

%; Row Percentage

When the total case-load was studied, it was determined that 43.5% of participants enrolled in a private universities have an average of 50-60 cases, while 44.0% of participants enrolled in state universities have an average of over 100 cases.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable, and it was determined that a statistically significant relationship was found between the institution of orthodontists and the total number of cases ($p < 0.05$) where orthodontists enrolled in state universities have more cases than orthodontists enrolled in private universities.

Table 22. Comparison of Research Subject by Registered Program of Orthodontists

		PhD		Masters		Residency		p
		N=145	%	N=25	%	N=84	%	
Research Subject	Clinical	42a	65,6	8a	12,5	14a	21,9	,082
	Biologic or animal study	21a	55,3	3a	7,9	14a	36,8	
	Epidemiologic	19a	51,4	7a	18,9	11a	29,7	
	Materials	31a	60,8	0b	0	20b	39,2	
	Cephalometric or radiographic	24a	50,0	5a	10,4	19a	39,6	
	Others	8a	50,0	2a	12,5	6a	37,5	

%; Row Percentage

When the research subject was studied, and each subject is expected to be selected equally, there is a statistically significant difference between subjects $p < 0.05$.

Chi-square independence test or Fisher's exact probability test was used to compare the different variable, and it was determined that for participants in Ph.D. programs, the statistically significant more than expected answers are clinical and materials subjects, respectively, while it was determined that for participants in residency programs, the statistically significant more than expected answers are cephalometric or radiographic and materials subjects, respectively and for participants in master's programs the statistically significant more than expected answers are epidemiologic, clinical and other subjects were selected, respectively.

4.4 Descriptive Analysis Results of The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge Survey

The variable of the research; It is a survey of the confidence of senior graduate students of orthodontics department and newly graduate orthodontists in their knowledge and their perspective on resources. In this part of the study, descriptive statistics about the variables are given.

Table 23. Descriptive Analysis Results for the Survey of The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge

Measure	N	Min.	Max.	Avr.	SS
The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge	254	1,57	4,93	4,04	,45

The total average of the answers given by the participants included in the study to the statements of The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge was determined as $4.04 \pm .45$, with a minimum score of 1.57 and a maximum score of 4.93.

4.5 Frequency Analysis of The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge Survey

In this part of the research, frequency analysis of The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge were made and presented in tables.

Table 24. Distribution of Growth & Development and Craniofacial Anomalies

Growth & Development and Craniofacial Anomalies		f	%
Growth & Development Craniofacial Anomalies	No Idea	0	0
	Not Confident	13	5,1
	Knowledgable	69	27,2
	Confident	115	45,3
	Highly Confident	57	22,4
	Total	254	100,0
Class Lectures		179	70,5
Clinical Work		204	80,3
Books		184	72,4
Articles		147	57,9
Seminars and off-campus lectures		59	23,2
Demo videos		238	93,7

When the confidence of the participants in the topic of growth & development and craniofacial anomalies, it was determined that 45.3% of participants are confident with this topic.

When the preferred method of learning about the topic of growth & development and craniofacial anomalies, it was determined that 93.7% of participants chose to watch demo videos to learn about this topic.

Table 25. Distribution of Imaging (Radiographic & CBCT) and Interpretation

	Imaging (Radiographic & CBCT) and	f	%
	Interpretation		
Imaging (Radiographic & CBCT) and Interpretation	No Idea	0	0
	Not Confident	9	3,5
	Knowledgable	17	6,7
	Confident	117	46,1
	Highly Confident	111	43,7
	Total	254	100,0
Class Lectures		187	73,6
Clinical Work		214	84,3
Books		166	65,4
Articles		127	50,0
Seminars and off-campus lectures		52	20,5
Demo videos		240	94,5

When the confidence of the participants in the topic of imaging (radiographic & CBCT) and interpretation, it was determined that 46.1% of participants are confident with this topic,

When the preferred method of learning about the topic of imaging (radiographic & CBCT) and interpretation, it was determined that 94.5% of participants chose to watch demo videos to learn about this topic.

Table 26. Distribution of Diagnosis and Treatment Planning

Diagnosis and Treatment Planning		f	%
Diagnosis and Treatment Planning	No Idea	2	,8
	Not Confident	2	,8
	Knowledgable	17	6,7
	Confident	100	39,4
	Highly Confident	133	52,4
	Total	254	100,0
Class Lectures		198	78,0
Clinical Work		236	92,9
Books		175	68,9
Articles		167	65,7
Seminars and off-campus lectures		126	49,6
Demo videos		52	20,5

When the confidence of the participants in the topic diagnosis and treatment planning, it was determined that 52.4% of participants are highly confident with this topic,

When the preferred method of learning about the topic of diagnosis and treatment planning, it was determined that 92.9% of participants chose clinical work to learn about this topic

Table 27. Distribution of Biomechanics

	Biomechanics	f	%
Biomechanics	No Idea	3	1,2
	Not Confident	10	3,9
	Knowledgable	55	21,7
	Confident	128	50,4
	Highly Confident	58	22,8
	Total	254	100,0
	Class Lectures	169	66,5
	Clinical Work	231	90,9
	Books	139	54,7
	Articles	157	61,8
	Seminars and off-campus lectures	139	54,7
	Demo videos	92	36,2

When the confidence of the participants in the topic biomechanics, it was determined that 50.4% of participants are confident with this topic,

When the preferred method of learning about the topic of biomechanics, it was determined that 90.9% of participants chose clinical work to learn about this topic.

Table 28. Distribution of Fixed Orthodontic Appliances, Different Wire Types and Wire Bending

Fixed Orthodontic Appliances, ifferent Wire Types and Wire Bending		f	%
Fixed Orthodontic Appliances, Different Wire Types and Wire Bending	No Idea	4	1,6
	Not Confident	6	2,4
	Knowledgable	53	20,9
	Confident	117	46,1
	Highly Confident	74	29,1
	Total	254	100,0
Class Lectures		141	55,5
Clinical Work		231	90,9
Books		136	53,5
Articles		151	59,4
Seminars and off-campus lectures		136	53,5
Demo videos		79	31,1

When the confidence of the participants in the topic fixed orthodontic appliances, different wire types and wire bending, it was determined that 46.1% of participants are confident with this topic.

When the preferred method of learning about the topic of fixed orthodontic appliances, different wire types and wire bending, it was determined that 90.9% of participants chose clinical work to learn about this topic.

Table 29. Distribution of Anchorage

	Anchorage	f	%
Anchorage	No Idea	2	,8
	Not Confident	4	1,6
	Knowledgable	18	7,1
	Confident	105	41,3
	Highly Confident	125	49,2
	Total	254	100,0
	Class Lectures	122	48,0
	Clinical Work	236	92,9
	Books	160	63,0
	Articles	191	75,2
	Seminars and off-campus lectures	170	66,9
	Demo videos	77	30,3

When the confidence of the participants in the topic anchorage, it was determined that 49.2% of participants are highly confident with this topic,

When the preferred method of learning about the topic of anchorage, it was determined that 92.9% of participants chose clinical work to learn about this topic.

Table 30. Distribution of Treatment of Class II Malocclusions

Treatment of Class II Malocclusions		f	%
Treatment of Class II Malocclusions	No Idea	4	1,6
	Not Confident	4	1,6
	Knowledgable	10	3,9
	Confident	90	35,4
	Highly Confident	151	59,4
	Total	254	100,0
Class Lectures		206	79,8
Clinical Work		240	94,8
Books		168	65,0
Articles		169	65,4
Seminars and off-campus lectures		119	48,3
Demo videos		34	13,4

When the confidence of the participants in the topic treatment of class II malocclusions, it was determined that 59.4% of participants are highly confident with this topic.

When the preferred method of learning about the topic of treatment of class II malocclusions, it was determined that 94.8% of participants chose clinical work to learn about this topic.

Table 31. Distribution of Treatment of Class III Malocclusions

Treatment of Class III Malocclusions		f	%
Treatment of Class III Malocclusions	No Idea	0	0
	Not Confident	9	3,5
	Knowledgable	58	22,8
	Confident	138	54,3
	Highly Confident	49	19,3
	Total	254	100,0
Class Lectures		209	80,1
Clinical Work		259	95,4
Books		191	74,3
Articles		187	74,2
Seminars and off-campus lectures		129	50,8
Demo videos		31	13,1

When the confidence of the participants in the topic treatment of class III malocclusions, it was determined that 54.3% of participants are confident with this topic.

When the preferred method of learning about the topic of treatment of class III malocclusions, it was determined that 95.4% of participants chose clinical work to learn about this topic.

Table 32. Distribution of Treatment of Crossbite

	Treatment of Crossbite	f	%
Treatment of Crossbite	No Idea	2	,8
	Not Confident	2	,8
	Knowledgable	56	22,0
	Confident	130	51,2
	Highly Confident	64	25,2
	Total	254	100,0
	Class Lectures	201	79,1
	Clinical Work	241	94,9
	Books	188	74,0
	Articles	189	74,4
	Seminars and off-campus lectures	129	50,8
	Demo videos	34	13,4

When the confidence of the participants in the topic treatment of crossbites, it was determined that 51.2% of participants are confident with this topic.

When the preferred method of learning about the topic of treatment of crossbites, it was determined that 94.9% of participants chose clinical work to learn about this topic.

Table 33. Distribution of Treatment of Deep and Open Bites

Treatment of Deep and Open Bites		f	%
Treatment of Deep and Open Bites	No Idea	3	1,2
	Not Confident	3	1,2
	Knowledgable	57	22,1
	Confident	131	50,2
	Highly Confident	65	25,3
	Total	254	100,0
Class Lectures		198	78,1
Clinical Work		231	91,9
Books		188	74,0
Articles		192	75,4
Seminars and off-campus lectures		139	55,8
Demo videos		44	18,4

When the confidence of the participants in the topic treatment of deep and open bites, it was determined that 50.2% of participants are confident with this topic.

When the preferred method of learning about the topic of treatment of deep and open bites, it was determined that 91.9% of participants chose clinical work to learn about this topic.

Table 34. Distribution of Interdisciplinary Treatments

Interdisciplinary Treatments		f	%
Interdisciplinary Treatments	No Idea	0	0
	Not Confident	9	3,5
	Knowledgable	21	8,3
	Confident	95	37,4
	Highly Confident	129	50,8
	Total	254	100,0
Class Lectures		143	56,3
Clinical Work		238	93,7
Books		97	38,2
Articles		73	28,7
Seminars and off-campus lectures		116	45,7
Demo videos		39	15,4

When the confidence of the participants in the topic interdisciplinary treatment, it was determined that that 50.8% of participants are highly confident with this topic.

When the preferred method of learning about the topic of interdisciplinary treatment, it was determined that 93.7% of participants chose clinical work to learn about this topic.

Table 35. Distribution of Functional Appliances

	Functional Appliances	f	%
Functional Appliances	No Idea	2	,8
	Not Confident	4	1,6
	Knowledgable	22	8,7
	Confident	122	48,0
	Highly Confident	104	40,9
	Total	254	100,0
	Class Lectures	162	67,7
	Clinical Work	141	94,9
	Books	169	66,5
	Articles	197	77,6
	Seminars and off-campus lectures	136	53,5
	Demo videos	41	16,1

When the confidence of the participants in the topic functional appliances, it was determined that that 48.0% of participants are confident with this topic.

When the preferred method of learning about the topic of functional appliances, it was determined that 94.9% of participants chose clinical work to learn about this topic.

Table 36. Distribution of Temporary Anchorage Devices

Temporary Anchorage Devices		f	%
Temporary Anchorage Devices	No Idea	2	,8
	Not Confident	13	5,1
	Knowledgable	20	7,9
	Confident	96	37,8
	Highly Confident	123	48,4
	Total	254	100,0
Class Lectures		144	56,7
Clinical Work		230	90,6
Books		110	43,3
Articles		140	55,1
Seminars and off-campus lectures		148	58,3
Demo videos		88	34,6

When the confidence of the participants in the topic temporary anchorage device, it was determined that that 48.4% of participants are highly confident with this topic.

When the preferred method of learning about the topic of temporary anchorage device, it was determined that 90.6% of participants chose clinical work to learn about this topic.

Table 37. Distribution of Clear Aligners

	Clear Aligners	f	%
Clear Aligners	No Idea	38	15,0
	Not Confident	102	40,2
	Knowledgable	82	32,3
	Confident	20	7,9
	Highly Confident	12	4,7
	Total	254	100,0
Class Lectures		58	22,8
Clinical Work		127	50,0
Books		112	44,1
Articles		145	57,1
Seminars and off-campus lectures		219	86,2
Demo videos		131	51,6

When the confidence of the participants in the topic clear aligners, it was determined that 40.2% of participants are not confident with this topic.

When the preferred method of learning about the topic of clear aligners, it was determined that 86.2% of participants chose seminars and off-campus lectures to learn about this topic.

Table 38. Findings Regarding The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge Questionnaire-1

	No Idea		Not Confident		Knowledgeable		Confident		Highly Confident	
	f	%	f	%	f	%	f	%	f	%
Growth & Development and Craniofacial Anomalies	-	-	13	5,1	69	27,2	115	45,3	57	22,4
Imaging (Radiographic & CBCT) and Interpretation	-	-	9	3,5	17	6,7	117	46,1	111	43,7
Diagnosis and Treatment Planning	2	,8	2	,8	17	6,7	100	39,4	133	52,4
Biomechanics	3	1,2	10	3,9	55	21,7	128	50,4	58	22,8
Fixed Orthodontic Appliances, Different Wire Types and Wire Bending	4	1,6	6	2,4	53	20,9	117	46,1	74	29,1
Anchorage	2	,8	4	1,6	18	7,1	105	41,3	125	49,2
Treatment of Class II Malocclusions	4	1,6	4	1,6	10	3,9	90	35,4	151	59,4
Treatment of Class III Malocclusions	-	-	9	3,5	58	22,8	138	54,3	49	19,3
Treatment of Crossbite	2	,8	2	,8	56	22,0	130	51,2	64	25,2
Treatment of Deep and Open Bites	3	1,2	3	1,2	57	22,1	131	51,3	65	25,3
Interdisciplinary Treatments	-	-	9	3,5	21	8,3	95	37,4	129	50,8
Functional Appliances	2	,8	4	1,6	22	8,7	122	48,0	104	40,9
Temporary Anchorage Devices	2	,8	13	5,1	20	7,9	96	37,8	123	48,4
Clear Aligners	38	15,0	102	40,2	82	32,3	20	7,9	12	4,7

When the confidence levels of participants in the topics asked about in our questionnaire, it was determined that 59.4% of participant are highly confident in the treatment of class II malocclusions, 54.3% are confident in the treatment of class III malocclusions, 40.2% of participants are not confident about clear aligners, 32.3% knowledgeable about clear aligners, and 15.0% have no idea about clear aligners.

Table 39. Findings Regarding The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge Questionnaire-2

	Classroom Lectures		Clinical Work		Books		Articles		Seminars and Off-Campus Lectures		Demo videos	
	f	%	f	%	f	%	f	%	f	%	f	%
Growth & Development and Craniofacial Anomalies	179	70,5	204	80,3	184	72,4	147	57,9	59	23,2	238	93,7
Imaging (Radiographic & CBCT) and Interpretation	187	73,6	214	84,3	166	65,4	127	50,0	52	20,5	240	94,5
Diagnosis and Treatment Planning	198	78,0	236	92,9	175	68,9	167	65,7	126	49,6	52	20,5
Biomechanics	169	66,5	231	90,9	139	54,7	157	61,8	139	54,7	92	36,2
Fixed Orthodontic Appliances, Different Wire Types and Wire Bending	141	55,5	231	90,9	136	53,5	151	59,4	136	53,5	79	31,1
Anchorage	122	48,0	236	92,9	160	63,0	191	75,2	170	66,9	77	30,3
Treatment of Class II Malocclusions	206	79,8	240	94,8	168	65,0	169	65,4	119	48,3	34	13,4
Treatment of Class III Malocclusions	209	80,1	259	95,4	191	74,3	187	74,2	129	50,8	31	13,1
Treatment of Crossbite	201	79,1	241	94,9	188	74,0	189	74,4	129	50,8	34	13,4
Treatment of Deep and Open Bites	198	78,1	231	91,9	188	74,0	192	75,4	139	55,8	44	18,4
Interdisciplinary Treatments	143	56,3	238	93,7	97	38,2	73	28,7	116	45,7	39	15,4
Functional Appliances	162	67,7	141	94,9	169	66,5	197	77,6	136	53,5	41	16,1
Temporary Anchorage Devices	144	56,7	230	90,6	110	43,3	140	55,1	148	58,3	88	34,6
Clear Aligners	58	22,8	127	50,0	112	44,1	145	57,1	219	86,2	131	51,6

When the participants were asked about the methods they prefer to learn about each topic they were asked about in our questionnaire, it was determined that 95.4% of the participants chose clinical work to learn about the treatment of class III malocclusions, 94.5% chose to watch demo videos to learn about Imaging (Radiographic & CBCT) and interpretation, 86.2% chose seminars and off-campus lectures to learn about clear aligners. It is seen that 79.1% chose classroom lectures to learn about temporary anchorage devices, 77.6% chose articles to learn about functional appliances and 74.3% chose books for the treatment of class III malocclusions.

4.5. Comparission Tests

In this part of the study, the differences between the average scores obtained from the variables according to the demographic and personal characteristics of the participants, age, gender, marital status and class status, distribution will be discussed.

Table 40. The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Age Differentiation of Scores Obtained from the Questionnaire

Variables	Age	f	$\bar{X}$	SS	<i>t</i>	<i>p</i>
	0 and younger	174	4,04	,41	,110	,912
	31 and older	80	4,03	,54		

Chi-square independence test or Fisher's exact probability test was used to score The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Age, and it was determined that there in no statistical significant difference with age ($p>0.05$). In other words, it has been determined that the age of orthodontists does not affect the confidence of orthodontists in their knowledge and perspective on resources.

Table 41. The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Gender Differentiation of Scores Obtained from the Questionnaire

Variables	Gender	f	$\bar{X}$	SS	<i>t</i>	<i>p</i>
	Male	100	4,01	,48	-,782	,435
	Female	154	4,06	,45		

Chi-square independence test or Fisher's exact probability test was used to score The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Gender, and it was determined that there in no statistical significant difference with gender ($p>0.05$). In other words, it has been determined that the gender of orthodontists does not affect the confidence of orthodontists in their knowledge and perspective on resources.

Table 42. The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Marital Status Differentiation of Scores Obtained from the Questionnaire

Variables	Marital Status	f	$\bar{X}$	SS	<i>t</i>	<i>p</i>
	Married	79	4,06	,44	,451	,653
	Single	175	4,03	,47		

Chi-square independence test or Fisher's exact probability test was used to score The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Marital Status, and it was determined that there in no statistical significant difference with gender ($p>0.05$). In other words, it has been determined that the marital status of orthodontists does not affect the confidence of orthodontists in their knowledge and perspective on resources.

Table 43. The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Class Status Differentiation of Scores Obtained from the Questionnaire

Variables	Class Status	f	$\bar{X}$	SS	<i>t</i>	<i>p</i>
	Senior Grad	174	4,04	,46	,047	,962
	Graduated within a year	80	4,02	,44		

Chi-square independence test or Fisher's exact probability test was used to score The Confidence of Senior Graduate Students of the Department of Orthodontists and Newly Graduated Orthodontists in their Basic Knowledge by Class Status, and it was determined that there in no statistical significant difference with class status ($p>0.05$). In other words, it has been determined that the marital status of orthodontists does not affect the confidence of orthodontists in their knowledge and perspective on resources.



5. DISCUSSION

5.1. Discussion of Purpose and Methods

The purpose of this structured, close ended (static) study was to investigate the Confidence of Senior Graduate Students of Orthodontics Department and Newly Graduate Orthodontists in their Knowledge and their Perspective on Resources they prefer to learn about different topics in Turkey.

As the oldest dental specialty with the most graduates per year (23), orthodontic education has been evolving in several ways and areas with time, and has been documented, especially during the past century (24). It has evolved from “trial and error” to “evidence based” throughout the years (24). The importance of high-quality orthodontic education and its importance in producing highly trained and qualified orthodontists who are able to serve their communities with the highest standards has been noted and discussed (2,3). Also, the factors influencing orthodontic education, the methods on which orthodontic education can be judged and observed were defined and effort has been made to standardize them (3,4,8,9), alongside studying how the skills of orthodontic postgraduate students is evolving during their studies and the factors affecting them and their learning methods (14-16,23,29).

There are several trends and issues with the current state of orthodontic education (4,16,17,20,22,23,32,35-38,40-42,) those issues alongside the disruption that occurred worldwide due to Covid-19 pandemic, which its effects are still being studied, aided in taking the decision to study this topic. This study will assist in understanding the current state of orthodontic education in Turkey, which in turn will assist in comparing the current state of orthodontic education in Turkey and other countries.

To conduct this study a questionnaire consisting of 42 questions in total, covering 3 areas, demographics, orthodontic education experiences and finally, the confidence in knowledge and perspective on resources. The answers were collected through 3 methods, the main method was sending the questionnaire by email through both Turkish Orthodontic Society (Türk Ortodonti Derneği [TOD]) and Young Turkish Orthodontic Society (Genç TOD) that was done on www.surveymonkey.com , the rest of the studied

population were interviewed through phone calls, social media and in-person meetings and their answers were filled for them.

IBM SPSS 25.0 program was used for all statistical analysis to examine the relationships between the research variables. Data analysis methods, descriptive statistical methods were used to examine demographic characteristics and difference tests were used to compare scores obtained from data measurement tools with demographic variables.

After setting the inclusion and exclusion criteria that fit the purpose of this study, the population size and the study sample size were set according to Büyüköztürk et al. (46) and Yazıcıoğlu and Erdoğan (51), and they were found to be 696 and 254, respectively. Then, The Evaluation of the Confidence of Senior Graduate Students of the Department of Orthodontics and Newly Graduated Orthodontists in their Basic Knowledge were determined by looking at the skewness and kurtosis coefficients, and parametric test methods were preferred and it was determined that the variables showed normal distribution. Then internal consistency analysis was done using the criteria for Cronbach's Alpha values, and the result was 0.845. This value; shows that the questionnaire is highly reliable and there is no obstacle to its use in the analysis.

After examining the socio-demographic profile of the participants, the descriptive analysis results for the overall scale were examined. While examining the differentiation status of the group scores of the variables according to the personal information of the participants, the "independent sample t test" was used in the comparisons of the variables that provided the normal distribution assumption, and "ANOVA" was used in the comparisons of three or more groups.

5.2. Discussion of Results

Personal information and demographics:

Age: We found out that 68.5% of participants are 30 years and younger, while 31.5% are 31 years and older. To the best of our knowledge, there are no other studies

that had the same inclusion criteria to compare the age of our population, though it is worth mentioning that the age of postgraduate orthodontic students has increased, and that the age of postgraduate orthodontic students in the USA is, 45.4 % are younger than 29 years, 23.6 are between 29 and 30, 31% are older than 31, while in the Commonwealth the averages are 32.3%, 32.3%, and 34.6%, respectively. (36)

Gender: We found that 60.6% of participants are female and 39.4% are male. While there is a trend of increased number of females that are being enrolled in orthodontic postgraduate programs, Turkey has surpassed the US and commonwealth where the average of females is 48.5% and 51.5%, respectively (36), and this indicates that while more women are entering higher education and building their careers worldwide, Turkey has surpassed other nations by the opportunities open to women and so became a leader in empowering women.

Marital Status: The results of our study were that 68.9% of participants were single while 39.4% were married. To the best of our knowledge, we were unable to find a study that compared the marital status of the same population, but the average in the US in 1994 of married postgraduate orthodontic students in all levels was 58.3%. (6), while the percentage in 2005 was 56.5% (23), in the US however, students are generally older, since they need to enter pre-med school prior to dental school and then postgraduate studies, while in Turkey usually students enter dental school immediately after highschool, this can explain why the levels of married individuals in Turkey was less than the US.

Orthodontic Education Experience:

Main Factors When Choosing a University for Orthodontic Education:

When asked about the main reason for choosing their university the results were, 18.1% for reputation, 24.4% for location, 4.7% for cost, 28.7% for clinical education, 9.4% for where I graduated dentistry, 1.2% for research opportunity and 13.4% for other reasons. These results are exactly consistent with the findings of Burner et al. in 2005 (23), which also found that research opportunity is the least important factor. The explanation for these results are consistent with some of the trends and issues in orthodontic education worldwide, since the number of qualified faculty members is

decreasing in comparison with the ones aiming for a career in the private sector. (21,36-38) explains why clinical education is the main factor, while the importance of just publishing a research to graduate is more important than the quality and reasons to publish (32,35) explains why research opportunity is the least important factor. These finding also shows that dental students understand the importance of the quality of the education they will receive and the importance of obtaining a degree from a prestigious institutions.

Preferred Career Path After Completion of Orthodontics:

When asked about the preferred career path after graduating from orthodontics postgraduate programs, the results are 65% stated that they prefer clinical work, while 20.1% preferred firms and 15.0% preferred an academic career path. These results support previous findings suggesting that most postgraduate orthodontic students prefer clinical careers, while fewer prefer a career in academics (21,36-38). When we added a career in firms as a new variable, the percentage of postgraduate orthodontic students who preferred a clinical career decreased, yet a career in academics is still the least desired, and these findings support the others that show a decrease in the number of full-time faculty member, and this is a challenge that faculties need to handle to maintain the quality of the education they provide to their students.

Reasons for Choosing Orthodontics:

When asked about the main reason for choosing orthodontics as their postgraduate dental education, the responses were 23.2% for job satisfaction, 19.3% for lifestyle, 18.9% for good career structure, 5.5% for no on-calls, 9.1% for financial satisfaction, 13.8% for dissatisfaction with dentistry, 9.4% for does not include interventional therapies that involve surgery and 0.8% for has less focus on medicine and pharmacology than other branches. When compared to the results found by Keith and Proffit in 1994 (6), similarly job satisfaction was the main reason, dissatisfaction with dentistry was very similar with 13.7%. While job satisfaction, lifestyle and good career structure can be interpreted differently between people, it shows that dentists appreciate the importance of an orthodontic degree for their careers, while having around 1 out of 6

individuals stating that their reason was dissatisfaction with dentistry requires further investigation into dental schools and it will be worth studying what individuals saw different in orthodontics than general dentistry, and whether or not those perceptions were correct.

Programs Enrolled:

When investigating the types of programs that participants are enrolled in, the results were 57.9% were enrolled in PhD programs, 9.1% in master's programs and 33.1% in residency programs. Since countries have different requirements for applying to postgraduate studies and different types of programs (21,36), we were not able to the best of our abilities to find other studies to compare our results. We are only able to state that the probable reason that participants enrolled in master's programs is, as we were informed by members of Turkish Orthodontic Society (Türk Ortodonti Derneği [TOD]) and Young Turkish Orthodontic Society (Genç TOD), lower is due to regulations in Turkey to register as certified orthodontist after graduation, and that most students enrolled in master's programs are foreigner students.

Class Status:

The participants in this study were 68.5% senior graduates and 31.5% are orthodontist who graduated within this year. We were not able to find to the best of our ability another study that had the same inclusion criteria to compare our results, also all participants got their studies and graduations interrupted due to the Covid-19 pandemic, so we were not able to derive any conclusions from these percentages.

Types of Universities Enrolled in:

When asked about the type of university the participants are enrolled in, the results were 54.3% of participants are/were enrolled in private universities and 45.7% in state universities. These finding can support that more than half of the students in Turkey have an extra financial burden, which supports the findings of Anning RJ et al, Behrents RG, and Cangialosi TJ et al (36-38) of increased financial burdens on students.

Research Subjects:

When asking participants about the research subject of the researches they are doing/did in order to graduate, the results were 25% clinical, 15% biologic or animal study, 14.7% epidemiologic, 20.3% materials, 18.7% cephalometric or radiographic and 6.3% other. When compared to results found by Anning, Thomson, and Quick (36), clinical was the most selected category but lesser in Turkey compared to the US and the Commonwealth which were 32% and 30.3%, respectively. Similar to the US where researches on materials was the second most common with 20.3%, it was the fourth most common in the Commonwealth with 10.1%. Again, topics on cephalometric or radiographic was also the third most common in the US with 18.8%, it was the fifth most common research area in the Commonwealth with 11.1%.

Total Case-Load:

When investigating the total case-load participants have/had during their postgraduate orthodontic education the answers were, 43.3% of orthodontists have 30-60 cases, 34.3% have 60-100 cases and 22.4% have 100+ cases. When compared with their counterparts in the US and Commonwealth in 2011 they had an average case-load of around 85 patients and over 100 patients, respectively (36).

We also found that participants have treated approximately 60 cases from start to finish, with the lowest answer was 20 cases and the highest was a 100 cases.

When asked about specific types of cases the answers were, around 4 surgical cases, with a minimum of 0 and a maximum of 10 surgical cases, around 3 cases of patients with syndromes with a minimum of 0 and a maximum of 8 syndrom cases, around 12 cases with mixed dentition with minimum of 2 and a maximum of 60 mixed dentition cases, around 11 growth modification cases with a minimum of 2 cases and a maximum of 40 growth modification cases, around 7 cases that included mini screws with a minimum of 2 cases and a maximum of 50 cases that included mini screws and an average of 0.81 clear aligners with a minimum of 0 and a maximum of 50 clear aligner cases.

What should be mentioned is that it came to our understanding after conducting our study that many postgraduate orthodontic students work part-time in private clinics

outside the times dedicated to their faculties, so we could not consider the previous numbers are what participants treated in their faculties only.

When asked about which types of cases do the participants wish to have more of, most chose clear aligners with 31.5%, followed by surgical with 20.2%, growth modification with 17.9%, mixed dentition with 13.1%, syndrom with 9% and mini screws with 8.2% being the least.

Chi-Square Analysis:

Main Factors for Choosing a University for Orthodontic Education by Age, Gender and Marital Status:

When looking at the main factors for choosing a university for orthodontic education, no statistically significant relationship was found with regards to gender, while statistically significant relationships were found when looking at age and marital status. More participants than expected aged 31 and older chose where I graduated from dentistry as their main factor. The other statistically significant finding was more than expected single participants chose reputation as their main factor, even though our findings were consistent with the findings of Burner et al. in 2005 (23), which had clinical education as the main factor and reputation as second, we may attribute that to not having any familial commitments or ties, which freed those participants to relocate with more ease than their married counterparts and that a general dentist will not have the sufficient knowledge to clinically judge and rate orthodontic clinical education. It will be valuable to ask the same question for general dentists prior to starting their postgraduate orthodontic education and after graduating if the factors they based their decision on was according to their expectations and if they were satisfied with their programs similarly to their counterparts elsewhere as documented by Burner et. al. (23).

Main Factors for Choosing Orthodontics According to Age, Gender and Marital Status:

While our results are similar to the findings of Keith and Proffit (6), when comparing the factors with the variables of age, gender and marital status we could not find any statistical significance with regards to gender and marital status, but we did find a statistically significant relationship with age, we found that more than expected participants aged 31 and older chose dissatisfaction with dentistry. To understand this finding a study needs to be done to investigate the reason(s) behind dissatisfaction with dentistry, what postgraduate programs and/or careers most dissatisfied general practitioners choose after graduating dental school, what they saw different with orthodontic education compared to dental education that influenced their decision and whether or not it was according to their expectations.

Comparison of Preferred Career Path after Completion of Orthodontics by Age, Gender and Marital Status of Participants:

There was no statistically significant relationship found of preferred career path after completion of postgraduate orthodontic education of the participants by age, gender or marital status. It is only worth mentioning that similar to previous findings (6), a clinical career path is the most preferred amongst postgraduate orthodontic students and a career in academics is the least preferred even when given a third option. These findings confirm the global trend of decreased number of orthodontists seeking a career in academics (21,36-38), and so will affect the number of faculty members in Turkey , but, we did not attempt to study which participants are better qualified for a career in academics, so we will refrain on judging the quality of the current and future faculty members of orthodontic programs in Turkey.

Comparison of the Registered Program of Orthodontists by Age, Gender and Marital Status:

There was no statistically significant relationship found in registered program of the participants with age and marital status, but there was a statistically significant relationship between the registered program and gender, there was a higher level than expected of male participants who are/were enrolled in PhD programs than the ones enrolled in master's programs, similarly, there was a higher level than expected of male participants who are/were enrolled in residency programs than the ones enrolled in

master's programs. In Turkey to be registered as an orthodontist one needs to graduate from a PhD or a residency program, which explains why participants enrolled in master's programs is the least.

Comparison of Participants' Class Status by Age, Gender and Marital Status:

While there was no statistically significant relationship between gender and class status, we found statistically significant relationships when age and marital status were studied, where more than expected more than expected participants aged 30 years and younger, similarly more than expected single participants were single. We could not draw any conclusions from these findings since orthodontic education as all aspects of life were disrupted due to the Covid-19 pandemic, which its affects on participants progress in their programs and their graduations is still unknown.

Comparison of Type of University Enrolled in by Age, Gender and Marital Status:

While no statistically relationship was found between type of university enrolled in and gender, a statistically significant relationship was found when investigating type of university enrolled in with age and marital status. Participants enrolled in private institutions, participants aged 30 years and younger are/were more than expected, while less than expected for married participants. A downfall of this study was not looking how many participants were Turkish nationals versus foreigners, also we did not look at which participants chose their program and are responsible of their tuitions or whether they are enrolled via scholarships, finally if the participants are enrolled in the university and program of their preference. So any conclusions that might be derived from these findings must be done with caution.

Comparison of The Total Case-Load According to The Type of University Enrolled in:

The results show that most participants enrolled in private universities have a total case-load of 30-60 cases, while most participants enrolled in state universities have a total case-load of 60-100. Participants enrolled in state universities had a statistically significant higher number of total case-load than their counterparts enrolled in private universities. One reason might be the types and amount of incuranses accepted at state held faculties in comparission to privately owned, while we did not conduct such an investigation during our study, but it is worth looking at.

Comparision of Research Subject by Registered Program:

When each subject is expected to be chosen equally, there is a statistically significant difference between subjects. Participants enrolled in PhD programs, clinical subjects and materials subjects were chosen, respectively, more than expected, while participants enrolled in Master's programs chose epidemiologic subjects, clinical subjects and other subjects, respectively, more than expected, and participants enrolled in residency programs chose cephalometric or radiographic subjects and materials subjects, respectively, more than expected. While clinical subjects was the most chosen by participants enrolled in PhD programs and second by participants enrolled in master's programs, it was not of the most chosen by participants enrolled in residency programs. While we can try to explain why clinical subjects are generally preferred since most postgraduate students prefer a clinicall career as our results show in table 7, it is worth investigating the reason for its lesser percentage in residency programs. It is also noted while materials subjects are the second most common overall, they are chosen more than expected by participants enrolled in PhD and residency programs. Epedimiologic subjects are the fifth most chosen overall, yet participants enrolled in master's programs chose it more than expected such as they chose other subjects that is the least chosen as our findings discovered. Cephalometric or radiographic subjects are the third most chosen subjects overall as our results show, yet only participants enrolled in residency programs chose it the most. Our study was to take an overhall view of the situation of postgraduate orthodontic education in Turkey by focusing on senior graduates and newly graduated orthodontists, the aim of this part of the study was to compare the subjects of research done in Turkey compared with other areas around the world, for those reasons the types of research, the quality and the reasons behind

choosing them was not investigated, yet we do believe it will be worth investigating more in future studies.

Descriptive Analysis Results of the confidence of senior graduate students of orthodontics department and newly graduate orthodontis in their knowledge and their perspective on resources Survey:

While we found studies that assesed the skills of postgraduate orthodontic students (4), the trends noted globally (4,16,22,23,36,40) the issues they face (4,17,20,21,36-38,41,42,35) and its evolvemnt throughout history (6,8,11,17-22) up to its current status (1,4,9,10,14,16,20,21,23,24,30,33), we were not able to the best of our ability to find any study that tried to assess the state of postgraduate orthodontic education by looking at the confidance of senior graduates and newly graduated orthodontis in their knowledge by the time they are just entering the work force as trained and certified orthodontists, so this was the main area of our study while at the same time reviewing what method(s) of learning the participants choose to learn about a specific topic. It is to the best of our knowledge, no other study has investigated as many topics of the same population, and it is, to the best of our knowledge as well, our study is novel in studying the confidence in knowledge in the topics we chose while correlating the preferred methods of learning for each topic as well.

We found that on avergae confidence of the participants in their knowledge was $4.04 \pm .45$, with a minimum score of 1.57 and a maximum score of 4.93.

According to our findings: 45.3% of the participants stated that they are confident with their knowledge in Growth & Development and Craniofacial Anomalies, 27.2% knowledgeable, 22.4% highly confident and 5.1% not confident, while no participant stated that they have no idea. And on the method(s) they choose to learn about growth & development and craniofacial anatomy, the answer of demo videos was statistically significant more than expected with 93.7% of participants chose it as their or one of the methods they choose for learning about growth & development and craniofacial anatomy. While 80.3% chose clinical work, 72.4% chose books, 70.5% chose classroom lectures, 57.9% chose articles and 23.2% chose seminars and off-campus lectures, and there are no statistically significant findings between these results.

46.1% of the participants stated that they are confident with their knowledge in Imaging (Radiographic & CBCT) and Interpretation, 43.7% highly confident, 6.7% knowledgeable and 3.5% not confident, while no participant stated that they have no idea. And on the method(s) they choose to learn about Imaging (Radiographic & CBCT) and Interpretation, the answer of demo videos was statistically significant more than expected with 94.5% of participants chose it as their or one of the methods they choose for learning about Imaging (Radiographic & CBCT) and Interpretation. While 84.3% chose clinical work, 73.6% chose classroom lectures, 65.4 chose books, 50% chose articles and 20.5% chose seminars and off-campus lectures, and there are no statistically significant findings between these results.

52.4% of the participants are highly confident with their knowledge in diagnosis and treatment planning, 39.4% confident, 6.7% knowledgeable, 0.8% not confident and 0.8% stated they have no idea. And on the method(s) they choose to learn about diagnosis and treatment planning, the answer of clinical work was statistically significant more than expected with 92.9% of participants chose it as their or one of the methods they choose for learning about diagnosis and treatment planning. While 78% chose classroom lectures, 68.9% chose books, 65.7% chose articles, 49.6 chose seminars and off-campus lectures and 20.5% chose demo videos, and there are no statistically significant findings between these results.

50.4% of the participants stated that they are confident with their knowledge in biomechanics, 22.8% highly confident, 21.7% knowledgeable, 3.9% not confident and 1.2% stated they have no idea. And on the method(s) they choose to learn about biomechanics, the answer of clinical work was statistically significant more than expected with 90.9% of participants chose it as their or one of the methods they choose for learning about biomechanics. While 66.5% chose classroom lectures, 61.8% chose articles, 54.7% chose books, 54.7% chose seminars and off-campus lectures and 36.2% chose demo videos, and there are no statistically significant findings between these results.

46.1% of participants stated they are confident with their knowledge in fixed Orthodontic Appliances, Different Wire Types and Wire Bending, 29.1% highly confident, 20.9% knowledgeable, 2.4% not confident and 1.6% stated they have no idea. And on the method(s) they choose to learn about fixed Orthodontic Appliances, Different Wire Types and Wire Bending, the answer of clinical work was statistically significant more than expected with 90.9% of participants chose it as their or one of the methods they choose for learning about fixed Orthodontic Appliances, Different Wire Types and Wire Bending. While 59.4% chose articles, 55.5% chose classroom lectures, 53.5% chose books, 53.5% chose seminars and off-campus lectures and 31.1% chose demo videos, and there are no statistically significant findings between these results.

49.2% of the participants are highly confident with their knowledge in anchorage, 41.3% confident, 7.1% knowledgeable, 1.6% not confident and 0.8% stated they have no idea. And on the method(s) they choose to learn about anchorage, the answer of clinical work was statistically significant more than expected with 92.9% of participants chose it as their or one of the methods they choose for learning about anchorage. While 75.2% chose articles, 66.9% chose seminars and off-campus lectures, 63% chose books, 48% chose classroom lectures and 30.3% chose demo videos, and there are no statistically significant findings between these results.

59.4% of the participants are highly confident with their knowledge in treatment of class II malocclusions, 35.4% confident, 3.9% knowledgeable, 1.6% not confident and 1.6% stated they have no idea. And on the method(s) they choose to learn about treatment of class II malocclusions, the answer of clinical work was statistically significant more than expected with 94.8% of participants chose it as their or one of the methods they choose for learning about treatment of class II malocclusions. While 79.8% chose classroom lectures, 65.4% chose articles, 65% chose books, 48.3% chose seminars and off-campus lectures and 13.4% chose demo videos, and there are no statistically significant findings between these results.

54.3% of the participants are confident with their knowledge in treatment of class III malocclusions, 22.8% knowledgeable, 19.3% highly confident and 3.5% not confident, while no participant stated that they have no idea. And on the method(s) they choose to learn about treatment of class III malocclusions, the answer of clinical work was statistically significant more than expected with 95.4% of participants chose it as their or one of the methods they choose for learning about treatment of class II malocclusions. While 80.1% chose classroom lectures, 74.3% chose books, 74.2% chose articles, 50.8% chose seminars and off-campus lectures and 13.1% chose demo videos, and there are no statistically significant findings between these results.

51.2% of the participants are confident with their knowledge in treatment of crossbites, 25.2% highly confident, 22% knowledgeable, 0.8% not confident and 0.8% stated they have no idea. And on the method(s) they choose to learn about treatment of crossbites, the answer of clinical work was statistically significant more than expected with 94.9% of participants chose it as their or one of the methods they choose for learning about treatment of class II malocclusions. While 79.1% chose classroom lectures, 74.4% chose articles, 74% chose books, 50.8% chose seminars and off-campus lectures and 13.4% chose demo videos, and there are no statistically significant findings between these results.

50.2% of the participants are confident with their knowledge in treatment of deep and open bites, 25.3% highly confident, 22.1% knowledgeable, 1.2% not confident and 1.2% stated they have no idea. And on the method(s) they choose to learn about treatment of deep and open bites, the answer of clinical work was statistically significant more than expected with 91.9% of participants chose it as their or one of the methods they choose for learning about treatment of deep and open bites. While 78.1% chose classroom lectures, 75.4% chose articles, 74% chose books, 55.8% seminars and off-campus lectures and 18.4% chose demo videos, and there are no statistically significant findings between these results.

50.8% of the participants are highly confident with their knowledge in interdisciplinary treatment, 37.4% confident, 8.3% knowledgeable and 3.5% not confident, , while no participant stated that they have no idea. And on the method(s) they choose to learn about interdisciplinary treatment, the answer of clinical work was statistically significant more than expected with 93.7% of participants chose it as their or one of the methods they choose for learning about interdisciplinary treatment. While 56.3% chose classroom lectures, 45.7% chose seminars and off-campus lectures, 38.2% chose books, 28.7% chose articles and 15.4% chose demo videos, and there are no statistically significant findings between these results.

48.0% of the participants are confident with their knowledge in functional appliances, 40.9% highly confident, 8.7% knowledgeable, 1.6% not confident and 0.8% stated they have no idea. And on the method(s) they choose to learn about functional appliances, the answer of clinical work was statistically significant more than expected with 94.9% of participants chose it as their or one of the methods they choose for learning about functional appliances. While 77.6% chose articles, 67.7% chose classroom lectures, 66.5% chose books, 53.5% chose seminars and off-campus lectures and 16.1% chose demo videos, and there are no statistically significant findings between these results.

48.4% of the participants are highly confident with their knowledge in TADs, 37.8% confident, 7.9% knowledgeable, 5.1% not confident and 0.8% stated they have no idea. And on the method(s) they choose to learn about TADs, the answer of clinical work was statistically significant more than expected with 90.6% of participants chose it as their or one of the methods they choose for learning about TADs. While 58.3% chose seminars and off-campus lectures, 56.7% chose classroom lectures, 55.1% chose articles, 43.3% chose books 34.6% chose demo videos, and there are no statistically significant findings between these results.

40.2% of the participants are not confident with their knowledge in CAT, 32.3% knowledgeable, 15% have no idea, 7.9% confident and 4.7% stated they are highly confident. And on the method(s) they choose to learn about CAT, the answer of seminars and off-campus lectures was statistically significant more than expected with 86.2% of participants chose it as their or one of the methods they choose for learning about CAT. While 57.1% chose articles, 51.6% chose demo videos, 50% chose clinical work, 44.1% chose books and 22.8 chose classroom lectures, and there are no statistically significant findings between these results.

According to our findings with regards to confidence levels, the participants chose highly confident with treatment of class II malocclusions the most and with CAT the least, confident with treatment of class III malocclusions the most and CAT the least, knowledgeable with CAT the most and Diagnosis and Treatment Planning and Imaging (Radiographic & CBCT) and Interpretation the least equally, not confident with CAT the most and treatment of crossbites the least and participants chose no idea with CAT the most and non chose it for Diagnosis and Treatment Planning, imaging (Radiographic & CBCT) and Interpretation, treatment of class III malocclusions and interdisciplinary treatment.

With regards to preference of resources, the participants chose classroom lectures with treatment of cross-bites the most and CAT the least, clinical work with treatment of class III malocclusions the most and CAT the least, books with treatment of class III malocclusions the most and interdisciplinary treatment the least, articles with functional appliances the most and interdisciplinary treatment the least, seminars and off-campus lectures with CAT the most and Imaging (Radiographic & CBCT) and Interpretation the least and participants chose demo videos with Imaging (Radiographic & CBCT) and Interpretation the most and treatment of class III malocclusions the least.

Difference Tests:

When difference tests were done between the average scores obtained from the variables according to the demographic and personal characteristics of the participants, age, gender, marital status and class status, there was no statistically significant found between the different variable and the levels of confidence the participants had.

While there are studies that looked at different learning styles and methods of assessment of postgraduate orthodontics student that were, in some aspects, covered in our study, there are no studies, to the best of our knowledge, that looked at the preferred learning resource(s) per topic while looking at the confidence of participants in that topic, which we believe that our study is the first to do such investigation.

What we notice is that clinical work is the most statistically significant method chosen, and can be considered as the top method of choice in 11 out of the 14 topics chosen in this study, while demo videos was the least chosen in 11 out of the 14 topics and was the 1st choice in only 2 topics. It is also noted that books come only as 3rd, 4th and 5th, while articles came as 2nd, 3rd and 4th choices, which reveals that self-reading is never the 1st nor the least preferred method of learning. Seminars and off-campus lectures are mostly considered the 5th resource of learning. While we did not investigate the numbers of postgraduate orthodontic students who work in part-time outside their faculties, yet our findings on how much the participants relied on clinical work and classrooms lectures to learn about various topics, illustrates the importance on having a high quality postgraduate orthodontic program, especially when a career in academics is the least preferred amongst postgraduate orthodontic students. What can also be noted that CAT was the topic with the lowest levels of confidence, and participants are preferring to seek learning about it outside their programs and wanting to have more of, this illustrates the importance of CAT therapy to postgraduate orthodontic students and how their programs are falling short in providing them with the knowledge and skills they need to be confident with when they graduate and start their practices as certified orthodontists.

6. CONCLUSION

1. The trends and issues with postgraduate orthodontic education in Turkey are similar to other parts of the world. Turkey now has more female than male orthodontists graduating, similar distribution of subjects being researched and published and a low number of participants seeking a career in academics, which explains why clinical education is the top reason participants chose their program followed by location and reputation respectively, along with job satisfaction being the reason that participants chose studying orthodontics in the first place.
2. An extra attention should be taken regarding total case-load and the types of cases being given to the students.
3. Postgraduate orthodontic programs in Turkey are able to graduate orthodontist who are confident with the knowledge they obtained at their time in their programs, the only exception is CAT, so programs must pay more attention to this topic which participants illustrated they are looking elsewhere to obtain the knowledge they require.
4. Clinical work is by far the most chosen method of learning, and demo videos was the least while self-reading was in between.
5. Clinical education is the leading factor for choosing a university for orthodontic education.
6. The most preferred career path after completing orthodontic education is a clinical career.
7. Job satisfaction is the main reason for choosing postgraduate orthodontic education.
8. Most research subjects done in Turkey are, clinical, materials and cephalometric or radiographic.
9. Outside conventional fixed orthodontic cases, participants have mixed dentition and growth modification cases the most, while clear aligner cases was the least.
10. Most students would like to have more of clear aligner and surgical cases.

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APPENDIX 8.1: ETHICAL COMMITTEE APPROVAL

	T.C. YEDİTEPE ÜNİVERSİTESİ GİRİŞİMSEL OLMAYAN KLİNİK ARAŞTIRMALAR ETİK KURULU	Versiyon No 1.0 Sayfa 1 / 2																																										
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KARAR BİLGİLERİ	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Başvuru Numarası</td> <td>202109094</td> </tr> <tr> <td>Toplantı Tarihi</td> <td>19.11.2021</td> </tr> <tr> <td>Toplantı Yeri</td> <td>Çevirim içi (Google Meet)</td> </tr> <tr> <td>Karar No</td> <td>16</td> </tr> </table>	Başvuru Numarası	202109094	Toplantı Tarihi	19.11.2021	Toplantı Yeri	Çevirim içi (Google Meet)	Karar No	16																																			
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Araştırmacılar	Dt. Abdullah Ziadeh, Doç. Dr. Feyza Eraydın																																											



T.C. YEDİTEPE ÜNİVERSİTESİ
GİRİŞİMSSEL OLMAYAN KLİNİK ARAŞTIRMALAR
ETİK KURULU

Versiyon No
1.0
Sayfa 2 / 2

BAŞVURU NUMARASI: 202109094

KARAR

21.12.2021

☒ KABUL	☐ RET ☐ KAPSAM DIŞI (GİRİŞİMSSEL) ☐ BİLİMSEL VE/VEYA ETİK KURALLARA AYKIRI ☐ BİR SORUMLU ARAŞTIRMACININ (TEZ İŞE TEZ DANIŞMANI), BİR TOPLANTIYA İKİ (2) ADETTE FAZLA ÇALIŞMA BAŞVURUSUNDA BULUNMASI ☐ KURUM İÇİ BAŞVURULARINDA YEDİTEPE UZANTILI E-POSTA HESABI İLE GİRİŞ YAPILMAMIŞ OLMASI ☐ ŞARTLI KABULDE BELİRTİLEN REVİZYONLARIN ZAMANINDA VE/VEYA İSTENİLDİĞİ ŞEKİLDE YAPILMAMIŞ OLMASI
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T.C. Yeditepe Üniversitesi
Girişimsel Olmayan Klinik Araştırmalar
Etik Kurulu adına

Prof. Dr. Didem ÖZDEMİR ÖZENEN
Başkan

Araştırmanın Başlığı: Ortodonti Anabilim Dalı yüksek lisans son sınıf öğrencilerinin ve yeni mezun olan ortodontistlerin temel bilgi ve becerilerine olan güvenlerinin değerlendirilmesi

Araştırmacılar: Dt. Abdullah Ziadeh, Doç. Dr. Feyza Eraydın

APPENDIX 8.2: TOD QUESTIONNAIRE DISTRIBUTION APPROVAL

	tel: +90.312.441 14 26 fax: +90.312.441 14 58 Cinnah Cad. 37/11 Çankaya 06080 Ankara/TURKEY www.tod.org.tr
Türk Ortodonti Derneği Turkish Orthodontic Society	

Tarih : 03.01.2022
Sayı : TOD-22-001

Sayın Doç.Dr.Feyza ERAYDIN, Dt.Abdullah ZIADEH,

Etik kurul onayı bulunan "Ortodonti Anabilim Dalı yüksek lisans son sınıf öğrencilerinin ve yeni mezun olan ortodontistlerin temel bilgi ve becerilerine olan güvenlerinin değerlendirilmesi" isimli çalışmanızda kullanacağınız anketin Türk Ortodonti Derneği üyelerine tarafımızca e-posta yolu ile gönderilmesinde herhangi bir sakınca bulunmamaktadır.

Çalışmanızda başarılar dileriz.

Dr.Bülent BAYDAŞ
TOD Yönetim Kurulu Adına
Genel Sekreter

APPENDIX 8.3: QUESTIONNAIRE TEMPLATE

Part 1: Demografik ve kişisel bilgiler / Demographics and personal information

1. Yaşınız / Age.
2. Cinsiyetiniz / Sex. (M/F)
3. Medeni durumunuz / Martial status. (Evli -Married/ Bekar-Single)

Part 2: Katılımcının ortodonti programından eğitim deneyimleri / Education experiences.

4. Üniversitenizi seçerken ana faktör neydi / What was the main factor for choosing a university for orthodontic education? (İtibar-Reputation/ Yer- Location/ Maliyet-Cost/ Klinik eğitim-Clinical education/ Diş hekimliğinden mezun olduğum yer-Where I graduated from dentistry/ Araştırma fırsatı-Research opportunity/ Diğer-Other)
5. Ortodonti bitirdikten sonra tercih ettiğiniz kariyer yolu nedir / What is your preferred career path after completing orthodontic education? (Klinik çalışma-Clinical work/ Akademik-Academic/ Firmalar / Firms)
6. Ortodontiyi seçme sebebiniz neydi / What was your reason for choosing orthodontics? (Mesleki tatmin-Job satisfaction/ Yaşam tarzı-Lifestyle/ İyi bir kariyer-Good career structure/ Nöbet sistemiyle çalışılmaması-No on-call/ Finansal yeterlilik-Financial satisfaction/ Diş hekimliğinden memnuniyetsizlik-Dissatisfaction with dentistry/ Cerrahi içeren girişimsel tedavileri içermemesi-Does not include interventional therapies that involve surgery/ Diğer branşlara göre tıp ve farmakolojiye daha az odaklanması-Has less focus on medicine and pharmacology than other branches)
7. Hangi programa kaydoldunuz / What type of program are you enrolled in? (Doktora-PhD/ Yüksek Lisans-Master's/ Uzmanlık-Residency)
8. Şu an eğitiminizin kaçınıcı yılındasınız / At which year are you now in your studies? (Bu yıl içinde mezun oldum-I graduated within this year/ Son sınıf-Senior graduate)
9. Bağlı olduğunuz üniversitenin türü nedir / What type of university are you attending? (Vakıf-Private/ Devlet-Governmental)
10. Lütfen araştırma konunuzu belirtin/ Please specify your research subject (Klinikal-Clinical/ Biyolojik veya hayvan çalışması-Biologic or animal study/ Epidemiyolojik -

Epidemiologic/ Materyal-Materials/ Sefalometrik veya radyografik-Cephalometric or radiographic/ Başka-Other)

11. Toplamda kaç vakanız var / How many cases do you have in total?
12. Bu vakaların kaçını baştan sona tedavi ettiniz/edeceksiniz / of those how many will/did you treat completely from start to finish?
13. Aşağıdakilerden kaç vakanız var / How many cases do you have of the following?
{Cerrahi-Surgical/ Sendrom-Syndrome/ Karışık dişlenme-Mixed dentition/ Büyüme değişikliği-Growth modification/ Mini vida-Mini screws/ Şeffaf plaklar-Clear aligners)
14. What types of cases would you like to have more of? {Cerrahi-Surgical/ Sendrom-Syndrome/ Karışık dişlenme-Mixed dentition/ Büyüme değişikliği-Growth modification/ Mini vida-Mini screws/ Şeffaf plaklar-Clear aligners)

Part 3: Katılımcının, bilgisine olan güveni ve kaynaklara bakış açısı / Confidence in knowledge

- Lütfen aşağıdaki konuların her biri için 1'den 5'e kadar derecelendirme yapınız. / Please rate the confidence in each of the following topics from 1 to 5
- 5 çok güveniyorum: Ortodonti konularını tamamen anlıyorum, ortodonti hakkında tartışabilir, açıklama yapabilir ve bilgilerimi pratikte uygulayabilirim. / 5 highly confident: I fully understand the topic, able to discuss, explain and implement it in my practice
- 4 güveniyorum: Ortodonti konularını anlıyorum ancak pratikte daha etkili bir şekilde uygulayabilmek için bilgimi artırma ihtiyacı hissediyorum. / 4 confident: I understand the topic but feel the need to boost my knowledge and how to implement it in my practice more effectively
- 3 ne güveniyorum ne güvenmiyorum: Ortodontiyi pratikte biraz uygulayabilecek kadar anlıyorum. / 3 knowledgeable: I somewhat understand the topic just enough to implement it slightly in my practice

- 2 güvenmiyorum: Temel prensipleri biliyorum ancak bunları güvenle uygulayabilmek için çok daha fazla bilgiye ihtiyacım var. / 2 not confident: I know the basics but need much more knowledge to be able to implement it with confidence
- 1 fikrim yok: Sadece ortodontinin varlığından haberdarım, ortodonti konularını en baştan çalışmam gerekiyor. / 1 have no idea: I just know it exists but need to study it from the beginning

Ayrıca bu seçenekler arasından, ortodonti konularının her biri için, ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını lütfen seçiniz. (sınıf ortamındaki dersler/klinik çalışması/kitaplar/makaleler/seminerler ve kampüs dışındaki dersler/demo videolar/diğer) Cevabınız diğer ise lütfen belirtiniz. / Also please pick your main source of information and preferred source of information for each of the topics from these options (class lectures/clinical work/ books/ articles/ seminars and off campus lectures/ demo videos/ other)

15. Büyüme ve gelişme ve kraniyofasiyal anomaliler ve tedavisi / Growth & development and Craniofacial anomalies and their treatment.
16. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
17. Görüntüleme (Radyografik & KIBT) ve yorumlama / Image (Radiographic & CBCT) tracing and interpretation.
18. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
19. anı ve tedavi planlaması / Diagnosis and Treatment planning
20. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for

the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)

21. Biyomekanik / Biomechanics

22. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)

23. Sabit Ortodontik Aletler, Farklı Tel Çeşitleri ve Tel Bükme/ Fixed Orthodontic Appliances, Different Wire Types and Wire Bending

24. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)

25. Ankraj / Anchorage

26. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)

27. Sınıf II maloklüzyonların tedavisi / Treatment of CII malocclusions

28. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)

29. Sınıf III maloklüzyonların tedavisi / Treatment of CIII malocclusions

30. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for

- the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
31. Çapraz kapanışların tedavisi / Treatment of cross bites
32. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
33. Derin ve açık kapanışların tedavisi / Treatment of deep and open bites
34. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
35. Disiplinlerarası tedaviler / Interdisciplinary treatments
36. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
37. Fonksiyonel Apareyler/ Functional Appliances
38. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)
39. Geçici Ankraj Cihazları / Temporary Anchorage Devices (TAD)
40. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-

Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)

41. Şeffaf plaklar / Clear aligners

42. Lütfen önceki soru için ana bilgi kaynağınızı ve tercih ettiğiniz bilgi kaynağını seçin / Please pick your main source of information and preferred source of information for the previous question (Sınıf ortamındaki dersler-Class lectures/ Klinik çalışması-Clinical work/ Kitaplar-Books/ Makaleler-Articles/ Seminerler ve kampüs dışındaki dersler-Seminars and off campus lectures/ Demo videolar-Demo videos)



CURRICULUM VITAE OF THE AUTHOR

Dr. Abdullah Ziadeh

Personal Information:

- Date of Birth:
- Place of Birth:
- Marital Status:

Education History:

- 2018-2022: Masters in Orthodontics, Yeditepe University
- 2008-2014: Bachelor's Degree of Dental Surgery, BDS, School of Dentistry, Jordan University of Science and Technology (JUST)

Work Experience:

- 2016-2017: Trainee, Dammam Medical Tower
- 2014-2016: Dental Resident, JUST Dental Teaching Center

Skills and Certifications:

- RCSI Diploma of Primary Care Dentistry, Membership: FODRCSI04097
- AHA Basic Life Support (BLS), e-code: 215601070328
- Participated alongside Orthodontics Masters Student in her research "Micro-Osteo Perforation and Tooth Movement, A Randomized Controlled Clinical Trial", Research Grant # 20150263
- Cone-Beam Computed Tomography (CBCT) Basic Users Course - Level 1
- Cone-Beam Computed Tomography (CBCT) Basic Users Course – Level 2
- Pro Taper Next Course
- Protaper Universal Rotary Files and Warm Vertical Obturation
- Laser Dentistry Workshop 2
- Public Speaking Course
- Negotiation Skills Workshop
- Several Oral Health Campaigns

Volunteering

- 2008-2016 Host & Guide for Overseas Visitors
- 2014-2015 Volunteer at King Abdullah the 2nd Fund for Development Office at JUST
- 2010-2013 Volunteer at Civil Society Development Centre (CSDC) at JUST
- 2010-2011 Elected Student Representative, Syrian Students' Representative