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*Article*

# Educational Approach: Leveraging SWOT Analysis for Entrepreneurial Success in Senior Dental Students

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**Abstract:** The SWOT analysis, pivotal in the competitive healthcare sector, aids dentists in identifying and analyzing internal strengths and weaknesses, as well as external opportunities and threats. This study focuses on senior dental students, aiming to scrutinize their use of SWOT analysis and evaluate its efficacy as an educational tool for career decision-making in dental entrepreneurship. The research sample comprises 116 senior dental students in the final stages of their dental education, with data collection accomplished through the administration of an e-questionnaire. The data extracted from the SWOT analysis encompass internal and external factors, gender distinctions, and outcomes derived from Stepwise Binary Logistic Regression concerning predictor markers. The results from the SWOT analysis of 114 questionnaires, revealed that participants identified communication skills (50%) and organization skills (49.10%) as their primary strengths, followed by favorable personal traits contributing to goal success (36%). Weaknesses predominantly centered around emotional and personal traits like anxiety (41.20%) and other characteristics, alongside practical challenges such as lack of initial capital (24.60%). Main opportunities included collaboration with experienced dentists (33.30%) and access to training programs (27.20%), while economic instability in Greece (77.20%) and the saturated dentist profession (26.30%) were perceived as significant threats. Gender differences were notable, with female dentists more likely to report organization skills as a strength and anxiety as a weakness. Values such as industriousness, persistence, and ethics were commonly shared, with actions focusing on training programs (57.9%) and gaining experience with experienced dentists (29.8%). Cluster analysis identified two subgroups, with one emphasizing on utilizing all available options (n=49) and the other prioritizing on gaining professional skills and experience (n=65). Logistic regression indicated that participants valuing industriousness were less likely to explore all available options, while those recognizing personal traits were more likely to do so. The study's outcomes highlight key predictor factors linked to a proactive orientation in career decision-making among senior dental students. These insights offer valuable implications for educational institutions and career counselors.

**Keywords:** SWOT analysis; competitive healthcare sector; dentists; internal strengths and weaknesses; external opportunities and threats; senior dental students; educational tool; career decision-making; dental entrepreneurship; career outcomes; career counselors

## 1. Introduction

In the dynamic landscape of the healthcare industry, where market demands, technological advancements, regulatory changes, and patient expectations constantly evolve, strategic planning and decision-making are pivotal for success [1–3]. The SWOT analysis, a fundamental framework widely used in healthcare organizations, provides a structured methodology for assessing internal strengths and weaknesses, as well as external opportunities and threats [1,3,4]. This tool's application is particularly valuable for crafting informed strategies in the healthcare sector, allowing organizations to adapt to the ever-changing environment [5,6].

Dentists and dental practices can also benefit significantly from the application of SWOT analysis, especially concerning various aspects of their business and professional practice [7,8]. For senior dental students who are on the verge of making crucial career decisions, the utilization of

SWOT analysis becomes imperative. As the landscape of dental healthcare undergoes transformation post-COVID-19, an increasing number of senior dental students are considering entrepreneurship as a viable career path [1]. However, the transition to entrepreneurship demands careful consideration of various factors to ensure long-term success. Senior dental students possess a unique set of strengths derived from their educational background, clinical skills, and hands-on experience gained during internships [9]. Yet, potential weaknesses may stem from limited business acumen and financial management skills, or a lack of experience in practice management.

This research endeavors to investigate the application of SWOT analysis among senior dental students at the Department of Dentistry, National and Kapodistrian University of Athens, Greece. Emphasis is placed on evaluating their preparedness to initiate independent dental practices shortly after graduation, offering valuable insights into the distinct requirements of senior dental students during the decision-making process [1,9]. Simultaneously, the study aims to elucidate the relevance of SWOT analysis in the realm of dental entrepreneurship. Its objective is to provide comprehensive insights and guidance on the effective utilization and seamless integration of SWOT analysis into decision-making processes during the transitional phases between academic and professional life. While SWOT analysis has been employed in various capacities within dentistry, its novel application for assessing dental students' anticipation of their future professional trajectories constitutes a noteworthy contribution [7]. This study addresses a conspicuous gap in the existing literature by undertaking a thorough exploration of SWOT analysis as an educational instrument tailored for senior dental students navigating the intricacies of entrepreneurial ventures within the dental healthcare sector. Furthermore, it seeks to contribute to the academic discourse by illuminating the application of SWOT analysis in dental education, specifically in the context of senior students' career decisions with a focus on dental entrepreneurship. The overarching goal is to empower senior dental students with strategic insights that can elevate their decision-making process and augment the likelihood of success in their entrepreneurial pursuits.

## 2. Materials and Methods

### 2.1. Application of SWOT for dental students

In the field of dental education SWOT could be used for the following purposes:

1. Identifying personal strengths and weaknesses. In this case, dental students can use SWOT analysis to assess their individual strengths and weaknesses. Strengths might include attributes such as a strong work ethic, good manual dexterity, effective communication skills, or a strong academic background. On the other hand, weaknesses could encompass areas needing improvement, like time management, specific academic subjects, or clinical skills. Recognizing these aspects will help students leverage their strengths and work on their weaknesses.

2. Opportunities for growth and development. Dental education offers numerous opportunities for students to develop professionally and personally. SWOT analysis as an educational tool will allow students to identify these opportunities, such as access to research projects, participation in community outreach programs, specialized training, or networking with professionals. Recognizing these avenues for growth will enable students to take advantage of these opportunities to enhance their skill set and knowledge.

3. Recognizing threats and challenges. Dental students face various challenges and potential threats in their educational and professional journey. These could include heavy academic workloads, intense competition, rapidly evolving technology, or the pressure to stay updated with current dental practices. By acknowledging these threats, students can prepare themselves to handle challenges more effectively and develop strategies to mitigate potential risks.

4. Career planning and decision-making. SWOT analysis can aid dental students in making informed decisions about their future careers. By identifying their strengths and aligning them with career paths, students can make choices that best suit their skill set and aspirations. Moreover, recognizing weaknesses will allow students to seek further education, training, or mentorship to enhance their professional capabilities.

5. Personal development and improvement strategies. After conducting a SWOT analysis, dental students can develop action plans to improve and grow. For example, if students identify communication skills as a weakness, they can seek opportunities to practice and enhance these skills, such as joining public speaking groups or taking communication workshops. Similarly, students can capitalize on strengths by actively participating in relevant extracurricular activities, mentorship programs, or advanced educational opportunities (Table 1).

**Table 1.** Structured overview of the issues addressed by dental students and innovative approaches for addressing each issue using SWOT analysis.

Issue	Innovative approach
1. Identifying personal strengths and weaknesses.	Utilize SWOT analysis for a comprehensive assessment, highlighting attributes like work ethic, manual dexterity, communication skills, and academic background. Leverage strengths and actively work on weaknesses for personal and professional development.
2. Opportunities for growth and development.	Employ SWOT analysis as an educational tool to recognize opportunities in dental education, such as research projects, community outreach, specialized training, and professional networking. Capitalize on identified opportunities to enhance skills and knowledge.
3. Recognizing threats and challenges.	Use SWOT analysis to acknowledge challenges like academic workloads, competition, evolving technology, and staying updated with practices. Develop strategies to handle challenges effectively and mitigate potential risks.
4. Career planning and decision-making.	Apply SWOT analysis for informed career decisions by aligning strengths with suitable career paths. Address weaknesses through further education, training, or mentorship.
5. Personal development and improvement strategies.	Develop action plans post-SWOT analysis. For example, if communication skills are identified as a weakness, engage in public speaking groups or communication workshops. Capitalize on strengths through extracurricular activities and mentorship.

2.2. Sample of the study

The study sample consisted of 116 senior dental students (N=116) who are currently enrolled in the Department of Dentistry at the National and Kapodistrian University of Athens, Greece. Specifically, these students are actively engaged in the "Dental Professional Practice" course for the academic year 2023-2024, which is an integral component of the dental curriculum, occurring during the 9th semester of their undergraduate studies. These participants are in the final stages of their dental education, nearing completion of their academic requirements and preparing for graduation. The inclusion criteria for this study specifically targeted only senior dental students to ensure a focused investigation into the career decision-making processes and their entrepreneurial aspirations at this critical stage of their education. Conversely, exclusion criteria were applied to junior and intermediate dental students, individuals from non-dental disciplines, and those who did not furnish complete and informed consent. These criteria were designed to focus the study exclusively on the unique perspective of senior dental students, thereby creating a targeted dataset conducive to exploring SWOT analysis within the context of their career decisions and entrepreneurial aspirations. The selection of participants from this cohort aimed to gather insights that are pertinent to the unique challenges and considerations faced by senior dental students as they approach the transition from academia to professional practice.

### 2.3. Ethics Statement

This research adheres to the principles of ethical conduct in research involving human subjects and is conducted in accordance with the guidelines outlined in the Declaration of Helsinki. The study received ethical approval from the Institutional Review Board (IRB) of the department of Dentistry, National and Kapodistrian University of Athens, Greece concerning inquiries conducted as part of the course, with one of the authors of the present study assuming responsibility for the course for the academic year 2023-2024 (611/17.10.2023). Participants were fully informed about the nature, purpose, and procedures of the research before their involvement. Prior to participating, each senior dental student received a detailed written and verbal explanation of the study and the SWOT tool. They were provided with an informed consent form outlining their voluntary participation, the potential risks and benefits of involvement, the confidentiality of their data, and the right to withdraw from the study at any time without consequence. Completing and submitting the questionnaire served as confirmation of the participant's willingness to take part in the study as mentioned elsewhere [10,11].

### 2.4. Methods

This research adopts a questionnaire-based approach, a method commonly employed in dental studies for data collection on relevant themes, as evidenced by previous works [10,12]. The questionnaire was uploaded to Google Forms, providing students with a QR code for convenient access during completion via their smartphones during the ninety minutes relevant seminar of the course.

The questionnaire of the study, structured into two parts, encompassed demographics (Part A) (Q1) and an exploration of final-year dental students' perspectives on their professional careers, particularly in establishing their own dental practice (Part B)(Q2-Q9). Q2-Q9 questions were open-ended, designed to allow students to provide as much detail as they wished in their responses. All questions were also obligatory to submit the form. Prior to participation, informed consent was sought, emphasizing the voluntary nature of involvement, anonymity, and the absence of rewards. Data collection relied on participants voluntarily completing the questionnaire, with each student allowed a single submission. Strict confidentiality measures were in place, ensuring the anonymity of participants, and that personal information will not be referenced or published. The study employed quantitative analysis to scrutinize the qualitative responses gathered from Part B, focusing on the professional outlook of senior dental students. Qualitative methodologies like the one used in this study are reported to enhance the depth and richness of research findings in the healthcare field [13], especially dentistry [14]. The research adhered to ethical guidelines, safeguarding participants' privacy and ensuring responsible data usage. The estimated time for participants to complete the questionnaire was a maximum of 16 minutes. The submission of the form implied participants' consent to participate in the study.

### 2.5. Statistical analysis

The data collected from the SWOT analysis were analyzed with the statistical package IBM SPSS v. 28. Respondents' short answers in the open-ended questions of SWOT components (strengths, weaknesses, opportunities, threats, values, and actions) were analyzed thematically and absolute and relative frequencies (n, %) were reported per theme and SWOT component. Then, chi-square tests of independence were performed with Fisher exact test correction when needed, to address potential differences between genders. To provide an overview of new dentists' profiles in terms of their actions to achieve their goal, Two-Step cluster analysis was implemented with the various reported actions as predictors, extracting two subgroups [15]. To detect the most influential factors that separate the dentists' action profiles, binary logistic regression analysis with stepwise backward elimination [16] was performed with dependent variable the action clusters and independent variables the themes extracted from the SWOT components.



### 3. Results

Data extracted from the SWOT analysis are presented in Table 2. The response rate was 98, 3% (114 correct questionnaires were finally collected). In terms of strengths, participants indicated mostly their communication skills (50% of participants) and organization skills (49.10%), followed by their favorable personal traits that would help them succeed in their goal (36%), such as persistence, patience, attention to detail, consistency, decisiveness, and critical thinking. Knowledge in their field (26.30%), industriousness (24.60%) and practical/clinical skills (17.50%) were also reported as strengths. Interestingly, when asked about weaknesses, participants focused on emotional and personal traits such as anxiety (41.20%) and other personal characteristics (30.70%), i.e., short-temper, lack of patience, indecisiveness, followed by lack of initial capital (24.60%), organization difficulties (16.70%), lack of experience compared to other dentists (14.00%) and perfectionism (10.50%). Other weaknesses that were reported to a lesser extent were oversensitivity (7.90%), fear of failure (7.00%), lack of confidence (7.00%), lack of extended social circle (5.30%), financial management difficulties (5.30%).

**Table 2.** SWOT chart of the data provided by the sample (N=114).

<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>• Communication skills (50.00%)</li> <li>• Organization skills (49.10%)</li> <li>• Personal traits<sup>1</sup> (36.00%)</li> <li>• Knowledge (26.30%)</li> <li>• Industriousness (24.60%)</li> <li>• Practical skills (17.50%)</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>• Anxiety (41.20%)</li> <li>• Personal traits<sup>2</sup> (30.70%)</li> <li>• Lack of capital (24.60%)</li> <li>• Organization difficulties (16.70%)</li> <li>• Lack of experience (14.00%)</li> <li>• Perfectionism (10.50%)</li> </ul> <p><i>Other:</i> Oversensitivity (7.90%), Fear of failure (7.00%), Lack of confidence (7.00%), Lack of extended social circle (5.30%), Financial management difficulties (5.30%)</p>
<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Collaboration with experienced dentists in dental practice (33.30%)</li> <li>• Training/Specialization (27.20%)</li> <li>• Dentists/Physicians in the family (11.40%)</li> <li>• Work as an intern (10.50%)</li> </ul> <p><i>Other:</i> Financial support from family (7.90%), Extended social circle (7.00%), Increased demand for dentists (6.10%), Digital dentistry (4.40%), Retirement of dentists (3.50%), Dental tourism (0.90%)</p>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>• Economic instability (77.20%)</li> <li>• Saturated profession (26.30%)</li> <li>• High initial capital required (23.70%)</li> <li>• Taxation (14.00%)</li> <li>• Political instability (13.20%)</li> </ul> <p><i>Other:</i> Covid-19 pandemic (5.30%), Bureaucracy (4.40%)</p>

Gender differences for the SWOT analysis components are presented in Table 3. The strength of organization skills was more likely reported by female dentists compared to male dentists (59.2% vs 32.6% respectively), while knowledge in their field was reported more frequently by male dentists (39.5% vs 18.3%). On the other hand, female dentists highlighted their anxiety as an important weakness to achieve their goal (49.3% vs 27.9% for female and male participants respectively). Female participants were more likely to consider access to training and specialization programs as an opportunity compared to males (35.2% vs 14%) while support from dentists and other physicians in the family was considered an opportunity by 20.9% of male dentists and only 5.6% of female dentists. Economic instability was reported as a threat by female dentists (85.9%) and by male dentists (62.8%) while high taxation rates in Greece was considered a threat by 25.6% of male participants and only 7% of females.

**Table 3.** Gender differences for the SWOT analysis components.

	<b>Gender</b>					
	<b>Total (N=114)</b>		<b>Male (n=43)</b>		<b>Female (n=71)</b>	
	n	%	N	%	N	%
<b><i>Strengths</i></b>						
Industriousness	28	24.6%	10 <sub>a</sub>	23.3%	18 <sub>a</sub>	25.4%
Organization skills	56	49.1%	14 <sub>a</sub>	32.6%	42 <sub>b</sub>	59.2%
Knowledge	30	26.3%	17 <sub>a</sub>	39.5%	13 <sub>b</sub>	18.3%
Communication skills	57	50.0%	22 <sub>a</sub>	51.2%	35 <sub>a</sub>	49.3%
Practical skills	20	17.5%	10 <sub>a</sub>	23.3%	10 <sub>a</sub>	14.1%
Personal traits <sup>1</sup>	38	33.3%	12 <sub>a</sub>	27.9%	26 <sub>a</sub>	36.6%
<b><i>Weaknesses</i></b>						
Anxiety	47	41.2%	12 <sub>a</sub>	27.9%	35 <sub>b</sub>	49.3%
Personal traits <sup>2</sup>	35	30.7%	14 <sub>a</sub>	32.6%	21 <sub>a</sub>	29.6%
Lack of initial capital	28	24.6%	10 <sub>a</sub>	23.3%	18 <sub>a</sub>	25.4%
Organization difficulties	19	16.7%	9 <sub>a</sub>	20.9%	10 <sub>a</sub>	14.1%
Lack of experience or clinical skills	16	14.0%	9 <sub>a</sub>	20.9%	7 <sub>a</sub>	9.9%
Perfectionism	12	10.5%	7 <sub>a</sub>	16.3%	5 <sub>a</sub>	7.0%
<b><i>Opportunities</i></b>						

Collaboration with experienced dentists in dental practice	38	33.3%	18 <sub>a</sub>	41.9%	20 <sub>a</sub>	28.2%
Training/Specialization	31	27.2%	6 <sub>a</sub>	14.0%	25 <sub>b</sub>	35.2%
Dentists/Physicians in the family	13	11.4%	9 <sub>a</sub>	20.9%	4 <sub>b</sub>	5.6%
Work as an intern	12	10.5%	3 <sub>a</sub>	7.0%	9 <sub>a</sub>	12.7%
<i>Threats</i>						
Economic instability	88	77.2%	27 <sub>a</sub>	62.8%	61 <sub>b</sub>	85.9%
Saturated profession	30	26.3%	15 <sub>a</sub>	34.9%	15 <sub>a</sub>	21.1%
High initial capital	27	23.7%	8 <sub>a</sub>	18.6%	19 <sub>a</sub>	26.8%
Taxation	16	14.0%	11 <sub>a</sub>	25.6%	5 <sub>b</sub>	7.0%
Political instability	15	13.2%	3 <sub>a</sub>	7.0%	12 <sub>a</sub>	16.9%

<sup>1</sup> persistence, patience, attention to detail, consistency, decisiveness, critical thinking  
<sup>2</sup> short-tempered, impatient, over-patient, indecisive  
Note: Values in the same row not sharing the same subscript are significantly different at p < .05.  
Cells with no subscript are not included in the test.  
a, b: significant differences

Values and actions provided by the participants are summarized in Table 4, along with gender differences. Industriousness (24.6%), Persistence (35.1%) and Ethics (28.9%) were the main values reported by both male and female dentists. In terms of the path to achieve their goals, participation in training programs (57.9%), gaining experience by working with more experienced dentists (29.8%) and participation in scientific conferences (16.7%) were the most prevalent actions.

**Table 4.** Gender differences in values and actions reported by the sample.

	Total		Sex			
			Male		Female	
	n	%	N	%	n	%
<i>Values</i>						
Industriousness	28	24.6%	11 <sub>a</sub>	25.6%	17 <sub>a</sub>	23.9%
Persistence	40	35.1%	17 <sub>a</sub>	39.5%	23 <sub>a</sub>	32.4%
Patience	25	21.9%	9 <sub>a</sub>	20.9%	16 <sub>a</sub>	22.5%
Ethics/Respect	33	28.9%	13 <sub>a</sub>	30.2%	20 <sub>a</sub>	28.2%
Faith	15	13.2%	6 <sub>a</sub>	14.0%	9 <sub>a</sub>	12.7%
Organization	25	21.9%	10 <sub>a</sub>	23.3%	15 <sub>a</sub>	21.1%
Goal setting	13	11.4%	4 <sub>a</sub>	9.3%	9 <sub>a</sub>	12.7%
<i>Actions</i>						
Training/Seminars	66	57.9%	20 <sub>a</sub>	46.5%	46 <sub>a</sub>	64.8%
Gaining experience	34	29.8%	14 <sub>a</sub>	32.6%	20 <sub>a</sub>	28.2%



Participate in Scientific Conferences	19	16.7%	3 <sub>a</sub>	7.0%	16 <sub>b</sub>	22.5%
Postgraduate studies	17	14.9%	5 <sub>a</sub>	11.6%	12 <sub>a</sub>	16.9%
Marketing	13	11.4%	6 <sub>a</sub>	14.0%	7 <sub>a</sub>	9.9%

Note: Values in the same row not sharing the same subscript are significantly different at  $p < .05$ . Cells with no subscript are not included in the test.

Actions were utilized in two-step cluster analysis and provided two subgroups (silhouette score of 0.2), namely the participants that intended to take advantage of all available options to achieve their goal ( $n=49$ ) and the ones that focused on gaining professional skills and experience ( $n=65$ ). Results of cluster analysis are presented in Table 5, showing that the first cluster included participants that intent to participate in training programs and scientific conferences, work as interns, pursue postgraduate degrees and utilize marketing strategies to promote their practice while the second cluster included only participants that intent to gain practical experience and training.

**Table 5.** Two Step Cluster Analysis results for action profiles.

Predictors	Action clusters			
	1		2	
	Taking advantage of all available options		Focus on professional experience	
	(n=49)		(n=65)	
	N	%	n	%
Training/Seminars	27	55.1%	39	60.0%
Gaining experience	10	20.4%	24	36.9%
Participate in Scientific Conferences	19	38.8%	0	0.0%
Postgraduate studies	17	34.7%	0	0.0%
Marketing	13	26.5%	0	0.0%

In Table 6, the results of Stepwise Binary Logistic Regression for the predictors of classification in cluster 1 "Taking advantage of all available options" are presented. Participants that report the strength of industriousness were less likely to take advantage of all options to achieve their goals and were more likely to focus on gaining practical skills and experience (OR 0.338 95% CI .126 - .906). Moreover, participants that perceived their strength related to personal traits such as persistence, patience, attention to detail, consistency, decisiveness, and critical thinking were more likely to take advantage of all options to achieve their goals (OR 2.922 95% CI 1.250-6.828).

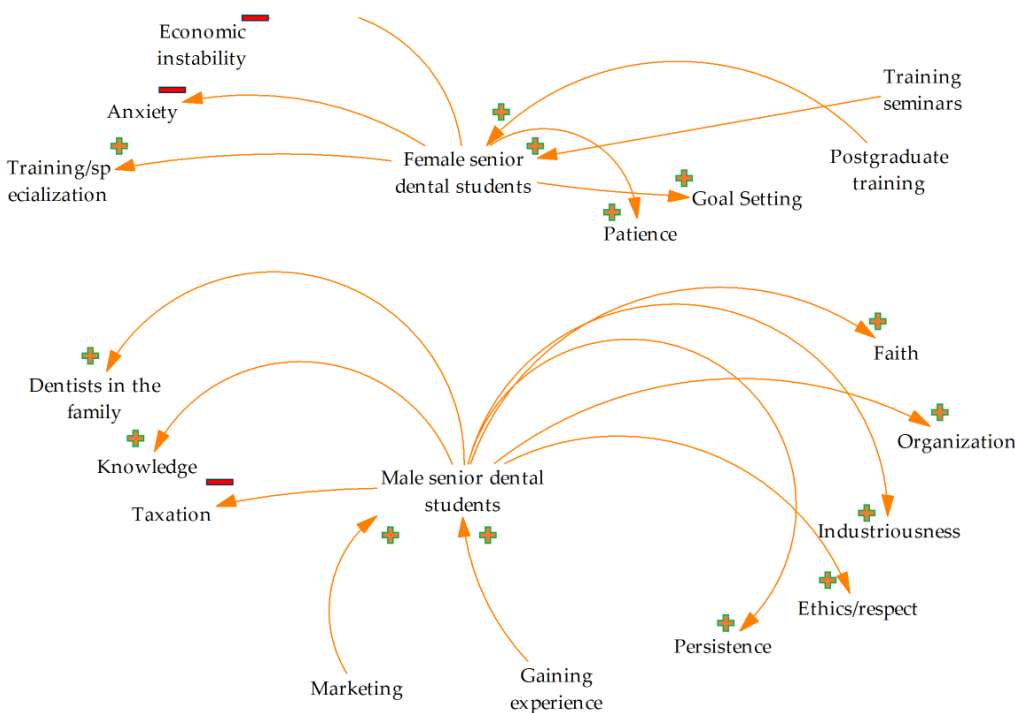
**Table 6.** Results of Stepwise Binary Logistic Regression for the predictors of classification in cluster 1 "Taking advantage of all available options" ( $n=49$ ).

	B	S.E.	Wald	Df	p	OR	95% C.I.	
							Lower	Upper
Industriousness	-1.085	.503	4.652	1	.031	.338	.126	.906
Personal traits (strengths)	1.072	.433	6.130	1	.013	2.922	1.250	6.828
Economic instability	.767	.515	2.216	1	.137	2.152	.784	5.905

Gender (Female vs Male)	vs	.008	.430	.000	1	.986	1.008	.433	2.342
Constant		-1.012	.752	1.812	1	.178	.364		

Predictors included in stepwise backward conditional method: Strengths: Industriousness, Organization skills, Knowledge, Communication skills, Practical skills, Personal traits. Weaknesses: Anxiety, Personal traits, Lack of initial capital, Organization difficulties, Lack of experience or clinical skills, Perfectionism. Opportunities: Collaboration with experienced dentists in dental practice, Training/Specialization, Dentists/Physicians in the family, Work as an intern. Threats: Economic instability, Saturated profession, High initial capital, Taxation, Political instability.

A schematic representation of the data is seen in Figure 1.



**Figure 1.** Schematic representation of factors influencing male and female students ‘decision on dental entrepreneurship (factors are mentioned according to the highest prevalence)(-: factor affects negatively, +: factor affects positively).

4. Discussion

Personal development plans play a pivotal role in fostering self-development and professional advancement [17–19]. In the realm of dentistry, where the demands on practitioners are multifaceted, the application of strategic tools becomes imperative [20]. Specifically, SWOT analysis emerges as a valuable technique for dentists and dental practices, offering insights into various aspects of their educational, business and professional practice [21,22]. The intricacies of the dental profession, from specialized skills to the utilization of advanced technological equipment and in-depth knowledge of the stomatognathic system, disease etiology, and therapeutic approaches, underscore the rigorous demands placed on dental professionals [23]. As the foundational training ground for future dental practitioners, dental schools bear the responsibility of imparting the necessary skills and knowledge [24]. The education of dental students, therefore, becomes a critical determinant of their future professional success.

Within this context, the application of SWOT analysis in our study delves into the strengths and weaknesses of dental students, providing a nuanced understanding of their preparedness for the challenges of the dental profession. Strengths’ analysis in our study had important feedback. More specifically, the results of the stepwise binary logistic regression revealed several significant predictors associated with the classification in Cluster 1, "Taking advantage of all available options." Notably, industriousness emerged as a significant predictor, indicating that students with a strong work ethic are more likely to exhibit a proactive approach in utilizing available entrepreneurship opportunities in the market of dental services. This finding aligns with previous research emphasizing the role of diligence in career success [1,25]. Moreover, personal traits, specifically strengths, were also identified as a significant predictor of career success in our study. This underscores the importance of self-awareness and leveraging one's unique qualities in career decision-making as also mentioned elsewhere [1,26]. The positive association between personal traits and the inclination to explore various options in dental entrepreneurship aligns with the idea that understanding one's strengths contributes to effective decision-making and adaptability [27] and corresponds to a growth mindset described already in the literature [28]. The relevant literature underscores the influential role of mindset, specifically the distinction between fixed and growth mindsets, in shaping decision-making and career trajectories [28–30]. A fixed mindset, characterized by the belief in inherent limitations, leads individuals to perceive their abilities as rigid and resistant to change, impacting their reactions to unexpected career developments [17]. Skepticism and reluctance to adapt which characterize the fixed mindset, become a self-fulfilling prophecy that discourages proactive engagement with career challenges [28,31]. In contrast, a growth mindset views abilities as malleable, embracing setbacks as opportunities for learning and improvement [28] as seen by most of our participants. Dental students with a growth mindset will approach unexpected developments as challenges, fostering resilience and adaptability while in the school as well as later in their profession [19,28,32]. This mindset encourages a proactive decision-making approach, marked by seeking feedback, experimenting with strategies, and ongoing development initiatives [17,28]. As discussed elsewhere, fostering a growth mindset is vital for dental students, enabling them to navigate uncertainties and challenges with flexibility, open-mindedness, and a commitment to continuous learning [17,28,33]. More specifically, Dweck's concept of a growth mindset emphasizes continual learning and openness, particularly relevant in the dynamic field of dentistry [28,34]. Embracing a growth mindset is crucial for our senior dental students, propelling them towards success but recognizing its limitations. The next step involves adopting an evolutionary mindset, delving into self-reflection, personal evolution, and addressing all opportunities for success as seen for the 43% of our participants and discussed also elsewhere [35]. An evolutionary mindset prompts individuals to explore competencies, talents, and ask challenging questions about their behavior, crucial for navigating complexities in dentistry [22,36]. In current and future high-performance dental environments, an evolutionary mindset will foster adaptability, flexibility, and readiness for self-scrutiny and necessary changes, marking the path towards true leadership in the dental profession [12](Table 7).

**Table 7.** Mindset categories and educational approaches for dental students.

Mindset category	Profile	Actions taken by the person	Educational approaches from dental schools
Fixed mindset	"Well, that’s it. I’m stuck"	Mistakes equate to failure	Lack of receptivity to feedback, aversion to risk, and stagnant self-perception
Growth mindset	"Interesting. What can I learn from this?"	Mistakes seen as opportunities for growth	Openness to feedback, actively seeks learning opportunities, values self-growth
Evolutionary mindset	"What does this say about me: how can I grow myself?"	Mistakes seen as a pathway to self-knowledge	Introspection, continuous self-learning, and a deep commitment to personal growth

Although economic instability in the decision-making process of senior dental students in our study did not achieve conventional significance levels, its presence in the model suggests potential influence. This aligns with the broader recognition that economic considerations wield substantial influence on career decisions. As highlighted by Stoller [1] and Gu et al. [37] in previous research, financial factors play a pivotal role in shaping career choices. Additionally, insights from Greenbank and Hepworth's work [38] on improving the career decision-making behavior of working-class students indicate that limited economic capital is a recognized factor influencing such behavior. Importantly, their study suggests that the students' values and non-financial circumstances have a more pronounced effect on their career decision-making, a point also evident in our data.

Moreover, weaknesses' analysis showed that gender (female vs male) did not emerge as a significant predictor in the current study. The non-significant association may suggest that, within the context of senior dental students in Greece, gender does not play a decisive role in the inclination to explore available options. This contrasts with some existing literature that has reported gender-based differences in career decision-making [27,39]. In the study of da Graça Kfoury et al. [39], conducted in Brazil, the investigation into future dental surgeons' discourses highlighted distinct motivations for entering the field based on gender. Women expressed a preference for dentistry due to their enjoyment of working with people and aspirations for formal employment, while men articulated desires for professional status, lucrative business prospects, and the autonomy of self-employment. This mirrors though the findings from our study, where gender differences in the SWOT analysis components underscored variations in strengths, weaknesses, opportunities, and threats perceived by female and male dental students. Notably, organization skills were more emphasized by female dentists, aligning with the Brazilian study's emphasis on women's appreciation for interpersonal aspects of dentistry. Conversely, male dentists in both studies shared a common inclination towards technical proficiency and a desire for business acumen. An intriguing parallel emerges in both datasets concerning female dentists' consideration of anxiety as a significant weakness and a heightened perception of economic instability as a threat. However, our study introduces the dimension of taxation rates as a concern for male dentists, a factor not explicitly addressed in the Brazilian study but negatively affecting our male sample. Finally, marketing involvement positively affects our sample as also addressed elsewhere [40,41]. These comparative observations underscore the importance of recognizing contextual variations in dental education and career expectations, emphasizing the need for tailored educational approaches that address gender-specific preferences and challenges. Such insights are instrumental in shaping inclusive and effective strategies within dental education systems, promoting an environment that nurtures the diverse aspirations and strengths of future dental professionals.

Opportunities' analysis was also important in our approach. The identification of key predictors opens avenues for targeted interventions and support mechanisms. Recognizing the significance of personal traits, educators and career counselors can design programs to enhance self-awareness and provide resources for students to better understand their strengths. Strengthening these personal attributes may positively influence career decision-making processes [27,42–44]. The study's focus on opportunities aligns also with the broader context of career development theories, emphasizing the importance of identifying and capitalizing on favorable conditions [45]. The opportunities identified in the study, such as collaboration with experienced dentists and specialized training, suggest avenues for strategic career planning as discussed elsewhere [17,46]. Finally, threats were also searched in our study with overall political situation in the area being a significant factor for decision making for students as addressed elsewhere [47]. Despite the insights gained, it's essential to acknowledge the limitations and potential threats to the study's validity. The non-significant association of certain variables, such as economic instability and gender, highlights the complexity of career decision-making as mentioned elsewhere too [47,48]. Despite the known factors discussed above, there might be others not captured in the current study which might contribute significantly to students' choices.

Senior dental students, as revealed by the literature and our study, prioritize attributes beyond goal setting in their hierarchy of decision-making factors [48]. Notably, characteristics such as

persistence, ethics, respect, industriousness, organization, patience, and loyalty take precedence over goal setting in their considerations. This inclination suggests that senior dental students place substantial value on personal qualities and ethical principles when making professional decisions. While goal setting is acknowledged as a valuable aspect, its prioritization appears to be lower compared to these character-based attributes. Therefore, enabling senior dental students in effective professional decision-making involves fostering and emphasizing the cultivation of these ethical and character-driven qualities. This aligns with the notion that the decision-making process goes beyond merely setting goals and underscores the significance of a holistic approach that incorporates personal values and ethical considerations [49–51]. The identified factors encompass not only the personal attributes but also the importance of fostering a classroom environment that encourages mastery goals and offers students opportunities to set their own goals. Additionally, accompanying goal setting with related steps such as planning, self-evaluation, feedback, and reflection emerges as crucial for a comprehensive decision-making process [52–54]. Therefore, facilitating senior dental students in their profession decision-making should involve nurturing a well-rounded set of skills and qualities, including but not limited to goal setting, to ensure a holistic and ethical approach to their future careers [55]. As Schunk [56] suggested “By themselves, goals do not automatically enhance learning and motivation.”

Overall, through its simplicity, the SWOT framework becomes accessible and applicable in various educational contexts, specifically, professional decision-making processes for senior dental students, guiding them in strategic planning by aligning strengths with opportunities and proactively addressing weaknesses and threats [57,58]. As Mary Renault aptly notes, there is a certain shock worse than the totally unexpected — the anticipated challenges for which one has failed to prepare [59]. This underscores the necessity of combining tools like SWOT with an evolutionary mindset of adaptability and resilience, to navigate the unforeseen developments that are an inherent part of any career journey as mentioned by other scholars [1,3,7,60].

According to our data the integration of educational approaches from dental schools should focus on fostering a growth mindset and, ultimately, an evolutionary mindset among dental students. This involves creating a learning environment that encourages self-awareness, values mistakes as opportunities for growth, and instills a sense of personal responsibility for one's behavior. Dental education programs can implement strategies such as feedback-rich assessments, reflective exercises, and mentorship programs to nurture a mindset conducive to continuous learning and personal evolution. Additionally, emphasizing the importance of embracing challenges and adapting to change within the dental profession should be a core component of the curriculum to prepare future dentists for success in the current and future dynamic healthcare environments [61,62].

## 5. Limitations

While the study offers valuable insights, it is essential to acknowledge certain limitations inherent in its methodology. The simplicity of the SWOT analysis, while advantageous, may oversimplify the intricacies of career decision-making, potentially overlooking crucial nuances [2,21,46]. Furthermore, subjective judgments play a significant role in the analysis, introducing the possibility of biased assessments. We should further take into consideration the desirability bias that could affect our estimations on the data derived. This is a documented phenomenon, that may influence participants to align their responses with societal norms or expectations, potentially impacting the accuracy of the study's findings [63]. So, in the context of career decision-making, our participants may have presented their choices in a favorable light, emphasizing the strategic nature of decisions or downplaying uncertainties. But as mentioned elsewhere, social desirability bias aligns with career development research findings, emphasizing the influence of response biases in self-reported data [64]. Of course, the static nature of SWOT provides a snapshot of the current situation, lacking the dynamic aspect necessary for understanding evolving career trajectories but the methodology provides valuable impact on factors that universities should consider while preparing dental educational programs. Future research should further address these limitations through



longitudinal designs and broader participant samples and triangulating findings with multiple data sources, could further enhance validity in future similar studies as mentioned by others [63–65].

## 5. Conclusions

In this study, we delved into the significant role of SWOT analysis for dentists operating in the competitive healthcare sector. Our focus was on senior dental students, exploring how they utilize SWOT analysis as an educational tool for making career decisions in dental entrepreneurship. Our findings highlighted that participants identified communication and organization skills as primary strengths, while weaknesses centered around emotional traits like anxiety and practical challenges such as a lack of initial capital. Opportunities were seen in collaboration with experienced dentists and access to training programs, while economic instability and the saturated dentist profession were perceived as significant threats. Gender differences were notable, particularly regarding organizational skills and anxiety. Common values such as industriousness, persistence, and ethics were identified, with actions primarily focusing on participating in training programs and gaining experience with experienced dentists. Senior students valuing industriousness were less likely to explore all available options, while those recognizing personal traits were more likely to do so.

Overall, our study sheds light on crucial factors influencing proactive career decision-making among senior dental students, offering valuable insights for both educational institutions and career counselors. The intervention involves promoting the recognition of personal traits and encouraging a comprehensive exploration of available career options through targeted educational programs. Framed within the SWOT analysis, this study contributes to the broader discourse on career development and underscores the importance of considering both internal and external factors in strategic decision-making. While acknowledging the limitations, the study lays a foundation for future research endeavors aimed at enhancing our understanding of the multifaceted nature of career choices in dentistry.

## 6. Appendix A

**Guidelines** The primary goal of this study is to contribute valuable insights to dental education and entrepreneurship of senior dental students. In this research, all collected data will be treated with the utmost confidentiality, adhering to ethical guidelines and data protection regulations. Identifiable information will be stored separately, and access will be restricted to the research team to safeguard privacy. Any details (if any) that could potentially reveal participants' identities will be anonymized or pseudonymized. Participation is entirely voluntary, and senior dental students have the right to withdraw without penalty, ensuring that their academic standing and relationship with the university remain unaffected.

Every effort will be made to minimize potential discomfort or inconvenience to participants, and the study poses no risks. All research data will be securely stored digitally, with restricted access limited to the authors. Data retention will follow ethical guidelines, and secure disposal will occur after a specified period.

For any questions or concerns, participants are encouraged to contact the principal investigator, or the Department of Dentistry of the National and Kapodistrian University of Athens' Ethics Committee.

By submitting the questionnaire of the study, senior dental students consent on their participation and contribution to advancing knowledge on dental entrepreneurship. The research team is committed to upholding the highest ethical standards throughout the process.

The questionnaire consists of two parts: demographics (Part A) and questions exploring final-year dental students' perspectives on their professional careers (Part B). It ensures anonymity, and no personal data is collected. Participation is voluntary, and there are no rewards. Students can complete the questionnaire once, implicitly accepting the rules of personal data protection. Full confidentiality is guaranteed, and personal information will not be mentioned in any reference or publication. Results will be used for scientific publications. Submission implies consent, and the

estimated time for completion is a maximum of 16 minutes. We appreciate your cooperation. Thank you.

## 7. Appendix B

The questionnaire of the study

Q1. What is your sex?

Q2. SWOT analysis is a functional tool that allows us to scrutinize a goal, a problem, or a situation and formulate an action plan or make informed decisions. Imagine you are strategizing for your upcoming dental practice either upon completing your studies or within the next 2-3 years. To facilitate decisions aimed at realizing this goal, begin by enumerating the strengths of the project pertinent to you personally. Highlight skills and talents you currently possess or anticipate acquiring in the next three years.

Q3. Record the personal weaknesses you identify that may impede your ability to carry out the project. This encompasses defects, weaknesses, negative beliefs, psychological barriers, and familial or societal beliefs that may act as barriers.

Q4. In this second segment, we document the THREATS (e.g., COVID, economic or political instability, tax-related issues, etc.) present in the environment that could pose a risk to our project. It is imperative to thoroughly consider these threats before making any decisions.

Q5. In this second segment, we document the THREATS (e.g., COVID, economic or political instability, tax-related issues, etc.) present in the environment that could pose a risk to our project. It is imperative to thoroughly consider these threats before making any decisions.

Q6. Which values do you think will assist you in organizing this specific goal?

Q7. Which values generally apply to each of your goals?

Q8. Which actions do you believe will contribute to the attainment of your goal?

Q9. How beneficial was the use of the tool in achieving this goal?

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