

Dentists' Entrepreneurial Intention and Associated Factors in Public Hospitals in Southeastern China: A Cross-sectional Study

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Abstract

Background: Due to the rising demand and fast growth opportunities, the private dental care sector in China tried to attract experienced dentists from the public hospital system, which hence are faced with challenges of talents outflow and shortage.

Methods: A dentist's entrepreneurial intention (EI) was represented by his/her intention of leaving the public hospital system to be engaged in the private sector. Dentists from public hospitals in 9 major cities of 5 provinces in Southeastern China were surveyed in this study. Through a snowball sampling method, a total of 336 questionnaires were collected. The association between the dentists' EI and their individual characteristics (basic demographic and professional characteristics, entrepreneurial behaviors) were analyzed using logistic regression analysis.

Results: In the public hospitals in China studied, female dentists are consistently less likely to report entrepreneurial intention (EI) (OR=0.365, p=0.001). Dentists in the age group of 36 to 45 and those aged over 45 reported much stronger EI (OR=14.205, p=0.012; OR=8.45, p=0.066) than those in 20's did. Compared with intern dentists, Attending Dentists (OR=7.812, p=0.016) and Associate/Chief Dentists (OR=9.857, p=0.021) were significantly more likely to report EI. Those with master level (OR=0.221, p=0.021) or Doctorate degrees (OR=0.118, p=0.005) are much less likely to report EI. Meanwhile, those in small hospitals (with employee numbers < 50) reported much stronger EI than those in large hospitals (OR=2.398, p=0.044). Additionally, dentists' entrepreneurial behaviors, risk aversion attitudes and their family background all have significant associations.

Conclusions:

The small public hospitals in China especially face a high risk of talented dentist outflow. As an offsetting strategy, these hospitals may consider more active recruiting policy for female dentists or those holding post-graduate degrees due to their good possibility of long term career path in the public hospital system.

Background

Rising demand for dental care service in China

Due to the traditional ignorance of oral health and past social-economic reasons, the general oral health status of Chinese residents is a serious concern and there has been a rapid growth in demand for dental service [1]. The caries incidence of the population was greater than 50%, and less than 50% of the residents had a healthy periodontal condition [2]. For adults between the age of 35 and 44, the dental cavity detection frequency was 96.7% and the gingival bleeding detection frequency was 87.4% [3]. The caries incidence for children at age of 5 years was 70.9%, and 34.5% at age of 12 [3]. With the significantly enhanced awareness of preventive dental health and improved living standards in China during the past

decade, public demand for dental care surged quickly with an annual growth rate of about 11% [4]. In 2020, China's dental care market was estimated to be worth RMB100 billion (US\$14 billion) [4].

Against the social background introduced above, there has been a major increase in demand for private dental services in China too. First, dental patients bear the burden of a significant share of the medical expenses under the current social health insurance scheme in China, which only covers minimum basic treatments of oral diseases and excludes additional treatments and cares, such as preventive dental hygiene, dental crowns with more advanced materials, orthodontics or dental implants. Second, many urban middle-class patients prefer to choose private dental clinics because they are willing to and can afford to pay for the better patient experience provided by private dental clinics, such as a patient-friendly facility environment, caring dental professionals, advanced equipment, a short or no waiting time, flexibility in appointments and so on.

Dental care supply in China

At the current stage, the dental care supply in China is still insufficient to meet the rising demand. By 2018, there were 314,347 trained dentistry personnel in mainland China, among whom 171,587 (54.6%) were dentists, 37.8% were dental nurses and 7.6% were dental technicians. The density of dentistry personnel (per 1000 population) was about 0.129 in 2018, while the WHO standard is 0.2 [5]. There were in total 75,399 dental service units among all healthcare providers in mainland China [5]. By institution number, 73.8% of these service units exist as dental departments of general hospitals [1].

There has been some policy reforms in China directed at improving the supply of dental health care, such as multi-sited practicing by qualified dentists, a simplified process of private clinic license application and approval, as well as encouraging private venture capital to enter the dentistry field in China [1, 6]. Owing to the favorable external environment, investment capital has actively flowed into the private dental sector and some large oral-care companies have opened chains of private dental clinics across China [4].

With the fast growth, the private dental sector in China faces the challenge of insufficient numbers of qualified dental professionals and has been trying to attract qualified dental personnel from public hospitals, where most dentists are trained and developed. While a career in public hospitals may provide job security and a decent professional reputation, private practice and dental entrepreneurs have the advantages of a more attractive income and the potential of a lucrative return from a successful dental venture business. Hence the public hospitals are especially concerned about the outflow and shortage of the highly skilled dentists due to their switching to private dental sector or entrepreneurial activities.

Dentists' entrepreneurial activities and intention

There are various ways to define entrepreneurship. Usually, entrepreneurship includes the ability to identify new opportunities, executive skills to obtain resources and implement plans, as well as leadership skills, including risk attitude and tolerance [7, 8]. Specifically, the entrepreneurship in dentistry involves initiating or developing a dental practice or relevant business, organizing the necessary financial and

human resources, and taking the associated risks and rewards [8]. Dentists may also be engaged in the manufacturing of dental instruments, equipment or materials.

Dentists traditionally are more likely than other healthcare professionals (such as physicians, surgeons or nurses) to start up their own practice, or move into private practice. [9, 10]. During the past decades, in an environment of dynamic healthcare policy reform that increasingly promotes the role of market factors (such as service competition and patient satisfaction), the entrepreneurship of dentists has increasingly received attention in both dentistry and dental education worldwide [8, 9, 11].

Meanwhile, there is a very small volume of literature studying the entrepreneurial behaviors or decisions of dental professionals [11-13]. Some studies only explore the motivations of dental students who chose to work in a private practice [14-18]. Since the public healthcare system plays a dominant role in China, an entrepreneurial career and related studies have not yet received much attention. Currently, there is no existing literature studying the entrepreneurial activities of dentists in China.

Objective of this study.

This study aims to examine the entrepreneurial intentions of dentists in the public hospitals in China and how it is associated with some key features of dentists. The key features examined include educational background, professional qualification and years of practice, as well as their entrepreneurial or leadership skills and risk aversion personality features. The influence of their family background will be examined too.

The analysis was conducted from the perspective of public hospitals in China. The findings are expected to provide information for the public hospitals to forecast their potential outflow and shortage of seasoned dental healthcare professionals and to provide ideas for a recruiting strategy to help maintain the team and alleviate the upcoming talent shortage.

Methods

Ethics approval and consent to participate

Ethical approval of this study was obtained from the Research Ethics Committee at School of Business, Macau University of Science and Technology (No: MUST/MSB/D/19/0128). Verbal informed consent procedure was approved by the Research Ethics Committee. The questionnaire has a brief cover letter in written form, describing the research purpose of the collected information and the confidential guarantee policy. Before starting the survey questionnaire, the ethics statement was disclosed to all respondents and verbal informed consents were obtained from all respondents. All respondents were voluntary and the responses were anonymous.

Study location

This study focuses on nine representative cities from five provinces/municipalities in Southeastern China. With the most developed economy in China, Southeastern China area has many public hospitals with top accreditations as well as high quality private healthcare providers[4]. As the pioneer region in China influenced by Western medicine since a century ago, the residents in Southeastern China have a higher preference for choosing private dental care than that of the rest of the country [4].

The nine cities sampled include Shanghai, Guangzhou, Shenzhen, Nanjing, Nanchang, Hefei, Foshan, Zhuhai, and Zhongshan. Among them, Shanghai, Guangzhou, and Shenzhen are the top cities in China. Nanjing, Nanchang and Hefei are provincial capital cities. Located in the Pearl River Delta area in Guangdong province, Foshan, Zhongshan and Zhuhai are reprehensive cities in Southeastern China that enjoy a developed economy and a high level of personal income.

Questionnaire

The questionnaire adopted an established scale to measure the key concepts of entrepreneurial intention and behaviors [19] and was pre-tested for validity by collegiate faculty, dentists, and dental students randomly selected from major public hospitals in Guangzhou, China. The reliability of the scales was estimated to be 0.81. (See “Additional files” in the appendix for the full version of the questionnaire.)

Sampling

A Snowball sampling method was adopted. Two or three senior dentists and professionals in the major public hospitals in each city were first randomly sampled, then each of them gave multiple referrals to other qualified dentists in their cities. This pattern was repeated until a sufficient number of dentists were available for the sample. The number of dentist respondents is proportional to the dental healthcare workforce population in each city/municipality.

The sampling and survey process was performed during ten months between September 2018 and June 2019. A total of 400 questionnaires were distributed in either paper or electronic forms through WeChat (the dominant social media App in China), depending on the respondents’ preference and convenience. Eventually, 336 valid responses were received (effective returning rate = 84%). All questionnaires were self-administrated. All data collected through questionnaires were entered and coded.

Statistical methods

Dependent variable:

Entrepreneurial intention (EI) is defined as “the conscious state of mind that precedes action and directs attention toward entrepreneurial behaviors such as starting a new business and becoming an entrepreneur” [20, 21]. EI is a useful and practical approach to understanding actual entrepreneurial behavior. As the first stage of a series of actions in organizational founding, EI is an important part of the business planning process [22, 23], reflecting an individual’s readiness to engage in subsequent

entrepreneurial activities [24-28]. This survey of dentists' EI captures their objective orientation, such as plans, wishes and preference of engaging in entrepreneurial dental business activities [29].

It was measured by one single question adapted from Krueger *et al.* [30], "It is likely that I will start and run my business in dentistry in a near future." Responses were measured with a 5-point Likert scale, with 1 being least likely and 5 being most likely. For logistic regression analysis, a dummy variable of EI was then created according to the number values of the answers. EI was assigned with the value of "1" if answers were "5 = most likely", or "4 = likely". EI took the value of "0" for other answers (3=neutral, 2=unlikely, 1=very unlikely).

Independent variables

The entrepreneur's demographic, technical knowledge and skills, entrepreneurial behaviors, as well as psychological characteristics are often cited as the most influential factors to their entrepreneurial activities and performance [31, 32]. This study hence includes these relevant factors accordingly.

Demographic and professional characteristics. This part contains questions about gender, age, education level, professional qualification and years of practice. The hospital workplace was measured in terms of employee numbers, rather than bed numbers, because most dental treatment is performed with outpatients, rather than inpatients.

Entrepreneurial behavior. This variable reflects personalities and skills associated with identifying and exploring business opportunities, taking risks and being engaged in implementation of business plans [33]. The scale for measuring entrepreneurial behaviors in this study was adopted from Afsar *et al.*[19], that is especially designed for employee's entrepreneurial behavior in knowledge-intensive industries [31, 32, 34]. Accordingly, the level of a dentists' entrepreneurial behavior is the average score of six dimensions. (1) "Encourage team members to take the initiative with their own ideas."; (2) "Inspire team members to think about their work in innovative perspectives"; (3) "Devote time to help team members improve the products and services"; (4) "Vividly describe how things could be in the future and what is needed to reach the goal"; (5) "Effectively organize team to meet a challenge"; (6) "Create an environment where people get excited about making improvement". All measurements are based on a 5-point Likert scale from 1 ("disagree strongly") to 5 ("agree strongly").

Risk aversion. An individual's risk-taking attitude may have direct and significant effects on EIs [35]. Strong perceptions regarding a potential loss of business, would lead to a lower level of EI [36]. Risk aversion in this study was measured by the established tool developed by Barbosa *et al.*[37]. Presented with the statement, "The failure of starting a private business will have a negative impact on my future career." respondents were asked to rate how closely this statement reflected their perceptions and responses using a 5-point Likert scale from 1 ("disagree strongly") to 5 ("agree strongly").

Entrepreneurial family background. Family background and parental role models can affect EI through attitudes [38, 39], innovation and creative capacities [40, 41]. There is a question asked about whether or

not a respondent had family/relative members who engaged in entrepreneurship.

Statistical analysis

The baseline model was a multivariate logistic regression model analyzing the major factors associated with the dependent variable, the dentists' EI, that is a dummy variable, taking the value of "1" if answering "having entrepreneurial intention". The independent variables included basic demographic and professional characteristics of the dentists.

The full model added additional variables to capture potential influences from the dentists' personalities, personal skills and resources, such as '*entrepreneurial behavior*', '*risk aversion*' and '*entrepreneurial family background*'. All statistical analyses were performed with STATA (version 15).

Results

Characteristics of the respondents

Table 1 reports the demographic and professional characteristics of the sample. The result showed 35.71% of the dentist respondents have EI. 70.83% of the respondents were female and 29.17% were male. More than three fourths of the respondents were less than 35 years old and only 11.01% were aged 46 or more. As for education level, nearly half of the dentists only have an associate or bachelor's degree while only 10.71% of them have a doctoral degree. The respondents in the sample hold various professional positions and work experience groups are well represented. Among all public hospitals in this sample, 72.02% of them are the major ones with more than 200 employees. About 78% of the respondents reported to have family members or relatives running or owning dental clinics.

Table 2 reports details of the survey questions and descriptive statistics about dentists' risk aversion and entrepreneurial behavior. The average score of risk perception is 3.14, indicating that the dentists were slightly risk averse. While the mean of the dentists' entrepreneurial behavior score is 3.62, indicating a moderately active level.

Dentists' entrepreneurial intention and basic characteristics

Table 3 analyzes the characteristics of the respondents with or without EI respectively. Male dentists had a significantly stronger intention than female dentists did. There were no statistically significant differences among various groups of age, education level and years of practice. Dentists in large hospitals (with more than 200 employees) tended to report a lower level of EI, while those in small hospitals (with less than 50 employers) are most likely to report a higher EI. Additionally, dentists who have entrepreneurial family members were significantly more likely to report intention to start their own business. Meanwhile, dentists with high level of risk aversion are significantly less likely to report EI.

Analysis results of the baseline model are reported in Table 4, which reports the association between EI, demographic, and professional factors, using a multivariable logistic regression model. The odds ratio for

females is 0.248 ($p=0.000$), indicating that the probability of a female dentist reporting planning to enter the private sector (EI) on average is only about 24.8% as likely as a male respondent. The EI of dentists in the age group of 36-45 were about 5 times as likely as those in the age group of 20-25 ($p=0.079$). Respondents with a higher education level are less likely to report EI, especially dentists with masters (OR=0.276, $p=0.019$) or doctoral degrees (OR=0.23, $p=0.023$). Regarding the professional qualification status of respondents, Attending Dentist (OR=7.084, $p=0.010$) and Associate/Chief dentists (OR=11.11, $p=0.009$) have significantly much higher odds of reporting EI. Dentists in administration positions are not significantly more likely to report EI. Meanwhile, years of practice are negatively associated with the EI. The odds ratios for dentists with 6-10 year and those with 11-year work experiences are 0.222 ($p=0.039$) and 0.068 ($p=0.000$) respectively. Additionally, the results suggest that dentists from small public hospitals (with employees less than 50) are generally significantly more likely to be engaged in entrepreneurial activities (OR=2.418, $p=0.025$).

Dentists' entrepreneurial intention and personality factors

The analysis results of the full model are reported in Table 5, which includes additional personality factors such as entrepreneurial behavior level, risk aversion and entrepreneurial family background. The association of EI with demographic and professional characteristics in the full model are generally consistent with the findings from the baseline model, except for significantly stronger effects among senior age groups (36-45 and 46-60 group) and large hospitals (with more than 201 employees). Respondents in the age range of 36 to 45 and aged over 45 (OR=14.205, $p=0.012$; OR=8.45, $p=0.066$) become significantly more likely to have EI. Dentists with more years of work experience became significantly less likely to have EI. The odds ratio of the dentists in small public hospitals (50 or less employees) remained similar strong effect in the full model (OR=2.398, $p=0.044$).

As reported in the bottom lines of Table 5, dentists with a higher level of entrepreneurial behaviors (OR=3.602, $p< 0.0001$), or with an entrepreneur family member (OR=3.672, $p=0.003$), are significantly more likely to report EI. However, dentists with stronger risk aversion are less likely to report EI (OR=0.702, $p=0.007$).

Discussion

As for the association between EI and demographic characteristics, the findings in this study are generally consistent with existing literature, but with some exceptions due to the knowledge-intensive feature of dentistry. The discussion below is based on the results from the full model.

Gender. Female dentists in this study are found on average to be less likely than males to report having EI. This finding is consistent with existing literature [42-44]. The driving forces and pathways behind the gender difference are complicated [43] and may be due to various factors, such as social/cultural gender roles [45, 46], natural differences in personality and family responsibilities [47, 48].

Age. The findings in the study indicate that age is a key factor with strong association with dentists' EI, and with the strongest effects among the group of 36-45 years old and remaining strong among the upper middle age group. Unlike general business startups with active innovations by the young generations [49-51], the professional qualification or criteria required by dentistry can only be obtained after years of education, practice, and experience.

Education level. A wide range of literature reports that education helps to increase EIs through developing the natural entrepreneurial tendencies and enhancing the managerial ability of individuals [52]. However, this study finds that dentists in China with postgraduate education are much less likely to report EIs, when other potential determinant factors are controlled. This may be due to the fact that, during the past decades, dental education in China has been focusing on research and academic career, or a career path in prestigious hospitals, with no or very little entrepreneurial knowledge and training. Additionally, dentists with long years of postgraduate dental education also have a greater opportunity cost for their career and social reputation, if they take risks to engage in entrepreneurship [53].

Professional Qualification. Dentists' professional qualification is another key factor with a strong positive association for EI. This finding can be explained by the fact that dentistry highly values professional qualification, which is especially necessary for the private sector if they want to obtain accreditation or to attract patients [54, 55].

Years of Practice. The findings in this study indicate that years of practice are negatively associated with the EI among dentists in China, holding other factors constant. Given a small group of literature reporting the decline in self-employment among near-retirees [56], most literature studying general business reports positive associations between working experience and EI [57-59]. Actually, the findings in this study have reasonably reflected the professional feature of dentistry. First, without sufficient professional qualification in dentistry, years of practice alone does not bring career advantage in a private sector practice. Second, the positive effects of entrepreneurial knowledge acquired through working experience have largely been reflected in the regression analysis by the variable of professional qualifications of dentists. In China, some senior-aged dentists received only two-year college level education in the late 1980's and currently can only attain a relatively low level of professional qualification despite their many years working.

Hospital-size effect. The results in the full model in Table 5 indicate that dentists in the small hospitals (with less than 50 employees) have a much higher level of EI. Since the overall professional satisfaction of a dentist's career in China is most associated with factors such as respect, delivery of care, income and patient relations [60], the large hospitals in China are those with top tertiary connections, and are always regarded with strong respect and supported with various types of social and financial resources. Meanwhile, small hospitals are on the another side of the spectrum, hence the career opportunity costs of entrepreneurial activities for the dentist there are smaller than those in large hospitals .

Entrepreneurial behavior. This study found that dentists' entrepreneurial behavior levels had a significant positive association with their EI. These results are consistent with existing literature [13, 61]. Since

entrepreneurial behavior features actually reflect a person's personality of becoming a leader, such as being proactive and innovative, and strong teamwork skills [28]. This finding also suggested that dentists with strong leadership skills or management skills in public hospitals in China have high probabilities to leave for their own entrepreneurial activities.

Risk aversion. This study found highly significant negative association between risk aversion and EI among dentists in China's public hospitals. Risk aversion may indirectly reduce EI through the channels of entrepreneurial skills and self-efficacy [53]. While dentists in China are more sophisticated and socially experienced than dental students studied [53], they actually may be even more risk-averse due to larger social and economic opportunity cost in terms of career path, reputation and family economic responsibilities to be considered.

Entrepreneurial family member. This study found a strong positive association between an individual's EI and their family members or relatives involvement in dentistry entrepreneurial activities. This result is consistent with literature that a family business culture/environment can help an individual acquire skills, confidence and values that are important to running their own business [62, 63]. Family influence and social/cultural background in general contribute to EI, which reflects a person's willingness or desire to start up a new business in the future. Further, active involvement in a social network may help to identify and obtain various resources needed for a start-up [14, 64].

Limitations

This study is a cross sectional survey study, hence has the limitations inherent in this research method. First, there may be nonrandom sampling errors and measurement errors during the process of the survey. However, these errors are not major concerns in this study, because precautions actions and sampling process management were performed to minimize these errors, though this is no guarantee of complete elimination.

Second, this study is subject to sampling error and a small sample size. Consisting of only 336 observations of dentists in southeastern areas of China, the sample in this study is not a national representative sample. Hence, caution is necessary when generalizing the findings in this study to the national level.

Third, due to survey research design using observatory data, this study may be subject to the survival bias. Dentists who are very good at entrepreneurial activities, or with strong skills may have left the public hospitals, as the consequence, only those with low EIs and skills are left and are currently working in the public hospitals. Hence, the analysis was limited to an associative relationship, rather than being interpreted as causal effects.

Forth, the analysis about EIs may be subject to the omitted variable bias. There are actually various factors (e.g., personality characteristics and social/culture environment) affecting a person's EI and these

factors may also have complicated interaction effects on each other. However, it is impossible to include all potential influential factors in the estimation model.

Conclusion

Analyzing the survey results of 336 dentists in major public hospitals in Southeastern China, this study found that the dentists in the age group of 36-45 years have the strongest EI, especially those with middle or senior professional qualifications and those with strong entrepreneurial or leadership skills. Additionally, those with family members or relatives engaged in entrepreneurial activities may also have strong encouraging effects on them. Female dentists, or those with post-graduate education, or those in large hospitals have a lower level of EI.

The findings in this study suggest that, against the background of the fast growth of private dental service, the small public hospitals in China may face considerable risks of talented dentist outflow, especially those with advanced qualifications and strong leadership skills. To maintain a stable and sufficient professional team, these hospitals need to pursue active strategies to retain their talent, while taking an aggressive recruiting strategy for some target candidate groups. For example, paying more attention to females dentists or those with post-graduate degrees, because these groups of dentists have a lower level of entrepreneurial intention and prefer to develop a long term and stable career life in the public hospitals in China.

Abbreviations

EI: Entrepreneurial intention

Declarations

Ethics approval and consent to participate:

Ethical approval of this study was obtained from the Research Ethics Committee at School of Business, Macau University of Science and Technology (No: MUST/MSB/D/19/0128). Verbal informed consent procedure was approved by the Research Ethics Committee. Before starting the survey questionnaire, the research purpose of the collected information and the confidential guarantee policy were disclosed and verbal informed consents were obtained from all respondents. All respondents were voluntary and the responses were anonymous.

Consent for publication

Not Applicable

Availability of data and materials

The datasets used and analyzed in the current study are available from corresponding author on reasonable request.

Competing interests

No competing financial, professional, or personal interests that might have influenced the performance or presentation of the work described in this manuscript.

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Authors' contributions

BP and JHZ conceptualized the study and designed the survey. BP performed the survey and collected data. JW and JHZ designed statistical analysis method and performed the data analysis. BP, JW, HZ and JHZ reviewed literature, prepared and edited the manuscript. All the authors have read and approved the final manuscript for publication.

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References

1. Zhou X, Xu X, Li J, Hu D, Hu T, Yin W, Fan Y, Zhang X. Oral health in China: from vision to action. *International journal of oral science*. 2018;10(1):1-6.
2. Liu J, Zhang SS, Zheng SG, Xu T, Si Y. Oral health status and oral health care model in China. *Chin J Dent Res*. 2016;19(4):207-215.
3. The National Committee for Oral Health: The fourth national epidemiological survey of oral health. Beijing: Beijing: People's Medical Publishing House; 2018.
4. KPMG. Commercial opportunities in the dental care market in China. KPMG Advisory (China) Limited. 2016. <https://assets.kpmg/content/dam/kpmg/cn/pdf/en/2016/10/commercial-opportunities-in-the-dental-care-market-in-china.pdf>. Accessed 29 April 2020.
5. Sun XY, Yuan C, Wang XZ, Wang X, Feng XP, Tai BJ, Hu Y, Lin HC, Wang B, Si Y. Report of the National Investigation of Resources for Oral Health in China. *Chin J Dent Res*. 2018;21(4):285-297.
6. Xu L, Zhang M. Regulated multi-sited practice for physicians in China: incentives and barriers. *Global Health Journal*. 2018;2(1):14-31.

7. Dacin PA, Dacin MT, Matear M. Social Entrepreneurship: Why We Don't Need a New Theory and How We Move Forward From Here. *Academy of Management Perspectives*. 2010;24(3):37-57.
8. Willcocks S. The entrepreneurial role in primary care dentistry. *British dental journal*. 2012;212(5):213-217.
9. Palaskar JN. Entrepreneurship in dentistry. *Journal of Dental and Allied Sciences*. 2014;3(2):69.
10. Cumming DJ, Fischer E. Publicly funded business advisory services and entrepreneurial outcomes. *Research Policy*. 2012;41(2):467-481.
11. Sharma A, Jain M, Yadav N, Chahar P. NEED FOR ENTREPRENEURSHIP EDUCATION IN UNDERGRADUATE DENTAL CURRICULUM. *Business Strategy and the Environment*. 2017;26(4):521-535.
12. Brijlal P, Brijlal P. Entrepreneurial knowledge and aspirations of dentistry students in South Africa: The influences of gender and race. *Industry and Higher Education*. 2013;27(5):389-398.
13. Mollica AG, Cain K, Callan RS. Using assessments of dental students' entrepreneurial self-efficacy to aid practice management education. *Journal of dental education*. 2017;81(6):726-731.
14. Nashleanas BM, McKernan SC, Kuthy RA, Qian F. Career influences among final year dental students who plan to enter private practice. *BMC Oral Health*. 2014;14(1):18.
15. Halawany HS, Binassfour AS, AlHassan WK, Alhejaily RA, Al Maflehi N, Jacob V, Abraham NB. Dental specialty, career preferences and their influencing factors among final year dental students in Saudi Arabia. *The Saudi dental journal*. 2017;29(1):15-23.
16. Fita S, Alshuraim F, Almulhim A, AlHumaid J, Alhareky M, Nazir M. Possible Future Career Challenges and Associated Factors among Dental Students and Interns. *International Journal of Dentistry*. 2020;2020.
17. Howell SE. Attitudes and behaviors regarding public health of dental school graduates from AT Still University. *Journal of Dental Education*. 2020.
18. Gordon S, Warren AC, Wright WG. Influence of community-based dental education on practice choice: preliminary data from East Carolina University. *Journal of dental education*. 2019;83(9):1000-1011.
19. Afsar B, Badir YF, Saeed BB, Hafeez S. Transformational and transactional leadership and employee's entrepreneurial behavior in knowledge-intensive industries. *The International Journal of Human Resource Management*. 2017;28(2):307-332.
20. Moriano JA, Gorgievski M, Laguna M, Stephan U, Zarafshani K. A cross-cultural approach to understanding entrepreneurial intention. *Journal of career development*. 2012;39(2):162-185.
21. Esfandiar K, Sharifi-Tehrani M, Pratt S, Altinay L. Understanding entrepreneurial intentions: A developed integrated structural model approach. *Journal of Business Research*. 2019;94:172-182.
22. Ajzen I. The theory of planned behavior. *Organizational behavior and human decision processes*. 1991;50(2):179-211.
23. Zampetakis LA, Gotsi M, Andriopoulos C, Moustakis V. Creativity and entrepreneurial intention in young people: Empirical insights from business school students. *The International Journal of*

- Entrepreneurship and Innovation. 2011;12(3):189-199.
24. Uddin MR, Bose TK. Determinants of entrepreneurial intention of business students in Bangladesh. *International Journal of Business and Management*. 2012;7(24):128.
 25. Bird B. Implementing entrepreneurial ideas: The case for intention. *Academy of management Review*. 1988;13(3):442-453.
 26. Fishbein M, Ajzen I. *Belief, attitude, intention, and behavior: An introduction to theory and research*. 1977.
 27. Abbey A. Cross-cultural comparison of the motivation for entrepreneurship. *Journal of Business and Entrepreneurship*. 2002;14(1):69.
 28. Kautonen T, Van Gelderen M, Fink M. Robustness of the theory of planned behavior in predicting entrepreneurial intentions and actions. *Entrepreneurship theory and practice*. 2015;39(3):655-674.
 29. Krueger NF, Carsrud AL. Entrepreneurial intentions: Applying the theory of planned behaviour. *Entrepreneurship & Regional Development*. 1993;5(4):315-330.
 30. Krueger Jr NF, Reilly MD, Carsrud AL. Competing models of entrepreneurial intentions. *Journal of business venturing*. 2000;15(5-6):411-432.
 31. Farrukh M, Lee JWC, Shahzad IA. Intrapreneurial behavior in higher education institutes of Pakistan. *Journal of Applied Research in Higher Education*. 2019.
 32. Berraies S, Bchini B. Effect of leadership styles on financial performance: mediating roles of exploitative and exploratory innovations case of knowledge-intensive firms. *International Journal of Innovation Management*. 2019;23(03):1950020.
 33. De Jong JP, Den Hartog DN. How leaders influence employees' innovative behaviour. *European Journal of innovation management*. 2007.
 34. Javed B, Abdullah I, Zaffar MA, ul Haque A, Rubab U. Inclusive leadership and innovative work behavior: The role of psychological empowerment. *Journal of Management & Organization*. 2019;25(4):554-571.
 35. Segal G, Borgia D, Schoenfeld J. The motivation to become an entrepreneur. *International journal of Entrepreneurial Behavior & research*. 2005.
 36. Douglas EJ, Shepherd DA. Self-employment as a career choice: Attitudes, entrepreneurial intentions, and utility maximization. *Entrepreneurship theory and practice*. 2002;26(3):81-90.
 37. Barbosa SD, Kickul J, Liao-Troth M. Development and validation of a multidimensional scale of entrepreneurial risk perception. *Academy of Management Proceedings*. 2007;2007(1):1-6.
 38. Krueger N. The impact of prior entrepreneurial exposure on perceptions of new venture feasibility and desirability. *Entrepreneurship theory and practice*. 1993;18(1):5-21.
 39. Delmar F, Davidsson P. Where do they come from? Prevalence and characteristics of nascent entrepreneurs. *Entrepreneurship & regional development*. 2000;12(1):1-23.
 40. Mueller P. Entrepreneurship in the region: breeding ground for nascent entrepreneurs? *Small Business Economics*. 2006;27(1):41-58.

41. McElwee G, Al-Riyami R. Women entrepreneurs in Oman: some barriers to success. *Career Development International*. 2003.
42. Santos FJ, Roomi MA, Liñán F. About gender differences and the social environment in the development of entrepreneurial intentions. *Journal of Small Business Management*. 2016;54(1):49-66.
43. Nikou S, Brännback M, Carsrud Alan L, Brush Candida G. Entrepreneurial intentions and gender: pathways to start-up. *International Journal of Gender and Entrepreneurship*. 2019;11(3):348-372.
44. Armuña C, Ramos S, Juan J, Feijóo C, Arenal A. From stand-up to start-up: exploring entrepreneurship competences and STEM women's intention. *International Entrepreneurship and Management Journal*. 2020:1-24.
45. Moser CHMSB. Family background and gender: implications for interest in small firm ownership. *Entrepreneurship & Regional Development*. 1995;7:4:365-378.
46. Laguía A, García-Ael C, Wach D, Moriano JA. "Think entrepreneur-think male": a task and relationship scale to measure gender stereotypes in entrepreneurship. *International Entrepreneurship and Management Journal*. 2019;15(3):749-772.
47. Fielden SL, Davidson MJ, Dawe AJ, Makin PJ. Factors inhibiting the economic growth of female owned small businesses in North West England. *Journal of Small Business and Enterprise Development*. 2003.
48. Lee L, Wong PK, Der Foo M, Leung A. Entrepreneurial intentions: The influence of organizational and individual factors. *Journal of business venturing*. 2011;26(1):124-136.
49. Levesque M, Minniti M. The effect of aging on entrepreneurial behavior. *Journal of business venturing*. 2006;21(2):177-194.
50. Reynolds PD, Curtin RT: *New firm creation in the United States*: Springer; 2007.
51. Boyd RL. Black and Asian self-employment in large metropolitan areas: a comparative analysis. *Social Problems*. 1990;37(2):258-274.
52. Krasniqi BA. Personal, household and business environmental determinants of entrepreneurship. *Journal of Small Business and Enterprise Development*. 2009.
53. Zhang P, Cain KW. Reassessing the link between risk aversion and entrepreneurial intention. *International Journal of Entrepreneurial Behavior & Research*. 2017.
54. Leggate M, Russell E. Attitudes and trends of primary care dentists to continuing professional development: a report from the Scottish dental practitioners survey 2000. *British dental journal*. 2002;193(8):465-469.
55. Buck D, Newton T. Continuing professional development amongst dental practitioners in the United Kingdom: how far are we from lifelong learning targets? *European Journal of Dental Education*. 2002;6(1):36-39.
56. Heim BT. Understanding the decline in self-employment among individuals nearing retirement. *Small Business Economics*. 2015;45(3):561-580.

57. Miralles F, Giones F, Riverola C. Evaluating the impact of prior experience in entrepreneurial intention. *International Entrepreneurship and Management Journal*. 2016;12(3):791-813.
58. Li Wen Yuan SAQ, Shuja Iqbal, Rana Yasir Hussain and Shaibu Ali. Impact of Prior Work Experience on Entrepreneurial Intention and Theory of Planned Behaviour in the Context of Pakistan. *Journal of Entrepreneurship & Organization Management*. 2019;8:1.
59. Kautonen T, Luoto S, Tornikoski ET. Influence of work history on entrepreneurial intentions in 'prime age' and 'third age': A preliminary study. *International small business journal*. 2010;28(6):583-601.
60. Cui X, Dunning DG, An N. Satisfaction among early and mid-career dentists in a metropolitan dental hospital in China. *Journal of Healthcare Leadership*. 2017;9:35.
61. Miralles F, Giones F, Gozun B. Does direct experience matter? Examining the consequences of current entrepreneurial behavior on entrepreneurial intention. *International Entrepreneurship and Management Journal*. 2017;13(3):881-903.
62. Paul D. Reynolds RTC: *New Firm Creation in the United States*: Springer, New York, NY; 2009.
63. Altinay L. The relationship between an entrepreneur's culture and the entrepreneurial behaviour of the firm. *Journal of small business and enterprise development*. 2008;15(1):111-129.
64. Quan X. Prior experience, social network, and levels of entrepreneurial intentions. *Management Research Review*. 2012.

Tables

Table 1 Demographic and professional characteristics of the respondents (N=336)	
Variables	N (%)
Entrepreneurial intention	120 (35.71)
Yes	216 (64.29)
No	
Gender	98 (29.17)
Male	238 (70.83)
Female	
Age (years)	80 (23.81)
20-25	170 (50.6)
26-35	49 (14.58)
36-45	37 (11.01)
46-60	
Education level	73 (21.73)
Associate degree	94 (27.98)
Bachelor's degree	133 (39.58)
Master's degree	36 (10.71)
Doctoral degree	
Years of practice	116 (34.52)
1 or less	102 (30.36)
2-5	41 (12.2)
6-10	77 (22.92)
11 or more	
Professional qualification	83 (24.7)
Intern	101 (30.06)
Resident	63 (18.75)
Attending dentist	39 (11.61)
Associate /Chief dentists	50 (14.88)
Administration	
Employee numbers of workplace hospital	41 (12.20)

50 or less	31 (9.23)
51-100	22 (6.55)
101-200	242 (72.02)
201 or more	
Entrepreneurial family member	262 (77.98)
Yes	74 (22.02)
No	

Table 2 Descriptive statistics of dentists' risk aversion and entrepreneurial behaviors.

(N=336)

Risk aversion	3.14 (mean)	1.04 (s.d.)
Entrepreneurial behavior score*	3.62 (mean)	0.67 (s.d.)

Risk aversion

Strongly Disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly Agree (5)	P value**
Q 1. The failure of starting a private business will have a negative impact on my future career. [N (%)]					
16 (4.76)	87 (25.89)	100 (29.76)	100 (29.76)	33 (9.82)	< 0.01

Entrepreneurial behavior

Strongly Disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly Agree (5)	P value*
Q 1. This employee encourages others to take the initiative for their own ideas. [N (%)]					
1 (0.3)	6 (1.79)	70 (20.83)	203 (60.42)	56 (16.67)	< 0.01
Q 2. This employee inspires others to think about their work in new and stimulating ways. [N (%)]					
3 (0.89)	12 (3.57)	84 (25)	171 (50.89)	66 (19.64)	< 0.01
Q 3. This employee devotes time to helping others find ways to improve our products and services. [N (%)]					
5 (1.49)	21 (6.25)	114 (33.93)	155 (46.13)	41 (12.2)	< 0.01
Q 4. This employee vividly describes how things could be in the future and what is needed to get us there. [N (%)]					
9 (2.68)	43 (12.8)	151 (44.94)	112 (33.33)	21 (6.25)	< 0.01
Q5. This employee gets people to rally together to meet a challenge. [N (%)]					
7 (2.08)	27 (8.04)	124 (36.9)	146 (43.45)	32 (9.52)	< 0.01
Q 6. This employee creates an environment where people get excited about making improvements. [N (%)]					
9 (2.68)	21 (6.25)	109 (32.44)	165 (49.11)	32 (9.52)	< 0.01

* The sample average score of Q1 to Q6

** Chi-squared test

Table 3 Associations between dentists' entrepreneurial intention and relevant factors

(N=336)

	Have Entrepreneurial intention (N = 120) N (%)	Do not have entrepreneurial intention (N = 216) N (%)	P value*
Gender	58 (59.18%)	40 (40.82%)	< 0.0001***
Male	62 (26.05%)	176 (73.95%)	
Female			
Age (years)	30 (37.5%)	50 (62.5%)	0.631
20-25	57 (33.53%)	113 (66.47%)	
26-35	21 (42.86%)	28 (57.14%)	
36-45	12 (32.43%)	25 (67.57%)	
46-60			
Education level	28 (38.36%)	45 (61.64%)	0.932
Associate degree	34 (36.17%)	60 (63.83%)	
Bachelor's degree	45 (33.83%)	88 (66.17%)	
Master's degree	13 (36.11%)	23 (63.89%)	
Doctoral degree			
Professional qualification	31 (37.35%)	52 (62.65%)	0.065*
Intern	32 (31.68%)	69 (68.32%)	
Resident	28 (44.44%)	35 (55.56%)	
Attending Dentist	18 (46.15%)	21 (53.85%)	
Associate /Chief dentists	11 (22.00%)	39 (78.00%)	
Administration			
Years of practice			0.588
1 or less	45 (38.79%)	71 (61.21%)	
2-5	33 (32.35%)	69 (67.65%)	

6-10	17 (41.46%)	24 (58.54%)	
11 or more	25 (32.47%)	52 (67.53%)	
Employee numbers	22 (53.66%)	19 (46.34%)	0.041**
of workplace hospital	9 (29.03%)	22 (70.97%)	
50 or less	10 (45.45%)	12 (54.55%)	
51-100	79 (32.64%)	163 (67.36%)	
101-200			
201 or more			
Risk aversion level			< 0.0001***
1 (very low)	9 (56.25)	7 (43.75)	
2 (low)	42 (48.28)	45 (51.72)	
3 (neutral)	31 (31)	69 (69)	
4 (high)	31 (31)	69 (69)	
5 (very high)	7 (21.21)	26 (78.79)	
Entrepreneurial family member			< 0.0001***
Yes	108 (41.22%)	154 (58.78%)	
No	12 (16.22%)	62 (83.78%)	
*Chi-squared test, *** p<0.01, ** p<0.05, * p<0.1			

Table 4 Multivariate logistic regression analysis of Dentists' entrepreneurial intention and associated factors (baseline model)

(N=336)

	Odds ratio (95% CI)	P value*
Gender	1	< 0.0001***
Male	0.248 (0.143- 0.43)	
Female		
Age (years)	1	0.16
20-25	2.262 (0.724- 7.065)	0.079*
26-35	5.142 (0.83- 31.872)	0.422
36-45	2.255 (0.31- 16.41)	
46-60		
Education level	1	0.142
Associate degree	0.489 (0.188- 1.269)	0.019**
Bachelor's degree	0.276 (0.094- 0.81)	0.023**
Master's degree	0.23 (0.065- 0.819)	
Doctoral degree		
Professional qualification	1	0.399
Intern	1.582 (0.545- 4.592)	0.01**
Resident	7.084 (1.594- 31.477)	0.009***
Attending Dentist	11.11 (1.83- 67.444)	0.877
Associate /Chief dentists	1.104 (0.315- 3.868)	
Administration		
Years of practice	1	
1 or less	0.514 (0.218- 1.209)	0.127
2-5 years	0.222 (0.053- 0.928)	0.039**
6-10 years	0.068 (0.01- 0.476)	0.007***
11 or more		
Employee numbers of workplace hospital	1	0.147
201 or more	2.086 (0.772- 5.644)	0.862

101-200	0.923 (0.375- 2.274)	0.025**
51-100	2.418 (1.120- 5.223)	
50 or less		
*** p<0.01, ** p<0.05, * p<0.1		

Table 5 Multivariate logistic regression analysis of Dentists' entrepreneurial intention and associated factors (Full model, with personality variables)

(N=336)

	Odds ratio (95% CI)	P value*
Gender	1	0.001***
Male	0.365 (0.197- 0.676)	
Female		
Age (years)	1	0.101
20-25	2.915 (0.81- 10.487)	0.012**
26-35	14.205 (1.804- 111.871)	0.066*
36-45	8.45 (0.868- 82.254)	
46-60		
Education level	1	0.089
Associate degree	0.36 (0.111- 1.169)	0.021**
Bachelor's degree	0.221 (0.061- 0.798)	0.005***
Master's degree	0.118 (0.026- 0.531)	
Doctoral degree		
Professional qualification	1	0.394
Intern	1.654 (0.52- 5.264)	0.016**
Resident	7.812 (1.471- 41.475)	0.021**
Attending Dentist	9.857 (1.411- 68.848)	0.789
Associate /Chief dentists	0.827 (0.206- 3.318)	
Administration		
Years of practice	1	
1 or less	0.389 (0.154- 0.982)	0.046**
2-5	0.133 (0.027- 0.664)	0.014**
6-10	0.015 (0.002- 0.143)	< 0.0001***
11 or more		
Employee numbers of workplace hospital		
201 or more	1	0.036

101-200	3.554 (1.09- 11.588)	0.768
51-100	1.163 (0.426- 3.179)	0.044**
50 or less	2.398 (1.025- 5.611)	
Entrepreneurial behavior	3.602 (2.152- 6.028)	< 0.0001***
Risk aversion	0.702 (0.542- 0.909)	0.007***
Have entrepreneurial family member	3.672 (1.571- 8.584)	0.003***
*** p<0.01, ** p<0.05, * p<0.1		