# "How obsessive are dentists?"—A personality styles & disorder inventory based prospective, controlled study

Thomas Gerhard Wolf [a,b,*], Valerie Fabienne Sonja Speyer [a], Burkhard Peter [a,c]

[a] *Department of Restorative, Preventive and Pediatric Dentistry, School of Dental Medicine, University of Bern, Switzerland*
[b] *Department of Periodontology and Operative Dentistry, University Medical Center of the Johannes Gutenberg-University, Mainz, Germany*
[c] *MEG-Stiftung München, Munich, Germany*

A B S T R A C T

*Objectives:* The aim of this study was to examine the typical personality traits of dentists and to discuss critically their influence on the necessary characteristics for a good dentist-patient relationship.
*Methods:* Two groups were invited via e-mail to participate the study in 2015–2020. One group consisted of German dentists (DENT $N = 580$). The other group was formed by German speaking psychotherapists from Germany, Austria and Switzerland (DACH $N = 1.027$). The Personality Styles and Disorder Inventory was used in its short form (PSDI-S) via online survey. The normalization sample (NORM $N = 3.392$) of the PSDI-S was used to compare the results with a normative sample.
*Results:* Dentists differed in 10 out of 14 personality styles from the normalization sample (NORM), and in 13 out of 14 personality styles compared with the psychotherapists (DACH). Female dentists differed in 7 out of 14 personality styles to their male colleagues.
*Conclusions:* The most significant differences in personality styles were *willful (PN), spontaneous (BL), reserved (SZ), ambitious (NA), optimistic (RH)* and *conscientious (ZW)*, which seem to be necessary for a good dentist-patient relationship and dental procedures. The expression of personality styles is most likely to influence the choice, delivery and cost as well as patient perception of treatment.
*Clinical significance:* Dentist's personality has an important impact on the interpersonal, which influences the dentist-patient relationship and its therapeutic outcome.

## 1. Introduction

Recent research has shown that personality is a valid predictor for occupational performance in any occupation [1]. Regarding dentists, in the past years some studies have determined the personality profile of dentists [2–7] and several studies have also focused on the personality of dental students [8–14]. Research presented that personality styles as noncognitive indicators are suggested to be better predictors for success in dental curriculum and that personality types can possibly be associated with dental school performances [13,15]. As quoted by Rodriguez et al. [13], the Commission on Dental Accreditation (CODA, 2016) defined the competence for becoming a dentist with abilities like knowledge, experience, critical thinking, problem-solving, professionalism, personal integrity and procedural skills [16], which are non-technical and cognitive abilities. In contrast Chamberlain et al. [17] mentioned the Canadian Dental Association (CDA), which

commissioned a study to identify abilities for a successful performance as a dentist, which are: "Sensitivity to Others, Self-Control, Tact and Diplomacy, Oral Communication, Integrity, Judgement and Analysis, Conscientiousness and Life-Long-Learning". These mentioned abilities present as well some noncognitive competencies [17]. In comparison Gray et al. [18] determined that cognitive abilities only could predict success in the preclinical years of dental curriculum, but as a predictor for the clinical years noncognitive abilities, such as interpersonal communication skills, were significant. In addition, various studies showed a significant relevance for personality traits as predictor for success in dental curriculum [12,13,15]. The personality as a noncognitive indicator seems to correlate with dental school performance [15]. Rodriguez et al. [13] defined the competence of patient care as one of the most important abilities, which evokes the need of interpersonal skills. Interpersonal skills may be influenced by an individual's personality style.

---

One common international used model in personality psychology is the Big Five Factor Model (FFM) [19]. It is an empirical based model, which development started with G. Allport and H. S. Odbert, while P. T. Costa and R. R. McCrae provided the NEO-Five-Factory Inventory (NEO-FFI), which is often used today [17,19,20]. The FFM consists of five main factors: Openness for experiences, Conscientiousness, Extraversion, Agreeableness and Neuroticism. The different expression of these five factors builds the individual personality. While focusing on interpersonal communication skills, the two factors extraversion and agreeableness influence the interpersonal behavior [19]. Extraversion indicates with high levels a quantity and intensity of interpersonal interaction [17]. High levels of agreeableness correlate with empathy [19,21–23]. The interpersonal behavior is important for the patient care, because there is still a great number of patients, who suffer from dental anxiety [24–27]. Consequently, the dentist-patient relationship has a high priority, which depends on interpersonal skills [28–30]. Jones and Huggins [28] ascertained the impact of empathy in the dentist-patient relationship. They realized the patients' need to feel understood by their dentist, while perceiving empathy, which reduced anxiety. A trusting relationship between practitioners and patients can evoke benefits for outcome, treatment context and prevention [23,28, 31–33]. The study by Chamberlain et al. [17] focused on personality as a predictor of professional behavior of dental students and compared their results with the personality of dental practitioners. They quoted the essential qualities the Canadian Dental Association Commission defined 1988, which have already been mentioned before [17]. These competencies, above all conscientiousness, which is one factor of the FFM, are non-technical abilities and tend to be dependent of individual's personality profile. Regarding conscientiousness Chamberlain et al. [17] and Stacey et al. [12] emphasized that this personality style predicts success for dental curriculum, but in general conscientiousness predicts job performance in different occupations (e.g. clerical, customer service, healthcare, law enforcement, management, military, professional, sales) [1,34–36].

The dentists personality in the present study was determined with the short form of Personality Styles and Disorder Inventory (PSDI) provided by Kuhl and Kazén [37]. The PSDI captures personality styles, which are in part based on non-pathological equivalents of classifiable personality disorders (see the part Survey Instruments). Related to the validity of the PSDI, there are medium to high correlations with other personality inventories. Kuhl and Kazén [37] ascertained correlations between the NEO-FFI and the PSDI: High correlations could be found for neuroticism and the personality styles *spontaneous* (0.66), *self-critical* (0.67) and *dependent* (0.73) and a medium level for *loyal* (0.44) and neuroticism was detected. Extraversion and *reserved* (−0.57) correlated highly, while *willful* (−0.3), *critical* (−0.3) and *dependent* (−0.36) had a medium correlation with extraversion. Furthermore, *willful* (−0.31), *reserved* (−0.44) and *conscientious* (0.34) correlated medium with agreeableness, and a medium correlation resulted for *critical* (−0.41) and conscientiousness. The personality styles *unselfish, assertive* and *optimistic* showed no correlation with the NEO-FFI [38].

The aim of the current exploratory study was to investigate the personality of dentists [39] and to compare these data with personality styles from psychotherapists and a norm sample representing the general population using the PSDI [37]. The hypothesis of this study was that differences exist in personality styles between dentists, psychotherapists, and the general population.

## 2. Materials and methods

### 2.1. Samples

The three samples consisted of two groups of healthcare professionals, dentists and psychotherapists, to be additionally compared with a normative sample. In a previous study by Peter and Wolf [39] 1.150 German dentists who were members of the German Society of Dental Hypnosis (DGZH) were contacted via e-mail in 2017 to participate in an internet survey about the relationship between personality and attachment styles. They were remembered in 2018 and again in early 2020. The 418 DGZH dentists who responded were between 20 and 75 years old (*mean* = 53.27; *SD* =10.3; 68.2% female). Another group of 1.100 dentists who didn't use hypnosis (NONHYP) was contacted by e-mail between 2018 and 2021 for participation. The 162 NONHYP dentists who responded were between 21 and 69 years old (*mean* = 38; *SD* = 10.8; 67.3% female). Because there was no significant difference between the two dentist groups in 13 of 14 personality styles, they were combined into one group (DENT, *N* = 580; female 68%). The only difference concerned the personality style *intuitive (ST)*, where the DGZH members using hypnosis had significantly higher scores than the dentists in the NONHYP group [38].

The second healthcare professional sample consists of German speaking psychotherapeutic practitioners form Germany, Austria and Switzerland (DACH countries) from a previous study of Peter et al. [40]. Initially, 4.600 psychotherapists were contacted via e-mail (3.160 from Germany, 610 from Austria, and 830 from Switzerland). A total of 1.027 psychotherapists responded and answered online the short form of the PSDI. Of those respondents 628 (61.1%) were from Germany, 114 (11.1%) from Austria, and 285 (27.8%) from Switzerland. The female part of the sample was 71.4% (male = 28.6%). The mean age was 53 years (*SD* = 10.6) with a duration of professional practical experience on average 19.34 years (*SD* = 10.75).

The 3.392 participants (52% female) of the normalization sample (NORM) had an age between 12 and 82 and various occupations (students, managers, regular employees, homemakers). These unpublished data were provided by Miguel Kazén and have been used in similar studies of the authors so far [40].

### 2.2. Survey instrument

The PSDI is a self-rating questionnaire designed by Kuhl & Kazén [37] that evaluates the relative manifestation of 14 personality styles. These personality styles can be related to the non-pathological equivalents of the Diagnostical and Statistical Manual of Mental Disorders (DSM-5) [41] and the ICD-10 Classification of Mental and Behavioral Disorders [42,37]. Originally it consists of 140 items that are divided into 14 scales. For the study the short form of the PSDI was used, because of time savings and to have less dropouts. The short form of the PSDI consists of 56 items, which means 4 items per scale. A four-point Likert-scale is used for answering every item from "*strongly disagree*" to "*strongly agree*". This results in 0–12 points per scale and is transformed into T-values. The mean T-value is 50, while the normal range is defined by 40–60. According to Kuhl & Kazén [37], scores outside the normal range (40–60) can indicate a personality disorder, but this inventory is not sufficient for a definite diagnosis. The PSDI is a standardized inventory and provides objective procedures, analyses and has an acceptable reliability (*Cronbach's α* = 0.64–0.79). Different studies established the validity of the PSDI and showed medium to strong correlations with proven personality inventories such as the Big Five and the Sixteen Personality Factor Questionnaire (16 PF-R) [43].

### 2.3. Data analysis

The data were collected with SoSci Survey (SoSci Survey GmbH, Munich, Germany) and directly loaded into SPSS (IBM SPSS, version 27, IBM Corp., Armonk, NY, USA) analogously to the previous studies of Peter and Wolf [39] and Peter et al. [40,44]. Hypotheses were tested by using t-tailed t-tests. T-tests were used, because they are considered robust against violation of the normal distribution assumption. Levene tests were used to evaluate homogeneity of variances. The threshold for significance was set after Bonferroni correction at $p = 0.0036$ ($p = 0.05/14 = 0.0036$), because of multiple comparisons.

## 2.4. Ethics statement

The participants were voluntarily part of this study and had neither an advantage nor a disadvantage for participation. They were legal age and received no compensation. While answering the questionnaire, the participants agreed with their written informed consent to the processing of their irreversibly anonymized data for research purposes. For this type of study there is no need for requiring a formal approval by the local ethics committee, because the collection and processing of participants' data for the study were under irreversibly anonymized conditions. This procedure agrees with the Swiss Human Research Act [810.30 Federal Law on Research Involving Human Subjects, Human Research Act (HRA)]. This study has been proceeded in accordance with the 1964 Declaration of Helsinki and its subsequent amendments and the ethical standards of the local research commission.

## 3. Results

### 3.1. Differences from the norm (DENT – NORM)

To determine whether dentists (DENT) differ from the mean value of the norm (NORM), t-tests were used. The mean value of the norm is 50 defined by the normative sample ($N = 3.392$). Lower T-values represent a weaker expression of the personality style. Dentists differed significantly in ten out of 14 personality styles with lower T-values in *willful (PN), spontaneous (BL), reserved (SZ), ambitious (NA), loyal (AB)*, and *passive (DP)*, as well as significantly higher T-values in the personality styles *intuitive (ST), unselfish (SL), optimistic (RH)* and *conscientious (ZW)*. While comparing personality styles of dentists to the norm sample a large effect size resulted for the personality style *conscientious (ZW)*. Medium effect sizes presented the personality styles *willful (PN)* and *reserved (SZ)*. For all other personality styles, the effect sizes were small and shown in Table 1 and Fig. 1.

**Table 1**

Comparison of the 14 personality styles (T-scores) of the dentists ($N = 580$) and the mean value of the norm ($T = 50$)

| Personality style | M | SD | df | T | d | CI$_{0.95}$ |
|---|---|---|---|---|---|---|
| **Willful (PN)** | 44.72 | 9.79 | 3970 | −11.74** | −0.53 | [−0.62; −0.44] |
| **Spontaneous (BL)** | 46.44 | 7.31 | 990.92 | −10.23** | −0.37 | [−0.46; −0.28] |
| **Reserved (SZ)** | 44.78 | 10.50 | 3970 | −11.52** | −0.52 | [−0.61; −0.43] |
| **Ambitious (NA)** | 45.47 | 8.27 | 894.74 | −11.81** | −0.47 | [−0.55; −0.38] |
| **Loyal (AB)** | 47.51 | 8.77 | 858.20 | −6.22** | −0.26 | [−0.34; −0.17] |
| Critical (NT) | 49.05 | 8.61 | 868.84 | −2.41 | −0.10 | [−0.19; −0.01] |
| **Intuitive (ST)** | 53.09 | 10.54 | 767.95 | 6.58** | 0.31 | [0.22; 0.40] |
| **Unselfish (SL)** | 52.39 | 10.23 | 3970 | 5.30** | 0.24 | [0.15; 0.33] |
| Self-critical (SU) | 50.23 | 9.33 | 823.59 | 0.57 | 0.02 | [−0.06; 0.11] |
| **Passive (DP)** | 48.85 | 8.25 | 897.40 | −3.01** | −0.12 | [−0.21; −0.03] |
| Assertive (AS) | 49.28 | 9.29 | 825.65 | −1.75 | −0.08 | [0.16; 0.01] |
| Charming (HI) | 49.79 | 9.48 | 815.40 | −0.47 | −0.02 | [−0.11; 0.07] |
| **Optimistic (RH)** | 53.60 | 9.08 | 838.15 | 8.65** | 0.36 | [0.27; 0.45] |
| Conscientious (ZW) | 58.84 | 7.76 | 941.29 | 24.24** | 0.91 | [0.82; 1.0] |

Bold print: all personality styles with significant differences; **$p < 0.004$

### 3.2. Differences regarding psychotherapists (DENT–DACH)

To assess the differences between the personality styles of dentists (DENT) and the psychotherapists (DACH), t-tests were executed in all 14 personality styles. The dentists had in every scale higher T-values than the psychotherapists except of the personality style *charming (HI)*. The effect sizes were large for *conscientious (ZW)* ($T(1605) = 21.30$, $p < 0.001$, $d = 1.11$, CI$_{0.95}$ [1.0; 1.2]), and almost large for *intuitive (ST)* ($T(960.69) = 14.16$, $p < 0.001$, $d = 0.79$, CI$_{0.95}$ [0.69; 0.90]). Small effect sizes could be assessed in the personality styles *reserved (SZ)* ($T(1056.19) = 3.16$, $p = 0.002$, $d = 0.172$, CI$_{0.95}$ [0.07; 0.27]) and *passive (DP)* ($T(1029.57) = 4.38$, $p < 0.001$, $d = 0.24$, $CI_{0.95}$ [0.14; 0.34]). The remaining nine personality styles presented moderate effect sizes, however, showed significant differences ($p < 0.001$) with the exception of *charming (HI)*; see Fig. 1.

### 3.3. Differences regarding gender

The results showed, by small effect sizes, significant differences between female and male dentists in seven personality styles. No significant gender differences could be found in the personality styles *willful (PN), reserved (SZ), loyal (AB), critical (NT), charming (HI), optimistic (RH)* and *conscientious (ZW)*, which is presented in Table 2 and Fig. 2.

## 4. Discussion

In this explorative study the short form of the PSDI [37] was used as an online survey. 580 German dentists (DENT) and 1.027 psychotherapists from Germany, Austria and Switzerland (DACH) participated. The focus was on whether there were significant differences of personality styles between dentists and psychotherapists, and between dentists and a normative sample (NORM $N = 3.392$); possible gender differences of the dentist sample were an additional research focus. Our hypothesis, that differences exist in personality styles between dentists, psychotherapists and the general population, has been confirmed.

Regarding results shown in Fig. 1 the dentists had the highest T-values for the personality style *conscientious (ZW)* with large effect sizes compared to the DACH sample and the NORM sample . Conscientiousness is described as a personality style of organized individuals, having an amount of persistence, being purposeful [19,17] and presenting one factor of the Big Five [19,20,36]. Referred to dental procedures a high level of conscientiousness is necessary during the treatment and for its therapeutic outcome. It is not only important to be organized, but also to have the capability to plan individually the best therapy while having all risk factors in mind, also focusing on patient's personal best and not losing overview on possible alternative therapies. Dentistry is a *"lege artis"* profession, which means every procedure must be performed accurately for a good therapy outcome. Therefore, it seems comprehensible that a high level of conscientiousness presents a key factor in dentists personality profile.

Conscientiousness is named to be one personality style which predicts success in dentistry [17]. In the field of dental practitioners, conscientiousness seems to be very important, because of the requirement of dental procedures, accuracy is essential. Wilmot and Ones [1] showed in their meta-analysis, that conscientiousness predicts occupational performance across all of their defined occupational groups (i.e., clerical, healthcare, law enforcement, professional, skilled/semiskilled, military, sales, management, and customer service). These authors explain that result with goal-directed performance, which is part of nearly every occupation, and related to conscientiousness. For this reason, it seems plausible that the dentists have a high level of conscientiousness. In comparison, the psychotherapists' sample (DACH) has no high level of conscientiousness. With a *mean* = 49.85 the psychotherapists' level of conscientiousness correspondents to the norm (*ZW M* = 49.99). Conscientiousness is not the only personality trait, which predicts job performance in any occupation [45]. Wilmot and Ones [1]
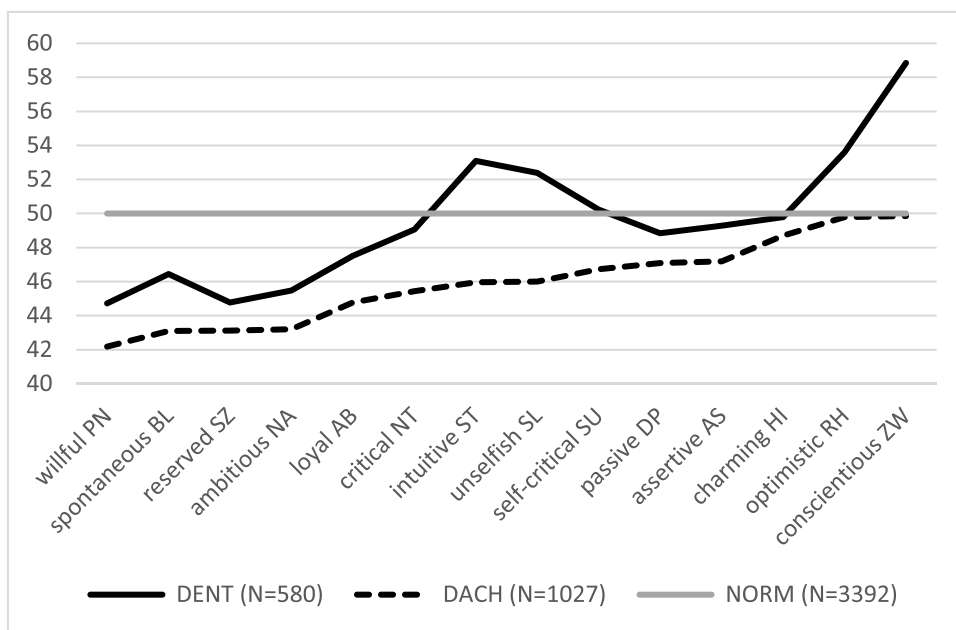
**Fig. 1.** Difference in personality styles between dentists (DENT), psychotherapists (DACH) and general population (NORM)

**Table 2**
Comparison of the 14 personality styles (T-scores) of male and female dentists

| Personality Style | Gender | M | SD | Df | T | d | CI$_{0.95}$ |
|---|---|---|---|---|---|---|---|
| Willful (PN) | Female | 44.91 | 9.96 | | | | |
| | Male | 44.32 | 9.45 | 578 | 0.68 | 0.06 | [−0.11; 0.24] |
| **Spontaneous (BL)** | Female | 47.05 | 7.70 | | | | |
| | Male | 45.17 | 6.25 | 438.97 | 3.13** | 0.26 | [0.08; 0.43] |
| Reserved (SZ) | Female | 44.99 | 10.45 | | | | |
| | Male | 44.31 | 10.63 | 578 | 0.73 | 0.07 | [−0.11; 0.24] |
| **Ambitious (NA)** | Female | 44.60 | 7.63 | | | | |
| | Male | 47.54 | 7.97 | 307.79 | −3.47** | −0.33 | [−0.51; −0.16] |
| Loyal (AB) | Female | 47.49 | 9.14 | | | | |
| | Male | 47.54 | 7.97 | 411.26 | −0.07 | −0.01 | [−0.18; 0.17] |
| Critical (NT) | Female | 49.02 | 8.47 | | | | |
| | Male | 49.13 | 8.92 | 578 | −0.14 | −0.01 | [−0.19; 0.16] |
| **Intuitive (ST)** | Female | 54.05 | 10.55 | | | | |
| | Male | 51.06 | 10.24 | 578 | 3.21** | 0.29 | [0.11; 0.46] |
| **Unselfish (SL)** | Female | 53.59 | 10.62 | | | | |
| | Male | 49.86 | 8.85 | 428.88 | 4.43** | 0.37 | [0.19; 0.55] |
| **Self-critical (SU)** | Female | 51.34 | 9.53 | | | | |
| | Male | 47.87 | 8.43 | 578 | 4.25** | 0.38 | [0.20; 0.55] |
| **Passive (DP)** | Female | 49.52 | 8.46 | | | | |
| | Male | 47.42 | 7.60 | 578 | 2.89** | 0.26 | [0.08; 0.43] |
| **Assertive (AS)** | Female | 48.50 | 8.91 | | | | |
| | Male | 50.93 | 9.88 | 578 | −2.97** | −0.26 | [−0.44; −0.09] |
| Charming (HI) | Female | 49.89 | 9.78 | | | | |
| | Male | 49.59 | 8.82 | 398.63 | 0.37 | 0.03 | [−0.14; 0.21] |
| Optimistic (RH) | Female | 53.54 | 9.25 | | | −0.02 | [−0.19; 0.15] |
| | Male | 53.72 | 8.71 | 578 | −0.22 | | |
| Conscientious (ZW) | Female | 59.28 | 7.52 | | | 0.18 | [0.00; 0.35] |
| | Male | 57.92 | 8.20 | 578 | 1.98 | | |

Bold print: all personality styles with significant differences; **$p<0.004$

emphasized that other personality traits may have a higher validity on the occupational performance, if they are more relevant for specific job requirements. Agreeableness, e.g., seems to be a more valid predictor in healthcare. In our study we besides did not determine job performance, we focused completely on the personality with the PSDI, therefore no valid assessment for the relationship of conscientiousness and successful job performance can be made with our results. Another view on conscientiousness is, that it can become a maladaptive trait. If the expression is too strong, conscientiousness becomes compulsive as mentioned by Moscoso and Salgado [36]. These authors determined the

negative effect of indecisiveness to efficiency in work. The dentist sample in our study had no compulsive T-values. The high T-value of *conscientious* ($M = 58,84$) is just yet within the normal range (T-values 40–60). Furthermore, Airagnes et al. [23] found a correlation between conscientiousness and empathy, which was expected by Costa et al. [22], but not proven in previous literature, because only a relationship between empathy and agreeableness and openness to experience was ascertained [21,22]. Empathy is a key factor for patient-dentist/physician relationship [21,23,28,33,46], which is explained in the following.
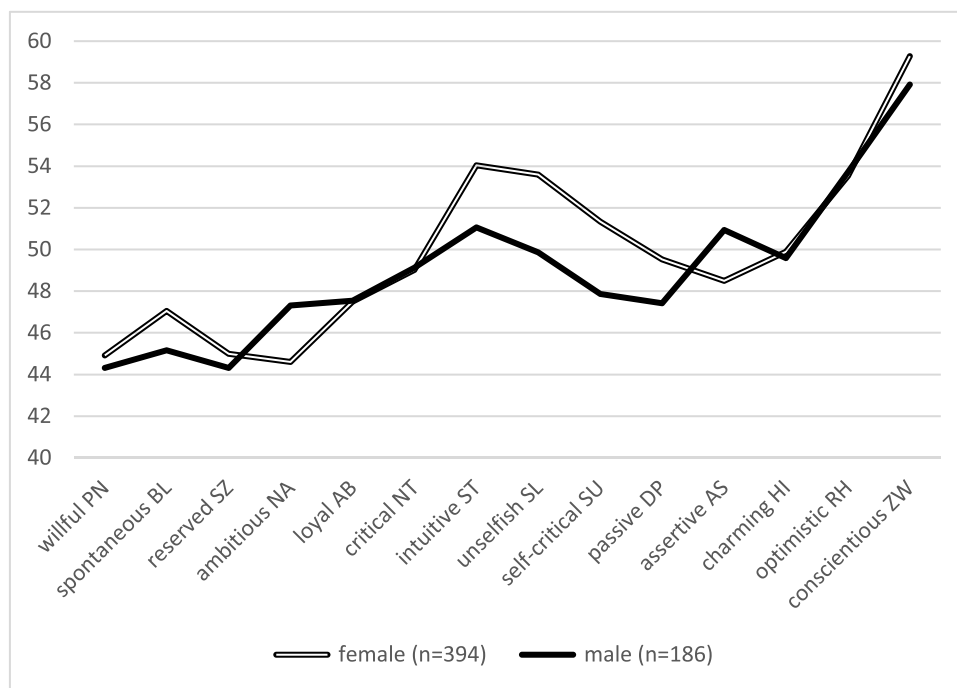
**Fig. 2.** Gender differences in personality styles between female and male dentists (DENT)

An interesting result presents the personality style *optimistic (RH)*. Dentists tend to be more *optimistic* than the normative sample and the psychotherapists. Optimism means having a positive, confident, life-affirming attitude [47]. To what extend optimism can be beneficial in dentistry is difficult to say. One possible approach can be the interpersonal relationship. In dental procedures the dentist is very close to the patient. The dentist's working area is the oral cavity, which might be very intimate for the patient and needs a lot of trust. A good dentist-patient relationship for a non-problematic treatment is helpful for both sides [28]. Regarding the results, optimistic people tend to have better social connections [48]. These authors assessed that people preferred optimistic people, because of their positive impact. This can be an advantage for the dentist-patient relationship, then having an optimistic dentist, who is able to cope with the patient's situation and give the patient a positive feeling by showing empathy and reducing patient's anxiety [28].

In addition to this approach, the dentist sample was significant less *willful (PN)*, less *spontaneous (BL)*, less *reserved* (SZ), and less *ambitious (NA)* than the NORM, which indicates the possibility for better relationship and communication skills. It is interesting to note that these same four personality styles have already been noted by Peter et al. [40] as essential to the therapeutic relationship: "These four personality styles in our psychotherapist sample seem to represent a patient-centered therapeutic attitude in accordance with two of Rogers [49] conditions: empathetic attention and unconditional positive regard." As mentioned before the patient-dentist-relationship is also one of the key factors in treatment during dental procedures [28,30]. Studies showed that many patients suffer from dental anxiety [24–27,50], which can follow into avoiding appointments at the dentist and neglecting prevention and oral health [25,26]. Caltabiano et al. [24] found in their study that not only clinical abilities but also interpersonal skills could decrease the dental anxiety of patients. Armfield and Heaton [25] concluded that a greater level of understanding and good communication can simplify the treatment of dental anxious patients. This shows how crucial a good dentist-patient relationship is, because it has a great impact in oral health [24–27,50].

Even if the effect sizes are only small regarding gender, see Fig. 2, the first thing that stands out is that the women are less *ambitious (NA)* and

*assertive (AS)* compared to the men. To put it bluntly: Female dentists are less "narcissistic" and less "assertive" than their male colleagues. Instead, they are more *spontaneous, intuitive, helpful* and *self-critical*.

Taken together it seems that the dentist profession may either influence the personality, or individuals with a specific personality profile tend to choose dentist as a profession. We suspect that not the first, but the second assumption is true, but to confirm this interpretation more studies are necessary with a focus on the personality of dentists before and after the career entry.

Finally, it must be mentioned that different personality styles than those we found are not a limitation for the dentist profession. The personality styles discussed above are obviously just helpful and seem to be necessary for the dentist-patient relationship, therapy outcome and oral healthcare [24–27,50]. There are techniques and abilities provided by coaching to improve the communication skills and showing empathy for the patient [24,25,39]. Still, our results are intriguing, because the dentists showed in their personality the "necessary" personality styles (*PN, BL, SZ, NA, RH*) to form a good dentist-patient relationship [40] and simultaneously to be accurate and precise *(ZW)* as their dental profession requires.

### 4.1. Limitations

Some limitations of this study should be emphasized. First, we have used a self-rating questionnaire, which may be flawed by self-report bias. The participants answered the online survey themselves without any interference or assessment of a third person. This could influence the results [51], but the participants were directly informed, that their data is irreversible anonymized, which can reduce the self-report bias. Another problem could be that individuals tend to present themselves in a good social-accepted manner, which is called social-desirability bias [52,53]. Further, the sample sizes were different and regarding gender of the dentist sample the female proportion was 67.93%. While the participants were contacted via e-mail and decided themselves to be part of the study, a potential self-selection bias should be mentioned.

## 5. Conclusions

The results presented that dentists' personality styles differ significantly from the general population (NORM) and from psychotherapists (DACH). The most significant differences were found in less *willful (PN), spontaneous (BL), reserved (SZ)*, and *ambitious (NA)*, as well as more *optimistic (RH)* and *conscientious (ZW)* personality styles. As discussed before these results give an approach for certain abilities, which are useful for dental practices, but also for the dentist-patient relationship.

Further studies on the impact of dentist's personality and dentist-patient relationship would be useful and necessary for better oral healthcare and to provide these skills for practitioners.

### Compliance with ethical standards

The study on human participants was in accordance with local legislation and institutional requirements. For this type of study there is no need for requiring a formal approval by the local ethics committee, because the collection and processing of participants' data for the study were under irreversibly anonymized conditions. This procedure agrees with the Swiss Human Research Act [810.30 Federal Law on Research Involving Human Subjects, Human Research Act (HRA)]. This study has been proceeded in accordance with the 1964 Declaration of Helsinki and its subsequent amendments and the ethical standards of the local research commission.

### Informed consent

All participants were adults and an informed consent for the processing of their data was obtained by accessing the online survey.

### Patient and public involvement

Not applicable.

### CRediT authorship contribution statement

**Thomas G. Wolf**: Writing – review & editing, Conceptualization, Project administration. **Valerie F. S. Speyer**: Writing – original draft, Writing – review & editing, Conceptualization, Data analysis, Visualization. **Burkhard Peter**: Data analysis, Writing – review & editing, Conceptualization, Formal analysis, Data analysis, Visualization.

### Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Acknowledgement

## References

[1] M.P. Wilmot, D.S. Ones, Occupational characteristics moderate personality–performance relations in major occupational groups, J. Vocat. Behav. 131 (2021), 103655, https://doi.org/10.1016/j.jvb.2021.103655.

[2] M.A. Mallinger, K.R. Brousseau, C.L. Cooper, Stress and success in dentistry, Some personality characteristics of successful dentists, J. Occup. Med. Off. Publ. Ind. Med. Assoc. 20 (1978) 549–553.

[3] G.H. Westerman, T.G. Grandy, C.G. Erskine, Personality types of dentists, Am. J. Dent. 4 (1991) 298–302.

[4] J.E. Mozer, C. Lloyd, Personality, self-esteem, stress, and satisfaction among Texas dentists, Tex. Dent. J. 109 (1992) 7–13.

[5] T.G. Grandy, G.H. Westerman, R.A. Ocanto, C.G. Erskine, Predicting dentists' career choices using the Myer-Briggs Type Indicator, J. Am. Dent. Assoc. 127 (1996) 253–258, https://doi.org/10.14219/jada.archive.1996.0178.

[6] H.L. Needleman, S. Bang, J. Zhou, J.R. Johnson, B. McPeek, D. Graham, Personality types of pediatric dentists: comparative analysis and associated factors, Pediatr. Dent. 33 (2011) 37–45.

[7] S. Anil, F.A. Hussein, A.S. Alahmari, S.H. Almubarak, S.A. Alateeq, Study on personality types of dentists in different disciplines of dentistry, J. Contemp. Dent. Pract. 18 (2017) 554–558, https://doi.org/10.5005/jp-journals-10024-2083.

[8] C.G. Erskine, G.H. Westerman, T.G. Grandy, Personality styles of first-year dental students, J. Dent. Educ. 50 (1986) 221–224.

[9] S.P. McDaniel, W.M. Siler, B.P. Isenberg, Comparison of personality variables and values among dental students, practitioners, and faculty, J. Dent. Educ. 52 (1988) 156–159, https://doi.org/10.1002/j.0022-0337.1988.52.3.tb02182.x.

[10] M.R. Fenlon, B.E. McCartan, M. Sheriff, T.J. Newton, Personality of dental students in two dental schools in the United Kingdom and in Ireland: dental student personality, Eur. J. Dent. Educ. 5 (2001) 173–176, https://doi.org/10.1034/j.1600-0579.2001.50406.x.

[11] S.A. Jessee, P.N. O'Neill, R.O. Dosch, Matching student personality types and learning preferences to teaching methodologies, J. Dent. Educ. 70 (2006) 644–651, https://doi.org/10.1002/j.0022-0337.2006.70.6.tb04120.x.

[12] D.G. Stacey, T.M. Kurunathan, Noncognitive indicators as critical predictors of students' performance in dental school, J. Dent. Educ. 79 (2015) 1402–1410, https://doi.org/10.1002/j.0022-0337.2015.79.12.tb06039.x.

[13] K.D. Rodriguez, J.A. Bartoloni, W.D. Hendricson, Is dental students' clinical productivity associated with their personality profile, J. Dent. Educ. 81 (2017) 1436–1443, https://doi.org/10.21815/JDE.017.104.

[14] J. Dalanon, Y. Matsuka, An investigation of Filipino dental students' personality types, Philipp. J. Health. Res. Dev. 2 (2018) 12–17.

[15] A. Jones, F. Courts, P. Sandow, R. Watson, Myers-Briggs Type Indicator and dental school performance, J. Dent. Educ. 61 (1997) 928–933, https://doi.org/10.1002/j.0022-0337.1997.61.12.tb03175.x.

[16] Commission on Dental Accreditation, Accreditation standards for dental education programs, Chicago, (2016). https://coda.ada.org.

[17] T.C. Chamberlain, V.M. Catano, D.P. Cunningham, Personality as a predictor of professional behavior in dental school: comparisons with dental practitioners, J. Dent. Educ. 69 (2005) 1222–1237, https://doi.org/10.1002/j.0022-0337.2005.69.11.tb04021.x.

[18] S.A. Gray, L.P. Deem, S.R. Straja, Are traditional cognitive tests useful in predicting clinical success, J. Dent. Educ. 66 (2002) 1241–1245, https://doi.org/10.1002/j.0022-0337.2002.66.11.tb03596.x.

[19] P.T. Costa, R.R. McCrae, Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) Professional Manual, Psychol. Assess. Resour. Inc., Odessa FL, 1992.

[20] W. de Gruyter, Pschyrembel: Klinisches Wörterbuch (editor), 268th ed., De Gruyter, Boston, 2020.

[21] G. Airagnes, S.M. Consoli, O. De Morlhon, A.-.M. Galliot, C. Lemogne, P. Jaury, Appropriate training based on Balint groups can improve the empathic abilities of medical students: a preliminary study, J. Psychosom. Res. 76 (2014) 426–429, https://doi.org/10.1016/j.jpsychores.2014.03.005.

[22] P. Costa, R. Alves, I. Neto, P. Marvão, M. Portela, M.J. Costa, Associations between medical student empathy and personality: a multi-institutional study, PLOS One 9 (2014) e89254, https://doi.org/10.1371/journal.pone.0089254.

[23] G. Airagnes, C.B. du Vaure, E. Galam, L. Bunge, N. Hoertel, F. Limosin, et al., Personality traits are associated with cognitive empathy in medical students but not with its evolution and interventions to improve it, J. Psychosom. Res. 144 (2021), 110410, https://doi.org/10.1016/j.jpsychores.2021.110410.

[24] M.L. Caltabiano, F. Croker, L. Page, A. Sklavos, J. Spiteri, L. Hanrahan, et al., Dental anxiety in patients attending a student dental clinic, BMC Oral Health 18 (2018) 48, https://doi.org/10.1186/s12903-018-0507-5.

[25] J.M. Armfield, L.J. Heaton, Management of fear and anxiety in the dental clinic: a review, Aust. Dent. J. 58 (2013) 390–407, https://doi.org/10.1111/adj.12118.

[26] L.D. Seligman, J.D. Hovey, K. Chacon, T.H. Ollendick, Dental anxiety: an understudied problem in youth, Clin. Psychol. Rev. 55 (2017) 25–40, https://doi.org/10.1016/j.cpr.2017.04.004.

[27] H.M. Wong, S.-.M. Peng, A. Perfecto, C.P.J. McGrath, Dental anxiety and caries experience from late childhood through adolescence to early adulthood, Community Dent. Oral Epidemiol. 48 (2020) 513–521, https://doi.org/10.1111/cdoe.12563.

[28] L.M. Jones, T.J. Huggins, Empathy in the dentist-patient relationship: review and application, N. Z. Dent. J. 110 (2014) 98–104.

[29] Y. Song, L. Luzzi, D.S. Brennan, Trust in dentist-patient relationships: mapping the relevant concepts, Eur. J. Oral Sci. 128 (2020) 110–119, https://doi.org/10.1111/eos.12686.

[30] Y. Song, L. Luzzi, S. Chrisopoulos, D. Brennan, Dentist-patient relationships and oral health impact in Australian adults, Community Dent. Oral Epidemiol. 48 (2020) 309–316, https://doi.org/10.1111/cdoe.12534.

[31] L.M.L. Ong, J.C.J.M. de Haes, A.M. Hoos, F.B. Lammes, Doctor-patient communication: a review of the literature, Soc. Sci. Med. 40 (1995) 903–918, https://doi.org/10.1016/0277-9536(94)00155-M.

[32] D. Roter, J.A. Hall, Doctors Talking With Patients/Patients Talking With doctors: Improving communication in Medical Visits, 2nd ed., Praeger, Westport Conn., 2006.

[33] M. Hojat, D.Z. Louis, F.W. Markham, R. Wender, C. Rabinowitz, J.S. Gonnella, Physicians' empathy and clinical outcomes for diabetic patients, Acad. Med. J.

Assoc. Am. Med. Coll. 86 (2011) 359–364, https://doi.org/10.1097/ACM.0b013e3182086fe1.

[34] M.R. Barrick, M.K. Mount, T.A. Judge, Personality and performance at the beginning of the New Millennium: what do we know and where do we go next, Int. J. Sel. Assess. 9 (2001) 9–30, https://doi.org/10.1111/1468-2389.00160.

[35] J.F. Salgado, The Big Five personality dimensions and counterproductive behaviors, Int. J. Sel. Assess. 10 (2002) 117–125, https://doi.org/10.1111/1468-2389.00198.

[36] S. Moscoso, J.F. Salgado, Dark Side" personality styles as predictors of task, contextual, and job performance, Int. J. Sel. Assess. 12 (2004) 356–362, https://doi.org/10.1111/j.0965-075X.2004.00290.x.

[37] J. Kuhl, M. Kazén, Persönlichkeits-Stil- und Störungs-Inventar (PSSI), Manual [Personality Style and Disorder Inventory (PSDI)], 2009.

[38] B. Peter, E. Böbel, Significant differences in personality styles of securely and insecurely attached psychotherapists: data, reflections and implications, Front. Psychol. 11 (2020) 611, https://doi.org/10.3389/fpsyg.2020.00611.

[39] B. Peter, T.G. Wolf, Replication studies on significant differences in personality profiles of securely and insecurely attached psychotherapists and dentists, Front. Psychol. 12 (2021), 662828, https://doi.org/10.3389/fpsyg.2021.662828.

[40] B. Peter, E. Böbel, M. Hagl, M. Richter, M. Kazén, Personality styles of German-speaking psychotherapists differ from a norm, and male psychotherapists differ from their female colleagues, Front. Psychol. 8 (2017) 840, https://doi.org/10.3389/fpsyg.2017.00840.

[41] American Psychiatric Association, Diagnostic and Statistical Manual of Mental disorders, Fifth Edition, American Psychiatric Association, 2013. 10.1176/appi.books.9780890425596.

[42] World Health Organization, The ICD-10 Classification of Mental and Behavioural disorders: Clinical descriptions and Diagnostic Guidelines, editor, World Health Organization, Geneva, 1992.

[43] R.B. Cattell, A.K. Cattell, H.E.P. Cattell, 16PF Fifth Edition Questionnaire, Champaign IL. Inst. Personal Abil. Test (1993).

[44] B. Peter, E. Böbel, Does the homo hypnoticus exist? Personality styles of people interested in hypnosis, Int. J. Clin. Exp. Hypn. 68 (2020) 348–370, https://doi.org/10.1080/00207144.2020.1756294.

[45] J.F. Salgado, Moderator effects of job complexity on the validity of forced-choice personality inventories for predicting job performance, Rev. Psicol. Trab. Las Organ. 33 (2017) 229–239, https://doi.org/10.1016/j.rpto.2017.07.001.

[46] R. Elliott, A.C. Bohart, J.C. Watson, D. Murphy, Therapist empathy and client outcome: an updated meta-analysis, Psychotherapy 55 (2018) 399–410, https://doi.org/10.1037/pst0000175.

[47] Duden Online, Berlin: Bibliographisches Institut GmbH (2021), https://www.duden.de/rechtschreibung/Optimismus.

[48] C.S. Carver, M.F. Scheier, S.C. Segerstrom, Optimism, Clin. Psychol. Rev. 30 (2010) 879–889, https://doi.org/10.1016/j.cpr.2010.01.006.

[49] C.R. Rogers, The necessary and sufficient conditions of therapeutic personality change, J. Consult. Psychol. 21 (1957) 95–103, https://doi.org/10.1037/h0045357.

[50] N. Jeddy, S. Nithya, T. Radhika, N. Jeddy, Dental anxiety and influencing factors: a cross-sectional questionnaire-based survey, Indian J. Dent. Res. Off. Publ. Indian Soc. Dent. Res. 29 (2018) 10–15, https://doi.org/10.4103/ijdr.IJDR_33_17.

[51] C.E. Lambert, Identifying Faking On Self-Report Personality inventories: Relative merits of Traditional Lie scales, New Lie scales, Response patterns, and Response times, Library and Archives Canada = Bibliothique et Archives Canada, 2014.

[52] A.L. Edwards, The Social Desirability Variable in Personality Assessment and Research, Dryden Press, Ft. Worth., TX., US., 1957.

[53] I. Krumpal, Determinants of social desirability bias in sensitive surveys: a literature review, Qual. Quant. 47 (2013) 2025–2047, https://doi.org/10.1007/s11135-011-9640-9.