

Influence of Neuroticism on the Prognosis of Nanoceramic and Microhybrid Composite Restoration: A Comparative 1-year Clinical Study

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ABSTRACT

Aim: This study aimed to compare the clinical performance of nanoceramic and microhybrid-based composite restorations in adult patients with different personality traits. **Materials and Methods:** Patients in accordance with the inclusion and exclusion criteria were asked to complete the BFI (Big Five Inventory) questionnaire. Of a total of 323 patients, 124 (67 males and 57 females) patients were categorized into agreeableness and neuroticism traits and were included in the study. The patients were randomly divided into two subgroups: SG I A ($n = 31$) and II A ($n = 31$) for microhybrid composite (Spectrum TPH 3, Dentsply/DeTrey, Konstanz, Germany), SG I B ($n = 31$) and II B ($n = 32$) for nanoceramic composite restorations (Ceram X mono, Dentsply/DeTrey, Germany). At baseline, 6 and 12 months, the restorations were evaluated using the Modified USPHS (United States Public Health Service) evaluation criteria. The Pearson chi-square and the Fisher's exact test were used to assess the difference between the personality traits and restorative material groups where a probability value of $P < 0.05$ was considered to be statistically significant. **Result:** Most of the restorations scored alfa (A), whereas very few scored bravo (B) in all the subgroups. However, there were no charlie (C) or delta (D) scores. Overall, Spectrum TPH and Ceram x mono displayed superior performances in retention and postoperative sensitivity than all the other clinical parameters. Furthermore, Ceram x mono restorations showed more surface roughness than Spectrum TPH. No statistical differences in the restoration performance were found between both personalities and restorative material types. **Conclusion:** Although neuroticism has an effect on various health outcomes, its impact on the clinical performance of composite restorations during the follow-up period was not observed. In addition, there was no difference between the performance of nanohybrid and microhybrid composite.

KEYWORDS: Agreeableness, clinical performance, microhybrid composite, nanohybrid composite, neuroticism

INTRODUCTION

Personality can be defined as “the dynamic organization of the psychobiological systems that modulate adaptation to changing environments through several personality traits, which are long-lasting patterns

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of how we perceive, relate to, think about oneself, other people, and the world as a whole.”^[1] Every person or patient coming to a dental clinic will have distinct personality traits which are highly valued predictors of psychosocial performance, psychopathology, physical health, and mortality.^[2] The neuroticism personality trait is proved to cause diseases (depression, cardiac disease, asthma, and Alzheimer’s disease) and influence its progression.^[3] Among various personality assessment models, Costa and McCrae’s “Big-Five” model is a widely accepted hierarchical model of personality traits. In this model, personality traits of an individual are measured as five different characteristics which include extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience.^[4] Patients who score high in neuroticism (experiencing high stress, anxiety, and aggression) and low in agreeableness are at a larger risk of contracting certain diseases.^[5,6]

Bruxism is a pathological activity that is strongly associated with the neuroticism personality trait where bruxism individuals, due to their higher bite force, carry the risk of occlusal wear, fractures of teeth, and direct restorations.^[7-11] Tasaka *et al.*^[12] observed stressful, neurotic individuals generate increased speed, and frequency of chewing strokes, which could negatively affect the longevity of restorations. In a recent study, people with personality traits such as neuroticism are found to have higher bite force compared to those with the agreeableness trait.^[13] Therefore, it is possible for personality traits especially neuroticism, to have considerable influence in the prognosis of restorative procedures such as dental implants, intracoronary, and extracoronary restorations.

Newer composite resins with enhanced physical and mechanical characteristics are available in recent times. Most of these evolutions involve inorganic filler fractions with few related to organic resin components.^[14] The physical and mechanical characteristics of composite materials are highly important when choosing suitable

materials; universal microhybrid composites with a mean particle size of 0.6–0.7 μm are indicated for both anterior and posterior restorations due to their good esthetics, high wear resistance, and smoother surface on polishing.^[15] Newer nanocomposite resins claim to have improved properties such as better compressive, diametric tensile strength, wear resistance, fracture resistance, minimal polymerization shrinkage, high translucency, smoother surface, and better esthetics.^[16] More recently, a new generation of ormocer-based nanoceramic material was developed and was found to have superior wear rates, better fracture resistance, and polishability than conventional microhybrid composites.^[17,18]

Hence, the primary objective of this study was to compare the clinical performance of composite restoration in patients with different personality traits (the neuroticism groups are the subjects of interest and the contrasting character, the agreeableness group, will act as a normal personality control group). Furthermore, the secondary objective was to determine whether recent improvised composite such as nanoceramic have significant advantages over microhybrid among individuals with the same personality (the potential confounding factor of personality was controlled in the secondary objective study group).

MATERIALS AND METHODS

SETTING AND DESIGN

The study was approved by the ethics committee of the institution (ethical clearance number 20180730), where it was carried out between the years 2018 and 2019. The inclusion criteria for the patients were ages between 20 and 35 years and the presence of all permanent teeth (at least 28 excluding third molars) with a bilateral Angle’s Class I molar and canine relationship. Patients having occlusal restorations involving cusps, presence of endodontically treated teeth, fixed prostheses, active periodontal disease,

Table 1: Material composition and batch number

Material name	Material type	Filler volume/ weight	Composition	Manufacturer and batch number
SPECTRUM T.P.H	Microhybrid	57 vol % / 77 wt %	Matrix: Bis-GMA, Bis-EMA, TEGDMA Bariumaluminiumborosilicate (mean particle size <1.5 μm), Highly dispersed silicon dioxide (particle size 0.04 μm)	Dentsply De Trey GmbH, Konstanz, Germany 60605301 60605302 60605303
CERAM.X MONO	Nanoceramic	57 vol % / 76 wt %	Methacrylate modified polysiloxane, dimethacrylate Barium-aluminum borosilicate glass, methacrylate functionalized silicon dioxide (nanofiller, 10 nm)	Dentsply De Trey GmbH, Konstanz, Germany 60701511 60701512 60701513

presence of local or systemic osseous or neuromuscular diseases, presence of spontaneous orofacial pain, temporomandibular joint (TMJ) disorder symptoms,

and large facial asymmetry were not considered for the study. As all the aforementioned factors would affect the intensity of bite force generated and alter the

Table 2: Comparative difference (frequency distribution) at baseline and 12 months between agreeableness (microhybrid) and neuroticism (microhybrid) individuals

Evaluation criteria	Score	Microhybrid (agreeableness) baseline		Microhybrid (neuroticism) baseline		P Value***	Microhybrid (agreeableness) 12 months		Microhybrid (neuroticism) 12 months		P Value***
		N	%	N	%		N	%	N	%	
		Retention	A*	31	100		31	100	NA	30	
	B**	0	0	0	0		0	0	0	0	
Color match	A	30	96.8	31	100	0.500	28	93.3	28	93.3	0.694
	B	1	3.2	0	0		2	6.7	2	6.7	
Marginal discoloration	A	31	100	31	100	NA	27	90	28	93.3	0.500
	B	0	0	0	0		3	10	2	6.7	
Marginal adaptation	A	31	100	31	100	NA	28	93.3	29	96.7	0.500
	B	0	0	0	0		2	6.7	1	3.3	
Secondary caries	A	31	100	31	100	NA	29	96.7	30	100	0.500
	B	0	0	0	0		1	3.3	0	0	
Surface texture	A	31	100	31	100	NA	27	90	28	93.3	0.500
	B	0	0	0	0		3	10	2	6.7	
Anatomic form	A	31	100	31	100	NA	28	93.3	29	96.7	0.500
	B	0	0	0	0		2	6.7	1	3.3	
Postoperative sensitivity	A	30	96.8	30	96.8	0.754	29	96.7	30	100	0.500
	B	1	3.2	1	3.2		1	3.3	0	0	

P ≤ 0.05

*A: Alfa rating according to the U.S. Public Health Service-Ryge modified criteria

**B: Bravo rating according to the U.S. Public Health Service-Ryge modified criteria

***Fisher exact test

Table 3: Comparative differences (frequency distribution) at baseline and 12 months between agreeableness (nanoceramic) and neuroticism (nanoceramic) individuals

Evaluation criteria	Score	Nanoceramic (agreeableness) baseline		Nanoceramic (neuroticism) baseline		P Value***	Nanoceramic (agreeableness) 12 months		Nanoceramic (neuroticism) 12 months		P Value***
		N	%	N	%		N	%	N	%	
		Retention	A*	31	100		32	100	NA	31	
	B**	0	0	0	0		0	0	1	3.2	
Color match	A	31	100	32	100	NA	28	90.3	28	90.3	0.664
	B	0	0	0	0		3	9.7	3	9.7	
Marginal discoloration	A	31	100	32	100	NA	28	90.3	28	90.3	0.664
	B	0	0	0	0		3	9.7	3	9.7	
Marginal adaptation	A	31	100	32	100	NA	29	93.5	29	93.5	0.694
	B	0	0	0	0		2	6.5	2	6.5	
Secondary caries	A	31	100	32	100	NA	31	100	30	96.8	0.500
	B	0	0	0	0		0	0	1	3.2	
Surface texture	A	31	100	32	100	NA	27	87.1	26	83.9	0.500
	B	0	0	0	0		4	12.9	5	16.1	
Anatomic form	A	31	100	32	100	NA	30	96.8	30	96.8	0.754
	B	0	0	0	0		1	3.2	1	3.2	
Postoperative sensitivity	A	29	93.5	31	96.9	0.488	31	100	30	96.8	0.500
	B	2	6.5	1	3.1		0	0	1	3.2	

P ≤ 0.05

*A: Alfa rating according to the U.S. Public Health Service-Ryge modified criteria

**B: Bravo rating according to the U.S. Public Health Service-Ryge modified criteria

***Fisher exact test

Table 4: Comparative differences among only neuroticism trait individuals (frequency distribution) at baseline and 12 months between microhybrid (neuroticism) and nanoceramic (neuroticism) restorations

Evaluation criteria	Score	Microhybrid (neuroticism) baseline		Nanoceramic (neuroticism) baseline		P Value***	Microhybrid (neuroticism) 12 months		Nanoceramic (neuroticism) 12 months		P Value***
		N	%	N	%		N	%	N	%	
		Retention	A*	31	100		32	100	NA	30	
	B**	0	0	0	0		0	0	1	3.2	
Color match	A	31	100	32	100	NA	28	93.3	28	90.3	0.516
	B	0	0	0	0		2	6.7	3	9.7	
Marginal discoloration	A	31	100	32	100	NA	28	93.3	28	90.3	0.516
	B	0	0	0	0		2	6.7	3	9.7	
Marginal adaptation	A	31	100	32	100	NA	29	96.7	29	93.5	0.513
	B	0	0	0	0		1	3.3	2	6.5	
Secondary caries	A	31	100	32	100	NA	30	100	30	96.8	0.508
	B	0	0	0	0		0	0	1	3.2	
Surface texture	A	31	100	32	100	NA	28	93.3	26	83.9	0.226
	B	0	0	0	0		2	6.7	5	16.1	
Anatomic form	A	31	100	32	100	NA	29	96.7	30	96.8	0.746
	B	0	0	0	0		1	3.3	1	3.2	
Postoperative sensitivity	A	30	96.8	31	96.9	0.746	30	100	30	96.8	0.508
	B	1	3.2	1	3.1		0	0	1	3.2	

$P \leq 0.05$

*A: Alfa rating according to the U.S. Public Health Service-Ryge modified criteria

**B: Bravo rating according to the U.S. Public Health Service-Ryge modified criteria

***Fisher exact test

chewing characteristics of an individual, those patients were excluded. Informed consent was obtained from all patients for their participation before starting the study.

SAMPLING CRITERIA

Big Five Inventory (BFI)^[4] has been used in this study. The candidates for this study were randomly selected from patients visiting the Department of Conservative Dentistry. They were given the BFI questionnaire [Appendix I] to fill, and the filled questionnaire was then evaluated accordingly with the help of a psychiatrist and allotted to the various personality traits as per the scores.^[4,19] Of the total 323 patients, 124 (67 males and 57 females) patients in the agreeableness and neuroticism traits were included in the study for further investigation.

Thereafter, patients from the agreeableness and the neuroticism group were randomly divided into two subgroups each: subgroup I A ($n = 31$) and II A ($n = 31$) for microhybrid composite and subgroup I B ($n = 31$) and II B ($n = 32$) for nanoceramic composite restorations. The choice of the composite restorative material type provided to the patient was randomly assigned by flipping a coin.

CLINICAL PROCEDURE

Two specialists in conservative dentistry performed the operative procedures. Class I cavities were prepared of almost similar size and location (enamel and dentin) on the molar teeth, and the outline of the preparations was limited to the removal of caries/defective restoration. The teeth

were etched, bonded, and restored as per the manufacturer's instructions. Each patient received one restoration either the microhybrid (Spectrum TPH 3, Dentsply/DeTrey, Konstanz, Germany) or the nanoceramic composite (Ceram X mono, Dentsply/DeTrey, Germany) [Table 1], excluding one neuroticism trait patient who received two Ceram X mono restorations. The placement of resin composites was done by employing the incremental technique and were cured using LED light for 40s, which was followed by finishing and polishing procedures (Enhance Finishing System Kit, Dentsply Sirona, Germany).

EVALUATION

At baseline (immediately after restoration), 6 and 12 months, the restorations were evaluated by two double-blinded, independent dental professionals for anatomical form, secondary caries, color match, retention, marginal adaptation, surface texture, marginal discoloration, and postoperative sensitivity using the Modified USPHS evaluation criteria [Cvar and Ryge, see Appendix II]. Any variation in the evaluations was solved through discussions to reach a consensus by both examiners.^[20,21]

STATISTICAL ANALYSIS

As the evaluation of restorations provided only ordinal structural data, nonparametric statistical analysis was performed using the SPSS version 24.0 (SPSS/IBM, Chicago, Illinois). The Pearson chi-square and the Fisher's exact test were used to assess the difference

Table 5: Comparative differences among only agreeableness trait individuals (frequency distribution) at baseline and 12 months between microhybrid (agreeableness) and nanoceramic (agreeableness) restorations

Evaluation criteria	Score	Microhybrid (agreeableness)		Nanoceramic (agreeableness)		P Value***	Microhybrid (agreeableness)		Nanoceramic (agreeableness)		P Value***
		baseline		baseline			12 months		12 months		
		N	%	N	%		N	%	N	%	
Retention	A*	31	100	31	100	NA	30	100	31	100	NA
	B**	0	0	0	0		0	0	0	0	
Color match	A	30	96.8	31	100	0.500	28	93.3	28	90.3	0.516
	B	1	3.2	0	0		2	6.7	3	9.7	
Marginal discoloration	A	31	100	31	100	NA	27	90	28	90.3	0.648
	B	0	0	0	0		3	10	3	9.7	
Marginal adaptation	A	31	100	31	100	NA	28	93.3	29	93.5	0.681
	B	0	0	0	0		2	6.7	2	6.5	
Secondary caries	A	31	100	31	100	NA	29	96.7	31	100	0.492
	B	0	0	0	0		1	3.3	0	0	
Surface texture	A	31	100	31	100	NA	27	90	27	87.1	0.519
	B	0	0	0	0		3	10	4	12.9	
Anatomic form	A	31	100	31	100	NA	28	93.3	30	96.8	0.487
	B	0	0	0	0		2	6.7	1	3.2	
Postoperative sensitivity	A	30	96.8	29	93.5	0.500	29	96.7	31	100	0.492
	B	1	3.2	2	6.5		1	3.3	0	0	

$P \leq 0.05$

*A: Alfa rating according to the U.S. Public Health Service-Ryge modified criteria

**B: Bravo rating according to the U.S. Public Health Service-Ryge modified criteria

***Fisher exact test

between the personality traits and restorative material groups, and a probability value of $P < 0.05$ was considered to be statistically significant.

RESULTS

Three patients who were seen at baseline did not return for the 12-month evaluation. These people accounted for overall restoration dropouts of 1.5% for Ceram X mono and 3.2% percent for Spectrum TPH over the 12 months. A majority of the restorations scored alfa (A), whereas very few scored bravo (B); however, there were no charlie (C) or delta (D) scores for any of the restorations, and all the restorations in both the personality trait groups were clinically acceptable at the 12-month evaluation except one in the neuroticism group. There were no statistically significant differences among all the groups or for any of the evaluation criteria at 12 months (Fisher exact test, $P > 0.05$).

Table 2 shows the comparison of Spectrum TPH restorations between different personality group patients. To highlight, Spectrum TPH restorations showed more deterioration in the agreeableness trait group than the neuroticism group in marginal discoloration, marginal adaptation, surface texture, and in anatomic form criteria. In the secondary caries criteria, one restoration in the neuroticism group had slight radio-opacity around the margins; however, it did not require replacement.

Table 3 shows the comparison of the nanoceramic restorations performance between different personality group patients. Notably in surface texture category, Ceram X mono showed higher surface roughness among both the personality groups.

Table 4 shows the comparison between Ceram X mono and Spectrum TPH restoration among the neuroticism group patients. One Ceram X mono restoration failed in the retention category which required replacement. Another Ceram X mono restoration had clinical evidence of caries indicated by opacity in the margins requiring a follow-up. A notable difference was that Ceram X mono restorations showed more surface roughness than Spectrum TPH restorations.

Table 5 shows a comparison between Ceram X mono and Spectrum TPH restorations among the agreeableness group patients. The distributions of A and B scores were similar among the two groups.

DISCUSSION

Researchers have established that personality traits have an effect on various health-related outcomes, of which neuroticism is the most studied personality trait from the point of view of health.^[5,22] Persons with higher scores of neuroticism are more frequently linked to experiencing stress, bruxism, binge-eating disorder (BED), and generalized anxiety disorder (GAD)

characterized by the hyperactivity of the temporalis muscle which significantly affects the masticatory system. Furthermore high- neuroticism individuals lead an unhealthy lifestyle by indulging in adverse habits such as substance abuse (increased amounts of smoking and alcohol addiction).^[23,24] Hence, it is highly imperative to check neuroticism's influence in the clinical survival of restorations. In addition, this study attempts to address the doubts among clinicians on choosing new generation nanoceramic over universal microhybrid composite in occlusal Class I cavity preparation.

The results show that there was no statistically significant difference in the clinical performance of restorations among different personality traits [Tables 2 and 3]. This could be because, although the neurotic individuals were found to generate significantly higher maximum voluntary bite force than agreeableness individuals, the mean difference was only around 100 Newtons.^[13] This finding could be the main reason for the lack of difference, as smaller variation in bite force levels between the two personality traits did not create an impact on the behavior of restorative materials in this short evaluation period. The results are in accordance with a previous *in vitro* study which stated that an increase in the chewing pressure by three to four times is required to observe changes on the restorations.^[25]

The results also show that the clinical performance of both Spectrum TPH and Ceram X mono composites among same personality groups [Tables 4 and 5] during the 12-month follow-up period was found to be excellent with no statistically significant difference attributable to their physical and mechanical properties, which is consistent with previous studies.^[26] Moreover, Schirrmeister *et al.*^[27] found no statistically significant difference between microhybrid and nanoceramic composites after 24 months of clinical service. However, these studies were done in populations without the control of personality traits, patient's ages, cavity types, TMJ and occlusion statuses unlike this study.

The Big Five factor model used in this study describes personality traits to be a larger extent of a product of biology than a product of life experiences and are relatively stable characters. BFI is being widely used by psychologists in India and was reported to have very good reliability.^[28,29] Among the five personality traits, we selected only two groups (neuroticism and agreeableness) as they are contrasting in nature and experience opposite patterns in disease incidence and progression. After the placement of restoration, the first 6–24 months period seems to be crucial in the buildup of deteriorations.^[5] Hence, we assumed this 1-year follow-up study could provide some insights regarding the behavior of these composite restorations.

As this study is the first of its kind, support from previous literature was not available to help determine an exact duration of the study period.

Overall, both Spectrum TPH and Ceram X mono displayed superior performance in retention and postoperative sensitivity than the other clinical parameters. In this study, better retention property among both restorative material types was seen, which could have been due to the hydrophobic monomer (Bis-EMA) of Spectrum TPH and high molecular weight of polysiloxane present in nanoceramic that could have resulted in hydrolytic and biochemical stability, thereby leading to more stable bonds.^[30] Reduced postoperative sensitivity among Spectrum TPH and Ceram X mono restorations in this study can be mainly attributed to the inherent ability of modern adhesive systems to effectively seal dentinal tubules by the mechanism of a hybrid layer formation.^[31] To further highlight, Ceram X mono restorations showed more surface roughness than Spectrum TPH; this might be primarily due to the high number of pores that develop on its surface over clinical use.^[32,33]

Compared to any previous USPHS clinical studies, this is the first study to investigate the effect of personality on the outcomes of restoration performance with standardization of many factors during the clinical preparation and evaluation. The study sample had been restricted to adjust the potential effects of covariates such as age, tooth type, cavity form and size, TMJ status, occlusion status, and dental conditions which could potentially influence the outcome of the results. Nevertheless, there are few inherent limitations of this study such as the inability to control factors such as individual patient's diet, habits, oral hygiene, and minor potential variations that could exist among the clinicians employed during the restorative and evaluative procedures.

CONCLUSION

Although neuroticism has a negative effect on various health-related outcomes, its negative impact on the clinical performance of Class I direct-composite restorations during the 12-month follow-up period was not observed. Furthermore, the claimed superiority of nanohybrid over microhybrid composite was not indicated in our results. However, a longer follow-up period is required for this study to appreciate the potential negative changes that may take place on the restorations due to the difference in bite forces, chewing patterns, unhealthy lifestyles and substance abuse associated with neuroticism.

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CONFLICTS OF INTEREST

Nil.

AUTHORS CONTRIBUTIONS

Not applicable.

ETHICAL POLICY AND INSTITUTIONAL REVIEW BOARD STATEMENT

Not applicable.

PATIENT CONSENT STATEMENT

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

DATA AVAILABILITY STATEMENT

Not applicable.

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APPENDIX I

BFI QUESTIONNAIRE

How I am in general?

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which *you agree or disagree with that statement*.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly

I am someone who...

1. ____ Is talkative
2. ____ Tends to find fault with others
3. ____ Does a thorough job
4. ____ Is depressed, blue
5. ____ Is original, comes up with new ideas
6. ____ Is reserved
7. ____ Is helpful and unselfish with others
8. ____ Can be somewhat careless
9. ____ Is relaxed, handles stress well.
10. ____ Is curious about many different things
11. ____ Is full of energy
12. ____ Starts quarrels with others
13. ____ Is a reliable worker
14. ____ Can be tense
15. ____ Is ingenious, a deep thinker
16. ____ Generates a lot of enthusiasm
17. ____ Has a forgiving nature
18. ____ Tends to be disorganized
19. ____ Worries a lot
20. ____ Has an active imagination
21. ____ Tends to be quiet
22. ____ Is generally trusting
23. ____ Tends to be lazy
24. ____ Is emotionally stable, not easily upset
25. ____ Is inventive
26. ____ Has an assertive personality

27. ____ Can be cold and aloof
28. ____ Perseveres until the task is finished
29. ____ Can be moody
30. ____ Values artistic, aesthetic experiences
31. ____ Is sometimes shy, inhibited
32. ____ Is considerate and kind to almost everyone
33. ____ Does things efficiently
34. ____ Remains calm in tense situations
35. ____ Prefers work that is routine
36. ____ Is outgoing, sociable
37. ____ Is sometimes rude to others
38. ____ Makes plans and follows through with them
39. ____ Gets nervous easily
40. ____ Likes to reflect, play with ideas
41. ____ Has few artistic interests
42. ____ Likes to cooperate with others
43. ____ Is easily distracted
44. ____ Is sophisticated in art, music literature

SCORING INSTRUCTIONS

To score the BFI, you'll first need to reverse-score all negatively-keyed items:

Extraversion: 6, 21,31

Agreeableness: 2, 12,27,37

Conscientiousness: 8, 18,23,43

Neuroticism: 9, 24,34

Openness: 35, 41

To recode these items, you should subtract your score for all reverse-scored items from 6. For example, if you gave yourself a 5, compute 6 minus 5 and your recoded score is 1. That is, a score of 1 becomes 5, 2 becomes 4, 3 remains 3, 4 becomes 2, and 5 becomes 1.

Next, you will create scale scores by *averaging* the following items for each B5 domain

(where R indicates using the reverse-scored item).

Extraversion: 1, 6R 11, 16, 21R, 26, 31R, 36

Agreeableness: 2R, 7, 12R, 17, 22, 27R, 32, 37R, 42

Conscientiousness: 3, 8R, 13, 18R, 23R, 28, 33, 38, 43R

Neuroticism: 4, 9R, 14, 19, 24R, 29, 34R, 39

Openness: 5, 10, 15, 20, 25, 30, 35R, 40, 41R, 44

APPENDIX II

Modified USPHS criteria / Ryge evaluation criteria

A: alfa, B: bravo, C: charlie, D: delta

Alfa: Restorations that have satisfactory quality and excellent clinical standard.

Bravo: Restorations satisfactory, but not ideal (acceptable).

Charlie: Restorations that do not have acceptable quality and must be replaced by preventive reasons.

Delta: Restorations with mobility or fractured or lost.

*Score A = Highest degree of clinical acceptability; Score B, C and D = progressively lessening degrees of acceptability

Retention

A: Complete retention of the restoration

B: Mobilization of the restoration, still present

C: Loss of the restoration

Color matches

A: The restoration matches the adjacent tooth structure in color, shade or translucency

B: Mismatch in color, shade or translucency between the restoration and the adjacent tooth

C: The mismatch in color and translucency is outside the acceptable range of tooth color and translucency

Marginal discoloration

A- No discoloration anywhere along the margin between the restoration and the adjacent tooth

B: Slight discoloration along the margin between the restoration and the adjacent tooth

C: The discoloration penetrated along the margin of the restorative material in a pulpal direction

Marginal adaptation

A: No visible evidence of crevice along the margin

B: Visible evidence of a crevice along the margin into which the explorer will penetrate

C -The dentine or the base is exposed

D: The restoration is fractured, mobile or missed

Surface texture

A: The restoration surface is as smooth as the surrounding enamel

B -The restoration surface is rougher than the surrounding enamel

C -There is a crevice and fracture on the surface of the restoration

Anatomical form

A: The restoration is continuous with existing anatomical form

B: The restoration is discontinuous with existing anatomical form but the material is not sufficient to expose dentine or base

C: Sufficient material lost to expose dentine or base

Secondary caries

A- No evidence of caries

B: Evidence of caries along the margin of the restoration

Postoperative sensitivity

A: No postoperative sensitivity at any time during the restorative process and the study period

B: Experience of sensitivity at any time during the restorative process and the study period
