Republic of Iraq
Ministry of Higher Education
and Scientific Research
University of Baghdad
College of Dentistry

Psychological Management of Orthodontic Patients

A Project Submitted to

The College of Dentistry, University of Baghdad, Department of Orthodontics in Partial Fulfillment for the Bachelor of Dental Surgery

By

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May, 2023

Certification of the Supervisor

I certify that this project entitled " Psychological Management of Orthodontic Patients" was prepared by the fifth-year student Dhamaa AL-hussein Tariq Zaid under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

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Date: 2/5/2023

Dedication

I dedicate this review to the most sincere heart in my life, **my mother** who supported me in my studying, and taught me that medical field is a human value before it is a profession.

Aknowlegment

Firstly, all gratefulness and faithfulness to **ALLAH** for answering our prayers and providing me with patience, perseverance and the ability to undertake and finally complete this study.

My deep appreciation to **Prof. Dr. Raghad A. AL-Hashimi**, the Dean of the College of Dentistry, University of Baghdad, for continuously supporting the postgraduate students.

My sincere respect and special thanks to **Prof. Dr. Dheaa H. Al-Groosh**, the Head of the Department of Orthodontics, for all his efforts to provide the necessary facilities and being always ready to give advice and support during the study and his valuable efforts in performing the statistical analysis of this study.

I especially want to thank my supervisor **Assist. Prof. Alan Issa Saleem**, for her guidance, patience, kind advices and efforts during my research, also for helping me in the theoretical and clinical program throughout the period of orthodontic course. Also, she was constantly reachable, and as a result, the research life became smoother and rewarding for me.

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Table of abbreviation

Words	Abbreviation
And	&
Self esteem	SE
Body mass index	BMI
Oral health related quality of life	OHRQoL
Quality of life	QOL
Duration of orthodontic treatment	DOT
Motivational interview	MI
Gingival index	GI
Plaque index	PI
Dental Monitoring	DM

Introduction

Orthodontic treatment affected by psychosocial variables which interfere between need and demand for treatment. These variables can be conceptualize into three domains, cognition, emotion and behavioral domain **(Giddon *et al.*, 2007)**.

Dental appearance can evoke social judgements that affect peer relations and childhood emotional and social development. Extensive research has been undertaken to examine the effect of malocclusion on psychosocial well-being in terms of self-perception, quality of life (QOL), and social interactions. Malocclusion has been linked to reduced self-confidence and self-esteem (SE), with more severe malocclusion and dentofacial deformities causing higher levels of oral impacts **(Littlewood & Mitchell, 2019)**.

In today's patient-physician relationship, a verbal explanation with aid of models may not be sufficient. With the introduction of modern technology and visual education has reached the top level (**Acharya *et al.*, 2011)**.

Orthodontists should recognize the existence of dental fear in patients coming for treatment and create an awareness of the problem. All the three initial appointments should be given importance with respect to anxiety. The banding bonding appointment needs more attention as moderate level of anxiety is found at this appointment. This knowledge will help the orthodontist to be cautious during the initial appointments and will enable him to use the anxiety reducing strategies timely and effectively in orthodontic patients **(Naureen *et al.*, 2021)**.

Aim of Study

This review was prepared to highlight the effect of malocclusion and orthodontic treatment human psychology and some psychological ways to improve patient psychology.

Chapter one

Review of Literature

1.1. Human Psychology

Psychology is the scientific study of behavior and mental processes. It encompasses not just what people do but also their thoughts, emotions, perceptions, reasoning processes, memories, and even the biological activities that maintain bodily functioning **(Subedi, 2022)**.

1.2. Development of Human Perception to Dentofacial Esthetics

Humans possess a tendency to rapidly and consistently make character evaluations from mere facial appearance. Children as young as 3-years-old provide adult-like assessments of others on character attributes such as “nice,” “strong,” and “smart” based only on subtle variations in targets’ face shape and physiognomy (i.e., latent face-traits). By 3 years of age, children used facial features in character evaluations but not in judgments of targets’ behavior, whereas by 5 years of age, children reliably made both character and behavior judgments from face-traits. By age 5 (but not earlier), children were more likely to give gifts to targets with trustworthy and submissive-looking faces and showed concordance between their character evaluations and gift-giving behaviors. By kindergarten, even relatively arbitrary and subtle face-traits appear to have meaningful consequences in shaping children’s social judgments and interactions **(Charlesworth *et al.*,2019)**.

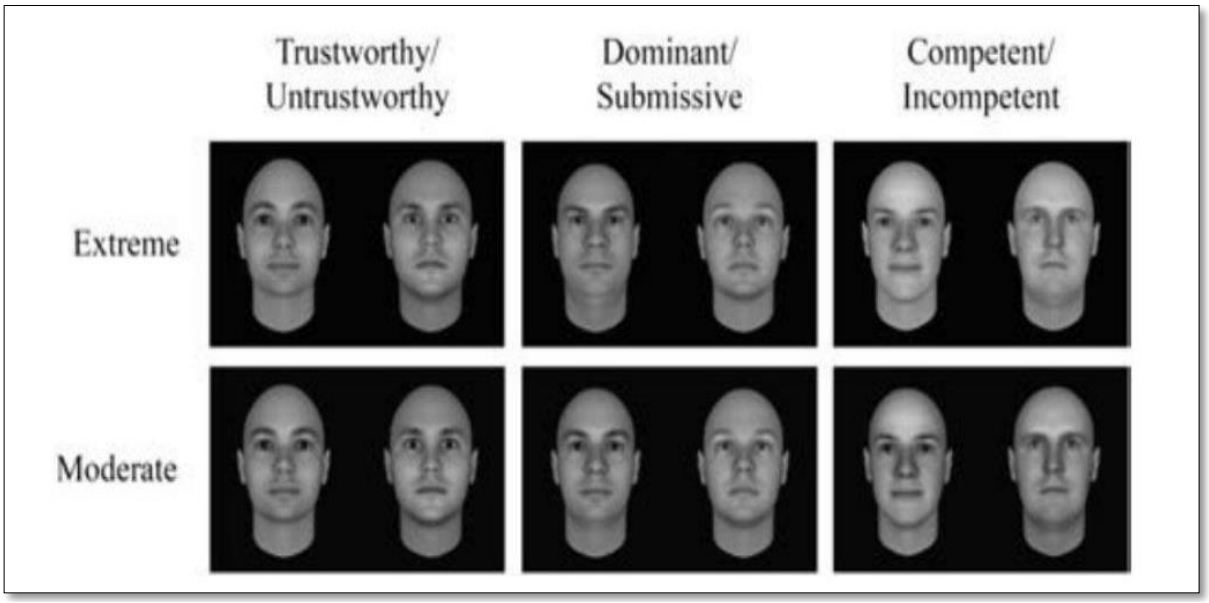

Figure 1. Face stimuli **(Charlesworth et al., 2019)**

So the awareness about dentofacial aesthetics found in all age groups. Younger and older children as well as adults, have clear perception of desirable and undesirable dental aesthetic appearance and the level of perception increases from the younger to the older age group. Attitudes about desirable and acceptable dental aesthetics differ in younger children compared with older children and parents. Small irregularities are not equally acceptable in the different age groups. A space between the anterior teeth is more acceptable to younger children, while older children are more receptive to mild density of the teeth. Younger children generally express a higher degree of criticism toward dental imperfections, while older children and adults are more moderate in their expression of criticism. Adults are less favorable toward the perfect appearance of teeth compared with children of both age groups **(Tiro *et al.*, 2021)**

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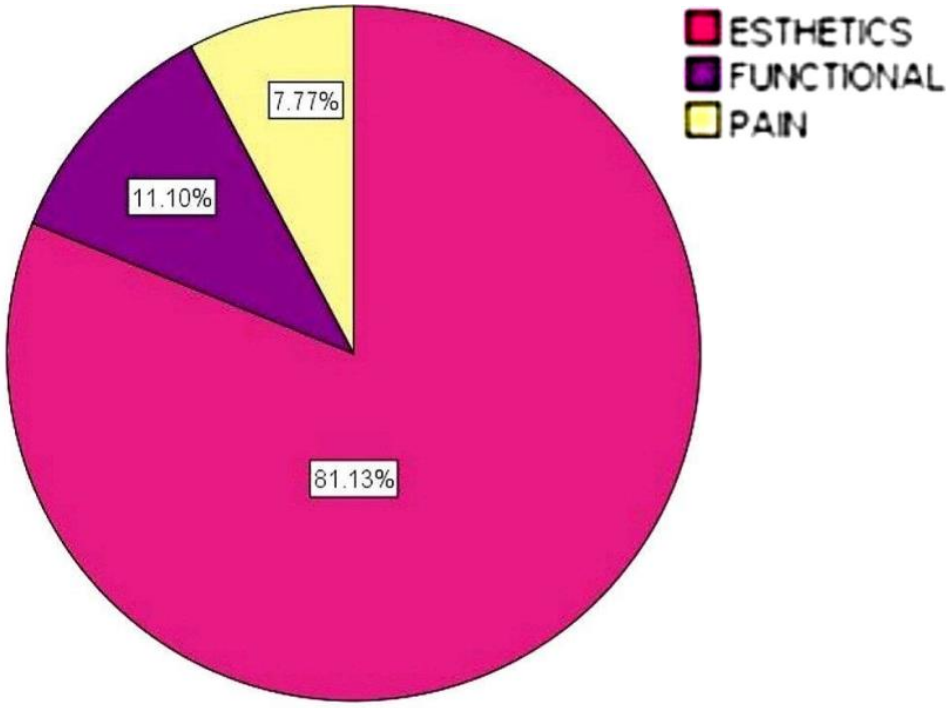
1.2.1 Self Perception to Dentofacial Attractiveness and Attribution

Nurohman (2018) stated, "Perception is a word that is directly tied to human psychology". Perception is the method by which we take in and comprehend data from the environment. Physical energy exists in the universe in a variety of degrees and forms, and one of the human reactions, perception, governs how information is received. Placing information or messages in the human brain has to do with perception.

Durer (1981) found that the concept of facial beauty and the assessment of facial proportions could be assumed objectively. He also assumed that disproportionate human faces are unaesthetic, however, proportionate features could provide acceptable facial characteristics even if they are not beautiful.

Actually, the demand for orthodontic devices is largely based on patients' own perception of dental aesthetics. However, the diagnosis entailing the need for orthodontic treatment has traditionally been based on a normative and objective evaluation that considers cephalometric measurements that treat the pathology from a professional perspective. However, this approach barely considers the patients' perception of their own malocclusion and how this aspect may affect their routine life, not only at a functional level, but also in terms of how their social relationships are impacted **(Kok *et al.*, 2004)**.



. **Figure 2.** Distribution of various chief complaints among orthodontic patients **(Sruthi et al., 2020).**

The parameters of beauty and facial attractiveness have considerable influence on the population, since esthetic standards are seen as an important factor for social acceptance. More than 70% of parents believe that their children will become more attractive, socially accepted and successful in their professional life after orthodontic treatment **(Kiekens *et al.*, 2006)**.

Miron *et al.* (2012) proposed the concept of sexual dimorphism of smile in men and women. Based on this concept, when smiling, the maxillary anterior teeth height and gingival tissues are more visible in women than in men. In addition, this concept also proposes that the mandibular incisor teeth are more visible when smiling in men than in women. The theories proposed in this concept were supported by other subsequent studies. Based on these studies, men and women have different perceptions regarding smile arc, gingival display, and buccal corridor.

1.3. Psaycholgical Impact of Malocclusion

Shaw (1981) found that children and adolescents with conspicuous malocclusion, such as extreme maxillary overjet (> 4 mm, > 6 mm, > 9 mm), extreme deep overbite, and having space between anterior teeth or missing teeth, would be bullied more often than those with normal occlusion. This might be associated with the fact that children with a normal dental appearance are considered to be prettier, smarter, and friendlier, whereas bad-looking ones are more prone to teasing and harassment.

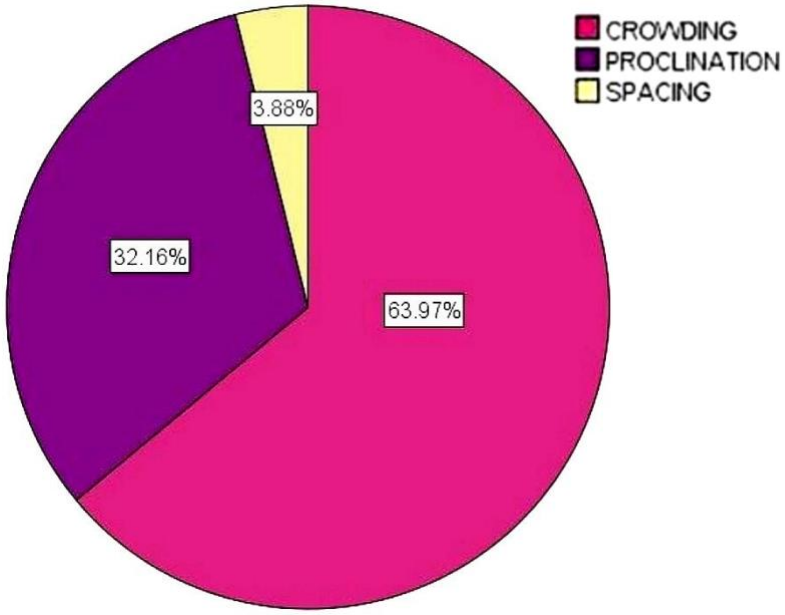


Figure 3. Distribution of various chief complaints based on esthetics among patients undergoing orthodontic treatment (**Sruthi et al., 2020).**

Shaw *et al.* (2010) also found that in severe malocclusions, oral functions such as phonetics, mastication, and lip profile were also affected along with aesthetics and these will limit social interaction leading to higher negative SE. Patients who had Class II proclination and class II deep bite type of malocclusion had significantly higher negative SE compared to other types.

Severe malocclusion is handicapping. Protruding upper incisors are likened to a dim-witted person and a prognathic lower jaw is always used in the description of a “witch”. In all, well aligned teeth always carry and infer a positive status to the possessor and not so well aligned teeth or other dentofacial deformities and malocclusions have a negative impact **(Shaw *et al.*, 1985; Perrini *et al.*, 2016)**.

Self-perception is another important facet of the psychosocial effect of malocclusion. The concept of self is affected far too often in some people and seldom in some. Individuals with mild malocclusion may have debilitating anxiety about their appearance whereas sometimes patients with excessive skeletal and dental problems tend to be very confident. Psychosocial problems are one of the main reasons people undertake orthodontic treatment, and they are far more than cosmetic issues because they directly impact the patient’s QOL **(Gavric *et al.*, 2015; Lin *et al.*, 2016)**.

The effect of malocclusion on facial attractiveness and how orthodontic treatment need might affect a person’s sense of self-worth are controversial issues. Several malocclusions including crowding, deep bite, anterior open bite, and overjet are responsible for the negative perceptions. These negative perceptions may act as a potential barrier for social relationships and may cause social anxiety **(Papio *et al.*, 2019)**.

Patients who perceive their dental arrangement as irregular may tend to neglect oral hygiene practice. This tendency may be even stronger in individuals who experience negative social and psychological impacts of their dental appearance. Adults patients with previous exposure to orthodontic treatment of a sufficient duration might have established a stable pattern of dental compliance, as indicated by their oral health status **(Santonocito *et al.*, 2020)**.

The malocclusion is extremely common place in the current day individual, and the need or want, to get it corrected has definitely increased over the years owing to an increase in awareness about appearance of self and the others, an increase in inter-personal interactions -far and wide- not only restricted to one's community and also the social media revolution. Malocclusion definitely leaves some sort of an impact on the psyche of the individual and the effect can range from mild reservations about teeth appearance to debilitating anxiety and self-image issues. It could lead to a deterioration of one's (SE). There is also the added factor of considering not only the perception of the self, but also the perception of the community, friends, family and one's social circle **(Sivakumar, 2020)**.

It was found that severe Class II - associated deep bite and protrusive lip profile may have lower (SE) and (QOL) scores than those with crowding, open bite, and class III malocclusion **(Marusamy *et al.*, 2021)**.

1.4. Psychological Impact of Orthodontic Treatment

Orthodontists are comparable to plastic surgeons who perform cosmetic surgery, or dentists who do cosmetic dentistry. however, treating the teeth and face is different from treating any other part of the body. Moyers stated, "Treatment of the face is more than moving teeth or cutting and rearranging bones; it is even more than the sculpture of living tissues noted earlier, for it often involves serious alterations in the personality and social interactions." **(Moyers, 1985)**.

During orthodontic treatment, there are many problem affect the path of treatment. Firstly, Oral health related quality of life (OHRQoL) worsens in the first month. After 6 months, the improvement of occlusion, together with the psychological and emotional well-being of undertaking treatment and with the orthodontist's help to remind the patients of the advantages for their health of

undergoing the treatment, showed a significant improvement of OHQoL. Moreover, adults who completed treatment and were in the retention phase had a better OHRQoL than untreated subjects **(Chehab *et al.*, 2022)**.

Secondly, body mass index (BMI) also decreased in the first 3 months and gradually recovered by the end of the first year of treatment. Hence, changes in BMI during orthodontic treatment can be considered temporary and to have no significant overall impact at the end of 1 year. The SE of the patients significantly improved during the course of orthodontic treatment.

The third problem is the Changes in diet patterns which observable only during the first few months of orthodontic treatment, after which the patients resumed their regular eating habits. Hence, considering fixed orthodontic appliances for a weight loss regimen is questionable and should be advised with caution, particularly in males **(Gnanasambandam & Gnaneswar, 2022)**.

With respect to anxiety, all the three initial appointments should be given importance. Different points of anxiety during orthodontics includes appointments before initial impressions, plan discussion, inserting separators and bracket placement. The most frequent cause of anxiety is the fear of pain related to orthodontic treatment at all the three appointments. Mouth ulcers is the second important cause at two week post banding bonding appointment, at first two appointments pain and lack of knowledge about procedure were the common causes of anxiety. As the time passes patient gets used to routine appointments and there is less chance of anxiousness **(Naureen *et al.*, 2021)**.

1.5. Patient Compliance (Cooperation)

With assessments of cooperation 8-10 months into treatment and at time of brace removal. A significant decrease in cooperation occurred between the two time points suggestive of patient burnout with time. Earlier cooperation predicted future cooperation, indicating stability in the patient's behavior over time. After 8-10 months of treatment, the patient's personality variables determined cooperation and not the parents. Patients with an external locus of control were found to be less cooperative. The change in correlation of compliance from parental to patient factors may reflect the changing nature of the parent-child relationship during adolescence, which coincides with orthodontic treatment **(Lee *et al.*, 2008)**.

High levels of compliance can described as better attendance, accurate appliance wear-times, and good oral hygiene. which are associated with the increased efficacy and effectiveness of orthodontic treatment **(Li *et al.*, 2015)**.

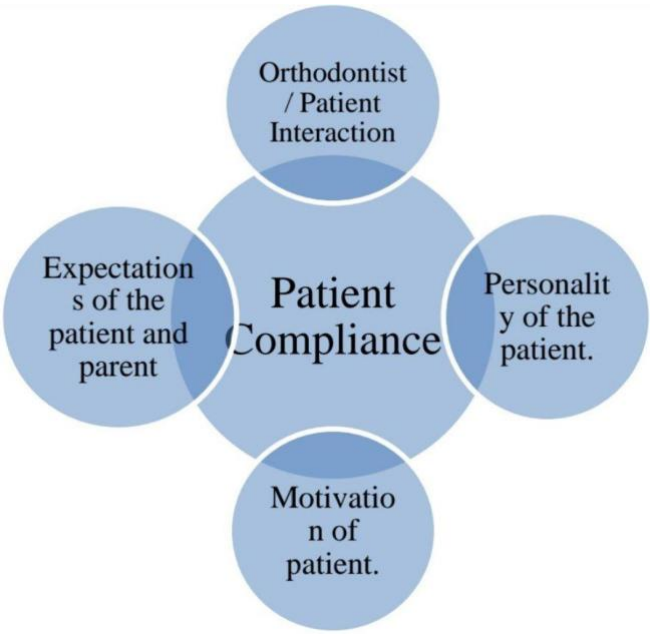


Figure 4. Factors affecting patient compliance **(mahajan, 2017).**

1.5.1. Psychological Ways to Improve Orthodontic Patient Compliance

1.5.1.1. Appointment/Waiting Time

An effecient system should be implemented to reduce the waiting time for patients. A good way to decrease the waiting time is using a staggered appointment system. Frequent breakages usually lead to emergency appointments resulting in delays that may negatively affect the appointment/waiting time as well as duration of other patients that have been given appointments for that particular day, so reducing breakages will allow the orthodontist to better predict the time needed to see each patient and in turn avoid overrunning the appointment time, also, patient education is integral. Interventions such as videos, magazines, health talks, visual art and information by oral health personnel in the waiting area have proven to reduce the waiting stress and to improve the waiting experience **(Motloba PD *et al.*, 2018)**.

1.5.1.2. Clinician/Patient Relationship

Yassir *et al*, (2020) stated that the clinicians should build a mutually beneficial relationship based on trust, honesty, and loyalty. The orthodontist should speak to the patients to introduce them to the treatment, to give advice, or to satisfy a request by using clear and coherent words. The purpose is to make the patients aware of every aspect of the treatment, such as the benefits, risks, costs, and uncomfortable effects. Moreover, the case discussion has the role of reducing the possibility of dissatisfaction or premature "drops-out". As patients' SE is considered a major predictor of the adherence to treatment, the clinicians should illustrate the treatment plan with the support of the patient's documentation (pictures, radiographs, 3D facial scans, dental models). The use of patients' documentation is of twofold importance.

Firstly, it demonstrates a successful outcome that can be attained if the patient adheres to the appliance's wearing instruction during every phase of the treatment. Secondly, it shows that the therapeutic outcomes would outweigh any experienced discomfort. It has been observed that patients will choose to be treated only if the "positive" motivation (keeping in mind the desired results) is stronger than the "negative" motivation (the pain and discomfort of the treatment) **(Yassir *et al.*, 2020)**.

1.5.1.3. Rewards

In operant conditioning , a behavior is maintained by its consequence. Thus, a positive behavior is more likely to reoccur if it is followed by a positive consequence (reinforced). Occasionally, older male patients chose not to accept the prize which may not have been desirable to them, therefore, it would not have been an effective. There are differences in age , gender , socioeconomic status , culture , and individual preferences. Possibility of future reward compared to the immediate reward may not have been an immediate motivation, for a behavior to be maintained by its consequences, it must be occurring. A long delay will make the behavior less likely to be modified by the consequence. Accumulated rewards simply increased the patients' chances to be drawn at the reward, but there was no guarantee of a win. The prospective win of a future reward may not be as strong a reinforcer as a more tangible immediate reward **(Aljabaa *et al.*, 2015)**.

Yee *et al.* (2023) found that perceived frequency of rewards had a greater effect on patient attitudes (toward reward programs), while actual frequency of rewards had a greater effect on compliance. Patients who always received actual rewards had the best compliance as shown by better oral hygiene, whereas patients who perceived they always received rewards had the most positive attitudes. After adjustment for age and length of time in treatment, always receiving actual rewards

was significantly associated with good oral hygiene that were 3.8 times higher than those who never/rarely received actual rewards.

1.5.1.4. Telecommunication (Teledentistry)

Smartphones and tablets have been widely used in health areas (to improve education and to facilitate the patient's management). Telecommunication is a method of communication between people (the clinician and the patients) who are physically separated. The distance does not inhibit the clinical process but is empowered by the frequent sharing of photos and information, which allows for an increased access to oral care and for remote but strict monitoring of the evolution of a treatment **(Jampani *et al.*, 2011)**.

In dentistry, the evidence shows that attendance can be incentivized by simply sending a reminder of any type before the appointments especially among adolescents, and on reducing the duration of orthodontic treatment (DOT). WhatsApp, WeChat, or any other chat platforms represent an effective way to improve the wearing time of orthodontic devices: it is reported that the DOT is shortened by 7.3 weeks on average **(Li *et al.*, 2015)**.

Telecommunication is a valid tool for the clinician, who can better educate and guide the patient through the therapy with advice, warnings, and reminders for hygiene or time wearing. The evidence suggested the effectiveness of this approach in decreasing the incidence of white spot lesions during the first year of treatment) **(Al-Moghrabi *et al.*, 2017)** .

Dental Monitoring (DM, Dental Monitoring, Montreal, France) is a further step in Teledentistry. It is a digital system with three integrated platforms (a teeth movement tracking algorithm, designed to conduct orthodontic follow-ups at a distance **(Dalessandri *et al.*, 2021)**.

Hansa *et al.* (2021) compared the effects of treatment with and without DM in terms of the duration of the treatment, the number of appointments, refinements, and refinement aligners, and the achievement of predicted tooth positions, the results suggested that DM leads to a reduction of appointments by 3.5 visits (33.1%) over the treatment duration, which obviously allows for an increase in office efficiency.

1.5.2. Patient Compliance with Oral Hygiene

Most patients sought orthodontic treatment for esthetic tooth alignment and reported the necessity of orthodontic treatment in daily life. Although, most of the patients used orthodontic toothbrush, fluoridated toothpaste, and some supplementary tool of brushing, there was inadequate emphasis in the oral hygiene instructions. Orthodontists or dental assistants should increase their awareness for instructing their patients on how to maintain good oral hygiene during fixed orthodontic treatment in order to prevent caries and periodontal disease during orthodontic treatment **(Anuwongnukroh *et al.*, 2017)**.

Since orthodontists worry that patients' compliance will decrease during the 4-6 week appointment intervals of the treatment, they must employ their ability to give good oral health education can influence healthy oral health practice in the patient. Periodic reinforcement of brushing instructions and dietary restrictions during the follow-up appointments, giving appropriate and adequate information, repeated motivation and practice to patients has been shown to change the patient's attitude and practice to a more positive one **(Huang *et al.*, 2018)**.

1.5.2.1Phase-Contrast Video Techniques

Acharya *et al.* (2011) examined the effects of two different motivational techniques on oral hygiene and gingival health in individuals who underwent

orthodontic treatment (motivation training with conventional plaque control methods, phase-contrast microscopy). As a result of the study, they found the long-lasting effect of the cleaning method with phase-contrast microscopy and plaque painting, especially the horizontal sweeping method. For this reason, plaque control programs emphasize the importance of providing different motivation tests and more training beyond the current plaque control practices.

Koca *et al.* (2020) concluded, training with phase-contrast microscopy in motivating oral hygiene education is more effective than verbal training. They observed the positive effect of training with phase-contrast microscopy in all clinical parameters. For this reason, they believe that the use of phase-contrast microscopy in patient motivation is important and useful as well as cheap and easy. In addition, the effect of phase-contrast microscopy on the patient is longer than the training given by the conventional method, because the use of this method has clinically reduced plaque formation significantly.

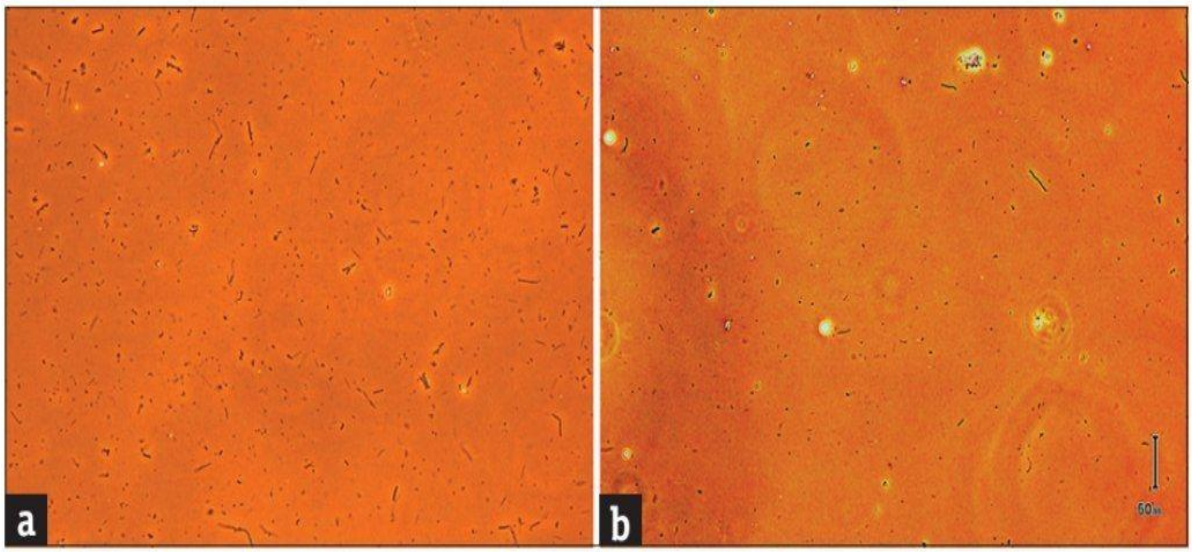


Figure 5. Phase-contrast microscopy image of microorganisms in dental plaque. (a) before treatment. (b) after treatment.**(koca et al., 2020)**

1.5.2.2. Motivational Interviewing

Motivational interviewing (MI) model is an evidence-based person-centered technique. This approach focuses on facilitating individual decision-making for making a change with maximum internal motivation and minimum resistance **(Miller & Rollnick, 2002)**.

Gillam & Yusuf (2019) stated that motivational Interviewing is an effective behavior change method, which can be utilized in the dental practice setting. It can be used as a brief intervention to motivate patients to improve their oral hygiene behaviors as well as providing a framework for delivering diet, smoking cessation, and alcohol advice and it contributes to both shared decision-making and patient-centered care. It can also be used for a range of behaviors relevant to both oral and general health, thereby improving patient outcomes. This method has five stages including:

1. Engaging (establishing an agreement based on a truthful patient-physician relationship.)
2. Focusing (determining an objective for behavior change.)
3. Evoking (helping the patient eliciting their internal motivations and forming ideas for behavior change.
4. Planning (finding final solutions for behavior change by the patient and helping to expand them by the physician.)
5. Review (providing feedback to the physician by the patient in review sessions.)

The results showed improvement in clinical indexes including plaque index (PI) and gingival index (GI), indicating the effectiveness of MI in oral health improvement, which was consistent with previous studies **(Ziari *et al.*, 2022)**.

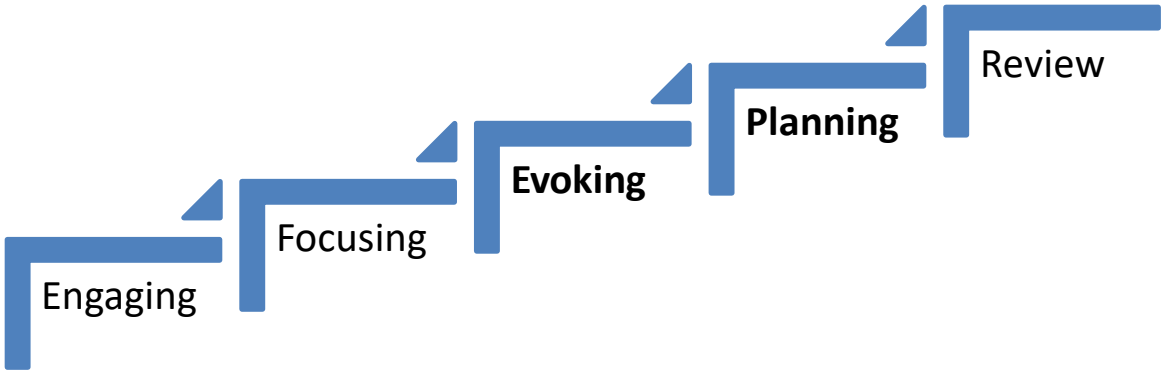


Figure 6. Five stages of motivational interviewing (MI)

Chapter two

Discussion

Humans -in all age groups- possess a tendency to make character evaluations from facial appearance. Dental appearance can evoke social judgements that affect social relationships, so the dentofacial esthetic can cause concern in indivisual life.

Orthodontists should recognize the existence of dental fear in patients coming for treatment and create an awareness of the problem and build a mutually beneficial relationship based on trust, honesty, and loyalty to get high levels of compliance **(Naureen *et al.*, 2021)**.

In today's patient-physician relationship, a verbal explanation with aid of models may not be sufficient. With the introduction of modern technology, visual education has reached the top level (**Acharya *et al.*, 2011).**

Smartphones and tablets have been widely used to improve education and to facilitate the patient's management) and the evidence shows that attendance can be incentivized by simply sending a reminder of any type before the appointments.

Support for oral hygiene was influenced by educational, organizational, economic, and environmental factors, but most importantly by educational factors; motivational interveiwing (MI) and phase-contrast video techniques has provided significant contributions to patient education increased the frequency of dental brushing.

Chapter three

Conclusions & Suggestions

3.1. Conclusions

1. Malocclusion can be cause disturbance for the patients and can affect esthetics causing low SE and low satisfaction towards facial appearance and bad impression and negative reactions from the patients which can affect the SE of the patients.
2. The orthodontic treatment has negative effects on QOL in the first stages and then with improvement of case and help of the orthodontist it begin to affect positively.
3. In today's patient-physician relationship, a verbal explanation with aid of models may not be sufficient and with the introduction of modern technology (teledentistry), visual education (contrast media) it has reached the top level.

3.2. Suggestions

1. Further study required to confirm the effect of rewards on orthodontic patient compliance.
2. Further review will be needed to find out how to control the psychological disorders that women's nowadays suffer from their obsession in their beauty.

References

(A)

Acharya, S., Goyal, A., Utreja, A.K. and Mohanty, U. (2011) Effect of three different motivational techniques on oral hygiene and gingival health of patients undergoing multibracketed orthodontics. *Angle Orthod.,* 81, 884-8.

Aljabaa A , McDonald F and Newton JT. (2015) A systematic review of randomized controlled trials of interventions to improve adherence among orthodontic patients aged 12 to 18. *Angle Orthod,* 85, 305-13 .

Al-Moghrabi, D.; Salazar, F.C.; Pandis, N.; Fleming, P.S. (2017) Compliance with removable orthodontic appliances and adjuncts: A systematic review and meta-analysis. *Am. J. Orthod. Dentofacial. Orthop.,* 152, 17–32.

Anuwongnukroh, N., Dechkunakorn, S., & Kanpiputana, R. (2017) Oral hygiene behavior during fixed orthodontic treatment. *Dentistry*, 7(10), 1-5.

(B)

Badran, S. A. (2010) The effect of malocclusion and self-perceived aesthetics on the self-esteem of a sample of Jordanian adolescents. *Eur. J. Orthod.*, 32(6), 638–644 .

(C)

Charlesworth, T.E., Hudson, S.K.T., Cogsdill, E.J., Spelke, E.S. and Banaji, M.R. (2019) Children use targets' facial appearance to guide and predict social behavior. *Developmental Psychology,* 55(7), p.1400.

Chehab, A., Dragomir, B. R., Balcos, C., Savin, C., Bud, M., and Zetu, I. (2022) Oral Health-Related Quality of Life in children and adolescents undergoing orthodontic treatment. *Romanian Journal of Oral Rehabilitation,* 14(2).

(D)

Durer, A. (1981) The art of measurement. *San Francisco: Alan Wofsy Fine Arts.*

Dalessandri, D., Sangalli, L., Tonni, I., Laffranchi, L., Bonetti, S., Visconti, L., Signoroni, A. and Paganelli, C. (2021) Attitude towards Telemonitoring in Orthodontists and Orthodontic Patients. *Dent. J.,* 9, 47.

(G)

Gavric, A., Mirceta, D., Jakobovic, M., Pavlic, A., Zrinski, M.T. and Spalj, S. (2015) Craniodentofacial characteristics, dental esthetics–related quality of life, and self-esteem. *American Journal of Orthodontics and Dentofacial Orthopedics*, 147(6), 711-718.

Giddon, D.B., Anderson, N.K. and Will, L.A. (2007) Cognitive, affective, and behavioral responses associated with mechanical tooth movement. *In Seminars in Orthodontics*, 13 (4), 212-219.

Gillam, D.G. and Yusuf, H. (2019) Brief Motivational Interviewing in Dental Practice. *Dent. J. (Basel),* 7(2), 51.

Gnanasambandam, V., & Gnaneswar, S. M. (2022) Effects of orthodontic treatment on body mass index, food habits and self-esteem of patients: A prospective single-arm cohort study. *Journal of Taibah University Medical Sciences*, 17(5), 818-825.

(H)

Hansa, I., Katyal, V., Ferguson, D.J. and Vaid, N. (2021) Outcomes of clear aligner treatment with and without Dental Monitoring: A retrospective cohort study. *Am. J. Orthod. Dentofacial. Orthop.*, 4, 453–459.

Huang, J., Yao, Y., Jiang, J., and Li, C. (2018) Effects of motivational methods on oral hygiene of orthodontic patients: A systematic review and meta-analysis. *Medicine.,* 97(47), 13182.

(J)

Jampani, N.D., Nutalapati, R., Dontula, B.S.K. and Boyapati, R. (2011) Applications of teledentistry: A literature review and update. *J. Int. Soc. Prev. Community Dent.,* 1, 37–44.

(K)

Kiekens, R.M., Maltha, J.C., Hof, M.A.T. and Kuijpers-Jagtman, A.M. (2006) Objective measures as indicators for facial esthetics in white adolescents. *The Angle Orthodontist,* 76(4), 551-556.

Koca, M. F., Acikgöz, G., Dundar, C., & Kirtiloglu, T. (2020) The effects of using phase-contrast microscopy on oral hygiene trainingof patients eceiving orthodontic treatment: A randomized controlled study. *Nigerian Journal of Clinical Practice,* 23(10), 1395-1400.

Kok, Y.V., Mageson, P., Harradine, N.W.T. and Sprod, A.J. (2004) Comparing a quality of life measure and the Aesthetic Component of the Index of Orthodontic Treatment Need (IOTN) in assessing orthodontic treatment need and concern. *Journal of orthodontics,* 31(4), 312-318.

Kovalenko, A., Slabkovskaya, A., Drobysheva, N., Persin, L., Drobyshev, A. and Maddalone, M. (2012) The association between the psychological status and the severity of facial deformity in 3018. orthognathic patients. *The Angle Orthodontist,* 82, 396–402.

(L)

Lee, S.J., Ahn, S.J. and Kim, T.W. (2008) Patient compliance and locus of control in orthodontic treatment : A prospective study. *Am J Orthod Dentofacial Orthop.*, 133, 354-8 .

Lin, F., Ren, M., Yao, L., He, Y., Guo, J. and Ye, Q. (2016) Psychosocial impact of dental esthetics regulates motivation to seek orthodontic treatment. *American Journal of Orthodontics and Dentofacial Orthopedics,* 150(3), 476-482.

Li, X., Xu, Z.R., Tang, N., Ye, C. and Zhu, X.L. (2015) Effect of intervention using a messaging app on compliance and duration of treatment in orthodontic patients. *Clin. Oral Investig.*, 20, 1849–1859.

Littlewood, S. J., & Mitchell, L. (2019) *An introduction to orthodontics.* Oxford university press, 5.

(M)

Mahajan, H. P. (2017). Patient Compliance in Orthodontics. *Innovative Journal of Medical Sciences,* 1(2), 01-03.

Marusamy, K.O., Marghalani, A., Aljuhani, L.K., Alhelali, S.N., Ramasamy, S. and Nayak, U.A. (2021) Relationship of Malocclusion with Self-Esteem & Quality of Life of Adult Saudi Female Orthodontic Patients. Journal of Evolution of Medical and Dental Sciences, 10(30), 2276-2281.

Miron, H., Calderon, S. and Allon, D. (2012) Upper lip changes and gingival exposure on smiling: vertical dimension analysis. *American journal of orthodontics and dentofacial orthopedics*, 141(1), 87-93.

Miller, W.R. and Rollnick, S. (2002) *Motivational Interviewing*.

Motloba, P.D., Ncube, O., Makwakwa, L.N. and Machete, M.L. (2018) Patient waiting time and satisfaction at a tertiary dental school. *S Afr Dent J.,* 73, 400–5.

https://www.sciencedirect.com/science/article/pii/S0889540602268717

(N)

Naureen, S., Kiani, H. G., and Amin, B. (2021) Assessment of anxiety in orthodontic patients. *Pakistan Orthodontic Journal,* 13(2), 53-58.

https://www.google.com/url?sa=t&source=web&rct=j&url=http://digilib.ikippgriptk.ac.id/id/eprint/1236/4/CHAPTER%2520II.pdf&ved=2ahUKEwjopr7vydPAhXxhf0HHT0bAzUQFnoECBYQAQ&usg=AOvVaw2SkCkE1l_O4FpnQHItZk1x

(P)

Papio, M.A., Fields Jr, H.W., Beck, F.M., Firestone, A.R. and Rosenstiel, S.F. (2019) The effect of dental and background facial attractiveness on facial attractiveness and perceived integrity and social and intellectual qualities. *American Journal of Orthodontics and Dentofacial Orthopedics*, 156(4), 464-474.

Parrini, S., Rossini, G., Castroflorio, T., Fortini, A., Deregibus, A. and Debernardi, C. (2016) Laypeople's perceptions of frontal smile esthetics: A systematic review. *American Journal of Orthodontics and Dentofacial Orthopedics*, 150(5), 740-750.

(S)

Santonocito, S., Ronsivalle, V., Fichera, G. and Indelicato, F. (2020) Psychological impact and patient perception of occlusion and orthodontic treatment in periodontitis patients. *Mediterranean Journal of Clinical Psychology,* 8(3).

Shaw, B.A., Liang, J. and Krause, N.(2010) Age and race differences in the trajectories of self-esteem. *Psychology and Aging,* 25(1), 84.

Shaw, W.C., Rees, G., Dawe, M. and Charles, C.R. (1985) The influence of dentofacial appearance on the social attractiveness of young adults. *American journal of orthodontics,* 87(1), 21-26.

Shaw, W.C. (1981) The influence of children's dentofacial appearance on their social attractiveness as judged by peers and lay adults. *American journal of orthodontics,* 79(4), 399-415.

Sivakumar, P. (2020) Psychosocial Effects Of Malocclusion. *European Journal of Molecular & Clinical Medicine,* 7(08).

Sruthi, H. (2020) common chief complaint of patient seeking orthodontic treatment. *European Journal of Molecular & Clinical Medicine,* 7(1), 1128-1133.

https://www.google.com/url?sa=t&source=web&rct=j&url=https://www.researchgate.net/publication/361886172_General_Psychology_Conceptual_and_Methodological_Frameworks&ved=2ahUKEwi_7o6Dy9P-AhV4h_0HHZDmADkQFnoECA0QAQ&usg=AOvVaw1tgwYLwspMOD24yLF0NMtc

(T)

Tiro, A., Nakas, E., Arslanagic, A., Markovic, N. and Dzemidzic, V. (2021) Perception of dentofacial aesthetics in school children and their parents. *European Journal of Dentistry,* 15(01), 013-019.

(Y)

Yassir, A., Mclntyre, G.T. and Bearn, D.R. (2020) The impact of labial fixed appliance orthodontic treatment on patient expectation, experience, and satisfaction: An overview of systematic reviews. *Eur. J. Orthod.,* 42, 223–230.

Yee, A., Chu, W., Sinha, P., Mohajeri, A., Hung, M., and Kritz-Silverstein, D. (2023) Effects of perceived vs actual frequency of rewards on orthodontic patient attitudes and compliance. *The Angle Orthodontist.,* 0(0).

(Z)

Ziari, S., Gholami, M., and Sarmadi, S. (2022) Effect of motivational interviewing on oral and dental health of adolescents with fixed orthodontic appliances. *Journal of Craniomaxillofacial Research*, 8794.