The correlation between Overbites and Anger Level

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Abstract. This paper is going to focus on the correlation between overbites and anger level based on facial feedback theory， in which it means people can feel emotions based on their facial expressions. Overbites are orthodontics conditions where upper teeth cover the lower teeth completely forcing the upper lip to protrude. Anger is one of the basic emotions, and it's the condition when people feel hate towards others. This paper will recruit participants who have overbites, people who have overbites tend to have tense muscles around their mouth. and researchers should use self-reports, questionnaires filled by participants' family members and test the cortisol level of participants before and after participants' teeth correction. The goal of this research is to find out whether correcting overbites can lower people's anger level, which helps participants reduce more of negative emotions.

Keywords: Overbites; Anger; Facial Feedback Theory.

1. Introduction

What are emotions? "a complex reaction pattern involving experiential, behavioral, and physiological elements (Cherry & Goldman, 2022)." From the definition, we can see that emotions can be in the form of how we feel, how we react or behave to how we feel, and the physiological and chemical states like heart rate and serotonin levels. The researchers found (Schwartz & Davidson, 1997) that humans possess five basic emotions like joy, anger, sadness, disgust, and fear, and even infants own these basic emotions.

Overall, humans want to pursue positive emotions like joy and avoid negative emotions like sadness, fear, disgust, and anger because happiness has many benefits. For example, research has shown that being happy can improve interpersonal relationships, income levels, and even health (Lyubomirsky et al., 2005). Furthermore, being happy is an essential factor in assessing mental health, and happier people tend to have less proclivity to having mental illnesses like depression.

Researchers have found that people's personality trait - neuroticism level is negatively correlated with happiness level (Feltman et al., 2009). However, personality traits are hard to change (Bleidorn, 2020), thus if people can find a more convenient way to reduce negative emotions and increase positive emotions, people can definitely benefit from it. Based on facial feedback theory that, people's mood can be influenced by their expressions (Coles et al., 2022). It can be proposed that when people express less of an angry expression, people can become less angry. When people have overbites, so they would have protruding lips and tense upper lips(Ohnishi et al., 2004); thus they would display an angry expression(Cohen, 2006). In this research, researchers can propose that if patients with overbites can be corrected, they would have less tense upper lip muscles and display less of angry emotions. Eventually, participants would feel less of the angry emotions because of more relaxed upper lip muscles based on the facial feedback theory (Coles et al., 2022).

How does having beautiful teeth help us become happier? According to this research about (Mugonzibwa et al., 2004), teeth correction, patients who underwent the teeth correction feel happier and love to smile more after teeth corrections. This study shows that even minute things like having teeth corrected can impact people's moods. To feel happy, people do not have to take action by attending parties or having a specific religion (Tkach & Lyubomirsky, 2006). The researchers (Tkach & Lyubomirsky, 2006) also found that specific personality traits like extraversion and agreeableness are positively related to happiness levels, and neuroticism is adversely associated with happiness levels. Furthermore, researchers (Tkach & Lyubomirsky, 2006) stated that people's personality state accounts for 40-50% of their happiness levels, so this literature review will focus on

whether actions other than personality traits, which are harder to change, can increase people's happiness level relatively easier.

This research will be based on the Facial Feedback theory (Coles et al., 2022), where people experience mood based on facial expressions. Furthermore, the researcher (Coles et al., 2022) found out that participants still display effects of expressions on their mood after being acknowledged about zero correlation between mood and facial expressions. Thus, this finding excludes the psychological effect.

In sum, this paper first summarizes the potential relationship between anger and overbites, then introduces how personality traits are hard to change, thus, leading to a proposal that correcting overbites could lower anger levels. In the second part, the paper will include all the research papers regarding facial feedback theory, anger level, overbites, and upper lip muscles. To end the paper, the paper includes the specific procedures to conduct experiments of testing anger levels before and after overbites' corrections. Additionally, the paper will conclude the paper with the meaning of this literature review.

2. Reseaches relating to Facial Feedback Theory

Based on past research on mood and smiles (Coles et al., 2022), we know that when people put on a smile, they can feel happier. Although the facial feedback effect is minor in this research (Coles et al., 2022), there could be cumulative effects later. Nevertheless, there is no current research on facial feedback theory about anger. Thus, this past research about the joy (Coles et al., 2022) could extend to emotions like anger. The study (Coles et al., 2022) was replicated by putting a pen horizontally in people's mouths. Participants felt happier because their smiling muscles were activated, showing that people can become happier when they smile.

The researchers (Alam et al., 2008) found out that patients with Botox in their upper faces-foreheads would experience fewer negative emotions like anger， sadness， and fear. The patients would be injected with botox at their procerus muscles around the head, which correlate with anger, sadness, and fear (Alam et al., 2008).

Thus, the results could indicate the facial feedback theory effect because when people got Botox in their forehead, the muscles in the forehead corresponding with anger, fear, and sadness cannot move, triggering patients not to make angry, sad, fearful expressions.

As for the emotion of anger, we can explain anger in 3 different domains- physiological, experiential, and behavioral. However, this literature review will only focus on the physiological aspect-the cortisol level. From the physiological aspect, people's cortisol increases when they express anger (Steptoe et al., 2000). In this research (Steptoe et al., 2000), the researchers collected participants' saliva in the morning and late at night to compare the cortisol levels of men and women, and they found that women were more likely to have higher cortisol levels in the mornings, while men to have higher cortisol level in the afternoons. During the timeslots when participants had higher cortisol levels, the participants would also express anger more (Steptoe et al., 2000). Another essential trait of anger is muscle tension around the mouth and forehead (Matsumoto et al., 2009). Specifically, people's muscles around the mouth are tightened, and brows are lower than before (Matsumoto et al., 2009).

Furthermore, when people have overbites, the muscles around their mouths get tenser (Schweitzer et al., 2001), and the researchers found that patients' lips become less tense after correcting the overbites. More specifically, the lower lip would cover less of the upper teeth, so the upper lip would cover the upper teeth more, which made upper lip muscles less tense. Thus, people who have overbites would be more likely to display expressions of tight lips, which is a part of anger expression. One hypothesis could be that people with overbites tend to feel angrier and are perceived as more furious before correcting their teeth. This study will be conducted through self-reports, surveys, and chemical analysis of cortisol in the saliva. The study aims to determine whether the anger level decreases after the patients with overbites correct their overbites. Reducing negative emotions could also help people

feel less stressed; if the overbites correlate with negative emotions like anger, people should pay more attention to dental health and see the benefits beyond correcting their teeth.

3. Research procedures regarding testing the Anger level

3.1 The Research Subjects

Researchers can collect volunteers online who have overbites and are planning to have their teeth straightened with braces or an invisible aligner. There is a restriction on people's age and economic status. Participants should be around 18-22, which has passed the generation of teenagers. The researchers should exclude teenagers because they have relatively unstable mood changes throughout the day (Larson et al., 1980), which could contaminate our results. Moreover, the researcher should be in the middle class because people from lower economic status might not want to pay for expensive orthodontists' treatment. Also, the number of people in the middle class is more significant than the number in the upper class (Anonymous, 2022), so it's more convenient for researchers to find enough participants. However, the researchers need not consider the stress patients undergo within the treatment period because they only need to test the cortisol levels after braces or the invisible aligner taken off.

3.2 Design of Anger Measurement

The participants need to be tested for their anger levels before correcting the overbites and after the overbites. The participants will be tested using three anger level measurements: self-reports, questionnaires by their family members, and testing cortisol levels. Thus, the participants must be tested for their anger levels six times. Specifically, three times before teeth correction and three times after teeth correction.

3.3 Measurement of Anger Level

Before the orthodontic treatment, the volunteer should fill out a self-report with questions testing anger. The researchers will send the questionnaire to each patient's email address, and patients need to return the surveys through email to the researchers. The questionnaire is called Anger Self Report: A Psychometrically Sound (30 Item) Version (Green et al., 1994), and the questionnaire includes statements like "I get mad easily." The participants need to answer statements on a scale from 1, Strong disagreement, to 6, Strong Agreement. The complete versions of all 30 items will be placed in Appendix. Then the volunteer's friends and family will also fill out a form that asks about family members' opinions on participants' moods. We can compare the volunteer's moods after the braces and see if they are not as irritable or upset about life as before. A third method is testing the cortisol level in the patient's saliva before and after teeth correction because cortisol level is positively correlated with anger affect (Steptoe et al., 2000).

The experiment should be approximately one to 2 years, depending on each patient's treatment period. Researchers should recruit 25 patients with overbites and collect patients' saliva at 10 am for seven days before patients' correcting teeth; furthermore, the researchers need to calculate the average cortisol levels tested seven days before the treatment. The researchers need multiple data entries and calculate the average data rather than collecting only one data is because this can make sure that the data accurately the everyday cortisol level; thus, this act rules out anomalies when participants have an extremely good day or extremely bad day(Anonymous, 2020). because after these twenty-five patients have fixed their overbites with braces or an invisible aligner, the period could be around 1 to 2 years, depending on each patient's treatment time. The researchers must recollect patients' saliva for seven days and calculate the average cortisol levels after the treatment ends. Furthermore, the researchers need to calculate the percentage increase or decrease after the orthodontists' treatment. The total number of days that the researchers need to collect a saliva sample from the patients is 14 days, which includes the seven days before the treatment and the seven days after the treatment.

The equipment researchers need to use cotton swabs to get saliva from the patients and use devices the Salivette systems (Inder et al., 2012), and the patients need to chew on the cotton swabs to get enough saliva samples. Another way to collect saliva can let the participants drool into the test tubes directly (Inder et al., 2012). More accurately, the researchers need 3 ml of saliva from each patient to use the Salivette Systems (Inder et al., 2012).

There are three hypotheses based on these three methods of measuring anger. For the first hypothesis, the patient's neuroticism level could decrease after the teeth are corrected based on the facial feedback theory. Neuroticism is positively correlated with emotion of anger, specifically the anger affect (Martin et al., 2000). When neuroticism lowers, the anger level will also decrease. Thus, I hypothesize that the participant's level of anger would decrease after teeth correction because the neuroticism level decreases. Secondly, since patients' teeth would be less protruding and their muscles around the mouth would be less tense after teeth correction (Schweitzer & Pancherz, 2001), the upper lip muscles activated when angry will be deactivated. The second hypothesis is that patients' family members would rate patients as less irritated on a scale of 1-10 based on the family-member survey in the Appendix (Green et al., 1994). Based on the facial feedback theory that people's expressions could signal to the human brain about how people should feel. After the upper lip becomes less tense, the patients display less angry emotions, and the patients would become less angry. Furthermore, anger expression and cortisol are positively related (Steptoe et al., 2000), so the third hypothesis is that the cortisol level will decrease after the patient corrects their teeth.

4. Conclusion

Different factors influence human emotions, and these can be actional, like going to concerts or hanging with friends. However, elements can also include correcting bites, so people would not have angry facial expressions when they start their days. If the hypotheses about this teeth treatment are true, researchers can conclude that patients feel less angry when the overbites are corrected. Thus, it could be a good idea to correct overbites for aesthetic benefits and mental health.

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