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Teeth Grinding: Is Emotional Stability related to Bruxism?

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Abstract

This study examines the association between personality traits and bruxism, the repetitive grinding or clenching of teeth. Community-dwelling participants ($N = 470$) had a comprehensive oral examination by a dentist and completed a dental history and personality questionnaires. Consistent with the literature on state anxiety and depression as antecedents of bruxism, Neuroticism-related traits were associated with self-reported teeth grinding. These traits were also associated with other oral complaints often associated with anxiety (jaw clicks, difficulty chewing food, and dry mouth), but not with more general oral health complaints (unhealthy gums, bleeding gums, and canker sores) or with dentist-assessed occlusal wear or tongue indentations. This study provides evidence for the association between Neuroticism and bruxism and other stress-related oral health symptoms.

Keywords

Emotional Stability; Bruxism; Teeth Grinding; Personality; Anxiety

Bruxism is the clinical term for the grinding or clenching of teeth while asleep (Lavigne, Khoury, Abe, Yamaguchi, & Raphael, 2008). The consequences of chronic bruxism are many, ranging from a sore jaw, facial pain, and irritating one's sleeping partner, to exposing the inner layers of teeth from the repetitive wearing away of enamel, tooth loss, hearing loss, and temporomandibular joint disorder. While this relatively common sleep disorder is thought to have a complex etiology, many have noted psychological antecedents. In particular, bruxism seems to be more severe during periods of heightened stress and anxiety. The extent to which bruxism is associated with stable individual differences in the tendency to experience negative emotions, however, have yet to be investigated.

The grinding of teeth has long been held as one physical manifestation of stress and anxiety. For example, individuals who grind their teeth tend to report more symptoms of anxiety and depression than non-bruxers (Gungormus & Erciyas, 2009; Manfredini, Landi, Romagnoli, & Bosco, 2004). And, compared to non-bruxers, those who grind their teeth tend to report greater life stress and are more likely to suffer from DSM-defined depression and anxiety disorders (Ohayon, Li, & Guilleminault, 2001). Even in rats, experimentally inducing emotional stress leads to brux-like symptoms, compared to controls (Rosales et al., 2002).

The association between bruxism and acute symptoms of anxiety and depression, as well as its relation to mood disorders raises the possibility that, in non-clinical populations, teeth grinding may also be associated with stable individual differences in the tendency to experience negative emotions (i.e., Neuroticism-related personality traits). Although most research has focused on acute anxiety and depression, there is some evidence that trait somatic anxiety and muscular tension are associated with chronic bruxism (Kampe, Edman, Bader, Tagdae, &

Karlsson, 1997). In the present research, we examine whether the two subscales of the Guilford-Zimmerman Temperament Scale (GZTS) most closely related to Neuroticism, Emotional Stability and Objectivity, are associated with bruxism. In addition to self-reported teeth grinding, we also test whether dentist-assessed physical evidence of damage that is commonly attributed to bruxism, occlusal wear and tongue indentations, are associated with these two traits.

Because individuals high in Neuroticism-related traits tend to report more somatic complaints in general (Costa & McCrae, 1987), we also examine whether Emotional Stability and Objectivity are associated with other oral health complaints often associated with anxiety (jaw clicks, difficulty chewing food, and dry mouth) and to more general oral health complaints (unhealthy gums, bleeding gums, and canker sores). That is, if Neuroticism-related traits lead individuals to report more complaints in general, we should see associations across different aspects of subjective oral health. Emotional Stability and Objectivity may, however, correlate more strongly with anxiety-related oral manifestations than with general oral complaints. Finally, we examine whether these traits are associated with other dentist-assessed measures of the health of the teeth and gums.

Method

Participants

Participants were community-dwelling volunteers drawn from the Baltimore Longitudinal Study of Aging (BLSA), an ongoing multidisciplinary study of aging. A total of 470 participants (43% female; mean age = 55.67 [$SD = 16.79$]) completed a dental history questionnaire and had at least one personality assessment. Of these participants, a total of 385 participants (41% female; mean age = 55.80 [$SD = 16.53$]) also underwent the dental examination.

Dental assessment

Participants completed a detailed history of oral-hygiene habits, dental treatment, and subjective complaints. Here we focus on subjective complaints. First, participants were asked whether they grind their teeth at night. Response options were no, yes, occasionally, not sure, and not applicable. In addition to bruxism, we examined a number of subjective complaints that are typically associated with anxiety, including jaw clicks, difficulties chewing food, and dry mouth, as well as more general oral health complaints, including unhealthy gums, bleeding gums, and canker sores. Specifically, participants were asked, “Does your jaw ever make a clicking sound?” (jaw clicks) “Do you have any difficulties chewing food?” (difficulty chewing), “Do you feel that your mouth is frequently dry?” (dry mouth), “Do you feel that your gums are healthy?” (reversed scored; unhealthy gums), “Do your gums bleed on brushing?” (gums bleed), and “As an adult, do you ever get canker sores in your mouth?” (canker sores). Items were scored as the presence (1) or absence (0) of these complaints. Correlations among these subjective measures ranged from $-.08$ (ns) for dry mouth and gums bleed to $.20$ ($p < .05$) for unhealthy gums and gums bleed.

Participants also underwent a comprehensive oral examination by a professional dentist (Baum, 1981). In the present research we focus primarily on the presence and severity of occlusal wear and evidence of tongue indentations. Occlusal wear refers to the wearing down of enamel which can result from excessive pressure from the clenching or grinding of teeth. Tongue indentations are evidence of biting that can also result from teeth grinding. The dentist noted whether any occlusal wear present was slight, moderate, or severe, and the presence or absence of tongue indentations.

We also examined a number of other dentist assessments of oral health: the gingival index, which is an assessment of the severity of gingivitis (gum inflammation), the DMFT index, which is the number of decayed, missing, or filled teeth in the mouth, the number of teeth with moderate to severe erosion, and the number of filled cavities. Correlations among these dentist assessments ranged from $-.33$ ($p < .05$) for tongue indentations and the DMFT index to $.27$ ($p < .05$) for coronal restorations and the DMFT index.

Personality assessment

The GZTS (Guilford, Zimmerman, & Guilford, 1976) is a factor-based personality questionnaire consisting of 300 items, 30 for each of the 10 GZTS scales. For each item, participants chose between “yes,” “no,” and “?”. Any scale with more than three “?” responses was considered missing, a procedure suggested by Guilford and colleagues. Therefore, small variations in the number of participants will be seen in the analyses for different scales. Raw scores ranged from 0 to 30.

The GZTS scales are valid and reliable (Guilford et al., 1976). Internal consistency coefficients range from 0.75 to 0.87 (median = 0.80). In the BLSA, the structural stability of the GZTS has been shown across age, cohort, and time-of-measurement (McCrae, Costa, & Arenberg, 1980). Retest stability coefficients for men ranged from 0.64 to 0.78 (median = 0.68) over an average interval of 16 years, and retest coefficients for women ranged from 0.68 to 0.78 over an average interval of 11 years (median = 0.71) (Terracciano, McCrae, & Costa, in press).

Personality (GZTS) was collected during regularly scheduled visits, for men starting in October 1958, and for women in January 1978, and continuing until May 2002. In the present research, because the personality assessment was generally not completed at the same time as the dental examination, we ran all of our analyses twice – once with the participant’s first assessment of personality and again with each individual’s average score across all available personality assessments between 1958 and 2002.

Results

Self-reported bruxism

Consistent with the estimated 20% prevalence in the general population (Lavigne et al., 2008), approximately 22% of the current sample reported that they grind their teeth at night, whereas 67% of participants reported that they did not. The remaining 11% either were not sure, bruxed occasionally, or did not have teeth; these participants were not included in the analyses. Controlling for sex, age at the dental exam, and education, participants who scored higher on either Emotional Stability or Objectivity were less likely to report that they grind their teeth (see Table 1). The findings were similar for the mean across all assessments of Emotional Stability and Objectivity (see Table 1). Thus, participants who scored higher on Neuroticism-related traits were more likely to report that they are bruxers.

Physical evidence of bruxism

We next turn to evidence of physical damage caused by bruxism: occlusal wear and tongue indentations. Approximately 66% of the sample had moderate or severe occlusal wear and approximately 50% of the sample had tongue indentations. In contrast to the self-reported bruxism, neither Emotional Stability nor Objectivity was associated with either occlusal wear or tongue indentations (see Table 1).

Other traits

For the sake of comparison, we report the significant associations between bruxism and the other eight scales of the GZTS. The first assessment of Sociability, but not the mean of

assessments, was associated with less self-reported teeth grinding (OR = .98, 95% CI = .95–.99 and .97, 95% CI = .93–1.01, *ns*). Sociability was also associated with less occlusal wear (OR = .96, 95% CI = .94–.99 and OR = .95, 95% CI = .91–.99, respectively, for first and mean assessment). In addition, both the first assessment and the mean across assessments of Friendliness were also associated with self-reported teeth grinding (OR = .97, 95% CI = .95–.99 and OR = .94, 95% CI = .90–.99, respectively). Tongue indentations were not associated with any of the GZTS traits.

Other markers of oral health

Finally we examined the association between the Neuroticism-related traits and other subjective and objective markers of oral health. In the present study, 20% of participants reported jaw clicks, 13% reported difficulty chewing food, 20% reported dry mouth, 23% reported unhealthy gums, 22% reported that their gums bleed, and 50% reported canker sores. Both Emotional Stability and Objectivity were associated with anxiety-related oral health complaints: Participants who scored low on these traits were more likely to report that their jaw makes a clicking sound, that they had difficulty chewing food, and that they often had a dry mouth (see Table 2). Both Emotional Stability and Objectivity, however, were unrelated to the more general oral somatic complaints we assessed: unhealthy gums, bleeding gums, and canker sores. Finally, neither Emotional Stability nor Objectivity was associated with dentist-assessed gingivitis (median $r = .00$, *ns*), the DMFT index (median $r = .01$, *ns*), or the number of teeth with moderate to severe erosion (median $r = -.02$, *ns*). The first assessment of Objectivity correlated positively with the number of filled cavities ($r = .11$, $p < .05$); this association did not replicate across the mean of Objectivity assessments or with Emotional Stability (median $r = .05$, *ns*).

Discussion

In this study we examined whether two traits related to Neuroticism, Emotional Stability and Objectivity, were associated with self-reported and physical evidence of teeth grinding. Both traits were associated with bruxism: Individuals who scored high on either Emotional Stability or Objectivity were less likely to report that they grind their teeth. These two traits were also associated with other anxiety-related oral symptoms, but were unrelated to more global, self-reported oral complaints. Neither trait, however, was related to the physical damage to teeth or the tongue often attributed to bruxism, nor were they related to dentist-assessed health of the teeth and gums.

Although psychological factors are routinely implicated in teeth grinding, previous research has focused primarily on state anxiety, depression, and life stress, rather than on stable individual differences in the tendency to experience negative emotions. Limited evidence from small samples suggests that the association between trait anxiety and bruxism starts in childhood (Restrepo, Vásquez, Alvarez, & Valencia, 2008) and persists into adulthood (Kampe et al., 1997). Much of this research, however, has relied on pathological bruxism, rather than the more common teeth grinding found in the general population. The present research supports the association between Neuroticism-related traits and bruxism in a community-dwelling sample.

Individuals high on Neuroticism-related traits consistently report more somatic complaints than individuals low on Neuroticism. The association, however, between Neuroticism and physical illness is much weaker than its association with somatic complaints; this discrepancy suggests that trait Neuroticism biases symptom reporting (Costa & McCrae, 1987). The present research is consistent with this argument: Participants high on Neuroticism-related traits reported that they grind their teeth, but there was no physical evidence to support their self-reported bruxism.

Yet, in the current study, the association between the Neuroticism-related traits and subjective oral health was limited to symptoms commonly associated with stress and anxiety, not to complaints more generally. Specifically, in addition to bruxism, individuals suffering from anxiety also often report other oral-related symptoms, including difficulties with chewing/swallowing food and dry mouth (American Psychiatric Association, 1994), and jaw-related problems are often associated with bruxism (Lavigne et al., 2008). Individuals high on Neuroticism-related traits may report more oral complaints because they do indeed suffer more from physical manifestations of anxiety. If the findings in the current study were solely due to the biased symptom reporting characteristic of these individuals, then Emotional Stability and Objectivity should also have been associated with more general oral health complaints, such as bleeding gums. They were not.

In addition, there is now growing evidence that Neuroticism is not all bark, but does indeed have some bite. For example, Neuroticism is associated with higher circulating levels of physiological biomarkers of inflammation (Sutin et al., in press) and even mortality (Terracciano, Löckenhoff, Zonderman, Ferrucci, & Costa, 2008). Both inflammation and mortality are objective measures untainted by self-report biases. The failure to find physical evidence of bruxism in the current study may be due more to our dental measures than to a lack of association. The use of occlusal wear as a marker of bruxism has been criticized because the magnitude of wear on a tooth is affected by many factors, including enamel density and saliva quality (Lavigne et al., 2008). And indeed, in the current study, self-reported teeth grinding was unrelated to either occlusal wear ($r = .09$, *ns*) or tongue indentations ($r = .08$, *ns*). Other measures of bruxism, such as spousal reports or electronic monitoring devices that can measure the occurrence and severity of teeth grinding, may be more valid measures than observed physical damage to the teeth and tongue.

Interestingly, we did find congruence between self-reported bruxism and physical damage for one of the other traits on the GZTS: Those high on Sociability were less likely to report suffering from teeth grinding and, likewise, their teeth had less occlusal wear. This effect, however, may be driven more by those low on Sociability. Low-sociable individuals have low tolerance for social interaction, may become anxious when forced to be around other people, and are often characterized as shy or timid (Guilford et al., 1976). Although Sociability is most strongly related to the Gregariousness facet of Extraversion (Terracciano, McCrae, & Costa, 2006), it is also has a strong negative correlation with the Self-Consciousness facet of Neuroticism. As such, this social discomfort may contribute to the psychological stress that can lead to bruxism.

The present research has several strengths, including a relatively large community-dwelling sample and dentist-assessed physical evidence of bruxism. Several limitations, however, need to be addressed in future research. First, as mentioned above, additional objective measures of bruxism are needed to ensure accurate evidence of teeth grinding; our dental assessment did not specifically target bruxism damage. Second, measures of both state and trait negative emotionality will help to clarify the role of stable traits versus environmental stressors as antecedents of bruxism. Finally, although our community sample is an improvement over the clinical samples typically used in bruxism research, participants were generally well-educated and in good health. These participants may have better oral hygiene habits and better access to dentists that would minimize damage due to bruxism. Future research on personality and bruxism would benefit from more representative samples. Despite these limitations, we offer the first evidence that bruxism is associated with not just acute symptoms of anxiety and depression, but also with stable traits that measure susceptibility to negative emotions in a non-clinical community population.

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Table 1

Logistic Regressions Predicting Self-reported Grinding, Occlusal Wear, and Tongue Indentations from Neuroticism-related Personality Traits

Traits	Self-reported grinding	Occlusal wear	Tongue indentations
Emotional Stability			
First assessment	.97 (.95–.99)*	.99 (.96–1.01)	1.00 (.98–1.02)
Mean	.94 (.90–.99)*	.99 (.95–1.03)	.99 (.95–1.03)
Objectivity			
First assessment	.97 (.95–.99)*	.99 (.97–1.02)	1.02 (.99–1.04)
Mean	.94 (.89–.99)*	.98 (.93–1.04)	1.04 (.99–1.10)

Note. *ns* range from 390 to 418 for self-reported grinding, *ns* range from 355 to 380 for occlusal wear, and *ns* range from 341 to 369 for tongue indentations. The logistic regressions control for sex, age at dental exam, and education.

*
 $p < .05$.

Logistic Regressions Predicting Anxiety-related and General Oral Health Complaints from Neuroticism-related Personality Traits

Table 2

Traits	Anxiety-related			General		
	Jaw clicks	Difficulty chewing	Dry mouth	Unhealthy gums	Gums bleed	Canker sores
Emotional Stability						
First assessment	.97 (.95–.99)*	.97 (.94–.99)*	.97 (.95–.99)*	.98 (.96–1.01)	1.00 (.98–1.02)	1.01 (.99–1.03)
Mean	.93 (.89–.98)*	.91 (.87–.96)*	.95 (.91–.99)*	.97 (.92–1.01)	1.00 (.96–1.04)	1.02 (.98–1.05)
Objectivity						
First assessment	.99 (.96–1.01)	.98 (.95–1.01)	.95 (.93–.98)*	.99 (.97–1.02)	1.00 (.98–1.02)	1.00 (.98–1.02)
Mean	.95 (.89–1.00)	.93 (.87–.99)*	.88 (.83–.94)*	.99 (.93–1.04)	1.00 (.95–1.05)	1.00 (.95–1.04)

Note. ns range from 385 to 414 for jaw clicks, ns range from 436 to 470 for difficulty chewing, ns range from 394 to 420 for dry mouth, ns range from 351 to 380 for unhealthy gums, ns range from 349 to 377 for gums bleed, ns range from 431 to 465 for canker sores. The logistic regressions control for sex, age at dental exam, and education.

*
p < .05.