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Sleep bruxism

Associations and comorbid conditions

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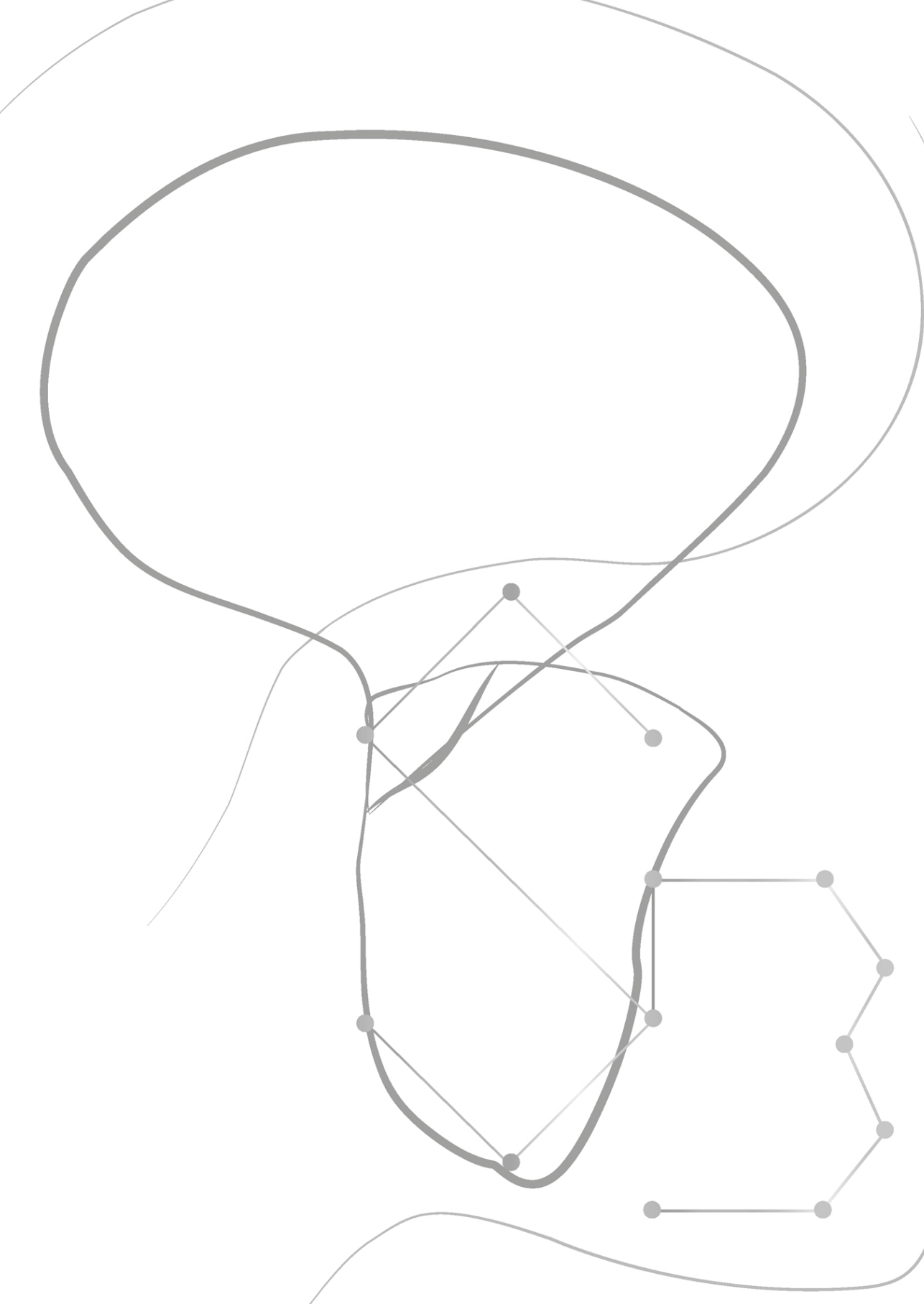
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CHAPTER 8

SUMMARY

The general aim of this thesis was to assess the associations of sleep bruxism (SB) on the one hand and awake bruxism (AB), psychological factors, temporomandibular disorders (TMD), and insomnia on the other hand, using self-report and instrumental techniques to establish the presence of bruxism. The associations of SB with AB, psychosocial factors, and TMD are described in chapters 2-4; the association between SB and insomnia, in chapters 5 and 6.

Chapter 1 provides a general introduction, including the definition, epidemiology, etiology, assessment, and management of SB and AB, as well as the sleep disorders associated with SB. In addition, the general aim and specific aims of this thesis are described.

Chapter 2 aimed to investigate whether individuals engaging in SB also engage in AB occurring during rest and stress-related activity, and to investigate whether SB and AB are associated with different characteristics. We recruited 122 female myofascial pain patients and 46 female pain-free controls. All participants underwent polysomnographic recordings for two consecutive nights and a 120-min. session for stress-related activity. The experiment included a non-stressful attention task, four stress-related activities, and between-task rest periods. Muscle activity during stress-related activities, i.e., AB during stress-related activity, and during between-task rest periods, i.e., AB at rest, were measured by surface electromyography (EMG). We examined the event rate and EMG activity of SB, AB at rest, and AB during stress-related activity and found that SB was not associated with either AB at rest or AB during stress-related activity. In contrast, the event rates and EMG activity of AB at rest were positively associated with those of AB during stress-related activity, suggesting that people who brux at rest tend to brux more when they are stressed. In addition, this chapter supports that SB is mainly characterized by grinding activity, while AB is mainly characterized by clenching activity, suggesting that SB and AB are different entities.

TMD pain has been shown to be associated with AB, SB, and psychosocial factors such as stress. However, there are insufficient data on the association between TMD dysfunction and the abovementioned factors. Thus, the cross-sectional study described in **chapter 3** investigated the association of the severity of TMD pain and dysfunction with the frequency of self-reported SB and AB, i.e., possible SB and AB, and stress in an adult TMD-patient population. In this study, 237 Thai TMD patients completed questionnaires on the frequency of SB and AB (assessed with the Oral Behaviors Checklist), TMD pain and TMD dysfunction (assessed with the modified Gerstner screening questionnaire), and stress (assessed with the Suan Prung Stress Test-20). We used univariate and multivariable regression analyses to predict TMD pain and

TMD dysfunction in two separate models, once with TMD pain and once with TMD dysfunction as the dependent variable. In addition, we implemented a novel statistical method called network analysis. We found that TMD pain is associated with possible AB, stress, and TMD dysfunction, while TMD dysfunction is only associated with TMD pain. The network model, i.e., the visualization of the network analysis, revealed that TMD pain is a bridge factor between AB, stress, and TMD dysfunction. In addition, SB is not associated with any factors in the network model.

Chapter 4 continued on the topic of the association between possible SB and AB on the one hand, and TMD on the other hand. TMD treatment strategies often include the management of SB and/or AB. However, how self-reports of SB and AB change after the start of interventions that aim at reducing these masticatory muscle activities in TMD patients remains unknown. This chapter aimed to investigate the association between the type of TMD treatment and psychosocial factors on the one hand and the changes in possible SB and/or AB on the other hand. 68 TMD patients were included in this prospective cohort study. Every patient received counselling, and 33 of 68 patients received counselling with other treatment(s) such as physical treatment, psychological treatment, and/or an occlusal splint. We studied the changes in SB and AB frequencies at week 6 after receiving the usual treatment. We investigated SB and various AB types, including AB-grinding, AB-clenching, AB-bracing, and the maximum frequency of all AB types combined, i.e., AB-combined. We found that there was no significant association between the changes in SB and in all types of AB on the one hand, and psychosocial factors on the other hand. Patients with counselling and any other treatment had a lower chance of improving their AB-combined frequency than patients with counselling alone. Most patients with counselling with any other treatment received physical treatment; thus, we suggested that patients with counselling and any other treatment may increase their awareness of AB. In contrast, the type of TMD treatment did not affect the change in SB frequency over a brief, 6-week period.

In **chapter 5**, we studied the aspect of the association between SB and sleep disorders. This chapter investigated the association between self-reported SB, insomnia, and their potential risk factors, e.g., depression and anxiety, and we constructed a network model with all these factors. We recruited a large population from the Netherlands Sleep Registry that is mainly a sleep-interested population. This study included 2251 participants who completed the questionnaires on self-reported SB, insomnia (assessed with the Insomnia Severity Index, ISI), obstructive sleep apnea (OSA) risk (assessed with the Berlin questionnaire, BQ), anxiety and depression (assessed with the Hospital Anxiety and Depression Scale, HADS), and lifestyle factors that were smoking frequency, alcohol consumption frequency, and coffee consumption frequency. We implemented

network analysis in this study as well. The network model shows that there is no direct link between self-reported SB and insomnia. However, there is an indirect link between self-reported SB and insomnia via anxiety.

In **chapter 6**, we continued evaluating the association of SB with other sleep disorders and demographic, psychological, and lifestyle factors in the adult general population. In addition, we investigated whether self-reported SB, i.e., possible SB, and polysomnographically- (PSG-) confirmed SB, i.e., definite SB, provide similar outcomes in terms of their associated factors. We recruited 915 adults from the general population in Sao Paulo, Brazil. All participants underwent a single-night PSG recording and completed questionnaires on self-reported SB, BMI, insomnia (assessed with the ISI), OSA risk (assessed with the BQ), anxiety and depression (assessed with the Beck Anxiety Inventory (BAI) and the Beck Depression Inventory (BDI), respectively), as well as the lifestyle factors that were average caffeine consumption (cup/day), smoking frequency, and alcohol consumption frequency. We investigated the link between SB and the other variables in univariate, multivariable, and network analyses, and we repeated each model once with self-reported SB and once with PSG-confirmed SB. Network analysis showed that self-reported SB has a direct positive link to insomnia, while PSG-confirmed SB is not significantly associated with any of the included variables. Thus, sleep bruxism is positively associated with insomnia only when assessed through self-report, but not when assessed using PSG.

Finally, **chapter 7** discusses this thesis' findings, their clinical implications, and future research.

Based on this thesis' findings, we conclude that different assessment techniques (viz., self-report and instrumental approaches) yield different clinical consequences of SB. Further, AB is associated with psychosocial factors and TMD, while SB is not associated with those factors. This suggests that SB and AB are different entities. Finally, possible SB connects with insomnia through psychosocial factors, but the association of definite SB with insomnia as well as with psychosocial factors could not be confirmed.