Received: 15 August 2023 | Revised: 25 February 2024 | Accepted: 2 March 2024

DOI: 10.1111/joor.13680

ORIGINAL ARTICLE

JOURNAL OF ORAL REHABILITATION WILEY

Bridging semantics and medical ontology in the definition of bruxism: An argument for a holistic definition

Nicolás P. Skarmeta[1,2]

[1]Orofacial Pain Unit at Hospital del Salvador, SSMO, Vitacura, Santiago, Chile

[2]Orofacial Pain, Clínica OPH, Vitacura, Santiago, Chile

Correspondence
Nicolás P. Skarmeta, Clínica OPH, Avenida Presidente Kennedy 7600, Oficina 401, Vitacura, Santiago, Chile.
Email: nicolas.skarmeta@gmail.com

Abstract

Objective: The objective of this commentary is to advocate for a holistic, ontology-based definition of bruxism. The intention is to synthesise the best aspects of current definitions into a structured ontological model, thereby refining and enhancing a comprehensive understanding of the full spectrum of bruxism.

Materials and Methods: The commentary elaborates on the process of integrating these insights into a hierarchical ontology that aligns with ontological principles.

Settings and Sample Population: Not directly applicable as this is a commentary.

Results/Conclusion: The proposed ontology-based definition of bruxism aims to clarify communication within the medical community and advance research by enabling a comprehensive ontology-based classification of bruxism. By aligning with ontological principles, this approach aspires to act as a catalyst for further research, discussion and consensus in the field.

KEYWORDS
awake bruxism, bruxism, definition, ontology, sleep bruxism

The understanding and clinical assessment of bruxism has significantly evolved over the past decades, thanks largely to the commendable efforts of researchers and experts in the field. The development of the 'Standardised Tool for the Assessment of Bruxism' (STAB)[1] and the integrated 'BruxScreen'[2] tool represents considerable advancements, offering a unique chance to gain insight into the intricate nature of bruxism. From exploring potential variants to assessing associated symptoms, these advancements offer an unprecedented opportunity to delve into the nuances of bruxism's clinical implications.

These developments herald an era of clarity, moving us beyond the acknowledged current understanding of bruxism as a 'work in progress'. In fact, it seems a logical and indeed necessary step to continually revisit and refine our approach to assessing bruxism, both clinically and instrumentally. This includes re-evaluating how our instrumental metrics are constructed and investigating how these measures can better reflect the multifaceted nature of bruxism.[3]

A truly unbiased definition, which better reflects bruxism's spectrum, should be created by bridging the misunderstanding rooted in semantics and should be framed within the realms of medical ontology. This approach not only holds the potential to provide a better understanding of bruxism for patients, clinicians and researchers alike, but it also promises to enhance the effectiveness of decision-making algorithms related to patient history, symptoms and signs and individualised treatment plans. By replacing ambiguity with precision, we can eliminate much of the confusion that often surrounds bruxism. By integrating the disciplines of semantics and medical ontology, we have the opportunity to redefine our understanding of bruxism in a way that serves the needs of all stakeholders—patients, clinicians and researchers.

In a previous commentary, we highlighted how some of the definitions arising from the 2018 consensus of experts appear to inadvertently pave the way for semantic misinterpretations.[4] It has been our contention that these potential ambiguities could impact not just our conceptual understanding of bruxism but also its clinical and research applications.

The semantics underlying the definition of bruxism have prompted considerable discussion among leading scholars in the

field.[5,6] In their editorial, Svensson and Lavigne proposed the terms 'normo-bruxism' and 'patho-bruxism' to better differentiate the clinical implications of bruxism. They asserted that the persistent use of a singular term, 'bruxism', contributes to confusion and suggested separating the condition into normo-bruxism (non-pathological awake/sleep bruxism, associated with normal homeostasis with no signs or symptoms) and patho-bruxism (pathological awake/sleep bruxism, with any type of harmful consequence) for a more comprehensive understanding of the condition.[5] Conversely, Lobbezoo et al. upheld the perspective established in the 2018 consensus of experts, advocating for descriptors such as 'harmless behaviour', 'risk factor' and 'protective factor' to characterise the status of bruxism. This framework recognises that bruxism may exert both detrimental and beneficial effects on different individuals. Their definition accurately portrays the intricate dynamics of the human body and its interactions with health conditions, leading the authors to argue that a dichotomous approach might not adequately capture the complexity of bruxism.[6]

Each perspective offers its merits, and indeed, the choice of terminology may depend on the specific context and goals of research or clinical practice. In my opinion, Svensson and Lavigne's[5] proposition of 'normo-bruxism' and 'patho-bruxism' emerges as a potentially robust and intuitive classification that could prove more beneficial both semantically and ontologically, particularly when seeking to provide a working definition. Semantically, the terms 'normo-bruxism' and 'patho-bruxism' offer a clearer distinction between clinical manifestations: normal or non-pathological sleep/awake masticatory motor activity and its potentially harmful sleep/awake counterpart. Additionally, it is important to note that the potential role of bruxism as a protective factor remains a hypothesis that is yet to be proven. For instance, recent literature on Obstructive Sleep Apnea and Sleep Bruxism questions the temporal relationship in which sleep bruxism episodes may contribute to the termination of apnea events.[7]

In the quest to better understand bruxism, a holistic definition that supports an ontological classification becomes imperative. This definition must comprehensively provide a framework to delineate its multiple components, including entities (i.e. sleep bruxism and awake bruxism), supertypes, subtypes and properties; it should also consider various manifestations and temporal characteristics, based on clear and logical axioms.

As the goal of the STAB and the task force on sleep bruxism metrics is to address the gaps in medical and dental literature,[1] a new working ontological-based definition should incorporate normative, phenomenological and pathophysiological aspects, thereby covering the entire spectrum of bruxism. A definition rooted in a hierarchical ontological structure would streamline communication among clinicians, researchers and patients, fostering a comprehensive understanding of bruxism, especially for newcomers to the field. It provides a structured framework, enabling clear classification through a coherent system of entities, characteristics and interrelations. This approach will facilitate a better understanding and provide semantic clarity but also serve as a foundational, adaptable basis for ongoing research and discussion.

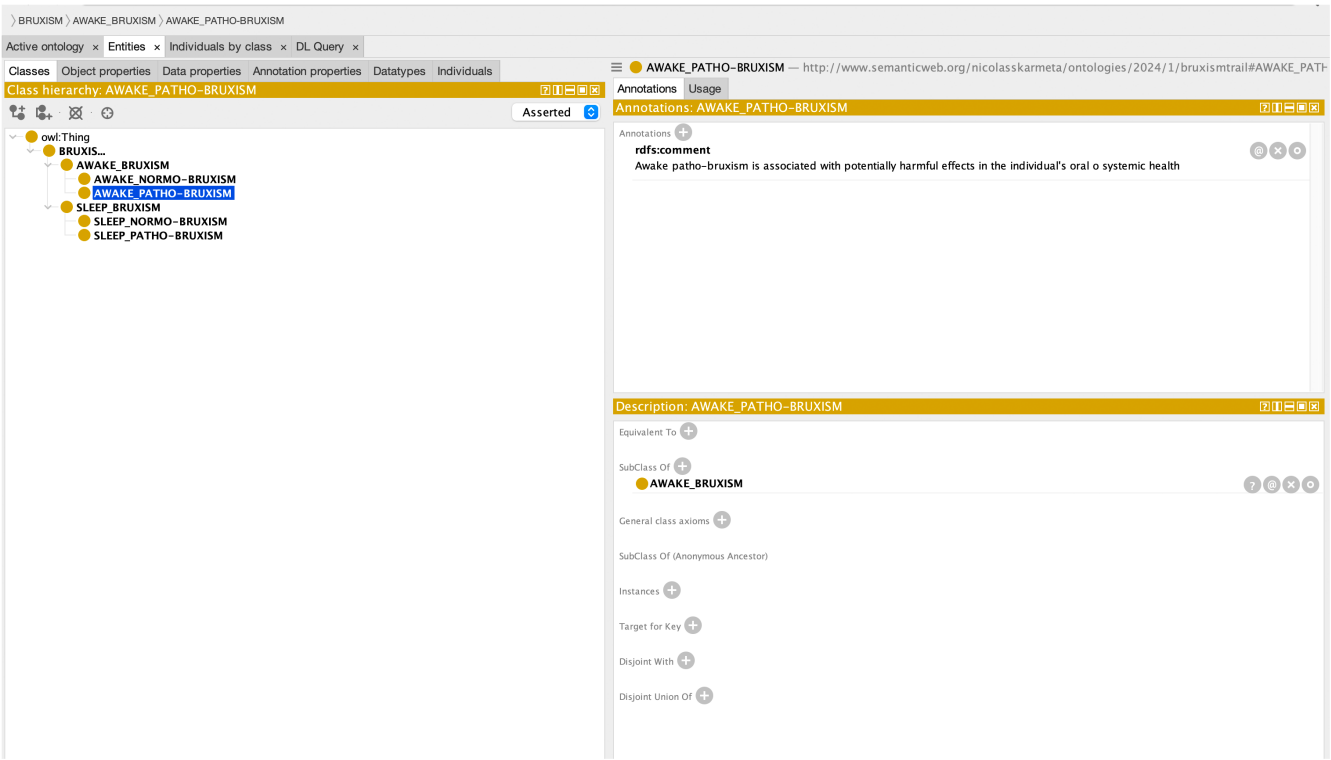

FIGURE 1 Hierarchical ontology of bruxism. This figure displays the ontology of bruxism, showing 'Sleep Bruxism' and 'Awake Bruxism' as top-level categories and its subdivisions indicating specific bruxism subtypes.

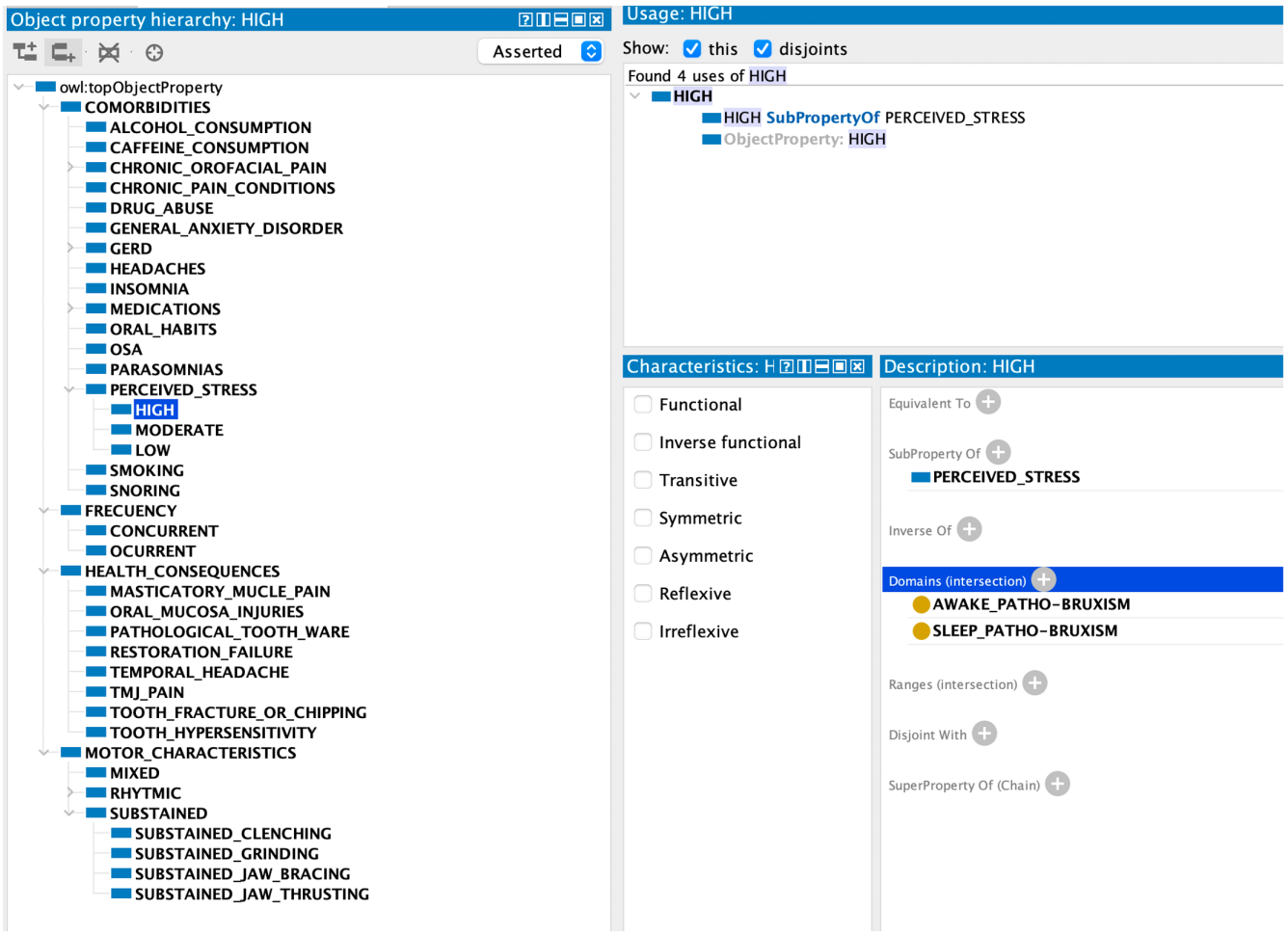

FIGURE 2 Properties of bruxism subtypes. This figure exemplifies the properties and attributes that are associated with each subtype of bruxism.

I humbly propose a more holistic terminology for defining bruxism. This terminology incorporates both the dichotomous classification of normo-bruxism and patho-bruxism, as proposed by Svensson and Lavigne,[5] and the multidimensional consequences of bruxism, as suggested by Lobbezoo et al.[6] This is all while adhering to an ontological framework: 'Bruxism is a broad term that encompasses two distinct gnoseological entities, sleep bruxism and awake bruxism, each representing a spectrum of masticatory motor activities. These entities can manifest as 'normo-bruxism,' typically characterized by a lack of detrimental impact on an individual's oral or systemic health, or 'patho-bruxism,' which is associated with potentially harmful effects. Both entities may vary in terms of frequency, characteristics, and intensity, and they may differentially impact individual health'. This comprehensive definition aims to reflect the multifaceted nature of bruxism while accommodating its diverse manifestations and consequences within an ontological framework. The proposed 'working' definition is intended as a flexible starting point for discussion and refinement. It is offered in the spirit of collaboration, with the hope of galvanising further research on phenotypes, fostering discussion and building consensus among experts in the field.

Within this framework, we can develop an ontological classification aligned with the Ontology for General Medical Science hierarchy. Such classification would categorise 'Sleep Bruxism' and 'Awake Bruxism' as the foundational supertypes, encapsulating the broader categories of bruxism. These supertypes are further subdivided into more precise subtypes, such as 'Awake Normo-Bruxism', and are then specified by attributes, properties and associated factors, like 'Occurrent Bracing Associated with Low Perceived Stress', as a subset of 'Awake Normo-Bruxism'. This hierarchical ontological structure not only brings clarity to the range of bruxism manifestations but also strengthens our capacity for clear communication and in-depth understanding of the condition, delineating the complex nature of bruxism (Figures 1 and 2).

This hierarchical ontological structure glimpses both general and specific details about the bruxism spectrum:

- Bruxism
  - Sleep Bruxism
    - Sleep Normo-Bruxism
    - Sleep Patho-Bruxism
  - Awake Bruxism
    - Awake Normo-Bruxism

- Occurrent Bracing Associated with Low Perceived Stress
- Awake Patho-Bruxism
  - Concurrent Clenching Associated with High Perceived Stress Leading to restoration failure.

As pointed out in the example, it can be observed that 'Bruxism' sits at the apex, and branches into different supertypes: 'Sleep Bruxism' and 'Awake Bruxism'. These further subdivide into 'Normo' and 'Patho' subtypes. Then, in finer detail, 'Occurrent Bracing Associated with Low Perceived Stress' may be a subset of 'Awake Normo-Bruxism'. Similarly, 'Concurrent Clenching Associated with Perceived Stress Leading to Restoration Failure' within 'Awake Patho-Bruxism', indicates the relation of a frequent specific masticatory motor activity with known risk factors such as perceived stress outlining a detrimental consequence.

In conclusion, the proposed ontological approach is designed to better represent the complexity of the bruxism spectrum, facilitating a deeper understanding for clinicians, researchers and patients. While the community's adoption of this definition, including the experts working on the STAB and the task force for sleep bruxism metrics, remains to be seen, striving for consensus on an ontology-based definition and classification is essential. Future classifications of bruxism should aim toward an ontological structure that accommodates the condition's diverse manifestations, from broad categories to specific instances.

CONFLICT OF INTEREST STATEMENT

None to declare.

PEER REVIEW

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/joor.13680.

DATA AVAILABILITY STATEMENT

Not applicable.

ORCID

Nicolás P. Skarmeta https://orcid.org/0000-0002-3023-0777

REFERENCES

1. Manfredini D, Ahlberg J, Aarab G, et al. Standardised tool for the assessment of bruxism. *J Oral Rehabil*. 2023;51:joor.13411. doi:10.1111/joor.13411
2. Lobbezoo F, Ahlberg J, Verhoeff MC, et al. The bruxism screener (BruxScreen): development, pilot testing and face validity. *J Oral Rehabil*. 2023;51:joor.13442. doi:10.1111/joor.13442
3. Lavigne G, Kato T, Herrero Babiloni A, et al. Research routes on improved sleep bruxism metrics: toward a standardised approach. *J Sleep Res*. 2021;30(5):e13320. doi:10.1111/jsr.13320
4. Skármeta NP, Hormazabal Navarrete F. Questions on the clinical applicability on the international consensus on the assessment of bruxism. *J Oral Rehabil*. 2020;47(2):255-257. doi:10.1111/joor.12891
5. Svensson P, Lavigne G. Clinical bruxism semantics beyond academic debates: normo- and patho-bruxism as a new proposal. *J Oral Rehabil*. 2020;47(5):547-548. doi:10.1111/joor.12967
6. Lobbezoo F, Ahlberg J, Aarab G, Manfredini D. Why using 'harmless behaviour', 'risk factor' and 'protective factor' as terms describing the various possible consequences of bruxism is still the best option. *J Oral Rehabil*. 2021;48(6):762-763. doi:10.1111/joor.13063
7. Yap AU, Tan MWY, Tan SHX, Chua AP. Sleep bruxism events: an epiphenomenon of severe obstructive sleep apnea? *Clin Oral Invest*. 2023;27(8):4633-4642. doi:10.1007/s00784-023-05089-w

How to cite this article: Skarmeta NP. Bridging semantics and medical ontology in the definition of bruxism: An argument for a holistic definition. *J Oral Rehabil*. 2024;00:1-4. doi:10.1111/joor.13680