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Oral and Upper-Extremity Biomechanics in Saxophonists:
A Systematic Review

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Korea.**ADMINISTRATIVE INFORMATION****Support** - None. This review received no financial support.**Review Stage at time of this submission** - Completed but not published.**Conflicts of interest** - None declared.**INPLASY registration number:** INPLASY202680004**Amendments** - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 1 August 2026 and was last updated on 1 August 2026.**INTRODUCTION**

Review question / Objective This review asks how the oral and upper-extremity interfaces are each loaded during saxophone performance, and whether evidence assembled separately for each region can support an account of the two together. The objective is to identify and appraise reported measurements of orofacial and upper-extremity loading during saxophone and comparable wind performance, together with the clinical problems reported in these players, and to synthesise them narratively within a single description of the performance task.

Rationale The orofacial and upper-extremity demands of saxophone performance have been examined in separate literatures, each addressing one region from a single disciplinary perspective. No review has asked whether findings from the two regions can be described together as demands of one performance task. This review was undertaken to assemble the evidence for both regions using a single explicit method, to appraise it by study

design, and to examine whether an integrated account is supported by what has actually been measured.

Condition being studied Playing-related biomechanical loading of the orofacial region and of the upper extremity in saxophonists and comparable wind instrumentalists, and the clinical problems reported in association with it. Orofacial loading arises at the single-reed embouchure, where the mouthpiece is supported between the maxillary incisors and the lower lip. Upper-extremity loading arises from instrument weight borne at the thumb rest, sustained postures, and repetitive key actuation. Reported clinical problems include temporomandibular and dental complaints, tendinopathy and tenosynovitis, nerve entrapment, and focal dystonia.

METHODS

Search strategy PubMed, Scopus, and the Web of Science Core Collection were searched from database inception to July 2026; the last search

was run on 25 July 2026. Three searches were run in each database: an orofacial term block, an upper-extremity term block, and an instrument-only supplementary search. A targeted dystonia search was run on 26 July 2026 without language restriction. Record counts at the search date are given in parentheses. Full strings follow.

A. OROFACIAL BLOCK

Scopus (197): TITLE-ABS-KEY ((saxophon* OR clarinet* OR "single reed" OR "single-reed" OR woodwind* OR "wind instrument" OR "wind instruments") AND (embouchure OR "orbicularis oris" OR perioral OR lip OR lips OR "intraoral pressure" OR "oral pressure" OR "bite force" OR temporomandibular OR tmj OR tmd OR "masticatory muscle" OR dental OR teeth OR tooth OR incisor* OR occlusion OR malocclusion OR periodontal OR orofacial) AND (LIMIT-TO (subjarea , "medi") OR LIMIT-TO (subjarea , "dent") OR LIMIT-TO (subjarea , "neur") OR LIMIT-TO (subjarea , "heal")))

PubMed (150): (saxophon*[tiab] OR clarinet*[tiab] OR "single reed"[tiab] OR "single-reed"[tiab] OR woodwind*[tiab] OR "wind instrument"[tiab] OR "wind instruments"[tiab]) AND (embouchure[tiab] OR "orbicularis oris"[tiab] OR perioral[tiab] OR lip[tiab] OR lips[tiab] OR "intraoral pressure"[tiab] OR "oral pressure"[tiab] OR "bite force"[tiab] OR temporomandibular[tiab] OR tmj[tiab] OR tmd[tiab] OR "masticatory muscle"[tiab] OR dental[tiab] OR teeth[tiab] OR tooth[tiab] OR incisor*[tiab] OR occlusion[tiab] OR malocclusion[tiab] OR periodontal[tiab] OR orofacial[tiab])

Web of Science (177): TS=((saxophon* OR clarinet* OR "single reed" OR "single-reed" OR woodwind* OR "wind instrument" OR "wind instruments") AND (embouchure OR "orbicularis oris" OR perioral OR lip OR lips OR "intraoral pressure" OR "oral pressure" OR "bite force" OR temporomandibular OR tmj OR tmd OR "masticatory muscle" OR dental OR teeth OR tooth OR incisor* OR occlusion OR malocclusion OR periodontal OR orofacial))

B. UPPER-EXTREMITY BLOCK

Scopus (110): TITLE-ABS-KEY ((saxophon* OR clarinet* OR "single reed" OR "single-reed" OR woodwind* OR "wind instrument" OR "wind instruments") AND (hand OR thumb OR wrist OR finger* OR forearm OR "upper limb" OR "upper extremity" OR musculoskeletal OR "playing-related" OR prmd OR overuse OR tendinopathy OR tenosynovitis OR "de quervain" OR "carpal

tunnel" OR "cubital tunnel" OR "nerve entrapment" OR dystonia OR "repetitive strain") AND (LIMIT-TO (subjarea , "medi") OR LIMIT-TO (subjarea , "heal") OR LIMIT-TO (subjarea , "neur") OR LIMIT-TO (subjarea , "dent")))

PubMed (87): (saxophon*[tiab] OR clarinet*[tiab] OR "single reed"[tiab] OR "single-reed"[tiab] OR woodwind*[tiab] OR "wind instrument"[tiab] OR "wind instruments"[tiab]) AND (hand[tiab] OR thumb[tiab] OR wrist[tiab] OR finger*[tiab] OR forearm[tiab] OR "upper limb"[tiab] OR "upper extremity"[tiab] OR musculoskeletal[tiab] OR "playing-related"[tiab] OR prmd[tiab] OR overuse[tiab] OR tendinopathy[tiab] OR tenosynovitis[tiab] OR "de quervain"[tiab] OR "carpal tunnel"[tiab] OR "cubital tunnel"[tiab] OR "nerve entrapment"[tiab] OR dystonia[tiab] OR "repetitive strain"[tiab])

Web of Science (198): TS=((saxophon* OR clarinet* OR "single reed" OR "single-reed" OR woodwind* OR "wind instrument" OR "wind instruments") AND (hand OR thumb OR wrist OR finger* OR forearm OR "upper limb" OR "upper extremity" OR musculoskeletal OR "playing-related" OR prmd OR overuse OR tendinopathy OR tenosynovitis OR "de quervain" OR "carpal tunnel" OR "cubital tunnel" OR "nerve entrapment" OR dystonia OR "repetitive strain"))

C. INSTRUMENT-ONLY SUPPLEMENTARY SEARCH

Scopus (864): TITLE-ABS-KEY (saxophon*)
PubMed (191): saxophon*[tiab]
Web of Science (773): TS=(saxophon*)

D. TARGETED DYSTONIA SEARCH (26 July 2026, no language restriction, one record in each database)

PubMed: (saxophone[tiab] OR saxophonist*[tiab]) AND (dystonia[tiab] OR "focal dystonia"[tiab] OR "musician's cramp"[tiab] OR "musicians cramp"[tiab] OR "embouchure dystonia"[tiab])

Scopus: TITLE-ABS-KEY((saxophone OR saxophonist*) AND (dystonia OR "focal dystonia" OR "musician's cramp" OR "embouchure dystonia"))

Web of Science: TS=((saxophone OR saxophonist*) AND (dystonia OR "focal dystonia" OR "musician's cramp" OR "embouchure dystonia"))

Notes. (1) Subject-area filters (medi, heal, neur, dent) were applied in Scopus only; PubMed and Web of Science have no equivalent function. (2) Counts are those obtained on 25 July 2026. On re-running, the Web of Science upper-extremity block returns 195 records; the difference reflects database updating, and the records downloaded on the search date (198) are the basis for screening. (3) PubMed [tiab] does not retrieve author keywords, whereas Scopus TITLE-ABS-KEY and Web of Science TS= do.

Participant or population Saxophonists of any age, sex, and level of training, including students, amateurs, and professional players. Players of comparable single-reed and other wind instruments were eligible where the reported data bear on saxophone performance and were interpreted in that context.

Intervention Not applicable. This is not an intervention review; no intervention was evaluated.

Comparator Not applicable. No comparator intervention was defined; comparisons, where reported, were between playing conditions or between players and non-players as described in the primary studies.

Study designs to be included Randomised trials; systematic reviews; cohort studies; analytical cross-sectional studies; experimental biomechanical measurement studies, including electromyographic, kinematic, and force measurement; quasi-experimental studies; case series; and case reports. Narrative reviews were retained as background material and were not treated as included studies.

Eligibility criteria Studies were eligible if they reported on the anatomy, biomechanics, physiological demands, or clinical sequelae of the oral apparatus or the upper extremity in saxophonists or in players of comparable single-reed or woodwind instruments. All study designs were considered, including biomechanical and electromyographic experiments, imaging studies, cross-sectional surveys, and clinical case reports. Acoustic, computational, and instrumentation studies without an anatomical, physiological, or clinical outcome were retained only as background and were not treated as included studies. Records without extractable loading or clinical data, records without a retrievable full text, duplicate reports of the same data, and non-research material were excluded. Study design was determined from the methods section of each report rather than from database fields, titles, or authors' own labels.

Information sources PubMed, Scopus, and the Web of Science Core Collection. In addition, reference lists of eligible articles and of relevant reviews were searched (citation searching), journals in the field were hand-searched, and targeted searches were run for specific topics identified during screening. No trial registers or grey-literature databases were searched.

Main outcome(s) Biomechanical loading measures at the orofacial and upper-extremity interfaces during performance: forces and pressures, muscle activity, and movement or timing measures, together with the conditions under which they were obtained, including instrument type, playing task, register and dynamic level, participant experience, and measurement method. Effect measures were as reported in the primary studies; no pooled effect estimate was derived.

Additional outcome(s) Clinical manifestations reported in these players, including temporomandibular and dental complaints, tendinopathy and tenosynovitis, nerve entrapment, and focal dystonia, and any preventive or management measures reported.

Data management All records were imported into EndNote and duplicate records were removed. Records were then screened in two stages, first by title and abstract and then by full text. Records were allocated by subject domain and screened by the reviewer with the relevant expertise: the orofacial literature by H.M. and the upper-extremity literature by D.R. Records spanning both domains were screened by both reviewers. Disagreements and uncertain cases were resolved by discussion. Data were extracted into a structured spreadsheet with predefined fields covering study design, participants, instrument, measurement method, reported values, and clinical findings.

Quality assessment / Risk of bias analysis Each of the 60 references cited in the synthesis was considered for appraisal, and 57 were appraised with the instrument matching its design: Cochrane RoB 2 for the randomised trial, AMSTAR 2 for systematic reviews, and the Joanna Briggs Institute checklists for cohort, analytical cross-sectional, quasi-experimental, case series, and case report designs. Study design was determined from the methods section of each report. Three narrative reviews were not appraised, as no critical appraisal instrument is designed for that study design. Studies were assigned for appraisal according to reviewer expertise, and a random sample was independently re-appraised by the

second reviewer. Results are reported in an appendix to the review.

Strategy of data synthesis Narrative synthesis without meta-analysis. The included studies differ substantially in instrument, participant experience, measurement method, and reported outcome, so pooling was not appropriate. Findings were grouped by anatomical region and, within each region, organised as structure, performance loading, and associated clinical problems. Reported values are presented with their measurement conditions, and loading at the two regions is described in its own terms rather than compared numerically across regions.

Subgroup analysis Not applicable. No subgroup analysis was planned or performed. Because the synthesis is narrative and no quantitative pooling was undertaken, formal subgroup comparison was not possible. Differences by instrument type and by participant experience are described narratively where the primary studies report them.

Sensitivity analysis Not applicable. No sensitivity analysis was planned or performed, as no pooled estimate was calculated. The influence of study quality on the synthesis is addressed narratively, with appraisal results reported for each cited study.

Language restriction English-language publications, except a targeted dystonia search run in all three databases without language restriction.

Country(ies) involved Republic of Korea.

Other relevant information This registration lists the two reviewers who conducted the search, screening, data extraction, and quality appraisal. The review was registered retrospectively: the searches, screening, extraction, and appraisal had been completed before registration, and the manuscript was in preparation at the time of submission. No changes were made to the eligibility criteria, screening procedure, appraisal instruments, or synthesis method after the work was carried out. Screening was allocated by subject-matter domain rather than performed in full duplicate by both reviewers, which is stated as a limitation in the review. Additional authors who contributed critical revision of the manuscript are listed in the published article in accordance with ICMJE criteria.

Keywords saxophone; embouchure; biomechanical phenomena; upper extremity; occupational diseases; cumulative trauma disorders.

Dissemination plans Publication in a peer-reviewed journal in the field of performing arts medicine.

Contributions of each author

Author 1 - Deokhyeon Ryu - Ryu D conceived the review with Moon H, screened and appraised the upper-extremity literature, extracted data for that domain, and drafted the upper-extremity sections. Email: hopeydh@gmail.com

Author 2 - Hojin Moon - Moon H conceived the review with Ryu D, screened and appraised the orofacial literature, extracted data for that domain, drafted the orofacial and integrative sections, and acted as corresponding author. Email: alkydes@dankook.ac.kr