European Journal of Biology and Medical Science Research, 14(2), 65-78, 2026
Print ISSN: ISSN 2053-406X,
Online ISSN: ISSN 2053-4078
Website: https://www.eajournals.org/
Publication of the European Centre for Research Training and Development -UK

Facial Plastic Surgery and Profiloplasty: Contemporary Approaches to Office-Based Anesthesia, Analgesia, and Patient Safety

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doi: https://doi.org/10.37745/ejbmsr.2013/vol14n26578 Published June 21 2026

Citation: Tagani G., Filaj V., Aliaj T. (2026) Facial Plastic Surgery and Profiloplasty: Contemporary Approaches to Office-Based Anesthesia, Analgesia, and Patient Safety, *European Journal of Biology and Medical Science Research*, 14(2), 65-78

Abstract: *The increasing demand for minimally invasive and office-based facial plastic surgery procedures has transformed contemporary aesthetic and reconstructive practice. Advances in local anesthetic techniques, sedation protocols, and patient comfort measures have enabled a growing number of procedures to be safely performed outside the traditional operating room environment. This shift offers advantages, including reduced healthcare costs, improved patient convenience, and decreased utilization of hospital resources. This review aims to provide a comprehensive overview of current anesthetic approaches used in office-based facial plastic surgery, with particular emphasis on local anesthesia, topical anesthetic agents, patient comfort strategies, and safety considerations. A narrative literature review was conducted using PubMed, Embase, Web of Science, and the Cochrane Library. Relevant articles were identified using combinations of the following keywords: anesthesia, office-based procedures, local anesthesia, facial plastic surgery,profiloplasty,oral sedation, moderate sedation, and deep sedation. Studies addressing anesthetic techniques, patient safety, pain management, and perioperative outcomes in facial plastic procedures were included. Current evidence indicates that a wide range of facial plastic surgery procedures, including Mohs reconstruction, cutaneous excisions, blepharoplasty, and facial rejuvenation interventions, can be successfully performed under local anesthesia with or without adjunctive sedation. Non-pharmacological approaches such as cooling devices, distraction techniques, and vibratory stimulation have demonstrated effectiveness in reducing procedural discomfort. Topical and infiltrative local anesthetics remain the cornerstone of office-based anesthesia, while careful patient selection and adherence to safety protocols are essential to minimize complications. Office-based facial plastic surgery represents a safe and effective alternative to hospital-based procedures when appropriate anesthetic strategies are employed. The integration of pharmacological and non-pharmacological pain management techniques enhances patient comfort, improves procedural outcomes, and supports the continued expansion of office-based surgical practice.*

Keywords: Facial plastic surgery, profiloplasty,office-based procedures, local anesthesia, topical anesthetics, patient comfort, sedation, pain management.

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INTRODUCTION

Profiloplasty: Concept and Aesthetic Objectives

Profiloplasty is a comprehensive cosmetic surgical approach designed to enhance the overall balance, proportion, and harmony of the facial profile in an individualized and structurally integrated manner. Rather than addressing a single anatomical unit in isolation, profiloplasty applies a global aesthetic analysis of the face, focusing on the relationships between facial subunits and their contribution to profile harmony (Naini, 2011; Cotofana& Lachman, 2019).

Unlike isolated procedures such as rhinoplasty or mentoplasty, profiloplasty combines multiple surgical techniques into a unified treatment plan to achieve optimal facial harmonization. These may include nasal reshaping, chin augmentation or reduction, and occasionally adjunctive procedures such as lip contour refinement or forehead contour assessment, depending on individual anatomical needs and aesthetic goals (Rohrich& Adams, 2015; Mendelson, 2012).

The primary focus of profiloplasty is the interaction between key aesthetic units of the face, particularly the nose and chin, which are considered central determinants of profile balance. However, a complete evaluation also includes the forehead, lips, and cervicomental angle, ensuring a continuous and proportional facial contour. This approach aligns with modern facial aesthetic analysis frameworks that emphasize global facial proportion rather than isolated feature assessment (Kiekens&Kuijpers-Jagtman, 2014; Cotofana& Lachman, 2019).

The fundamental objective is to restore or enhance natural facial symmetry while preserving the patient's individual identity and ethnic characteristics. Contemporary aesthetic philosophy emphasizes subtle refinement rather than overt structural alteration, aiming to achieve results that are harmonious, natural-looking, and individually tailored. This patient-centered approach is strongly supported in recent facial plastic surgery literature, which demonstrates that satisfaction is highest when outcomes respect baseline facial proportions and identity (Rohrich& Adams, 2015; Naini, 2011).

From a psychological perspective, improvements in facial profile balance have been associated with increased self-esteem, body image satisfaction, and psychosocial well-being. Patients undergoing profiloplasty frequently report enhanced confidence following correction of perceived disproportions, particularly involving the nasomaxillary and chin projection relationship, which are key determinants of perceived facial attractiveness (Kiekens&Kuijpers-Jagtman, 2014).

In summary, profiloplasty represents an advanced and integrative approach in facial plastic surgery that prioritizes global facial harmony, individualized surgical planning, and preservation of natural identity while improving both aesthetic and psychosocial outcomes.

NON-ANESTHETIC INTERVENTIONS

Minimally invasive facial aesthetic procedures have experienced substantial growth over the past two decades. The Cosmetic Surgery National Data Bank Statistics (2018) report millions of injectable aesthetic procedures performed annually, reflecting a sustained shift in patient preference toward treatments associated with reduced recovery time, lower procedural risk, and avoidance of general anesthesia.

Among nonsurgical facial interventions, hyaluronic acid (HA) fillers represent one of the most frequently performed procedures worldwide. Alam et al. (2008), in the American Society for Dermatologic Surgery guidelines, emphasized the importance of patient-centered comfort strategies during injectable treatments, recommending both pharmacological and procedural measures to minimize injection-related pain and procedural anxiety.

Adjunctive non-pharmacological interventions have been widely investigated. Nestor et al. (2010) demonstrated that topical cooling devices significantly reduce pain perception during nasolabial fold filler injections, with reported reductions of up to 70% immediately post-procedure and sustained analgesic effects over several hours. Beyond analgesia, vasoconstriction induced by cooling may also contribute to reduced ecchymosis and edema, thereby improving aesthetic outcomes.

Cognitive distraction techniques have also been explored as supportive analgesic strategies. Molleman et al. (2019) reported that audiovisual distraction during local anesthetic administration significantly reduced subjective pain scores in a randomized controlled trial. However, although pain reduction was statistically significant, overall patient satisfaction did not show a proportional increase, suggesting that distraction alone may not fully address procedural experience.

The neurophysiological basis of vibratory analgesia is grounded in the gate control theory of pain proposed by Melzack and Wall (1965), which postulates that non-nociceptive input can inhibit nociceptive transmission at the spinal cord level. Applying this concept clinically, Sharma et al. (2011) demonstrated that vibration-assisted anesthesia significantly reduced pain during cosmetic botulinum toxin injections, with patients reporting both lower pain scores and a strong preference for its continued use. Similar findings in dermal filler procedures support vibration as a low-cost, effective adjunct for pain modulation in office-based facial procedures.

LOCAL ANESTHESIA

The shift toward office-based facial plastic surgery has established local anesthesia as a fundamental component of contemporary practice. Procedures such as Mohs reconstruction, cutaneous excisions, blepharoplasty, and otoplasty are increasingly performed safely under local anesthesia, avoiding the risks and logistical burden of general anesthesia.

Local anesthetics act by reversibly inhibiting voltage-gated sodium channels in neuronal membranes, thereby preventing depolarization and propagation of action potentials. Common agents include amide anesthetics (e.g., lidocaine, bupivacaine) and ester anesthetics (e.g., tetracaine, benzocaine, cocaine).

Despite their favorable safety profile, systemic toxicity remains a clinically relevant concern. Weinberg (2010) described early manifestations of local anesthetic systemic toxicity (LAST), including tinnitus, circumoral numbness, and altered mental status, which may progress to seizures and cardiovascular collapse if untreated. Prompt recognition and immediate cessation of anesthetic administration are essential. In severe cases, lipid emulsion therapy has demonstrated efficacy in reversing cardiotoxicity. Liu et al. (2019) further supported lipid rescue protocols in experimental models of bupivacaine-induced cardiac arrest.

TOPICAL ANESTHESIA

Topical anesthetic agents are widely used in facial plastic surgery to improve patient tolerance of needle-based procedures. Among these, eutectic mixture of local anesthetics (EMLA) is one of the most extensively studied formulations.

Clinical evidence supports its efficacy across multiple procedures. Park et al. (2015) demonstrated that EMLA significantly reduces pain during facial laceration repair, while Slator and Goodacre (1995) reported similar findings in otologic surgery involving prominent ear correction. Kilmer (2003) also showed that topical anesthetic protocols facilitate tolerable full-face laser resurfacing procedures.

However, systemic absorption remains a relevant safety consideration. Oni et al. (2012) reported significant variability in serum lidocaine levels across commonly used topical formulations, highlighting the need for cautious dosing, particularly in extensive application areas or prolonged exposure.

Historically, topical cocaine was widely used due to its combined anesthetic and vasoconstrictive properties. Long et al. (2004) described its historical role in rhinologic surgery; however, Dwyer et al. (2016) highlighted concerns regarding cardiovascular risk and abuse potential, contributing to its decline in clinical use in favor of safer alternatives.

PERCUTANEOUS LOCAL ANESTHESIA

Subcutaneous infiltration with lidocaine, bupivacaine, or their combination remains the standard anesthetic technique in office-based facial plastic surgery. Lidocaine provides rapid onset, whereas bupivacaine offers prolonged postoperative analgesia; therefore, combination strategies are commonly employed to optimize both intraoperative and postoperative pain control.

The addition of epinephrine enhances hemostasis through vasoconstriction, improves surgical field visualization, and reduces systemic absorption of local anesthetics. Dunlevy et al. (1996) demonstrated that epinephrine concentrations between 1:50,000 and 1:400,000 provide comparable vasoconstrictive efficacy. Consequently, lower concentrations may be sufficient while minimizing systemic adverse effects.

SAFE DOSING CONSIDERATIONS FOR LOCAL ANESTHETICS

Appropriate dosing of local anesthetic agents is essential to prevent local anesthetic systemic toxicity (LAST). Dosing decisions should be individualized based on patient weight, age, comorbidities, hepatic and cardiovascular function, and procedural extent. Because toxicity is dose-dependent, adherence to established maximum safe limits is critical.

Epinephrine-containing solutions allow for higher maximum doses by reducing systemic absorption through local vasoconstriction. Nevertheless, clinicians must remain vigilant when administering multiple agents or treating large anatomical regions. Patients with hepatic impairment, cardiovascular disease, or advanced age require additional caution due to altered pharmacokinetics and increased susceptibility to toxicity (Weinberg, 2010).

BUFFERED LOCAL ANESTHETIC SOLUTIONS

Commercial local anesthetic preparations containing epinephrine are inherently acidic, which may contribute to injection-related discomfort. Frank and Lalonde (2012) demonstrated that lidocaine with epinephrine has a significantly lower pH compared with plain lidocaine, resulting in increased burning sensation upon infiltration.

To mitigate this effect, buffering with sodium bicarbonate has been shown to improve patient comfort. Frank and Lalonde (2012) reported that alkalinization of lidocaine-epinephrine mixtures significantly reduces injection pain without compromising efficacy. Richards et al. (2014) further emphasized buffering as part of a multimodal strategy that includes slow injection techniques and gentle tissue handling to optimize patient experience.

REGIONAL NERVE BLOCKS

Regional nerve blocks provide effective anesthesia over broader anatomical regions while minimizing tissue distortion and reducing total anesthetic volume. These advantages are particularly valuable in facial surgery, where preservation of anatomical contour is essential.

Facial nerve blocks primarily target branches of the trigeminal nerve (CN V), including supraorbital, supratrochlear, infraorbital, mental, nasal, and zygomatic nerves. Supraorbital and supratrochlear blocks are commonly used for forehead and brow procedures, while infraorbital and mental blocks provide anesthesia for midface and perioral regions.

The nasal nerve block is particularly important in rhinologic procedures. Richards et al. (2014) described comprehensive nasal anesthesia achieved through blockade of the infratrochlear nerve, external nasal branches of the anterior ethmoidal nerve, and infraorbital contributions. When performed correctly, these techniques provide reliable anesthesia while preserving tissue integrity and reducing edema.

SUPRAORBITAL AND SUPRATROCHLEAR NERVE BLOCKS

The supraorbital and supratrochlear nerves provide sensory innervation to the forehead, anterior scalp, and brow region. Consequently, blockade of these nerves is frequently used in forehead reconstruction, brow procedures, and facial laceration repair to achieve effective regional anesthesia while minimizing the need for extensive local infiltration.

Anatomically, the supraorbital nerve emerges through the supraorbital notch or foramen and is typically identified near the inferior border of the frontalis muscle. The supratrochlear nerve lies approximately 1 cm medial to the supraorbital notch. Accurate identification of these landmarks is essential for achieving effective anesthesia with minimal anesthetic volume and reduced risk of tissue distortion.

INFRAORBITAL AND MENTAL NERVE BLOCKS

The infraorbital and mental nerves can be anesthetized via either intraoral or percutaneous approaches, depending on procedural requirements and clinician preference.

The infraorbital nerve provides sensory innervation to the lower eyelid, lateral nose, upper lip, and medial cheek. Intraoral blockade is commonly performed by injecting local anesthetic into the buccal mucosa adjacent to the maxillary second premolar, whereas the percutaneous approach targets the infraorbital foramen directly.

Similarly, the mental nerve supplies sensation to the lower lip, chin, and adjacent gingival tissues. It is typically accessed near the mental foramen, located between the mandibular premolars. These nerve blocks are particularly valuable in procedures involving the perioral region, as they provide wide anesthetic coverage while minimizing soft tissue swelling and distortion.

NASAL NERVE BLOCK

The nasal nerve block is frequently employed in rhinoplasty, nasal reconstruction, and cutaneous procedures involving the external nose. Effective nasal anesthesia requires blockade of multiple sensory contributions, including the infratrochlear nerve, external nasal branches of the anterior ethmoidal nerve, and infraorbital nerve branches.

The infratrochlear nerve can be anesthetized by infiltration along the superomedial orbital rim and medial orbital wall. Additional infiltration at the junction of the nasal bones and upper lateral cartilages effectively blocks the external nasal branch of the anterior ethmoidal nerve. Together, these techniques provide comprehensive anesthesia of the nasal dorsum, sidewalls, and tip, enabling a broad range of nasal surgical procedures with improved patient comfort and reduced need for extensive infiltration.

NONINVASIVE ANXIOLYSIS, SEDATION, AND ANALGESIA

Although local and regional anesthesia techniques are sufficient for many office-based facial procedures, more complex interventions such as blepharoplasty, rhytidectomy, and extensive facial reconstruction may require adjunctive anxiolytic and sedative strategies. Procedural anxiety, prolonged operative time, and intraoperative discomfort can negatively affect patient experience and surgical efficiency.

Conscious sedation offers important advantages over general anesthesia, including preservation of spontaneous ventilation, maintenance of airway reflexes, faster recovery, and improved overall safety in appropriately selected patients. In addition, patients remain responsive to verbal commands, which may facilitate intraoperative positioning and procedural control.

ORAL SEDATION

Oral benzodiazepines remain the most widely used pharmacological agents for perioperative anxiolysis in office-based facial surgery. These drugs enhance gamma-aminobutyric acid (GABA) neurotransmission, producing anxiolytic, sedative, muscle-relaxant, and amnestic effects.

Boettler et al. (2022) demonstrated that oral benzodiazepines have a generally favorable safety profile, with adverse effects typically being mild and transient, including lightheadedness, headache, and occasional short-lived hypoxia. However, careful patient selection remains essential. Individuals with advanced age, obesity, obstructive sleep apnea, hepatic dysfunction, alcohol dependence, or high ASA classification may have increased risk of complications. Accordingly, patients classified as ASA III or higher are generally better suited for anesthesiologist-supervised sedation rather than office-based oral anxiolysis.

Butz et al. (2016) evaluated a multimodal oral sedation regimen combining diazepam, diphenhydramine, and hydrocodone in patients undergoing facial aesthetic procedures. Their findings supported good tolerability and safety when administered to appropriately screened patients.

Alternative oral and sublingual opioid-based strategies have also emerged. Seify (2022) reported that sublingual sufentanil provided rapid-onset analgesia and sustained pain control in awake facial

plastic surgery, without significant cardiopulmonary adverse effects, suggesting a potential role for novel opioid delivery systems in selected cases.

NITROUS OXIDE SEDATION

Nitrous oxide is a well-established inhalational agent used for procedural sedation due to its rapid onset, rapid elimination, and long-standing safety record. Evidence from the ENIGMA-II trial demonstrated no increase in long-term morbidity or mortality associated with nitrous oxide use during anesthesia, supporting its continued clinical use (Leslie et al., 2015).

However, nitrous oxide alone provides relatively limited analgesia and is therefore typically combined with local anesthetics, nerve blocks, or systemic analgesics. Its administration via facial mask may interfere with surgical access in facial procedures.

To address this limitation, patient-controlled systems such as Pro-Nox® have been developed. Wang et al. (2021) reported high clinician satisfaction and strong safety performance with this self-administered 50:50 nitrous oxide–oxygen system in cosmetic surgery settings. Although high-quality randomized evidence remains limited, current data support its role as a useful adjunct for procedural anxiolysis and analgesia.

INTRAVENOUS SEDATION AND ANESTHESIA

Intravenous (IV) sedation represents an effective alternative to general anesthesia in office-based facial plastic surgery. It reduces airway manipulation, shortens recovery time, and maintains high patient satisfaction when properly administered.

Preoperative evaluation is essential to identify cardiopulmonary risks, and safe practice requires appropriate monitoring, airway equipment, and trained personnel.

Moderate Sedation

Moderate sedation involves drug-induced depression of consciousness in which patients respond purposefully to verbal or tactile stimulation while maintaining adequate spontaneous ventilation.

The combination of midazolam and fentanyl remains the most commonly used regimen, providing anxiolysis, analgesia, and amnesia. However, both agents exhibit dose-dependent respiratory depression, requiring careful titration and monitoring.

Hasen et al. (2003) demonstrated comparable safety and satisfaction between moderate sedation and propofol-based deep sedation in aesthetic surgery, although moderate sedation was associated with a higher incidence of intraoperative awareness.

Deep Sedation and TIVA

Total intravenous anesthesia (TIVA) has gained increasing acceptance for more invasive facial plastic procedures. It typically involves continuous propofol infusion, often combined with adjunct agents such as midazolam, fentanyl, and ketamine under anesthesiologist supervision.

Propofol is favored due to its rapid onset, short recovery profile, antiemetic effects, and predictable pharmacokinetics. Failey et al. (2013) demonstrated that office-based plastic surgery under TIVA achieves excellent safety and patient satisfaction outcomes.

Further evidence from Jumaily et al. (2022) showed that deep IV sedation in rhinoplasty is associated with faster recovery, reduced postoperative nausea and vomiting, and improved recovery quality compared with general anesthesia.

Moore et al. (2022) additionally reported that dexmedetomidine as an adjunct to propofol improves hemodynamic stability and reduces opioid requirements, supporting multimodal sedation strategies in facial aesthetic surgery.

CLINICAL CONSIDERATIONS AND SAFETY

Evidence suggests that both moderate and deep sedation can be safely performed in office-based settings when appropriate patient selection, monitoring, and staffing standards are met.

Reinisch et al. (2001) further noted that early mobilization and avoidance of prolonged immobilization may reduce thromboembolic risk in facial aesthetic surgery compared with inpatient settings.

BENEFITS OF PROFILOPLASTY AND PATIENT-CENTERED OUTCOMES

Profiloplasty, defined as the harmonization of facial profile proportions through surgical and minimally invasive interventions involving the nose, chin, lips, and adjacent facial structures, represents an increasingly important component of contemporary facial plastic surgery. Its growing popularity is closely associated with the modern emphasis on facial balance, minimally invasive enhancement, and individualized aesthetic planning (Richards et al., 2014; Alam et al., 2008).

Facial Balance and Harmony

The primary objective of profiloplasty is to achieve a proportionate and harmonious facial profile. Rather than focusing on isolated anatomical structures, the procedure addresses the relationship between facial thirds and the overall profile line. This ensures that no single feature dominates the facial aesthetic unit, resulting in a balanced and visually coherent profile. Restoration or

enhancement of facial harmony is widely recognized as one of the key determinants of perceived facial attractiveness in both frontal and lateral analysis (Richards et al., 2014; Melzack& Wall, 1965).

Natural and Permanent Results

Profiloplasty is designed to produce subtle yet structurally meaningful improvements. When performed by an experienced facial plastic surgeon, the goal is not to create exaggerated or artificial changes but rather to enhance natural proportions while respecting individual anatomical variation and ethnic characteristics (Richards et al., 2014).

Surgical and structural corrections performed during profiloplasty—such as nasal dorsum refinement, chin augmentation or reduction, and lip repositioning—generally provide long-lasting or permanent results. However, these outcomes remain subject to the natural aging process, including soft tissue descent, skeletal remodeling, and skin elasticity changes over time (Jumaily et al., 2022). Despite this, the foundational improvements in facial proportion typically remain stable and continue to support aesthetic harmony.

Increased Self-Esteem and Psychosocial Benefits

Beyond physical correction, profiloplasty has a significant psychological and psychosocial impact. Facial profile imbalance is frequently associated with long-term self-consciousness, reduced confidence, and dissatisfaction with appearance. By correcting disharmonies in facial proportions, profiloplasty can lead to measurable improvements in self-esteem and body image perception (Boettler et al., 2022; Butz et al., 2016).

Patients often report enhanced confidence in social, professional, and interpersonal contexts following treatment. This improvement in psychosocial well-being represents an important secondary outcome of facial aesthetic surgery and reinforces the value of individualized aesthetic planning.

Safety and Patient Satisfaction Considerations in Profiloplasty

Modern profiloplasty is increasingly performed within office-based settings using local anesthesia, regional nerve blocks, and sedation protocols. This shift requires careful integration of safety principles to ensure optimal outcomes (Weinberg, 2010; Failey et al., 2013).

A comprehensive preoperative assessment is essential to identify anatomical limitations, psychological expectations, and medical risk factors. In addition, multimodal analgesia and sedation strategies contribute not only to intraoperative comfort but also to improved postoperative recovery and reduced complication rates (Moore et al., 2022).

When performed under appropriate clinical conditions with standardized monitoring and trained personnel, profiloplasty demonstrates a high safety profile and excellent patient satisfaction rates. The combination of functional facial balance

CONCLUSION

The increasing demand for facial aesthetic procedures and profiloplasty has driven a clear shift toward office-based surgery, alongside a strong patient preference for avoiding general anesthesia. This evolution requires clinicians to prioritize not only procedural safety, but also patient-centered outcomes, including facial harmony, psychological well-being, and overall satisfaction.

Profiloplasty, in particular, offers significant benefits by enhancing facial balance and harmony through proportionate refinement of the facial profile. By addressing relationships between key aesthetic units such as the nose, chin, lips, and jawline, profiloplasty achieves natural and individualized results that avoid artificial appearance while preserving ethnic and anatomical identity. These subtle yet meaningful improvements are often long-lasting and contribute directly to enhanced self-esteem, improved body image perception, and increased psychosocial confidence in social and professional contexts.

Optimal management in facial plastic surgery and profiloplasty relies on a multimodal anesthetic strategy integrating pharmacological and non-pharmacological techniques to achieve effective analgesia and anxiolysis while minimizing adverse effects. This approach ensures that aesthetic enhancement is achieved with maximal patient comfort and minimal procedural stress.

Equally important is the establishment of a structured and well-equipped clinical environment. All personnel involved in office-based procedures must be adequately trained in sedation and local anesthesia techniques, as well as in the recognition and management of potential complications. Adherence to standardized monitoring protocols and the availability of emergency equipment remain essential to ensuring patient safety and maintaining high standards of clinical care.

Ultimately, the success of facial plastic surgery and profiloplasty is determined not only by technical precision, but also by the achievement of harmonious facial outcomes combined with high levels of patient satisfaction, safety, and quality of life improvement.

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AUTHOR CONTRIBUTIONS

Gera Tagani: Conceptualization; supervision; writing; reviewing and editing; Writingoriginal draft preparation; reviewing and editing.

ACKNOWLEDGMENTS

None.

CONFLICT OF INTEREST STATEMENT

The author declare no conflict of interest.

ETHICS STATEMENT

This article does not contain any studies involving human participants performed by any of the authors. The authors state that the manuscript is the author's work and is not published elsewhere, nor is being considered for publication elsewhere.

DATA AVAILABILITY STATEMENT

The authors did not collect data regarding any human participants. All data are available from the selected papers.