



# ETHICAL AND BIOETHICAL ASPECTS OF ARTIFICIAL INTELLIGENCE IN ORTHODONTICS: A SYSTEMATIC REVIEW

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## Supplementary Tables

DISCIPLINE OF ORTHODONTICS					
Orthodontic Domain	n	Studies included			
<b>AI in orthodontic education, training and research</b>	8	Gandedkar et al. 2021 Karanth et al. 2024	Verma et al. 2024 Yuan et al. 2024	Akram 2025 Akwaid & Almousa 2025	Baxmann et al. 2025 Chutia et al. 2025
<b>AI-assisted diagnosis and treatment planning</b>	19	Johannes et al. 2023 Alqahtani 2024 Deepa et al. 2024 Kazimierczak et al. 2024 Leonardi et al. 2024	Mirzaei et al. 2024 Semerci & Yardimci 2024 Surendran et al. 2024 Tahir et al. 2024 Verma et al. 2024	Veseli 2024 Yuan et al. 2024 Akwaid & Almousa 2025 Aziz et al. 2025	Baxmann et al. 2025 Chutia et al. 2025 Kaushik & Rapaka 2025 Tyagi et al. 2025 Trakulmututa & Win 2026
<b>Orthodontic simulations</b>	9	Gandedkar et al. 2021 Karanth et al. 2024 Kazimierczak et al. 2024	Verma et al. 2024 Veseli 2024	Akwaid & Almousa 2025 Baxmann et al. 2025	Chutia et al. 2025 Khattak et al. 2025
<b>AI-assisted treatment monitoring and tracking</b>	9	Surovková et al. 2023 Kazimierczak et al. 2024	Leonardi et al. 2024 Askari et al. 2025	Veseli 2024 Kaushik & Rapaka 2025	Khattak et al. 2025 Park et al. 2025 Polizzi et al. 2025
<b>Teleorthodontics</b>	13	Surovková et al. 2023 Verma et al. 2024 Kazimierczak et al. 2024 Leonardi et al. 2024	Semerci & Yardimci 2024 Tahir et al. 2024 Akram 2025 Akwaid & Almousa 2025	Askari et al. 2025 Assiry et al. 2025	Kaushik & Rapaka 2025 Polizzi et al. 2025 Park et al. 2025
<b>AI-based imaging, segmentation and radiographic analysis</b>	13	Johannes et al. 2023 Deepa et al. 2024 Karanth et al. 2024	Kazimierczak et al. 2024 Mirzaei et al. 2024 Semerci & Yardimci 2024	Surendran et al. 2024 Veseli 2024 Yuan et al. 2024 Akram 2025	Akwaid & Almousa 2025 Khattak et al. 2025 Sohrabniya et al. 2025
<b>Cephalometric analysis</b>	18	Johannes et al. 2023 Alqahtani 2024 Kazimierczak et al. 2024 Mirzaei et al. 2024 Semerci & Yardimci 2024	Surendran et al. 2024 Tahir et al. 2024 Verma et al. 2024	Yuan et al. 2024 Akram 2025 Akwaid & Almousa 2025 Aziz et al. 2025 Baxmann et al. 2025	Chutia et al. 2025 Kaushik & Rapaka 2025 Khattak et al. 2025 Tyagi et al. 2025
<b>Clear aligner therapy and monitoring</b>	9	Surovková et al. 2023 Karanth et al. 2024 Kazimierczak et al. 2024	Verma et al. 2024 Akwaid & Almousa 2025	Askari et al. 2025 Kaushik & Rapaka 2025	Polizzi et al. 2025 Trakulmututa & Win 2026

**ETHICAL CHALLENGES ADDRESSED**

Ethical Challenge	n	Studies included			
<b>Privacy, confidentiality and data security</b>	25	Gandedkar et al. 2021 Johannes et al. 2023 Surovková et al. 2023 Alqahtani 2024 Karanth et al. 2024 Kazimierczak et al. 2024 Leonardi et al. 2024	Mirzaei et al. 2024 Semerci & Yardimci 2024 Surendran et al. 2024 Tahir et al. 2024 Verma et al. 2024 Veseli 2024	Yuan et al. 2024 Akwaïd & Almousa 2025 Akram 2025 Askari et al. 2025 Assiry et al. 2025 Baxmann et al. 2025	Chutia et al. 2025 Kaushik & Rapaka 2025 Khattak et al. 2025 Park et al. 2025 Tyagi et al. 2025 Trakulmututa & Win 2026
<b>Accountability, governance and regulation</b>	13	Gandedkar et al. 2021 Johannes et al. 2023 Kazimierczak et al. 2024 Mirzaei et al. 2024	Semerci & Yardimci 2024 Tahir et al. 2024 Veseli 2024	Akram 2025 Kaushik & Rapaka 2025 Khattak et al. 2025	Park et al. 2025 Polizzi et al. 2025 Tyagi et al. 2025
<b>Informed consent and patient autonomy</b>	9	Gandedkar et al. 2021 Leonardi et al. 2024 Yuan et al. 2024	Karanth et al. 2024 Veseli 2024	Akwaïd & Almousa 2025 Khattak et al. 2025	Polizzi et al. 2025 Tyagi et al. 2025
<b>Transparency, explainability and human oversight</b>	18	Johannes et al. 2023 Surovková et al. 2023 Deepa et al. 2024 Karanth et al. 2024 Mirzaei et al. 2024	Semerci & Yardimci 2024 Surendran et al. 2024 Yuan et al. 2024 Akwaïd & Almousa 2025	Askari et al. 2025 Baxmann et al. 2025 Chutia et al. 2025 Kaushik & Rapaka 2025 Khattak et al. 2025	Polizzi et al. 2025 Sohrabniya et al. 2025 Tyagi et al. 2025 Trakulmututa & Win 2026
<b>Equity, accessibility and economic feasibility</b>	10	Gandedkar et al. 2021 Karanth et al. 2024	Veseli 2024 Yuan et al. 2024 Akwaïd & Almousa 2025	Askari et al. 2025 Assiry et al. 2025 Kaushik & Rapaka 2025	Khattak et al. 2025 Park et al. 2025
<b>Legal responsibility and liability</b>	6	Johannes et al. 2023 Surovková et al. 2023	Semerci & Yardimci 2024	Yuan et al. 2024 Park et al. 2025	Polizzi et al. 2025
<b>Reliability, diagnostic accuracy and risk of misdiagnosis</b>	19	Johannes et al. 2023 Surovková et al. 2023 Deepa et al. 2024 Karanth et al. 2024 Kazimierczak et al. 2024	Semerci & Yardimci 2024 Surendran et al. 2024 Veseli 2024 Akram 2025 Akwaïd & Almousa 2025	Askari et al. 2025 Aziz et al. 2025 Baxmann et al. 2025 Chutia et al. 2025 Kaushik & Rapaka 2025	Khattak et al. 2025 Polizzi et al. 2025 Sohrabniya et al. 2025 Trakulmututa & Win 2026
<b>Algorithmic bias /dataset limitations or lack of interpretability</b>	18	Alqahtani 2024 Deepa et al. 2024 Karanth et al. 2024 Kazimierczak et al. 2024	Leonardi et al. 2024 Mirzaei et al. 2024 Surendran et al. 2024 Verma et al. 2024 Yuan et al. 2024	Akram 2025 Akwaïd & Almousa 2025 Assiry et al. 2025 Baxmann et al. 2025 Chutia et al. 2025	Khattak et al. 2025 Sohrabniya et al. 2025 Tyagi et al. 2025 Trakulmututa & Win 2026

# PRISMA chart

