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Artificial Intelligence and the Transformation of Human Experience in Smart Cities: Societal Implications and Anthropological Perspectives on Adolescents

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Abstract
Artificial Intelligence (AI) is increasingly integrated into healthcare systems, educational institutions, and smart city infrastructures, reshaping how social life is organized, evaluated, and governed. While AI-based solutions are often promoted for their efficiency and predictive capacity, their broader societal and cultural implications remain insufficiently examined. This paper adopts a multidisciplinary and anthropological perspective to analyze AI as a socio-technical system embedded in everyday institutional practices. Focusing on smart city contexts, the study explores how algorithmic governance influences human experience across healthcare, education, and urban services, with particular attention to adolescents as a socially and ethically sensitive group. Adolescents are increasingly exposed to AI-mediated environments that shape learning, identity formation, and access to opportunities, while simultaneously raising concerns related to surveillance, consent, and inequality. Drawing on recent research in anthropology, digital governance, and AI ethics, the paper develops a conceptual framework for evaluating AI-driven systems beyond technical performance alone. It proposes the notion of Anthropologically Informed Artificial Intelligence as a practical orientation for design and governance, emphasizing cultural context, social responsibility, and human well-being. The paper contributes to multidisciplinary debates on responsible AI by offering guidance relevant to policymakers, educators, healthcare professionals, and urban decision-makers

Keywords: *Artificial Intelligence; Smart Cities; Adolescents; Algorithmic Governance; Anthropology; Digital Society*

Introduction

Anthropology—often described as the study of humanity—examines how people create meaning, organize social life, and negotiate values through everyday practices. Its long-standing commitment to context-sensitive analysis makes it particularly well suited to studying contemporary technologies not merely as tools, but as socio-technical systems that reshape relationships, institutions, and forms of agency (Boellstorff et al., 2024). As Artificial Intelligence (AI) moves from experimental settings into routine governance and service provision, anthropological analysis becomes increasingly relevant for understanding how AI is experienced, interpreted, resisted, or normalized in different cultural and institutional contexts (Seaver, 2022; UNESCO, 2021).

In the 21st century, AI systems are being embedded across domains that directly structure human life: healthcare, education, and urban governance (Rajkomar et al., 2022; Topol, 2023). This shift is especially visible in smart city initiatives, where data infrastructures (sensors, platforms, predictive analytics) support new forms of decision-making, resource allocation, and behavioral steering—often summarized as "algorithmic governance" (Kitchin, 2023; van Zoonen, 2022; Wernick & Artyushina, 2023). These developments raise questions that are not only technical, but also cultural and ethical: how legitimacy is

produced, how accountability is distributed, how bias and exclusion are reproduced at scale, and how public trust is affected when automated or semi-automated systems shape access to services (Europe, 2024; Suchman, 2023). Recent governance frameworks reflect this growing concern, emphasizing risk management, transparency, and human oversight in high-impact contexts (Standards & Technology, 2023; UNESCO, 2021; Union, 2024).

This paper argues that anthropology is uniquely positioned to clarify the societal implications of AI-driven smart city systems because it focuses on lived experience, power relations, and values-in-practice—dimensions that are frequently under-specified in purely technical accounts (Boellstorff et al., 2024; Kitchin, 2023). Within this broader societal frame, the paper foregrounds adolescents as a critical analytic lens. Adolescence is a formative life stage for identity construction, social belonging, and autonomy; it is also increasingly shaped by AI-mediated environments, including recommender systems, educational technologies, and urban data infrastructures (Livingstone & Third, 2023; Orben & Przybylski, 2022). Because minors face distinctive risks related to consent, privacy, surveillance, and unequal treatment, child- and youth-centered governance guidance is essential when evaluating AI deployments in public and semi-public settings (Europe, 2024; UNICEF, 2021).

Contribution and approach.

The paper makes two contributions. First, it develops a socio-technical and anthropological framing for analyzing how AI transforms human experience in smart city contexts, emphasizing how "efficiency" goals can conflict with equity, well-being, and democratic accountability (Kitchin, 2023; van Zoonen, 2022). Second, it articulates the concept of **Anthropologically Informed Artificial Intelligence** as a practical orientation for design and governance—grounded in cultural context, social diversity, and mechanisms for contestability and oversight—consistent with major international and standards-based guidance on responsible AI (Standards & Technology, 2023; UNESCO, 2021; Union, 2024). Methodologically, the paper is conceptual and integrative: it synthesizes recent policy and governance frameworks and uses targeted domain examples (healthcare and smart-city services) to illustrate how anthropological perspectives can sharpen evaluation criteria and guide more legitimate, human-centered AI deployments (Char et al., 2023; Organization, 2025).

1. AI and the Transformation of Anthropological Research

Artificial Intelligence is transforming anthropology in two interconnected ways: first, as a methodological resource that expands the scale and scope of social analysis, and second, as a socio-technical phenomenon that itself becomes an object of anthropological inquiry (Boellstorff et al., 2024; Seaver, 2022). The digitalization of social life has generated vast quantities of data—from social media interactions and digital cultural artifacts to sensor-generated urban data—posing both opportunities and challenges for anthropological research (Kitchin, 2023; van Zoonen, 2022).

From a methodological perspective, AI enables the analysis of large and heterogeneous datasets at a scale that would be impossible using traditional qualitative methods alone (Rajkomar et al., 2022; Seaver, 2022). Machine learning techniques can identify patterns, correlations, and dynamics across extensive populations and timeframes, supporting comparative and longitudinal insights into social behavior. These capabilities offer clear advantages: enhanced pattern discovery, increased analytical scale, and efficiency gains through the automation of tasks such as data cleaning, classification, and preliminary coding (Nacereddine, 2024). By delegating such processes to computational systems, researchers can focus more intensively on interpretation, theory-building, and contextual analysis (Boellstorff et al., 2024).

At the same time, the use of AI in anthropological research raises significant epistemological and ethical challenges. Algorithmic systems are shaped by the data on which they are trained and can reproduce or amplify existing social biases (Standards & Technology, 2023; Suchman, 2023). Moreover, the opacity of many machine learning models—the so-called "black box" problem—complicates interpretability and accountability (Suchman, 2023). While AI excels at processing numerical and symbolic data, it lacks the contextual sensitivity required to interpret meaning, intention, and power relations (Boellstorff et al., 2024). These limitations underscore the continued necessity of anthropological expertise in situating computational outputs within lived social realities (UNESCO, 2021).

Rather than viewing AI as a replacement for ethnographic inquiry, recent scholarship emphasizes the potential for synergy between anthropologists and data scientists (Boellstorff et al., 2024; Seaver, 2022). Such collaboration enables the study of rapidly evolving digital ecosystems, including online political cultures, algorithmically mediated communication, and the dynamics of misinformation and online hostility (Livingstone & Third, 2023). Anthropological engagement adds interpretive depth to large-scale analyses by foregrounding values, emotions, and social context—dimensions often invisible in purely data-driven approaches (Suchman, 2023).

Within anthropology, AI-related research has been most influential in areas such as digital anthropology, medical anthropology, and the anthropology of infrastructure and organizations (Boellstorff et al., 2024). In digital anthropology, computational methods are used to analyze online interactions, cultural production, and mediated identities, while ethnographic approaches investigate how platforms and algorithms shape social norms and belonging (Seaver, 2022; van Zoonen, 2022). In medical and biological contexts, AI tools support genomic analysis, disease prediction, and assistive technologies, but also raise critical questions about data governance, inequality, and the reconfiguration of expertise (Razmi, 2024; Topol, 2023). Across these domains, anthropology contributes by examining how technological systems intersect with institutional practices and everyday experience (Kitchin, 2023).

Ethnography remains central in this transformed research landscape. Participant observation and qualitative engagement allow researchers to "follow" technologies as they circulate across sites, institutions, and communities, tracing how meanings, expectations, and power relations are negotiated around AI systems (Boellstorff et al., 2024). Emerging approaches—sometimes described as AI ethnography—combine close qualitative observation with an awareness of algorithmic infrastructures, enabling anthropologists to study not only users, but also designers, datasets, and governance mechanisms (Suchman, 2023).

Beyond academia, anthropological insights increasingly inform applied domains such as organizational, business, and design anthropology (Malefyt, 2024). In these settings, anthropologists contribute to the development and evaluation of AI systems by foregrounding worker experience, organizational culture, and user diversity (Malefyt, 2024; Nacereddine, 2024). This applied engagement challenges deterministic narratives of technological exploitation by demonstrating how participatory design and culturally informed governance can mitigate harm and foster more inclusive outcomes (Standards & Technology, 2023; UNESCO, 2021).

Overall, the transformation of anthropological research through AI highlights a reciprocal relationship: while AI expands analytical capacity, anthropology provides critical tools for interpreting, governing, and ethically aligning AI systems with human values (Boellstorff et al., 2024; UNESCO, 2021). By bridging ethnographic sensibilities with computational techniques, anthropologists are well positioned to influence how AI technologies are designed, deployed, and regulated—ensuring that efficiency gains do not come at the expense of social meaning, equity, and human well-being (Europe, 2024; Union, 2024).

2. Medical Anthropology and the AI-Driven Healthcare Revolution

Artificial Intelligence is increasingly positioned as a transformative force in contemporary healthcare, driven by its capacity to process vast and heterogeneous datasets, generate rapid predictions, and support complex clinical decision-making (Rajkomar et al., 2022; Topol, 2023). From a medical anthropological perspective, however, AI is not merely a technical innovation but a socio-technical intervention that reshapes relationships between patients, clinicians, institutions, and governing authorities (Boellstorff et al., 2024; Char et al., 2023). As AI systems are embedded into diagnostic practices, clinical workflows, and health governance, they actively reconfigure notions of expertise, responsibility, trust, and care (Suchman, 2023).

AI-driven applications in medicine have demonstrated significant potential benefits, including improved diagnostic accuracy, personalized treatment pathways, and more efficient resource allocation (Razmi, 2024; Topol, 2023). At the same time, anthropological and critical health scholarship highlights that these benefits are unevenly distributed and accompanied by new forms of risk, particularly in relation to data protection, algorithmic bias, and the reorganization of professional roles (Char et al., 2023; Organization,

2025). Concerns regarding discrimination, opacity in decision-making, and the partial displacement or deskilling of healthcare professionals have become central to debates on responsible health AI deployment (Char et al., 2023; Standards & Technology, 2023).

2.1 AI in National Healthcare Contexts: The Case of Romania

Recent research provides a comprehensive overview of the development and implementation of AI within the Romanian healthcare system, illustrating both its promise and its constraints (Fitzek et al., 2023). AI has been introduced across multiple functions, including medical imaging, diagnostic support, patient management, and treatment optimization. These developments reflect broader European trends in digital health, while also revealing local institutional, regulatory, and infrastructural specificities (Union, 2024).

Several applied initiatives illustrate this trajectory. Researchers from the *Carol Davila University of Medicine and Pharmacy* in Bucharest have developed AI-based tools for the early detection of brain tumors, enhancing the precision of radiological assessment (Fitzek et al., 2023). At the Bucharest Oncology Institute, AI systems have been used to analyze complex patient datasets to support individualized treatment selection (Fitzek et al., 2023). Additionally, Pană et al. developed a non-contact AI system capable of predicting heart failure exacerbations through vocal analysis, demonstrating the potential of machine learning to identify subtle physiological indicators beyond conventional clinical observation (Pană et al., 2021).

These examples indicate a gradual but sustained integration of AI into Romanian medical practice, with measurable impacts on diagnosis, treatment planning, and data management (Fitzek et al., 2023). However, medical anthropological analysis emphasizes that such integration must be evaluated not only in terms of technical performance but also through its implications for patient autonomy, equity of access, and institutional accountability (Char et al., 2023; Organization, 2025). The risk of unequal treatment arising from biased training data or context-insensitive models remains a significant concern, particularly in healthcare systems marked by structural inequalities (Standards & Technology, 2023).

2.2 Professional Practice, Education, and Human Oversight

A recurring theme in the literature concerns the relationship between AI systems and medical expertise. While AI is often framed as a potential replacement for certain professional roles—most notably in radiology—recent consensus suggests that its most appropriate function lies in clinical support rather than autonomous decision-making (Rajkomar et al., 2022; Topol, 2023). AI systems are increasingly used to prioritize cases, manage workflows, and flag anomalies, thereby augmenting rather than substituting clinical judgment (Char et al., 2023; Razmi, 2024).

Educational applications further illustrate this supportive role. In a recent study, ChatGPT-4o was employed as a virtual standardized patient to assess clinical case management competencies among intern physicians (Öncü et al., 2025) The findings revealed discrepancies between participants' self-assessments and their demonstrated competencies, particularly under time pressure. From an anthropological perspective, this highlights how AI-mediated training environments can reshape learning practices, professional self-perception, and evaluative cultures within medical institutions (Boellstorff et al., 2024). When designed responsibly, such tools may enhance feedback mechanisms and support the development of metacognitive and crisis-management skills (Öncü et al., 2025; Organization, 2025).

2.3 Adolescents, Preventive Health, and AI-Mediated Care

AI-driven healthcare applications also have particular relevance for adolescents, especially in preventive medicine and health education (UNICEF, 2021). One emerging area involves the use of AI-powered chatbots to deliver personalized sexual and reproductive health education aimed at reducing unplanned adolescent pregnancies (Gbala et al., 2024). These systems offer continuous, private, and non-judgmental access to information, addressing barriers related to stigma, availability, and confidentiality (Gbala et al., 2024; UNICEF, 2021).

From a medical anthropological standpoint, such interventions illustrate both opportunity and risk. On the one hand, they expand access to health knowledge and support autonomy; on the other, they raise questions about data protection, informed consent, and the cultural framing of sensitive health topics

(Europe, 2024; Organization, 2025). The effectiveness and legitimacy of these tools depend heavily on cross-sector collaboration among healthcare providers, policymakers, technology developers, and civil society actors, as well as on sensitivity to local social norms and adolescent lived experience (UNESCO, 2021).

2.4 Data, Governance, and Responsible AI in Healthcare

The expanding use of AI in healthcare intensifies longstanding challenges related to data governance. Physicians increasingly confront an overload of clinical, genomic, and behavioral data, requiring sophisticated interpretive tools (Razmi, 2024; Topol, 2023). AI enables the identification of complex, non-linear relationships between variables—such as conditional drug interactions or multifactorial disease risks—that exceed the capacity of traditional statistical methods (Rajkomar et al., 2022). Yet, realizing this potential requires addressing critical structural issues.

These challenges are not purely technical but reflect a combination of organizational, regulatory, economic, and ethical constraints that shape how AI systems are adopted in healthcare institutions. From a medical anthropological perspective, barriers such as professional resistance, data governance uncertainties, and interoperability limitations are embedded in existing institutional cultures and power relations. Figure 1 synthesizes the most frequently identified barriers to AI adoption in healthcare, highlighting the socio-technical conditions that influence implementation beyond algorithmic performance alone.

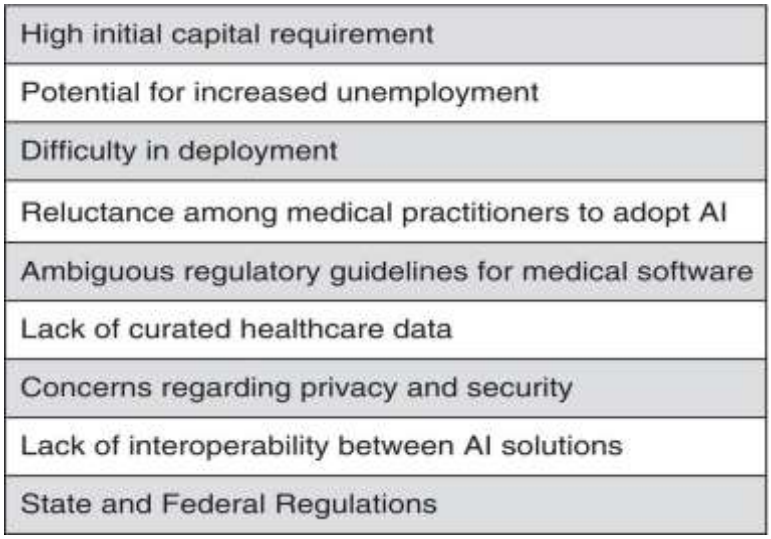

Figure 1. Key organizational, regulatory, ethical, and technical barriers to the adoption of Artificial Intelligence in healthcare systems.
Source: Adapted from (Razmi, 2024).

As illustrated in Figure 1, barriers to AI adoption extend well beyond issues of technical feasibility. High initial capital requirements, concerns regarding privacy and data security, and the lack of interoperability between AI solutions interact with regulatory ambiguity and professional skepticism. Anthropological analysis draws attention to how these barriers are experienced by practitioners as uncertainties about responsibility, trust, and accountability, particularly in high-stakes clinical environments. Addressing such barriers therefore requires governance frameworks that integrate technical standards with institutional practices and ethical oversight.

A central source of both opportunity and risk in AI-driven healthcare lies in the diversity and scale of data sources integrated into clinical and predictive systems. Contemporary medical AI increasingly combines experimental, biological, clinical, environmental, and wearable data, producing complex socio-technical assemblages that exceed traditional models of medical decision-making. From an anthropological perspective, such data integration reshapes how bodies, behaviors, and risks are represented and governed. Figure 2 illustrates the main categories of data sources commonly incorporated into AI-enabled healthcare systems, highlighting the multiplicity of data domains that must be coordinated, interpreted, and regulated.

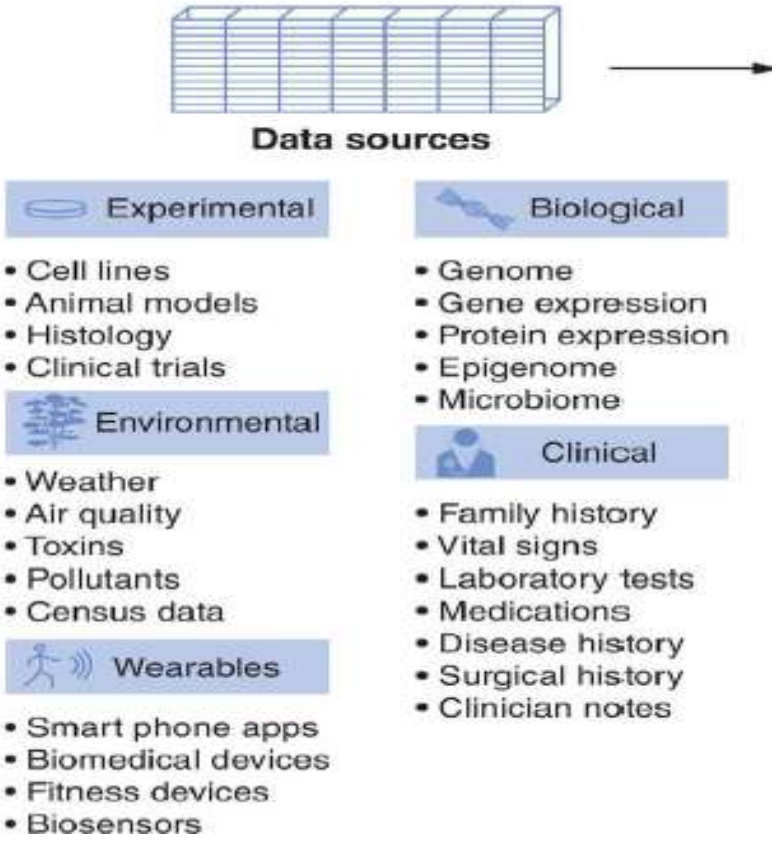

Figure 2. Main categories of data sources integrated into AI-enabled healthcare systems, including experimental, biological, clinical, environmental, and wearable data.
Source: Adapted from (Razmi, 2024).

As shown in Figure 2, AI-driven healthcare systems rely on the aggregation of heterogeneous data types that originate from distinct institutional, technological, and social contexts. While such integration enables more comprehensive predictive modeling and personalized care, it also intensifies challenges related to data quality, interoperability, consent, and accountability. Anthropological analysis draws attention to how these data sources are embedded in unequal social relations—for example, differences in access to wearable technologies or variations in how clinical histories are documented—thereby shaping whose bodies and experiences become legible to algorithmic systems. Effective governance of medical AI therefore requires not only technical solutions, but institutional practices that address the social production and interpretation of health data.

Key challenges include compliance with data protection regulations such as the General Data Protection Regulation (GDPR), which mandates explicit and informed consent (Union, 2024); the standardization and integration of heterogeneous data sources into clinical workflows (Standards & Technology, 2023); and the development of privacy-preserving techniques such as federated learning and synthetic data generation (Organization, 2025). Model explainability remains a central ethical requirement, as clinicians and patients must be able to understand and contest algorithmic outputs (Standards & Technology, 2023). Algorithmic bias—introduced through data collection practices, model design, or interpretive frameworks—continues to pose a major risk to equitable care (Char et al., 2023; UNESCO, 2021).

In response to these challenges, international governance initiatives have articulated principles for responsible health AI. The Coalition for Health AI's *Blueprint for Trustworthy AI Implementation* and the World Health Organization's recent guidance on AI and large multimodal models emphasize transparency, accountability, human oversight, and alignment with public health values (Organization, 2025; Standards & Technology, 2023). From an anthropological perspective, these frameworks underscore the importance of embedding ethical principles not only at the level of policy, but within everyday clinical practice and institutional culture (Boellstorff et al., 2024).

2.5 Medical Anthropology and Societal Implications

Medical anthropology contributes a critical lens for understanding how AI reshapes healthcare beyond efficiency metrics (Char et al., 2023). By focusing on lived experience, power relations, and moral economies of care, anthropological analysis reveals how AI systems mediate trust between patients and institutions, redistribute responsibility, and potentially exacerbate or mitigate health inequalities (Boellstorff et al., 2024; Organization, 2025). In smart city contexts, where healthcare infrastructures increasingly intersect with urban data systems, these dynamics acquire broader societal significance (Kitchin, 2023).

Overall, the AI-driven transformation of healthcare illustrates the need for **Anthropologically Informed Artificial Intelligence**—systems designed and governed with sustained attention to cultural context, social vulnerability, and human well-being (Standards & Technology, 2023; UNESCO, 2021). Such an approach does not oppose technological innovation but seeks to ensure that medical AI enhances care while remaining accountable to the diverse human lives it affects (Europe, 2024; Union, 2024).

3. The Smart City and the Algorithmic Governance of Youth

Smart cities are commonly defined as urban environments that deploy digital technologies, data infrastructures, and algorithmic systems to improve efficiency, optimize resource use, and enhance quality of life for residents (Kitchin, 2023; Tyagi, 2024). Beyond this functional definition, smart cities constitute complex socio-technical ecosystems in which governance increasingly operates through data collection, predictive analytics, and automated or semi-automated decision-making (van Zoonen, 2022; Wernick & Artyushina, 2023). From an anthropological perspective, smart cities are not merely technological assemblages but cultural and political projects that reshape how urban life is organized, experienced, and regulated (Kitchin, 2023).

Artificial Intelligence lies at the core of smart city systems, enabling the integration of data streams across domains such as transportation, energy, healthcare, education, public safety, and social services (Tyagi, 2024). Sensors, platforms, and analytics tools interconnect these domains, producing continuous forms of urban "awareness," enabling rapid institutional "response," and supporting predictive models of behavior and risk (Kitchin, 2023). Digital twins—virtual representations of physical urban systems—are increasingly deployed to simulate scenarios and guide planning decisions, reinforcing the anticipatory logic that characterizes contemporary urban governance (Tyagi, 2024).

3.1 Algorithmic Governance as a Socio-Technical Process

Recent scholarship conceptualizes smart cities as sites of **algorithmic governance**, where algorithms mediate access to resources, shape behavioral incentives, and influence policy implementation (van Zoonen, 2022; Wernick & Artyushina, 2023). This form of governance operates through three interrelated mechanisms:

1. **Sensing**: the large-scale collection of data through cameras, sensors, wearables, educational platforms, and mobile devices;

2. **Scoring**: the classification, profiling, and ranking of individuals or groups through predictive models and recommender systems;

3. **Steering**: the use of algorithmic outputs to guide decisions, allocate resources, or nudge behavior.

These mechanisms raise critical anthropological questions about power, legitimacy, accountability, and participation, particularly when they are embedded in public infrastructures and affect populations with limited capacity to contest or opt out (Kitchin, 2023; Suchman, 2023).

3.2 Adolescents in Smart City Environments: Opportunities and Risks

For adolescents, smart cities present a distinctive configuration of opportunities and vulnerabilities (Livingstone & Third, 2023). On the one hand, AI-enabled urban systems can expand access to educational resources, healthcare services, cultural activities, and mobility solutions (UNESCO, 2021). Smart education initiatives promote digital learning environments, adaptive curricula, and skill-development programs aimed

at preparing young people for rapidly changing labor markets (Pisica et al., 2023). From a policy perspective, such initiatives are often framed as empowering, inclusive, and future-oriented (Union, 2024).

On the other hand, adolescents are disproportionately exposed to the risks associated with algorithmic governance (UNICEF, 2021). As minors, they have limited legal and social capacity to provide informed consent, challenge automated decisions, or fully understand how their data are collected and used (Europe, 2024). Surveillance technologies in public spaces, educational platforms, and online environments can restrict autonomy, normalize constant monitoring, and shape behavior in ways that remain largely invisible (Livingstone & Third, 2023). Child- and youth-focused governance frameworks increasingly emphasize that AI systems deployed in public services must account for these asymmetries of power and vulnerability (Europe, 2024; UNICEF, 2021).

A concrete illustration of these dynamics can be found in the growing use of AI-enabled digital education platforms integrated into smart city infrastructures. In many smart city initiatives, secondary schools operate within interconnected urban data ecosystems where learning management systems, attendance monitoring tools, and behavioral analytics platforms are linked to municipal digital services. These systems may track students' learning progress, engagement levels, and mobility patterns in real time, generating predictive indicators used by educators and administrators to personalize instruction, allocate resources, or flag "at-risk" students. While such configurations are often framed as efficiency-enhancing and supportive of individualized learning, they also exemplify algorithmic governance in practice: adolescents become subjects of continuous assessment across institutional boundaries, often without transparent mechanisms for consent, contestation, or meaningful explanation. From an anthropological perspective, this illustrates how smart city infrastructures extend governance into everyday educational life, shaping adolescent experience through anticipatory and data-driven forms of regulation rather than direct disciplinary intervention (Kitchin, 2023; Williamson, 2017).

3.3 Education, Automation, and the Reconfiguration of Youth Futures

Education represents one of the most significant points of contact between adolescents and AI-driven smart city infrastructures (Pisica et al., 2023). AI applications in education include personalized learning systems, adaptive assessments, automated feedback, and educational content recommendation (UNESCO, 2021). These technologies promise increased learning efficiency and individualized support, but they also introduce new forms of categorization and evaluation that may reinforce existing inequalities (Livingstone & Third, 2023).

Studies suggest that AI-driven labor market forecasts and admissions algorithms increasingly shape educational trajectories by signaling which skills and disciplines are "future-proof" (Union, 2024). Occupations involving routine and highly structured tasks are considered more susceptible to automation, while fields emphasizing creativity, interpretation, and social interaction—often associated with the humanities and social sciences—are perceived as more resilient (UNESCO, 2021). Such narratives may influence institutional priorities, admissions processes, and adolescent aspirations, with long-term implications for social stratification (van Zoonen, 2022).

From an anthropological perspective, these developments raise concerns about how algorithmic classifications shape young people's sense of possibility, worth, and belonging (Seaver, 2022). Increased reliance on AI in educational contexts also risks reducing interpersonal interaction, fostering technology dependence, and intensifying performance pressure—factors linked to stress and declining mental well-being among adolescents (Orben & Przybylski, 2022).

3.4 Smart Cities, Youth, and Democratic Accountability

The governance of smart cities increasingly relies on predictive and automated systems whose decision-making logics are opaque to citizens (Kitchin, 2023; Suchman, 2023). For adolescents, this opacity compounds existing challenges related to participation and voice in urban decision-making (UNICEF, 2021). Recent policy and human-rights-oriented scholarship argues that smart city governance must incorporate transparency, contestability, and participatory mechanisms, particularly when systems affect children and young people (UNESCO, 2021; Union, 2024).

Anthropological analysis contributes by examining how young people interpret, negotiate, and sometimes resist algorithmic systems in their everyday lives (Boellstorff et al., 2024). By foregrounding lived experience, anthropology reveals how efficiency-oriented urban technologies can conflict with values such as autonomy, dignity, and social inclusion (Suchman, 2023). These insights are essential for designing smart city systems that support not only technical optimization but also democratic legitimacy and intergenerational justice (Europe, 2024).

3.5 Implications for Anthropologically Informed AI

The smart city illustrates how AI-driven infrastructures extend governance into the intimate domains of learning, mobility, health, and social interaction (Kitchin, 2023). When adolescents are embedded in these systems, the stakes of responsible design and oversight are especially high (UNICEF, 2021). An **Anthropologically Informed Artificial Intelligence** approach emphasizes participatory design, contextual sensitivity, and safeguards that recognize youth as both current citizens and future social actors (Standards & Technology, 2023; UNESCO, 2021).

Such an approach aligns with emerging international standards that frame AI governance as a matter of human rights, social justice, and long-term societal sustainability (Europe, 2024; Union, 2024). Integrating anthropological insight into smart city design and policy is therefore not an optional ethical add-on, but a prerequisite for ensuring that AI-enabled urban futures remain inclusive, accountable, and responsive to the lived realities of younger generations (Boellstorff et al., 2024).

4. Real-World Smart Hospital Initiatives in the Smart Era

Smart hospitals represent a critical intersection between Artificial Intelligence, digital infrastructure, and healthcare delivery within smart city ecosystems (Organization, 2025; Tyagi, 2024). They integrate emerging technologies—such as AI-driven analytics, telemedicine, wearable devices, and digital twins—into clinical, administrative, and logistical processes with the aim of improving care quality, efficiency, and patient experience (Razmi, 2024; Topol, 2023). From a medical anthropological perspective, smart hospitals are not merely technologically enhanced institutions but socio-technical environments that reorganize relationships between patients, healthcare professionals, data systems, and governing authorities (Boellstorff et al., 2024; Char et al., 2023).

4.1 Core Technologies and Infrastructural Integration

Key components of smart hospitals include telemedicine platforms, remote patient monitoring systems, wearable health devices, and interoperable electronic health records (Topol, 2023). These technologies enable continuous data collection beyond traditional clinical settings, shifting care from episodic encounters to ongoing monitoring (Razmi, 2024). Within smart city contexts, such systems are often linked to broader urban infrastructures, allowing health services to interact with mobility systems, emergency response networks, and population-level public health analytics (Tyagi, 2024).

Anthropological research highlights that while these integrations promise improved accessibility and continuity of care, they also alter patients' experiences of illness and responsibility (Boellstorff et al., 2024). Continuous monitoring can blur boundaries between care and surveillance, particularly for vulnerable populations such as older adults, chronically ill patients, and adolescents (UNICEF, 2021). The success of smart hospitals therefore depends not only on technical performance but on trust, transparency, and culturally sensitive implementation (Organization, 2025; UNESCO, 2021).

4.2 AI-Driven Clinical Innovation

AI-driven diagnostics constitute one of the most widely adopted applications in smart hospitals (Rajkomar et al., 2022). Machine learning systems support image interpretation, risk stratification, and early disease detection, often outperforming traditional methods in speed and pattern recognition (Topol, 2023). AI-assisted surgery, including robotic systems and decision-support tools, enhances precision and reduces procedural variability, while maintaining the necessity of human oversight (Char et al., 2023).

Drug discovery and precision medicine represent additional areas of rapid development (Razmi, 2024). AI accelerates the identification of molecular targets, optimizes clinical trial design, and supports

personalized treatment strategies based on genomic and phenotypic data (Rajkomar et al., 2022). From an anthropological standpoint, these advances reconfigure notions of personalization, shifting them from relational care models toward data-intensive representations of the body (Boellstorff et al., 2024).

4.3 Digital Twins, Simulation, and Patient-Centric Care

Digital twins—virtual replicas of physical systems—are increasingly used in smart hospitals to simulate patient flows, resource allocation, and treatment scenarios (Tyagi, 2024). When applied to individual patients, digital twins enable predictive modeling of disease progression and treatment outcomes, supporting patient-centric healthcare strategies (Topol, 2023). At the institutional level, they facilitate planning, crisis response, and operational optimization (Razmi, 2024).

While these tools enhance efficiency and preparedness, they also raise ethical and epistemological questions about representation, uncertainty, and accountability (Suchman, 2023). Anthropological analysis draws attention to how models simplify complex human realities and how reliance on simulation may marginalize experiential knowledge held by clinicians and patients alike (Boellstorff et al., 2024).

4.4 Education, Training, and Professional Transformation

Smart hospitals also function as sites of technological learning and professional transformation (Öncü et al., 2025) AI-powered training environments, virtual simulations, and digital assessment tools are increasingly used in medical education and continuous professional development (Öncü et al., 2025; Organization, 2025). These systems reshape how competence is evaluated and how expertise is distributed across human and machine actors (Char et al., 2023).

As discussed in earlier sections, such transformations have implications for professional identity, autonomy, and responsibility (Suchman, 2023). Anthropological perspectives emphasize that successful adoption requires alignment with existing professional cultures and attention to how practitioners interpret and negotiate new forms of algorithmic authority (Boellstorff et al., 2024).

4.5 Governance, Security, and Responsible Implementation

The expansion of smart hospital infrastructures intensifies governance challenges related to data security, interoperability, and ethical oversight (Standards & Technology, 2023). Secure health records, drug traceability systems, and AI-enabled decision tools must comply with data protection regulations and ethical guidelines, particularly when integrated into city-wide data ecosystems (Union, 2024). International frameworks emphasize the importance of transparency, explainability, and human-in-the-loop governance to maintain public trust and institutional legitimacy (Organization, 2025; Standards & Technology, 2023).

From a societal perspective, smart hospitals exemplify how healthcare innovation is increasingly embedded within broader digital governance regimes (Kitchin, 2023). Anthropologically informed analysis reveals that responsible implementation depends on recognizing healthcare institutions as moral and cultural spaces, not solely as sites of technical optimization (UNESCO, 2021).

4.6 Implications for Anthropologically Informed Artificial Intelligence

Real-world smart hospital initiatives demonstrate that AI-driven healthcare transformation is as much a social process as a technological one (Char et al., 2023). An **Anthropologically Informed Artificial Intelligence** approach calls for participatory design, sensitivity to local contexts, and continuous evaluation of how AI systems affect patient experience, professional practice, and institutional trust (Boellstorff et al., 2024; Organization, 2025). Within smart city environments, such an approach is essential to ensure that smart hospitals contribute to equitable, humane, and sustainable healthcare futures rather than reinforcing existing inequalities or technocratic governance models (Europe, 2024; Union, 2024).

5. Adolescence in the Age of Artificial Intelligence

The growing pervasiveness of Artificial Intelligence and data-driven technologies is profoundly reshaping adolescence as a life stage marked by identity formation, social learning, and increasing autonomy. Adolescents today grow up within AI-mediated environments in which algorithmic systems structure communication, learning, visibility, and opportunity. From an anthropological perspective, these

transformations are not merely technological but cultural and relational, influencing how young people understand themselves, others, and their place within society.

5.1 Algorithmic Mediation, Identity, and Social Life

Social media platforms powered by AI-driven recommender systems play a central role in shaping adolescent sociality. Far from operating as neutral intermediaries, these platforms actively curate content, prioritize visibility, and modulate interaction, thereby influencing norms of popularity, belonging, and self-presentation (Gillespie, 2018). Algorithmic ranking and recommendation systems determine which voices are amplified, which forms of expression gain traction, and which interactions remain marginal, embedding platform-specific values into everyday social experience.

Research indicates that these systems can intensify social comparison, amplify emotionally charged or polarizing content, and generate feedback loops that affect adolescents' beliefs, values, and emotional well-being. From an anthropological perspective, social media platforms function as cultural environments in which meanings, identities, and relationships are continuously negotiated under algorithmic conditions (Bucher, 2018). Adolescents do not merely consume algorithmically curated content; they learn to anticipate, interpret, and adapt to algorithmic logics, shaping how they present themselves and evaluate others.

At the same time, adolescents' limited capacity to understand or contest how recommender systems operate places them in a structurally asymmetrical position relative to platforms and data brokers (Livingstone & Third, 2023). This asymmetry is reinforced by processes of early and continuous datafication, through which behaviors, preferences, and social interactions are translated into data points subject to analysis, prediction, and monetization (van Dijck, 2014). Such processes extend beyond individual platforms, contributing to long-term digital profiles that may influence future opportunities and forms of social classification.

Studies in digital youth research and public health increasingly link algorithmic content curation to mental health risks, including anxiety, stress, and reduced self-esteem, particularly when engagement metrics—such as likes, shares, and views—become proxies for social value and recognition (Orben & Przybylski, 2022). Anthropological analysis highlights that these effects cannot be reduced to individual vulnerability alone, but must be understood in relation to platform design choices, data-driven business models, and broader cultural norms that equate visibility with worth.

5.2 Education, Personalization, and Algorithmic Assessment

Education represents a critical domain in which AI increasingly shapes adolescent experience. AI-powered educational technologies—including personalized learning platforms, adaptive assessments, automated feedback systems, and intelligent tutoring—promise more individualized and efficient learning pathways (UNESCO, 2021). These tools can support diverse learning needs, facilitate access to global educational resources, and enhance engagement through gamification, virtual reality, and interactive content (Pisica et al., 2023).

However, anthropological and critical education research emphasizes that personalization is never neutral (Selwyn, 2019). Algorithmic assessment systems classify learners, predict performance, and recommend educational trajectories, potentially reinforcing existing inequalities through biased data, embedded assumptions, or opaque decision rules (Williamson, 2017). Increased reliance on automated evaluation may also narrow pedagogical relationships, reducing opportunities for mentorship, interpretation, and contextual understanding. For adolescents navigating high-stakes educational transitions, algorithmic judgments can significantly shape self-perception, motivation, and perceived life chances (Selwyn, 2019).

Moreover, AI-mediated education increasingly intersects with labor market forecasting and skill signaling. Narratives about automation and employability influence institutional priorities and adolescent aspirations, contributing to heightened performance pressure and uncertainty (UNESCO, 2021). The anticipation of algorithmically driven futures thus becomes part of the lived experience of adolescence, with implications for mental health and social stratification (Williamson, 2017).

5.3 Well-Being, Surveillance, and Vulnerability

Across smart city contexts, adolescents are increasingly embedded in environments characterized by continuous data collection—from educational platforms and health applications to urban surveillance systems (Kitchin, 2023). While such systems are often justified in terms of safety, efficiency, or optimization, they also normalize persistent monitoring and behavioral evaluation (Zuboff, 2019). Anthropological scholarship emphasizes that for adolescents, whose identities and boundaries are still forming, constant surveillance can constrain experimentation, autonomy, and trust (Boellstorff et al., 2024).

Concerns about data privacy, algorithmic bias, and the commodification of youth data are particularly acute given adolescents' limited legal agency and negotiating power (UNICEF, 2021). International governance frameworks increasingly recognize children and adolescents as a group requiring enhanced protection in AI systems, especially in public and semi-public services (Europe, 2024; UNESCO, 2021). From an experiential perspective, these protections are essential not only to prevent harm but to sustain adolescents' capacity to participate meaningfully in social and civic life (UNICEF, 2021).

5.4 Higher Education, Opportunity, and Inequality

As adolescents transition into higher education, AI continues to shape access, assessment, and academic experience. AI applications in higher education include automated admissions screening, learning analytics, academic advising systems, and administrative decision support (Union, 2024). While these systems can improve efficiency and expand access to resources, they also risk embedding institutional biases and reducing complex human trajectories to quantifiable indicators (Williamson, 2017).

The benefits of AI in higher education—such as multilingual support tools, chatbots, personalized tutoring, and instant feedback—can foster inclusivity and interdisciplinary learning (Pisica et al., 2023). At the same time, unequal access to high-quality digital infrastructure and institutional support exacerbates existing social divides (UNESCO, 2021). Anthropological perspectives underscore that technology-mediated opportunity is deeply contingent on social context, family resources, and institutional culture (Selwyn, 2019).

5.5 Implications for Anthropologically Informed AI

Adolescence in the age of AI exemplifies the broader societal implications of algorithmic systems operating at scale (Kitchin, 2023). AI does not simply influence what adolescents learn or consume; it shapes how they are seen, evaluated, and governed (van Dijck, 2014). An **Anthropologically Informed Artificial Intelligence** approach insists that youth are not passive users but social actors whose experiences, values, and vulnerabilities must inform system design and governance (Boellstorff et al., 2024; UNICEF, 2021).

Such an approach advocates for participatory mechanisms, transparency, and contestability in AI systems affecting adolescents, particularly in education, healthcare, and urban services (Europe, 2024; UNESCO, 2021). By integrating anthropological insight into policy and design processes, AI systems can better support adolescent well-being, autonomy, and social inclusion—contributing to urban and societal futures that are not only smart, but just and humane (Union, 2024).

Conclusion: Anthropologically Informed Artificial Intelligence

The integration of Artificial Intelligence into healthcare systems, educational institutions, and smart city infrastructures represents one of the most significant socio-technical transformations of contemporary society (Kitchin, 2023; UNESCO, 2021). As this article has shown, AI does not merely optimize processes or enhance efficiency; it actively reshapes human experience, redistributes power, and reconfigures relationships between individuals, institutions, and governing structures (Boellstorff et al., 2024; Suchman, 2023). These transformations are particularly consequential for adolescents, whose identities, opportunities, and vulnerabilities are deeply affected by AI-mediated environments during a formative stage of life (Livingstone & Third, 2023; UNICEF, 2021).

Anthropology offers a critical and necessary perspective for understanding these changes. By focusing on lived experience, cultural context, and values-in-practice, anthropological inquiry reveals dimensions of AI deployment that remain underexamined in purely technical or economic analyses (Boellstorff et al., 2024). Ethnographic and interpretive approaches make visible how algorithmic systems

are interpreted, negotiated, and sometimes resisted by those who live with them, highlighting the social consequences of design choices, data practices, and governance arrangements (Seaver, 2022; Suchman, 2023)In smart city contexts, where AI increasingly mediates access to services and shapes forms of algorithmic governance, such insights are essential for assessing legitimacy, trust, and social inclusion (Europe, 2024; Kitchin, 2023).

This paper advances the concept of **Anthropologically Informed Artificial Intelligence** as a guiding orientation for both research and practice. Anthropologically Informed AI is grounded in sustained attention to human diversity, social inequality, and contextual meaning, and it treats ethical principles not as abstract constraints but as practices embedded in everyday institutional settings (Standards & Technology, 2023; UNESCO, 2021). Rather than opposing innovation, this approach emphasizes that AI systems are most effective and socially sustainable when they are designed and governed in dialogue with the communities they affect—particularly those, such as adolescents, who face asymmetries of power, visibility, and voice (UNICEF, 2021; Union, 2024).

Realizing Anthropologically Informed AI requires interdisciplinary collaboration among anthropologists, computer scientists, healthcare professionals, educators, urban planners, and policymakers (Organization, 2025). Such collaboration supports the development of AI systems that are transparent, contestable, and responsive to human well-being, while remaining aligned with emerging international standards on responsible AI governance (Europe, 2024; Union, 2024). Importantly, this approach reframes responsibility as an ongoing process rather than a one-time compliance exercise, recognizing that AI systems evolve alongside social practices and institutional contexts (Suchman, 2023).

Ultimately, the societal value of Artificial Intelligence will depend not only on technical sophistication, but on the extent to which AI contributes to equitable, humane, and democratically accountable futures (UNESCO, 2021). By integrating anthropological insight into the design, deployment, and governance of AI—especially in domains that shape youth experience and urban life—Anthropologically Informed Artificial Intelligence provides a pathway toward technological systems that support human flourishing in an increasingly data-driven world (Boellstorff et al., 2024).

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List of Figures

Figure 1. Key organizational, regulatory, ethical, and technical barriers to the adoption of Artificial Intelligence in healthcare systems.

Figure 2. Main categories of data sources integrated into AI-enabled healthcare systems, including experimental, biological, clinical, environmental, and wearable data.

Conflict of Interest

The author declares no conflict of interest.