

Ethical Concern	Description	Sources
Privacy and Data Protection	The tool shall protect the personal data in any operations or set of operations performed on it. Moreover, it shall prevent secondary uses such as profiling, marketing, etc., and prohibit the sharing of personal data with third parties without a lawful basis.	Scheffler [37], GDPR [15], UNESCO [41, 42], IEEE Standards [27], Ethical guidelines of Trustworthy AI, AI ACT, DSA, ePrivacy directive
Data Minimization	The tool should collect only the minimum data necessary for age verification, avoiding excessive or disproportionate information requests.	EU digital Rights [36] GDPR [15], IEEE Standards [27]
Transparency and Explainability	The tool shall be explainable by design, disclosing how it works, which data it collects, and uses, and how decisions are made, to ensure transparency and informed consent.	Almeida et al. [4], GDPR [15], AI ACT, DSA, UNESCO AI Act [42], UNESCO data protection [41], Ethical guidelines of Trustworthy AI, IEEE Standards [27]
Fairness and Discrimination	The tool shall not embed algorithmic or procedural biases, leading to unequal treatment, disproportionate exclusion of certain groups (e.g., ethnic minorities, gender groups, or age cohorts), or significant reduction of accuracy.	Cao et al. [11], Korshunov et al. [30], Ganel et al. [18], Gibbs and Nightingale [19], GDPR [15], AI ACT, UNESCO AI Act [42], IEEE Standards [27], Ethical guidelines of Trustworthy AI
Responsibility and Accountability	The tool and its provider shall be responsible for any data they collect. In case of harm, misuse, or violations, they shall be held accountable under relevant regulations.	GDPR [15], AI ACT, DSA, UNESCO AI Act [42], UNESCO data protection [41], Ethical guidelines of Trustworthy AI, IEEE Standards [27]
Safety and Security	The tool shall operate with high accuracy and robustness and guarantee its conformance to industry standards.	EU digital Rights [36] GDPR [15], AI ACT, DSA, UNESCO AI Act [42], UNESCO data protection [41], Ethical guidelines of Trustworthy AI, IEEE Standards [27], ePrivacy directive
Accessibility and Social Inclusion	The tool must be accessible to all users, including those with limited digital literacy, undocumented individuals, or marginalized groups, disabled persons, and avoid unjust exclusion from services requiring verification.	GDPR [15], AI ACT, DSA, UNESCO AI Act [42], Ethical guidelines of Trustworthy AI, IEEE Standards [27]
Consent granting and autonomy	The tool shall inform users and explicitly ask their consent for data collection, use, storage, and transmission. The users shall be allowed to withdraw consent at anytime in an accessible way. Moreover, the user shall be allowed to select among different verification options when possible.	van der Hof [44], GDPR [15], EDRI [36], Townsend [40]
Normative Compliance	The tool shall align with the legal frameworks (e.g., GDPR, COPPA, DSA, AI Act (in the European Union), UK Data Protection Act (in the UK), etc).	GDPR [15], AI ACT, DSA, ePrivacy directive as they are norms and regulations
Trust and Social Acceptance	The tool shall be perceived as legitimate, safe, and fair by users and society.	GDPR [15], AI ACT, DSA, UNESCO AI Act [42], Ethical guidelines of Trustworthy AI

Table 1: Ethical concerns relevant to age verification Tools