Genometric data privacy within the ECHR regime

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Key Points

- The European Court of Human Rights (ECtHR) has been adjudicating law enforcement use of deoxyribonucleic acid (DNA) data since 2006. We compare and contrast DNA data-related terms used by the ECtHR with the terms genetic and biometric data as defined by law, and propose a new term: genometric data.
- We define genometric data as personal data resulting from specific technical processing relating to identification markers in the human genome, which allow or confirm the unique identification of an individual. We show that law enforcement use of genometric data in criminal investigations has fewer data privacy challenges compared to genetic and biometric data.
- The ECtHR protects genometric data under Article 8 of the European Convention on Human Rights (ECHR) on the right to respect for private life (right to privacy). We posit that the ECtHR, without explicitly naming it as such, has developed a specific category of genometric data privacy within the right to respect for private life under Article 8 ECHR.
- We define genometric data privacy as an interest that individuals and their genetic relatives have over their genetic data that can be used to identify them individually, whether directly or indirectly, within the bounds of data protection and privacy laws. We identify the ECtHR boundaries of genometric data privacy for the use of genometric data in criminal investigations.

Introduction

The European Court of Human Rights (ECtHR) adjudicated law enforcement use of deoxyribonucleic acid (DNA) data for the first time in 2006 in an admissibility decision in *Van der Velden v the Netherlands*.[1] Given its legal weight, it is the Court's Grand Chamber decision in *S. and Marper v the United Kingdom*[2] that caught global attention at that time.[3] In both cases, the ECtHR affirmed that the taking and retention of cellular samples and DNA profiles are sufficiently intrusive to constitute an interference with the right to respect for private life under Article 8 of the European Convention on Human Rights (ECHR).[4]

The ECtHR has maintained the line of reasoning in *Marper* in various decisions that ensued with some variations given the circumstances of the case, such as in *W. v the Netherlands* (2009),[5] *Peruzzo and Martens v Germany* (2013),[6] and *Aycaguer v France* (2017),[7] and more recently, in *Gaughran v United Kingdom* (2020),[8]

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1 ECtHR, *Van der Velden v the Netherlands* no 29514/05 [dec] (7 December 2006).

2 ECtHR, *S. and Marper v the United Kingdom* nos 30562/04 and 30566/04 [GC] (4 December 2008).

3 The ECtHR or 'Strasbourg Court' is the supranational court of the Council of Europe (CoE), whereas the Court of Justice of the European Union (CJEU) or the 'Luxembourg Court' that of the European Union (EU). When the phrase 'the Court' is used in this article, we refer to the ECtHR.

4 ECtHR, *Van der Velden* (n 1); ECtHR, *S. and Marper* (n 2), para 77.

5 ECtHR, *W. v the Netherlands* no 20689/08 [dec] (20 January 2009).

6 ECtHR, *Peruzzo and Martens v Germany* nos 7841/08 and 57900/12 [dec] (4 June 2013).

7 ECtHR, *Aycaguer v France* no 8806/12 (22 June 2017).

8 ECtHR, *Gaughran v United Kingdom* no 45245/15 (13 February 2020).

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Trajkovski and Chipovski v North Macedonia (2020),[9] and *Petrović v Serbia* (2020).[10] However, a closer look into the text of those judgments reveals that the ECtHR sometimes confounds various DNA-related terms, such as 'DNA profile' and 'DNA material'.

The first aim of this article is to propose a new term—genometric data—and distinguish it from genetic and biometric data as defined by the Council of Europe's (CoE) Convention 108+,[11] the European Union's General Data Protective Directive (GDPR),[12] and Law Enforcement Directive (LED).[13] We demonstrate that the use of genometric data by law enforcement in criminal investigations is more suitable *privacy wise* compared with genetic and biometric data. As law enforcement continues to use DNA data in catching criminals using various DNA-based techniques—such as investigative forensic genetic genealogy in the Golden State Killer case[14]—we argue that it is important to provide a legal basis for this law enforcement practice in various legal jurisdictions; in the case of our article, within the ECHR regime.

The second aim of this article is to propose a specific category of genometric data privacy within the right to respect for private life under Article 8 ECHR. It is neither the aim of this article to provide a systematic analysis of various definitions concerning the better-known term 'genetic privacy' and its relation to 'genometric data privacy' nor to identify 'broadly applicable legal principles about genetic privacy'.[15] This article focuses mainly on genometric data privacy as may be understood through the lens of ECtHR jurisprudence.

The structure of this article follows these two objectives. The section on 'Genetic and genometric data in Europe and the ECtHR' proposes a definition of genometric data. We discuss the scientific and legal meanings of genetic data and trace the emergence of the concept of genetic data in European law. We then compare the term genometric data with the currently-defined terms, genetic and biometric data, and show why it is a more appropriate term to be used in criminal investigations. The section on 'ECtHR case law involving law enforcement use of DNA data' discusses the relevant facts and judicial pronouncements of ECtHR case law involving law enforcement use of DNA data. This section serves as a conceptual bridge to the section on 'Genometric data privacy within Article 8 ECHR', which tackles directly the concept of genometric data privacy. The section on 'Genometric data privacy within article 8 ECHR' proposes a definition of genometric data privacy and identifies the boundaries or limitations set by the ECtHR that allow law enforcement use of genometric data in criminal investigations. The section on 'Conclusions' provides an overview of the key findings of this article while addressing its two main objectives.

Genetic and genometric data in Europe and the ECtHR

In adjudicating cases related to law enforcement use of DNA-related data, the ECtHR uses various terms. This section first looks into the scientific meaning of genes and genomes, and how they relate to genetic and genomic data. It then shows the development of the concept of genetic data in European law. Finally, it looks into and evaluates how similar terms are defined and used by the ECtHR in its case law and explains the propriety of the use of the term 'genometric data'.

Genes and genomes, genetic data and genomic data

At the physical level, a human being is a conglomeration of around 37.2 trillion cells.[16] The genetic material, DNA, is found inside the nucleus bound within chromosomes, and in the mitochondria. The DNA contains the necessary information to direct the biosynthetic machinery of the cell for its growth, division, and survival.

9 ECtHR, *Trajkovski and Chipovski v North Macedonia* nos 53205/13 and 63320/13 (13 February 2020).

10 ECtHR, *Dragan Petrović v Serbia* no 75229/10 (14 April 2020).

11 art 6, Council of Europe *Convention 108 +: Convention for the protection of individuals with regard to the processing of personal data*, 128th session of the Committee of Ministers, 18 May 2018.

12 art 4(13)–(14), EU *General Data Protection Regulation (GDPR): EU Regulation 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC*, OJ 2016 L 119/1.

13 art 3(12)–(13), EU *Law Enforment Directive (LED): EU Directive 2016/680 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data by competent authorities for the purposes of the prevention, investigation, detection or prosecution of criminal offences or the execution of criminal penalties, and on the free movement of such data, and repealing Council Framework Decision 2008/977/JHA*, OJ L 119/89.

14 RA Wickenheiser, 'Forensic Genealogy, Bioethics and the Golden State Killer Case' (2019) 1 Forensic Science International: Synergy 114. OM Tuazon and others, 'Law Enforcement use of Genetic Genealogy Databases in Criminal Investigations: Nomenclature, Definition and Scope' (2024) 8 Forensic Science International: Synergy 1.

15 'Given the diversity of actors and their interests, the increasing power of genetic technologies, and the wide variety of ways these data are held, it is *difficult* to develop broadly applicable legal principles for genetic privacy', EW Clayton and others, 'The Law of Genetic Privacy: Applications, Implications, and Limitations' (2019) 6 Journal of Law and the Biosciences 1. [emphasis added]

16 The latest estimate is 3.72×10^{13} cells. See E Bianconi and others, 'An Estimation of the Number of Cells in the Human Body' (2013) 40 Annals of Human Biology 463. See also N Bakalar, '37.2 Trillion: Galaxies or Human Cells?' The New York Times <https://www.nytimes.com/2015/06/23/science/37-2-trillion-galaxies-or-human-cells.html> accessed 22 August 2024.

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A gene is a segment of the DNA that codes for a protein, which may contribute to an observable physical trait, such as eye colour, height, or hair curliness. The physical expression (phenotype) of these traits depends, among others, on the permutation of the four nucleotides (genotype) that make up the DNA which are classified according to their corresponding bases: adenine (A), guanine (G), cytosine (C) and thymine (T). Scientists have discovered more than 25,000 genes, whose protein products and their interactions may account for the physical traits of an individual.[17] A genome, on the other hand, refers to all the genes of an individual including all the other portions of the DNA that are so-called non-coding, that is, they do not code for a known protein but they can be used to identify individuals, such as those mainly used in short tandem repeat (STR)-based profiling.[18]

Human genomic and genetic data are ultimately derived from nucleated cells of the human body which carry the genetic material (nuclear DNA), and to some extent, their extranuclear DNA found in the mitochondria (mitochondrial DNA).[19] In law enforcement investigations, the most common source of DNA sample is 'touch or trace DNA'.[20] Regardless of the cell from which the genetic material is extracted, it is generally believed that the composition of DNA across the trillions of cells within an organism is largely conserved and unique to that organism.[21] What is physically expressed in one part of the body are the genes responsible for that body part, although the entire DNA is present.[22] When the DNA is extracted and only the genes responsible for the colour of the eye are amplified and sequenced, for example, the corresponding data generated is properly called 'genetic data' for eye colour. When the entire genome—or its exome (the part containing the codes for proteins)—is sequenced and converted into data, that is properly called 'genomic data'.

In short, following its scientific origin and using data terminology, genomic data refers to the complete DNA sequence of an individual or of a part of the genome (such as the exome) that uniquely identifies its source, whereas genetic data refers to the DNA sequence of genes. In both instances, the source of the data is the individual's genetic material, which is the DNA. Loosely speaking, since the DNA is also referred to as the person's 'genetic material', any data that is derived from it is referred to as 'genetic data'.

Genetic data in European law

Although it makes sense that scientific and legal definitions on the same concept should be the same, it does not always happen. Under the rule of law, it is the legal definition that prevails as to who or what is covered by that definition in case of a legal dispute. Hence, analysis of a legal definition is important because it provides guidance as to whether one is working on what the law covers, and thereby, be subject to possible penalties in case of breach.[23]

In Europe, the category of 'genetic data' was In Europe, the category of genetic data was introduced in a legislation by the European Union's (EU) General Data Protection Regulation (GDPR), which took effect on 25 May 2018. the European Union's (EU) General Data Protection Regulation (GDPR), which took effect on 25 May 2018. It included genetic data among its growing list of 'special categories' of personal data under Article 9. The Council of Europe (CoE), on the other hand, did not formally define genetic data until 2018, when it

17 There is no consensus among scientists on the actual number of genes, including whether the definition should also include non-protein-coding genes. See SL Salzberg, 'Open Questions: How Many Genes do We Have?' (2018) 16 BMC Biol 1.

18 DH Kaye and G Sensabaugh, *Reference Guide on DNA Identification Evidence* (Federal Judicial Center ed, 3rd edn, in Reference Manual on Scientific Evidence, National Academy Press, Washington, DC 2011) 141. Recently, STRs have been 'associated with expression of nearby genes', SF Fotsing and others, 'The Impact of Short Tandem Repeat Variation on Gene Expression' (2019) 51 Nature Genetics 1652. See also V Link and others, 'Microsatellites used in Forensics are in Regions Enriched for Trait-associated Variants' (2023) 26 iScience 1. And also MM Bañuelos and, 'Associations between Forensic Loci and Expression Levels of Neighboring Genes may Compromise Medical Privacy' (2022) 119 Proceedings of the National Academy of Sciences 1.

19 We discussed DNA as information and how such information is decoded through sequencing in this book chapter: A Porciuncula and OM Tuazon, 'Personal Genomes' in C Willemsen (ed), *Four Decades of Information Technology and Innovation: Experts and Academics Share their Experience and Knowledge* (Kindle Direct Publishing 2021).

20 These are '[b]iological samples with low levels of DNA not attributed to a specific body fluid', J Burrill, B Daniel and N Frascione, 'A Review of Trace "Touch DNA" Deposits: Variability Factors and an Exploration of Cellular Composition' (2019) 39 Forensic Science International: Genetics 8. Extracellular or cell-free DNA (cfDNA) could be extracted from touch DNA; see J Burrill and others, 'Exploration of Cell-free DNA (cfDNA) Recovery for Touch Deposits' (2021) 51 Forensic Science International: Genetics 1.

21 'The DNA in the human genome is remarkably stable', National Research Council (US) Committee on Mapping and Sequencing the Human Genome, 'Mapping and Sequencing the Human Genome' 12 <https://www.ncbi.nlm.nih.gov/books/NBK218247/> accessed 22 August 2024. There is ongoing research project called 'Somatic Mosaicism Across Human Tissues (SMaHT)' which explores somatic mutations within the human genome; see M Leslie, 'NIH Project Probes the Human Body's Multitude of eGnomes' (2023) 381 Science 719.

22 This is technically called the 'control of gene expression'. See Chapter 7, 'Control of gene expression' in B Alberts and others, *Molecular Biology of the Cell* (Garland Science, New York 2008). See also P Cramer, 'Organization and Regulation of Gene Transcription' (2019) 573 Nature 45.

23 In the case of the GDPR, penalties for infringement involving genetic data processing can go up to 20 million EUR or up to 4 per cent of an undertaking's total worldwide annual turnover, whichever is higher. art 83(5)(a) GDPR.

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modernized its data protection law, Convention 108+.[24] Although the EU's key data protection law—first, the Data Protection Directive,[25] and later on updated by the GDPR—was based on the CoE Convention 108,[26] it was EU's GDPR that first defined genetic data, and that definition was later adopted with slight modifications by the CoE in Convention 108+. In any case, however, the ECtHR had already adjudicated cases concerning genetic data even before the GDPR was promulgated, as discussed in the section on 'ECtHR case law involving law enforcement use of DNA data'.

What is covered by Convention 108+ and the GDPR is genetic data, and for that purpose, genetic data with its own legal definition.[27] Let us take a quick look into the development of the concept of genetic data in the two European supranational organizations—the CoE and the EU—in order to appreciate better its development in Europe. The first definition of genetic data appears in CoE Recommendation No. R (97) 5, although the wording does not appear to have caught traction in the eventual legislations, EU's GDPR and CoE's Convention 108+ (cf. Fig. 1). In 2000, the Article 29 Data Protection Working Party issued an opinion on the 'genome issue' (WP 34) on the occasion of the near completion of the Human Genome Project (HGP).[28] While WP 34 acknowledged the medical significance of the HGP in understanding the 'diagnosis and treatment of diseases in a manner previously unimaginable', it raised the need to provide privacy protection not only to individuals but also to their genetic relatives.[29] At that time, the applicable data protection law at the EU level, the Data Protection Directive (DPD), did not yet include genetic data in its list of special categories of data.[30] The closest link to genetic data in the DPD was the category of 'data concerning health'.[31] However, that term was deemed insufficient to cover the reality of genetic data, given that it only covers genetic data with a 'clear and close link' with the health of an individual.[32] Arguably, not all genetic data is necessarily health data.[33] Hence, there was a growing need to specifically include genetic data in the EU's data protection law.

In 2004, the Article 29 Data Protection Working Party issued its 'Working Document on Genetic Data' (WP 91) but fell short of recommending the inclusion of a new category of genetic data.[34] It was only in 2011, in its 'Advice paper on special categories of data ("sensitive data")', when the same Working Party explicitly proposed genetic data to be included in the list of sensitive data at the EU level, and it recommended that it be 'legally defined'.[35] A year later, the European Commission proposed reforms to the DPD, which included a definition of genetic data.[36] After four years of deliberations, genetic data finally found its way to the list of 'special categories of personal data' under Article 9 of the GDPR, which was promulgated in 2016. It was defined under Article 4(13) as 'personal data relating to the inherited or acquired genetic characteristics of a natural person which give unique information about the physiology or the health of that natural person and which result, in particular, from an analysis of a biological sample from the natural person in question'.[37]

24 art. 6 Convention 108 + Explanatory Report, 128th session of the Committee of Ministers, 18 May 2018. Note that there was a previous definition of genetic data in a CoE Recommendation: No. R (97) 5 on the protection of medical data (cf. Fig. 1).

25 art 8, EU *Data Protection Directive (DPD): EU Directive 95/46/EC on the protection of individuals with regard to the processing of personal data and on the free movement of such data*, OJ 1995 L 281/31.

26 Council of Europe *Convention 108: Convention for the Protection of Individuals with Regard to the Automatic Processing of Individual Data*, ETS No 108.

27 Although one might assume that the law also covers genomic data, a strict legal construction does not necessarily imply this assumption, especially since the term 'genomic data' is not defined by either legislation. Compare, for example, the more encompassing definition of genetic data in the original proposal of the European Commission to update the DPD in 2012 with its final, more limited, definition in the GDPR in 2016 (Fig. 1). The coverage of a particular legal provision is determined not on what is assumed but on the words of the text. And when a dispute arises on the meaning of those words, the corresponding court is made to adjudicate and provide an authoritative interpretation of those words. To date, there is no case yet before the ECtHR nor CJEU on the interpretation of the meaning of genetic data, and whether or not it covers genomic data.

28 Article 29 Working Party, 'WP 34 Opinion 6/2000 on the Genome Issue (5062/00/EN/FINAL)' <https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2000/wp34_en.pdf> accessed 22 August 2024.

29 ibid.

30 art 8, DPD.

31 ibid.

32 Article 29 Working Party, 'WP 131 Working Document on the processing of personal data relating to health in electronic health records (EHR)', 7 <https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2007/wp131_en.pdf> accessed 22 August 2024.

33 ' … genetic data which determine the colour of someone's hair, for example, may not be regarded as data directly concerning health'. Article 29 Working Party, 'WP 91 Working Document on Genetic Data (12178/03/EN)', 5 <https://ec.europa.eu/justice/article-29/documentation/opinion-recommendation/files/2004/wp91_en.pdf> accessed 22 August 2024.

34 ibid 13–14.

35 Article 29 Working Party, 'Advice Paper on pSecial Categories of Data ("sensitive data")', 15 <https://ec.europa.eu/justice/article-29/documentation/other-document/files/2011/2011_04_20_letter_artwp_mme_le_bail_directive_9546ec_annex1_en.pdf> accessed 22 August 2024.

36 See art 4(10), European Commission Proposal for a *Regulation of the European Parliament and of the Council on the protection of individuals with regard to the processing of personal data and on the free movement of such data (General Data Protection Regulation)*, COM(2012) 11 final, 2012/0011 (COD).

37 art 4(13) GDPR. The same definition of genetic data appears in art 3 (12), LED.

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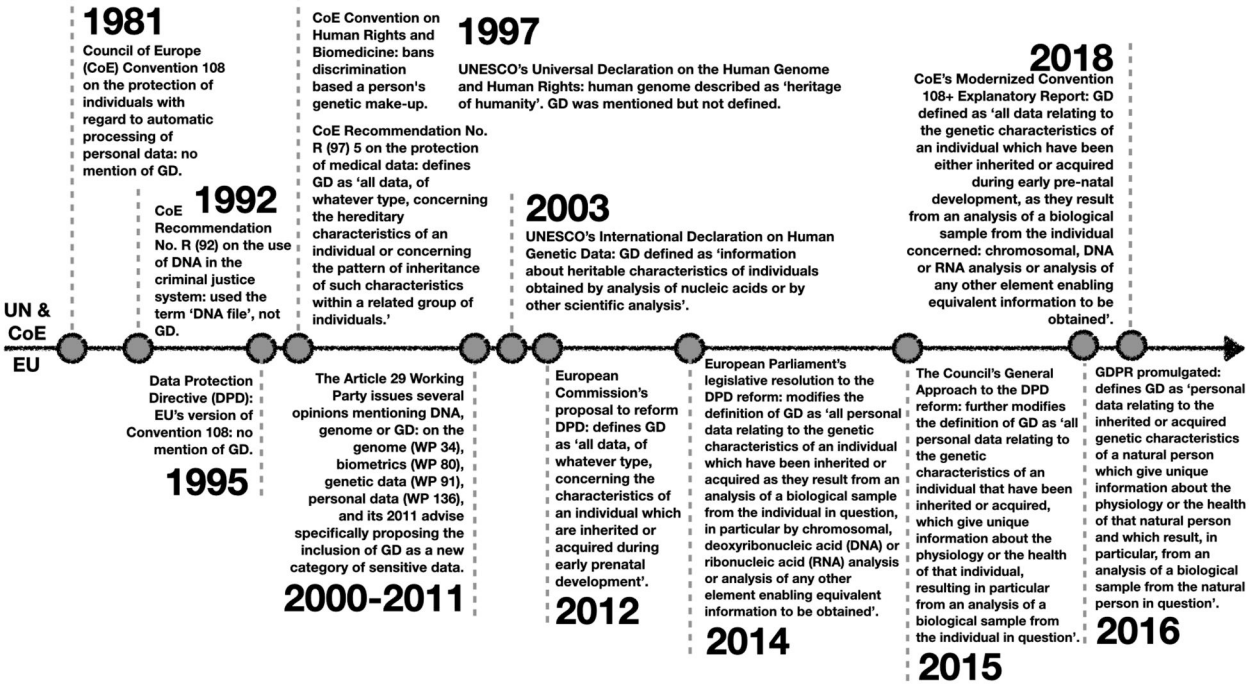

Figure 1. Europe-wide legal instruments between the Council of Europe (CoE) and the European Union (EU) showing the emergence of genetic data (GD), starting with the Data Protection Convention of 1981 (Convention 108), until its definition in the GDPR (2016) and Convention 108+ (2018). To put this legislation in a more global perspective, we included two related declarations from the United Nations (UN) in 1997 and 2003.

A couple of years later, the CoE updated its data protection law, Convention 108+, where it also included genetic data among its list of special categories of data under Article 6 (Fig. 1). Its accompanying Explanatory Report defined genetic data as:

> all data relating to the genetic characteristics of an individual which have been either inherited or acquired during early pre-natal development, as they result from an analysis of a biological sample from the individual concerned: chromosomal, DNA or RNA analysis or analysis of any other element enabling equivalent information to be obtained.[38]

Convention 108+'s definition appears to have been lifted GDPR Article 4 (13) and Recital 34 with slight modifications (Fig. 2).[39] As a consequence of the EU's and CoE's legal definitions, the question arose on whether there are genetic data known *as such*—in science and medicine, law enforcement, or even in the industry such as direct-to-consumer genetic testing—but are not considered as genetic data under the law, or whether they may be merely classified as personal data, or even considered outside the ambit of both definitions, hence, not covered by the law.[40] That is a separate research topic but it is worth mentioning it given the flow of the discussion. Let us now focus on law enforcement use of genetic data in the case law of the ECtHR.

Terms used in ECtHR jurisprudence and genometric data

In order to grasp the nuances of the ECtHR rulings involving law enforcement use of DNA data in the section on 'ECtHR case law involving law enforcement use of DNA data',[41] it is important to know the Court's understanding of these concepts, which has a consequence on their coverage. In *Petrovic v Serbia*, the respondent state claimed that the phrase 'other medical procedure' in the

38 art 6 Convention 108+ Explanatory Report.

39 The definition of genetic data in the Explanatory Report of Convention 108+ no 57 is more similar to the definition of genetic data in Recital 34 of the GDPR.

40 To be classified as genetic data, compared to mere personal data, means more restrictions under data protection laws, hence, the difference cannot be taken lightly. See art 6, Convention 108+.

41 When we use the term 'DNA-related data' or simply 'DNA data', we refer to all terms that are connected or related to the DNA, such as but not limited to genetic and genometric data. In other words, DNA data is a more encompassing term and may refer to both genetic and genometric data.

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	Genetic Data	Biometric Data	Genometric Data
GDPR	Arts. 4 (13) & 9 Recital 34	Arts. 4 (14) & 9 Recital 51	proposed in this article
LED	Arts. 3 (12) & 10 Recitals 23 & 51	Arts. 3 (13) & 10 Recital 51	
Convention 108+	Art. 6 Explanatory Report 57	Art. 6 Explanatory Report 58	
personal data?	yes	yes	yes
product of	analysis of a biological sample	specific technical processing	specific technical processing of a biological sample
refers to	inherited or acquired genetic characteristics	physical, physiological or (behavioral) characteristics	identification markers in the human genome
uniqueness	(unique) information about (physiology or) health	allow (or confirm) unique identification	allow or confirm unique identification

Figure 2. Comparing the proposed category of genometric data with currently defined categories of genetic and biometric data in European legal instruments (GDPR and LED under the EU; Convention 108+ under CoE). The words in parentheses are present in both GDPR [Arts. 4(13) and (14)] and LED [Arts. 3 (12) and (13), but not in Convention 108+ (E.R. nos. 57 and 58).

impugned law covers the taking of a DNA sample from the applicant.[42] However, the ECtHR ruled that the respondent state wrongly interpreted the said phrase, hence, it violated the applicant's right to respect for private life when it ordered the taking of his DNA sample.[43] This case illustrates the importance of using the right terms and understanding their definitions since they have an impact on whether a specific case at hand is covered by it or not.

The various terms related to DNA and forensic samples used by the ECtHR are summarised in Table 2.[44] However, only two terms—aside from the DNA itself—are defined in *Marper* (Table 1).[45] All the other case law do not provide any definition of the terms they used. In this regard, it is assumed that the ECtHR conceded to the definitions of *Marper*, given that it is a Grand Chamber judgment and that the Court does not reason otherwise in its succeeding case law.

In *Marper*, two DNA-related terms are used: cellular samples and DNA profiles.[46] Cellular samples are equated with 'DNA samples', although arguably, DNA samples should refer only to the DNA extracted from cellular samples, not the cellular samples themselves.[47] Cellular samples are also cited interchangeably with 'biological samples',[48] which provides not much technical difficulty since cellular samples are biological samples,[49] although not all biological samples are cellular samples.[50]

As to DNA profiles, the ECtHR is more consistent in referring to them as 'digitised information' that are 'stored electronically' in databases.[51] In *Gaughran*, a DNA profile is defined as 'a digital extraction of key data' that was 'subsequently taken from the DNA sample'.[52] The term 'DNA data' was also used without defining it. Using only the definitions it provided (Table 1), one may assume that it refers only to 'DNA profiles' when using the term 'DNA data' given that profiles are 'digitized information' that can be stored electronically, and may not refer to cellular samples. However, it is in *Marper* where the ECtHR made a landmark pronouncement declaring 'cellular samples' as data, to wit:

> The Court notes at the outset that all three categories of the personal information retained by the authorities in the present case, namely fingerprints, DNA profiles and **cellular**

42 ECtHR, *Dragan Petrović* (n 10), para 81.

43 ibid para 84.

44 The term 'DNA findings' was only cited by the Court in *Marper*, hence it was not included in the table. See ECtHR, *S. and Marper* (n 2), para. 44.

45 The definitions in Table 1 were derived from *ibid* fn no 1.

46 The case also involves fingerprints but it is not included in the discussion because the focus is on DNA-related data.

47 We will not belabour the difference here given the focus of the discussion. It is sufficient to state that, strictly speaking, cellular samples refer to cells that contain DNA, and DNA samples refer to the DNA itself.

48 ECtHR uses the term 'biological samples' when citing Scottish law and a report of the Nuffield Council on Bioethics; see ECtHR, *S. and Marper* (n 2), paras 36 and 38.

49 Extracellular materials, like cell-free excretions, are arguably biological materials but not cellular materials.

50 The term 'cellular material' was also used to refer to 'cellular sample'; see for example ECtHR, *S. and Marper* (n 2), paras 70 and 72.

51 ibid.

52 ECtHR, *Gaughran* (n 8), para 6.

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Table 1. *Marper's* definition of DNA, DNA samples, and DNA profiles.

Deoxyribonucleic acid (DNA)	the chemical found in virtually every cell in the body and the genetic information therein, which is in the form of a code or language; it determines physical characteristics and directs all the chemical processes in the body
DNA samples	cellular samples and any subsamples or part samples retained after analysis
DNA profiles*	digitized information stored electronically on the national database together with details of the person to whom it relates

*Gaughran defines a DNA profile as 'a digital extraction of key data' from the DNA sample.

> **samples, constitute personal data** within the meaning of the Data Protection Convention as they relate to identified or identifiable individuals.[53]

The cited text provides that cellular samples constitute 'personal data', which is a more general term, but not specifically 'DNA data'. However, it appears that the ECtHR uses the term 'DNA data' to also refer to cellular samples when it lumped together DNA profiles and cellular samples into a broader category of 'DNA data'.[54] The Court is then indirectly making a legal pronouncement: that cellular samples are not only 'personal data' but also 'genetic data'. At the time *Marper* was delivered 2008, however, 'genetic data' was not yet defined in European law, although the updating of the Data Protection Directive was already underway (Fig. 1).

The ECtHR also used the terms 'DNA information' and 'DNA records', again without defining them. Following the text of *Marper*, however, both terms appear to refer to both cellular samples and DNA profiles, in the same way that it uses 'DNA data'. The ECtHR used the phrases 'fingerprint and DNA information'[55] and 'fingerprint and DNA records'[56] instead of 'fingerprint, DNA profiles and cellular samples'.

The ECtHR also used the term 'DNA material' without defining it. Unlike the other undefined DNA-related phrases described above, it is harder to discern what the ECtHR exactly means by 'DNA material'. It can mean both cellular samples and DNA profiles—as a synonym to 'DNA data' and 'DNA records'—when it uses the phrase 'fingerprint and DNA material'.[57] However, 'DNA material' may only mean 'DNA samples' given that the succeeding paragraph simply uses the term 'DNA sample'.[58] At the same time, 'DNA material' may also mean 'DNA profiles' in another section of the decision where the Court appears to interchange both terms.[59] One may also argue that 'DNA material' may also refer to 'DNA samples' from which the DNA profiles are extracted or processed. In any case, the ECtHR does not make itself clear by not defining these terms, especially since their legal definitions may differ from their scientific definitions as explained at the start of this section. It appears that the ECtHR is nonchalant in its use of DNA-related terms, without realizing that the limited definitions it provides (Table 1) do not necessarily cover the other DNA-related terms it uses (Table 2).

The subsequent decisions of the Court on law enforcement use of DNA-related data—in *W. v the Netherlands* (2009), *Peruzzo and Martens v Germany*

53 ECtHR, *S and Marper* (n 2), para 68. [emphasis added].

54 'The question is not whether the retention of *fingerprints, cellular samples and DNA profiles* may in general be regarded as justified under the Convention. The only issue to be considered by the Court is whether the retention of the *fingerprint and DNA data* of the applicants, as persons who had been suspected, but not convicted, of certain criminal offences, was justified under Article 8 § 2 of the Convention.' ibid para 106 [emphasis added]. *Compare with* paras 59, 114, and 125.

55 'The Court agrees with the Government that the retention of *fingerprint and DNA information* pursues the legitimate purpose of the detection and, therefore, prevention of crime. While the original taking of *this information* pursues the aim of linking a particular person to the particular crime of which he or she is suspected, its retention pursues the broader purpose of assisting in the identification of future offenders.' ibid para 100 [emphasis added]. For the use of 'DNA information', see also paras 16, 103, and 105.

56 'The Court agrees with the Government that the retention of the applicants' *fingerprint and DNA records* had a clear basis in the domestic law.' ibid para 97 [emphasis added]. For the phrase 'fingerprint and DNA records', see also paras 117 and 138. For the term 'DNA records', see also para 116.

57 'Against this background, England, Wales and Northern Ireland appear to be the only jurisdictions within the Council of Europe to allow the indefinite retention of *fingerprint and DNA material* of any person of any age suspected of any recordable offence.' ibid para 110 [emphasis added].

58 'The Government lay emphasis on the fact that the United Kingdom is in the vanguard of the development of the use of *DNA samples* in the detection of crime … ' ibid para 111 [emphasis added]. See also para 124.

59 'The Government also submitted specific examples of the use of *DNA material* for successful investigation and prosecution in some eighteen specific cases. In ten of these cases the *DNA profiles* of suspects matched some earlier unrelated crime-scene stains retained on the database, thus allowing successful prosecution for those earlier crimes.' ibid para 93 [emphasis added]. See also para 64.

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Table 2. Summary of ECtHR case law involving law enforcement use of DNA-related data. Column 5 shows the various terms related to DNA and forensic samples used by the Court. Following *Marper's* definition (Table 1), DNA sample also refers to biological/cellular sample/material.

Year	Case Name	App. No.	Applicants (verdict)	DNA-related terms	Art. 8 ECHR violated?
2006	*Van der Velden v the Netherlands*	29514/05 [dec]	Convicted: extortion and theft	DNA sample, DNA profile, DNA material, DNA records	No
2008	*S. and Marper v the United Kingdom*	30562/04 and 30566/04 [GC]	Acquitted (S): attempted robbery; Charge not pressed (Marper): harassment of partner	DNA sample, DNA profile, DNA material, DNA data, DNA records, DNA information	Yes
2009	*W. v the Netherlands*	20689/08 [dec]	Convicted: causing bodily harm	DNA sample, DNA profile, DNA material, DNA records	No
2013	*Peruzzo and Martens v Germany*	7841/08 and 57900/12 [dec]	Repeated convictions (separately): drug trafficking, illicit importation of drugs, causing bodily harm, among others	DNA sample, DNA profile, DNA material, DNA records, DNA information	No
2017	*Aycaguer v France*	8806/12	Convicted for refusing to undergo DNA profiling for an earlier conviction (striking gendarmes with an umbrella)	DNA sample, DNA profile	Yes
2020	*Gaughran v the United Kingdom*	45245/15	Convicted: driving with excess alcohol	DNA sample, DNA profile, DNA material, DNA records, genetic data	Yes
2020	*Trajkovski and Chipovski v North Macedonia*	53205/13 and 63320/13	Convicted (separately): aggravated theft	DNA sample, DNA profile, DNA material, DNA data, DNA records, DNA information, DNA findings, genetic data	Yes
2020	*Petrovic v Serbia*	75229/10	Suspected of murder; charged with illegal possession of firearms	DNA sample, DNA profile, DNA data	Yes

(2013), and *Aycaguer v France* (2017), *Gaughran v United Kingdom* (2020), *Trajkovski and Chipovski v North Macedonia* (2020), and *Petrović v Serbia* (2020)—do not make any further clarifications on the definitions of these DNA-related terms. The result is a general lack of clarity on what the ECtHR really means or refers to exactly in its decisions. The following section of the *ratio decidendi* of *Trajkovski and Chipovski v North*

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Macedonia—where the Court used the terms DNA samples, DNA profiles, DNA material, DNA data, DNA records, and even DNA findings,[60] one after another—serves to illustrate this point:

> The Court notes that the applicants' **DNA samples** and **DNA profiles** derived from those samples were taken in view of the criminal proceedings [.] Whereas the first applicant's conviction was based on the **DNA findings**, the **DNA material** taken from the second applicant was not indispensable [.] Indeed, as stated by the Government, **DNA profiles** were to be recorded in the relevant registers [.] The amendments to the Police Act [.] introduced subsequent to the taking of **DNA samples** from the applicants provide that **DNA data** is stored in the relevant register permanently [.] Furthermore, it has not been argued that the nature or gravity of the offence [.] have any bearing on the collection, storage and retention of **DNA records** [.][61]

The ECtHR appears to confound these DNA-related terms. As to the use of the term 'genetic data', there is no clear indication that the ECtHR prefers its use in cases concerning criminal investigations by law enforcement. Although it was *Marper* that had been hailed as the ECtHR's 'landmark ruling for the protection of **genetic data** used for law enforcement purposes',[62] the Court never mentioned the term 'genetic data' in that judgment, understandably because at that time genetic data was not yet included in Convention 108. It is surprising, however, that the ECtHR did not elaborate on the term in its post-2018 decisions involving law enforcement use of DNA data, specifically, *Gaughran v United Kingdom*, *Trajkovski and Chipovski v North Macedonia*, and *Petrović v Serbia*, all of which were delivered in 2020.

The ECtHR mentions the phrase 'genetic data'[63] to refer to DNA profiles in *Gaughran*.[64] Except for that apparent 'judicial slip', the ECtHR referred to DNA profiles, together with fingerprints, as 'biometric data' in *Gaughran*.[65] Just like genetic data, biometric data was included among the new special categories of data under Article 9 of the GDPR—and for law enforcement purposes, under Article 10 of the LED. Both biometric and genetic data were also included as special categories of data under Article 6 of Convention 108+. However, their definitions (Fig. 2) in these laws do not fit in exactly with what the ECtHR appears to allow when law enforcement uses DNA data in criminal investigations, that is, within the context of the right to respect for private life under Article 8 ECHR. This leads us to propose the new term, genometric data. Following the construction of the definitions for genetic and biometric data in Convention 108+, GDPR and LED (Fig. 2) and at the same time specifying it, we define genometric data as personal data resulting from specific technical processing relating to identification markers in the human genome, which allow or confirm the unique identification of an individual.

It is argued that the main concern of law enforcement authorities is the ability of DNA to identify individuals, specifically criminal perpetrators who leave behind biological samples at the crime scene. They are not concerned therefore about the other potential use of DNA such as, but not limited to, the knowledge of an individual's predisposition to diseases and other health-related matters—which fall under the definition of genetic data, and even arguably of biometric data (Fig. 2)—that have far-reaching privacy repercussions.[66] In this regard, the only concern is about its use in allowing or confirming the unique identification of an individual. The legal definition of biometric data is closer to that purpose, as it precisely allows or confirms the unique identification of an individual where data is derived after 'specific technical processing'.[67] However, biometric data refers to physical, physiological, or behavioural characteristics,[68] as compared to genetic data which refers to inherited or acquired genetic characteristics (Fig. 2). For the purposes of identification by law enforcement using DNA, there is no need to refer to any of these listed characteristics. One only has to use identification markers in the human genome that are sufficient to uniquely identify the source of

60 In *Marper*, the Court only cited 'DNA findings' but did not use it. It was not defined in either case. See ibid para 44.

61 ECtHR, *Trajkovski and Chipovski* (n 9), paras 51–53. [emphasis added]

62 M Zieger, 'Forensic DNA Phenotyping in Europe: How Far may it Go?' (2022) 9 Journal of Law and the Biosciences 1, at 12. [emphasis added]

63 'However, the Court considers that the situation is different concerning *DNA profiles* and that there is a distinction between retaining *DNA profiles* indefinitely and setting a defined limit on the retention period linked to the biological life of the person concerned, even if the period of retention foreseen is long. That is because retaining *genetic data* after the death of the data subject continues to impact on individuals biologically related to the data subject.' ECtHR, *Gaughran* (n 8), para 81. [emphasis added]

64 Unlike *Marper*, the case did not concern cellular samples. In *Chipovski*, the Court also mentioned 'genetic data' in the context of law enforcement but as part of the procedural aspects of the case; ECtHR, *Trajkovski* (n 9), para 11.

65 The case also concerned photographs but they were not classified as biometric data. Although it is from another European entity, this may be justified using recital 51 of the GDPR, which provides that '[t]he processing of photographs should not systematically be considered to be processing of special categories of personal data as they are covered by the definition of biometric data only when processed through a *specific technical means* allowing the unique identification or authentication of a natural person.' Photographs are not discussed further because they are not covered by this article.

66 L Bonomi, Y Huang and L Ohno-Machado, 'Privacy Challenges and Research Opportunities for Genomic Data Sharing' (2020) 52 Nature Genetics 646.

67 Compare with *boldfaced* words of recital 51 in fn no 65.

68 Instead of 'behavioral', it uses 'biological' in art 6 Convention 108+ Explanatory Report.

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the biological materials deposited at the crime scene or to confirm the identity of a criminal suspect.

On a more practical note, a recent breakthrough reported by a forensic testing company, QIAGEN, shows the application of the term genometric data in criminal investigations.[69] QIAGEN developed a new product, ForenSeq Kintelligence System, which is able to use DNA markers that avoid medically related information but at the same time is capable of identifying criminal perpetrators.[70] In short, this new product makes use of genometric data and it is offered to law enforcement for criminal identification purposes.

Since the ability of DNA in solving crimes was discovered in 1985,[71] new techniques continue to be developed to maximize this potential.[72] We argue that if law enforcement limits itself to the use of genometric data in its effort to identify criminal perpetrators who leave behind biological samples at crime scenes, it will face fewer privacy challenges compared to using genetic data, and to a certain extent, biometric data. It has no specific interest in knowing whether criminal perpetrators have a particular predisposition to a genetic disease or whether they exhibit certain physiological or behavioural characteristics, all of which can set the privacy alarm bells ringing.[73] Its main concern is to identify criminal suspects. Hence, law enforcement should only use genometric data, neither genetic data nor biometric data, so that it can focus on its criminal investigative work without being entangled with excessive data privacy concerns. We are not claiming that genometric data can only be used for law enforcement purposes—as the definition itself shows (Fig. 2)—but we do claim that the use of genometric data by law enforcement in criminal investigations is more acceptable *privacy wise*, at least within the ECHR regime.

Obviously, the use of genometric data still has its own privacy concerns. This will be tackled in the section on 'Genometric data privacy within Article 8 ECHR'. In order to have a full grasp of that concept, we will first briefly discuss the case law of the ECtHR from which the concept of genometric data privacy can be derived.[74]

ECtHR case law involving law enforcement use of DNA data

This section discusses the relevant facts and judicial pronouncements of ECtHR case law involving law enforcement use of DNA data in order to understand more clearly the concept of genometric data privacy that we expound in the section on 'Genometric data privacy within Article 8 ECHR'. This wealth of jurisprudence has far-reaching repercussions given the scope of the Court's jurisdiction over the 46 Member States of the Council of Europe, among which are the 27 Member States of the EU. Moreover, the EU is in the process of acceding to the ECHR as its 47th contracting party,[75] as provided in the Lisbon Treaty,[76] thereby highlighting further the influence of the Strasbourg Court.[77]

Van der Velden v the Netherlands: preliminary interference rule

Van der Velden v the Netherlands is the pioneering case at the ECtHR involving DNA sample collection and retention for law enforcement purposes. The applicant was guilty of bank robberies and car theft. He objected to the collection and retention of his DNA profile, among others. Although the ECtHR eventually dismissed the case for lack of merit, it made two important determinations that were adopted in *Marper* and

69 The company did not use the term 'genometric data', which is coined and defined for the first time in this article.

70 QIAGEN, 'DNA Labs International Solves Significant Cold Cases with QIAGEN Workflow for Forensic Genetic Genealogy' <https://corporate.qiagen.com/English/newsroom/press-releases/press-release-details/2023/DNA-Labs-International-solves-significant-cold-cases-with-QIAGEN-workflow-for-forensic-genetic-genealogy/default.aspx> accessed 2 August 2024.

71 P Gill, AJ Jeffreys and DJ Werrett, 'Forensic Application of DNA 'fingerprints'' (1985) 318 Nature 577.

72 These techniques are summarized in this article: Tuazon and others (n 14) 4-6.

73 Law enforcement may be interested in knowing the physical characteristics of the individual for identification purposes. This separate topic on forensic DNA phenotyping has been tackled in this article: Zieger (n 62).

74 Given that genometric data is a new term proposed in this article, it has not been obviously used by the ECtHR in its jurisprudence. Hence, we continue using the term DNA data in our discussion of ECtHR case law.

75 European Court of Human Rights, 'Accession of the European Union. What is EU Accession?' <https://prd-echr.coe.int/web/echr/accession-of-the-european-union> accessed 21 June 2024. In a 29 September 2020 joint statement between the Council of Europe and the European Commission, the resumption of negotiations for EU's accession to the ECHR has been considered as an 'important milestone in the protection of human rights and fundamental freedoms across Europe' and 'will further strengthen human rights protection in Europe'; see European Commission, 'The EU's accession to the European Convention on Human Rights: Joint statement on behalf of the Council of Europe and the European Commission' <https://ec.europa.eu/commission/presscorner/detail/en/statement_20_1748> accessed 21 June 2024.

76 art 1(8) amending art 6 of the Treaty on European Union (TEU), European Union Treaty of Lisbon Amending the Treaty on European Union and the Treaty Establishing the European Community, 2007/C 306/01. See also art 6 (2), European Union *Treaty on European Union (TEU)*: Consolidated version of the Treaty on European Union OJ 2016 C 202/13.

77 For a more detailed study on the distinction between ECtHR and CJEU on matters of privacy and data protection, see J Kokott and C Sobotta, 'The Distinction between Privacy and Data Protection in the Jurisprudence of the CJEU and the ECtHR' (2013) 3 International Data Privacy Law 222.

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practically by all other subsequent cases concerning DNA profiles and databases as established doctrines. First, the Court held that the collection of cellular material through a mouth swab amounted to an 'intrusion on the applicant's privacy'. Secondly, the Court affirmed that 'the systematic retention' of cellular material 'goes beyond the scope of neutral identifying features such as fingerprints'—whose retention does not constitute as an interference according to the decision of the European Commission of Human Rights (ECmHR) in *Kinnunen v Finland*,[78] making it 'sufficiently intrusive to constitute an interference with the right to respect for private life' under Article 8(1) ECHR.[79]

The significance of these determinations cannot be overemphasized. They underscore the sensitive nature of DNA data which may provide more than 'neutral identifying features' compared to fingerprints. This constitutes a clear distinction from another jurisdiction across the Atlantic, the USA, which considers the collection of the DNA of an arrestee through a cheek swab as a mere booking procedure similar to fingerprinting and the taking of a suspect's mug shots.[80]

In subsequent cases, such as *Marper* (2008),[81] *W* (2009),[82] *Martens* (2013),[83] *Aycaguer* (2017),[84] *Gaughran* (2020),[85] *Chipovski* (2020),[86] and *Petrović* (2020),[87] the ECtHR barely touched upon the issue of interference, thereby highlighting the importance of *Van der Velden* in understanding the Court's jurisprudence on DNA sample collection and retention. *Van der Velden* also shows the initial predisposition of the ECtHR to limit access to DNA data given that it may go 'beyond the scope of neutral identifying features'. The separate category of genometric data that we propose in the previous section addresses this concern of the ECtHR, since it only concerns limited sections of the DNA that allow identification of an individual and not 'beyond'.

S and Marper v United Kingdom: retention of DNA data of the suspected but un-convicted

This case involves two applicants: a minor (S.) charged with attempted robbery but eventually acquitted, and Marper charged with harassing his partner to whom he eventually reconciled, resulting in the formal discontinuation of the trial.[88]

Following the ECtHR's line of reasoning, one can make a distinction between the retention of DNA samples and DNA profiles. For DNA samples, their 'retention *per se*' is regarded as an interference given that they are sources of the complete DNA of an individual.[89] This is because of the 'nature and the amount of personal information' that can be derived from DNA samples noting that they contain 'much sensitive information' about an individual and their health, including its 'unique genetic code'.[90] On the other hand, in describing the capacity of DNA profiles to identify 'genetic relationships between individuals', their retention is deemed to be 'in itself sufficient' to declare an interference.[91] While it is true that in the end, the ECtHR's pronouncement is limited to the finding of a violation of Article 8 ECHR by virtue of the 'blanket and indiscriminate nature of the powers of retention' of both cellular samples and DNA profiles,[92] the Court's *ratio decidendi* reveals an awareness of the greater privacy impact of retaining cellular samples compared to DNA profiles.

On a side note, another major development in *Marper* is the protection that the ECtHR afforded to fingerprints as personal data. It clarified the ambiguity of the decision of the European Commission of Human Rights (ECmHR) in *McVeigh and Others*,[93] and overturned the non-interference ruling in the ECtHR's decision in *Kinnunen*.[94] Although the Court agreed with the UK Government's assertion that fingerprints contain 'neutral, objective and irrefutable material' which are

78 ECmHR, *Kinnunen v Finland* no 24950/94 [dec] (15 May 1996).

79 ECtHR, *Van der Velden* (n 1).

80 US, *Maryland v King* 569 (2013), 465–6. The Supreme Court of the US considered DNA as 'another metric of identification' to connect the suspect to his 'public persona', that is, as shown in his police records, ibid 436–37. Hence, it claims that '[t]he only difference between DNA analysis and fingerprint databases is the unparalleled accuracy DNA provides', ibid 436. Although it acknowledged the 'unmatched potential' of DNA identification, it only sees it as an extension of the current methods of identification in criminal investigations, ibid 461.

81 ECtHR, *S. and Marper* (n 2), para 77.

82 ECtHR, *W. v the Netherlands* (n 5).

83 ECtHR, *Peruzzo and Martens* (n 6), para 33.

84 ECtHR, *Aycaguer* (n 7), para 33. In this case, the Court made use of an earlier case (not involving DNA profiles) to affirm that mere storage of personal data amounts to an interference within the meaning of private life under art 8 ECHR; see ECtHR, *Leander v Sweden* no 9248/81 (26 March 1987), para 48.

85 ECtHR, *Gaughran* (n 8), para 63.

86 ECtHR, *Trajkovski* (n 9), para 43.

87 'The taking and retention of a DNA sample has furthermore been deemed to amount to an interference with the individual's "private life" within the meaning of the same provision … '; see ECtHR, *Dragan Petrović* (n 10), para 69.

88 ECtHR, *S and Marper* (n 2), paras 10–11.

89 ibid para 73.

90 ibid paras 72–73.

91 ibid paras 75–76.

92 ibid para 125.

93 In *McVeigh and Others*, the question on whether the retention of fingerprints amounted to an interference was left open; ECmHR, *McVeigh and others v the United Kingdom* nos 8022/77, 8025/77, and 8027/77 [report] (18 March 1981), para 226. See also ECtHR, *S. and Marper* (n 2), para 79.

94 The Court noted, however, that the fingerprints at issue in *Kinnunen* 'had been destroyed nine years later at the applicant's request'; see ECtHR, *S. and Marper* (n 2), para 80.

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'unintelligible to the untutored eye and without a comparator fingerprint', it highlighted the 'fact' that they contain 'objectively unique information' about an individual thereby allowing their 'identification with precision in a wide range of circumstances'.[95] Similar to its ruling on cellular samples and DNA profiles, the ECtHR also declared that the 'blanket and indiscriminate' retention of fingerprints violated Article 8 ECHR.[96] It then shows that although the ECtHR may declare a violation of Article 8 ECHR in a similar way for three different types of personal data, it does not necessarily consider their impact on data privacy to be at the same level. Hence, we present the use of genometric data as less privacy intrusive compared to genetic and biometric data and offer it as a safer type of personal data *privacy wise* for criminal investigations by law enforcement.

W. v the Netherlands and *Peruzzo and Martens v Germany*: retention of DNA data of the convicted

One year after *Marper*, the ECtHR delivered another DNA data retention case, this time involving a convicted minor.[97] In *W. v the Netherlands*, the Court dismissed the case for being 'manifestly ill-founded' noting that the background of the applicant was substantially different compared to the minor in *Marper* who was acquitted of the crime charged.[98] Moreover, the Court noted the provision of sufficient safeguards in the enabling national law in question to protect the right to privacy of the applicant, among which is what it regards as the 'anonymous storage' of his DNA samples and DNA profiles.[99]

In the same vein a few years later, the ECtHR approved the retention of DNA profile data of two applicants with repeated convictions for serious offences. In *Peruzzo and Martens v. Germany*,[100] the ECtHR agreed with *Van der Velden* and *Marper* on the 'substantial contribution' made by DNA data to 'law enforcement and the fight against crime in recent years' while at the same time emphasised the need for 'appropriate safeguards' to protect such special categories of 'more sensitive data' whose information affects both the person—as the direct source of data—and their family, who may be implicated by such data.[101] However, the Court made it clear that the case differs from *Marper* in the following ways, among others: the applicants in this case were convicted of offences of a 'certain level of gravity'; the cellular material collected was destroyed after the generation of the DNA profile; and only DNA profile data was retained.[102] What is intriguing in *Martens* is the Court's acquiescence to the absence of 'statutorily prescribed maximum time-limits for the storage of DNA profiles' as long as the applicants have an option to review the appropriateness of their continued retention.[103]

These two post-*Marper* cases concern convicted individuals and the retention of their DNA data in both cases was deemed appropriate by the ECtHR (Table 2). Although they did not provide a blanket approval of offender databases,[104] *W.* and *Martens* gave the impression that the Court was willing to provide justification for their existence when the applicant had been previously convicted by their national court. Our proposal that law enforcement only use genometric data in criminal identification makes storage of these data more acceptable given that they do not contain sensitive information, subject to the limitations we identify in the section on 'Genometric data privacy within Article 8 ECHR'.

Aycaguer v France: conviction for refusal to undergo DNA profiling

A curious case emerged in 2017 where the applicant was convicted for refusing to undergo DNA profiling after a prior conviction. In *Aycaguer v France*, the applicant was previously sentenced to imprisonment for striking the French gendarmes with an umbrella while

95 ibid para 84.

96 ibid para 125.

97 One of the applicants in *Marper* was a minor but he was eventually acquitted; ibid para 10. The applicant in *W. v the Netherlands* was 'guilty of causing bodily harm' and was sentenced a 'suspended term of juvenile detention (*voorwaardelijke jeugddetentie*), a community service order (*werkstraf*) of 30 hours and a training order (*leerstraf*) of 20 hours'.

98 'The Court notes however that, contrary to the *S. and Marper* case, the present case deals with the issue of storing and retaining DNA records of persons who have been convicted of a criminal offence.', ECtHR, *W. v the Netherlands* (n 9).

99 In *W. v the Netherlands*, the ECtHR did not question the national law's claim that 'DNA material is stored anonymously'. The question on whether it is possible to anonymised DNA data requires a separate article altogether. DNA is regarded as 'uniquely identifiable', AL McGuire, 'Identifiability of DNA Data: The need for Consistent Federal Policy' (2008) 8 American Journal of Bioethics 75. It concerns data that retain 'by their very nature [.] a link to the person from whom they came', H Schmidt and S Callier, 'How Anonymous is "anonymous"? Some Suggestions towards a Coherent Universal Coding System for Genetic Samples' (2012) 38 Journal of Medical Ethics 304, at 305.

100 Peruzzo was convicted of six counts of drug trafficking, four of which were preceded by illicit importation of drugs; ECtHR, *Peruzzo and Martens* (n 6), para 6. Martens was convicted in various occasions for causing bodily harm by dangerous means, attempted coercion and persistently stalking a woman, ibid para 12.

101 ibid para 42.

102 ibid paras 44–49.

103 ibid para 46.

104 Offender databases include DNA profiles of convicts. For a summary of the various databases used by law enforcement, see: Tuazon and others (n 14) 3–4.

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participating in a rally.[105] The applicant was subsequently ordered to provide DNA sample to the police.[106] He refused. Later, he was convicted of the 'offence of refusing to undergo a biological test',[107] which the ECtHR found to have amounted to an interference within the meaning of Article 8(1) ECHR.[108]

What sealed the ECtHR's finding of a violation of the right to respect for private life in this case was the lack of proportionality between the retention period and the nature of the offence including the lack of access to a 'deletion procedure' by convicted individuals.[109] Regardless of the offence committed, and *Aycaguer*'s concern 'mere blows with an umbrella directed at gendarmes',[110] the retention period was 40 years. Given the lack of adjustment of this 40-year retention period regardless of the offence committed, the Court ruled that it is 'in practice, treated as indefinite storage'.[111] It means that such 'duration and the lack of a possibility of deletion' fail to provide 'sufficient protection' of a person's right to privacy.[112]

Although *Aycaguer* did not involve the actual retention of an individual's DNA profile in a national database, as the applicant was precisely convicted for refusing to register, the ECtHR unwittingly paved the way for the evaluation of offender databases that retain DNA data. Such databases had been perceived to be acceptable since *Marper*. Two subsequent cases that reached the Court, *Gaughran* and *Chipovski*, precisely challenged the retention of DNA profiles of convicted individuals in these databases.

Gaughran v United Kingdom and *Trajkovski and Chipovski v North Macedonia*: questionable retention of DNA data of the convicted

In 2020, the ECtHR rendered new judgments on DNA data stored in databases involving convicted individuals. In *Gaughran v United Kingdom*, the conviction of the applicant was based on a guilty plea for driving with excess alcohol,[113] a recordable offence in the respondent member state.[114] In *Trajkovski and Chipovski v North Macedonia*,[115] two applicants were convicted of aggravated theft,[116] although DNA evidence was not used to secure the conviction of the second.[117] In both cases, the Court found a violation in the respondent states' practice of retaining DNA profiles of convicted individuals.[118]

In *Gaughran*, the ECtHR held that the 'duration of the retention period is not necessarily conclusive' in the assessment of the retention regime for convicted individuals.[119] Compare that with *Martens* where there was no retention limit but the obligation on the part of the state's Federal Criminal Office to review the continued storage of data at regular intervals of 'at the latest every ten years' was considered sufficient.[120] In *Aycaguer*, the blanket 40-year definite retention regime was deemed by the Court to have amounted to an 'indefinite period in practice'.[121] And in *Chipovsky*, the Court noted that the state permits indefinite retention '[i]n the absence of anything to suggest that such retention may be linked to any fixed point in time'.[122] These cases suggest that the default evaluation of the Court to a state's retention regime is 'indefinite' unless it shows a specific provision of the law to the contrary.

The common *ratio decidendi* for the determination of a violation in both *Gaughran* and *Chipovski* was the presence or absence of sufficient legal safeguards in the relevant national DNA database law for the protection of the right to respect for private life of the convicted applicants. In its evaluation, the ECtHR moved towards a more holistic consideration of the presence of sufficient safeguards in the database law. Aside from the retention period, the Court indicated that the enabling law should also take into account the seriousness of the offence, provision for review on the continuing need to retain the data 'in view of the nature of the offence', the 'age' of the applicant, the 'length of time that has elapsed' and the 'current personality' of the convict, with an option to have one's data deleted after such re-

105 ECtHR, *Aycaguer* (n 7), paras 6–8.
106 ibid para 9.
107 ibid para 13.
108 ibid para 35.
109 ibid para 44.
110 ibid para 43.
111 ibid paras 42–43.
112 ibid para 45.
113 ECtHR, *Gaughran* (n 8), para 7.
114 DNA profiles could then be taken without consent for recordable offences in England, Wales, and Northern Ireland; see AO Amankwaa and C McCartney, 'The Effectiveness of the UK National DNA Database' (2019) 1 Forensic Science International: Synergy 45, at 46.
115 Note that *Chipovski* cites *Gaughran* although they bear the same judgment date; see ECtHR, *Trajkovski* (n 9), para 32.
116 ibid paras 7 and 12.
117 ibid para 51.
118 Another DNA profile-related case was decided a few months later. However, after having found that the collection of DNA samples was not in accordance with the law, the Court already declared a violation of art 8 ECHR and did not proceed with the usual proportionality assessment; see ECtHR, *Dragan Petrović* (n 10), para 84.
119 ECtHR, *Gaughran* (n 8), para 88.
120 ibid para 87. See also ECtHR, *Peruzzo and Martens* (n 6), para 46.
121 ECtHR, *Aycaguer* (n 7), para 42. See also ECtHR, *Gaughran* (n 8), para 87.
122 ECtHR, *Trajkovski* (n 9), para 52.

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view.[123] The Court held that the presence of these safeguards in the database law is not enough—they should also be operative. In addition, the convict's option for review should not be 'so narrow as to be almost hypothetical'.[124] In *Chipovski*, for example, the law only provided a general possibility of 'judicial review coupled with a prior administrative review' but there was no provision for 'specific review of the necessity of data retention', and the Court found these insufficient to protect a convict's right to respect for private life.[125] Hence, the 'existence and functioning' of these safeguards are 'decisive' whenever the respondent state avails of the Hence, the 'existence and functioning' of these safeguards are 'decisive' whenever the respondent state avails of an extensive retention regime.[126]

A common thread in case law involving law enforcement use of DNA data

A few ideas can be derived from this brief exposition of the development of ECtHR jurisprudence on the collection and retention of DNA data for law enforcement purposes. *First*, the Court has consistently ruled—following *Van der Velden*—that DNA data constitute personal data pertaining to a person's private life, and whenever the state retains them, there exists an interference with the right to respect for private life of those data subjects within the meaning of Article 8 ECHR. On whether such an intrusion amounts to a violation of this right—*the right to respect for private life not being an absolute right*—the Court's proportionate balancing exercise through its four-fold test plays a big role in its final decision.[127]

Secondly, the ECtHR's finding of a violation of the right to respect for private life has not been entirely based on the conviction of the applicant, which *Marper*, *W.* and *Martens* may have unwittingly projected (*compare* columns 4 and 6, Table 2).[128] The Court's main preoccupation, as shown more clearly in later case law, has been on the existence of sufficient legal safeguards in the national database law that serve to protect this right despite conviction. In that vein, the retention of the convicted applicants' DNA data in *Gaughran* and *Chipovski*—whose line of reasoning follows *Aycaguer*—violated their right to respect for private life due to the insufficiency of legal safeguards in their respective states' database laws. The *third* flows from the second: the most crucial safeguard appears to be the availability and enforceability of an option to review the continuing retention of DNA data, and the consequent possibility of its deletion from the database even in the absence of retention time-limit in the statute, as shown in *Martens*.

Fourthly, although the ECtHR acknowledged in *Gaughran* that the risk of stigmatization among convicted individuals is 'not the same' as that of non-convicted applicants in *Marper*, it affirms that their right to respect for private life still deserves protection.[129] Hence, one cannot merely affirm the acceptability of retaining DNA data under the ECHR regime without a qualification as shown in *Aycaguer*, *Gaughran*, and *Chipovksi*. Nor is it possible to outrightly reject their retention as sufficient safeguards may be established to protect the right to private life of suspects while criminal investigations are still ongoing as may be indirectly gleaned from *Marper*.

Finally, the initial predisposition of the ECtHR to limit access to DNA data in *Van der Velden*—given its potency to reveal sensitive personal data beyond its ability to identify an individual—has been consistently affirmed by the Court until its most recent case law. Such judicial coherence lends objectivity to our proposal that law enforcement use of genometric data—limited to identification markers in the genome—provides a better legal justification *privacy wise* in criminal investigations, as explained further in the next section.

Genometric data privacy within Article 8 ECHR

There are four interests protected by Article 8 ECHR: private life, family life, home, and correspondence.[130] The specific category of genometric data privacy we discuss in this section belongs to the first interest (private life).[131] We posit that in the course of adjudicating cases

123 ECtHR, *Gaughran* (n 8), para 88 in relation to 94.

124 ibid para 94.

125 ECtHR, *Trajkovski* (n 9), para 53.

126 ECtHR, *Gaughran* (n 8), para 88.

127 For an overview of the ECtHR four-fold test in evaluating the presence or absence of a violation of art 8 ECHR with respect to DNA-related data, see OM Tuazon and GJ Zwenne, 'DNA Profile Data and Right to Privacy' in C Willemsen (ed), *Four Decades of Information Technology and Innovation: Experts and Academics Share their Experience and Knowledge* (Kindle Direct Publishing 2021) 24–25. For a concrete application of the ECtHR four-fold test, see OM Tuazon, 'Universal Forensic DNA Databases: Acceptable or Illegal under the European Court of Human Rights Regime?' (2021) 8 Journal of Law and the Biosciences 1.

128 The entry under the last column of Table 2 refers mainly to the admissibility of the case for admissibility decisions as indicated in column 3.

129 ECtHR, *Gaughran* (n 8).

130 DJ Harris and others, *Law of the European Convention on Human Rights* (4th edn, OUP 2018) 503–10.

131 For a more basic discussion on the right to respect for private life and the right to personal data protection, see Tuazon and Zwenne (n 127) 19–21. See also B Rainey, P Mc. Cormick and C Ovey, *Jacobs, White, and Ovey: The European Convention on Human Rights* (8th edn, OUP 2020) 424–28.

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related to law enforcement use of DNA data (the section on 'ECtHR case law involving law enforcement use of DNA data'), the ECtHR has created a specific category of genometric data privacy within the right to respect for private life under Article 8 ECHR. We first define genometric data privacy and then identify the boundaries or limitations set by the ECtHR that allow law enforcement to operate within this category.

Genometric data privacy defined

After showing that it is more acceptable *privacy wise* for law enforcement to use genometric data in criminal investigations, we propose its corresponding category within the general 'private-life interest' under Article 8 ECHR: genometric data privacy. We are aware of 'genetic privacy', a term that has no universally accepted definition. Genetic privacy has been defined as 'an interest that individuals, families, or even communities have with respect to genetic information'.[132] It may also be defined as a state of limited access to an individual's genetic information.[133]

Following our definition of genometric data in the section on 'Genetic and genometric data in Europe and the ECtHR', we define genometric data privacy as an interest that individuals and their genetic relatives have over their genetic data that can be used to identify them individually, whether directly or indirectly, within the bounds of data protection and privacy laws. In other words, genometric data privacy refers to privacy interests of individuals and their genetic relatives over their genometric data within the limits of law.

The specific law presented in this article is the ECHR as interpreted by the ECtHR in its jurisprudence on law enforcement use of DNA data (the section on 'ECtHR case law involving law enforcement use of DNA data'). In order to be classified under Article 8 ECHR, an aspect of the private life of an individual has to be affected. In the case at hand, it is the individual's personal data, or more specifically, genometric data as defined in the section on 'Genetic and Genometric Data in Europe and the ECtHR'.

Genometric data privacy boundaries

We posit that the ECtHR has set the boundaries or limitations around genometric data privacy that allow law enforcement to use genometric data in criminal investigations as may be surmised from the Court's jurisprudence. We identified four boundaries from ECtHR case law.

First, law enforcement should limit itself to the use of genometric data, that is, identification markers in the human genome that allow or confirm the unique identification of an individual—in this case, the criminal suspect(s). Data privacy concerns that may arise following the use of genetic data,which allow the use of information about the physiology or health of an individual, or of biometric data, which allow the use of physiological or behavioural characteristics, are addressed when law enforcement use genometric data instead (Fig. 2), such as in the case of QIAGEN's *ForenSeq Kintelligence System* discussed above. This boundary addresses the ECtHR's concern beginning with *Van der Velden* on the ability of DNA data to provide sensitive personal data beyond its ability to identify an individual.

Secondly, law enforcement should only store cellular samples whenever strictly necessary, i.e., only until the criminal case has been solved with finality without further recourse to appeal and within the legal retention limit. There are authors who claim that cellular samples can be classified as data,[134] and those who claim the opposite.[135] At the ECtHR level, however, cellular samples are classified as 'personal information'.[136] The ECtHR's main argument is that cellular samples 'contain' DNA, which is an individual's highly personal data.[137] It shows that the Court has taken a stand on the debate and even appears to provide greater protection to

132 BM Knoppers and MJS Beauvais, 'Three Decades of Genetic Privacy: A Metaphoric Journey' (2021) 30 Human Molecular Genetics R156, at R157.

133 Following the definition of privacy as 'a state of limited access to an individual or information about an individual' in Clayton and others (n 15) 4–5.

134 D Hallinan and P De Hert, 'Many Have It Wrong—Samples do Contain Personal Data: The Data Protection Regulation as a Superior Framework to Protect Donor Interests in Biobanking and Genomic Research' in B Mittelstadt and L Floridi (eds), *The Ethics of Biomedical Big Data* (Springer 2016). See also D Hallinan and M Friedewald, 'Open Consent, Biobanking and Data Protection Law: Can Open Consent be "informed" under the Forthcoming Data Protection Regulation?' (2015) 11 Life Sciences, Society and Policy 1; D Hallinan, 'Biobank Oversight and Sanctions under the General Data Protection Regulation' in S Slokenberga, O Tzortzatou and J Reichel (eds), *GDPR and Biobanking Individual Rights, Public Interest and Research Regulation Across Europe* (Springer 2021).

135 LA Bygrave, 'The Body as Data? Biobank Regulation via the Back Door of Data Protection Law' (2010) 2 Law, Innovation and Technology 1; LA Bygrave and L Tosoni, 'Article 4(1). Personal Data' in C Kuner, LA Bygrave and C Docksey (eds), *The EU General Data Protection Regulation (GDPR) A commentary* (OUP 2020).

136 ECtHR, *S. and Marper* (n 2), para 68.

137 'In addition to the highly personal nature of cellular samples, the Court notes that they *contain* much sensitive information about an individual, including information about his or her health. Moreover, samples *contain* a unique genetic code of great relevance to both the individual and his relatives', ibid para 72. See also para 120. [emphasis added]

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cellular samples than DNA profiles.[138] Hence, law enforcement should be more discerning in its storage of cellular samples, subject to appropriate safeguards such as their destruction upon the complete resolution of the case and within the time limit provided by law.

Thirdly, law enforcement should avoid familial searching, and should only resort to it when a case goes cold. When the ECtHR acknowledged the 'unique genetic code' found in DNA samples in *Marper*, it also recognized its 'great relevance' on the relatives of the individual concerned because they share part of this code and could be indirectly identified by it.[139] This is done for example through familial searching,[140] and more recently, through the use of genetic genealogy databases.[141] Connected to this, genometric data may also be used to identify the ethnic origin of an individual.[142] Although this ECtHR case law points to the direction of protecting the rights of genetic relatives, the Court has not yet decided on a case that specifically protects them. As rightly pointed out by Costello, the privacy of genetic relatives 'are occasionally recognised but nowhere substantively addressed' in ECtHR jurisprudence.[143] It would then be wise for law enforcement to only use familial searching and genetic genealogy database searching as a last resort. Each jurisdiction should set its rules given the peculiarities of their legal tradition in order to objectively assess whether law enforcement has exhausted all possible means before resorting to familial searching and genetic genealogy searching.

Fourthly, and corollary to the first, law enforcement should strictly use genometric data for criminal identification purposes. This limitation appears to be obvious given the definition of genometric data. However, as science develops, what could have been previously known as an insignificant portion of the DNA—that is, an identification marker and not a trait or health marker—may be discovered later as revealing sensitive personal information, as in the case of 'junk DNA',[144] and short tandem repeat (STR) profile data.[145] This fourth limitation is technology-proof in a sense that it is not affected by future breakthroughs in DNA technology, for example, when what is currently used by law enforcement as genometric data (as a sole identity marker) is later discovered by science as genetic data (as revealing physiological or health traits). The ECtHR noted as early as *Van der Velden* that 'given the use to which cellular material in particular could conceivably be put in the **future**' their systematic retention 'goes beyond the scope of neutral identifying features such as fingerprints'.[146] This conclusion in *Van der Velden* was criticized by the UK Government in *Marper* for 'speculat[ing] on the theoretical future use of samples'.[147] However, the Court did not yield to that criticism but rather reaffirmed it more strongly claiming that 'the Court cannot discount the possibility that **in the future the private-life interests bound up with genetic information** may be adversely affected in novel ways or in a manner which cannot be anticipated with precision today'.[148] Hence, law enforcement should consciously limit the use of whatever future scientific breakthroughs that may arise, that is, they should only be used in so far as they facilitate criminal identification.[149]

138 'Given the nature and the amount of personal information contained in cellular samples, their retention ***per se*** must be regarded as interfering with the right to respect for the private lives of the individuals concerned. That only a limited part of this information is actually extracted or used by the authorities through DNA profiling and that no immediate detriment is caused in a particular case does not change this conclusion [.]', ibid para 73. [emphasis added]

139 ibid para 72.

140 'The Court notes in this regard that the Government accepted that DNA profiles could be, and indeed had in some cases been, used for familial searching with a view to identifying a possible genetic relationship between individuals', ibid para 75.

141 CJ Guerrini and others, 'Four Misconceptions about Investigative Genetic Genealogy' (2021) 8 Journal of Law and the Biosciences 1; RA Wickenheiser, 'Expanding DNA Database Effectiveness' (2022) 4 Forensic Science International: Synergy 1.

142 'The Court further notes that it is not disputed by the Government that the processing of DNA profiles allows the authorities to assess the likely ethnic origin of the donor and that such techniques are in fact used in police investigations [.]', ECtHR, *S. and Marper* (n 2), para 76. It continues: 'The possibility the DNA profiles create for inferences to be drawn as to ethnic origin makes their retention all the more sensitive and susceptible of affecting the right to private life.'

143 Costello is advocating for a 'relational model of privacy'. She opines that both ECtHR and CJEU offer a 'nascent conception' of this model. See RA Costello, 'Genetic Data and the Right to Privacy: Towards a Relational Theory of Privacy?' (2022) 22 Human Rights Law Review 1, at 23.

144 SA Cole, 'Coming Clean about "junk DNA"'(2007) 102 Northwestern University Law Review Colloquy 107; DH Kaye, 'Please, let's Bury the Junk: The CODIS Loci and the Revelation of Private Information' (2007) 102 Northwestern University Law Review 70.

145 N Wyner, M Barash and D McNevin, 'Forensic Autosomal Short Tandem Repeats and their Potential Association with Phenotype' (2020) 11 Front Genet 1.

146 ECtHR, *Van der Velden* (n 1). [emphasis added]

147 ECtHR, *S. and Marper* (n 2), para 70.

148 ibid para 71. [emphasis added] It continues: 'Accordingly, the Court does not find any sufficient reason to depart from its finding in the *Van der Velden* case.'

149 In this sense, the use of genometric data is more acceptable *privacy wise* given that they are not used—although new scientific developments can make them more easily accessible—to elaborate on other characteristics of individuals such as but not limited to their propensity to genetic diseases or any other genetic characteristics that may be used to discriminate against them. This is also in line with a UN statement urging states 'to ensure that no one shall be subjected to discrimination based on genetic characteristics'. See UN Economic and Social Council, 'ECOSOC Resolution 2001/39 on Genetic privacy and non-discrimination' <https://www.un.org/en/ecosoc/docs/2001/resolution%202001-39.pdf> accessed 22 August 2024. See also UN Economic and Social Council, 'ECOSOC Resolution 2004/9 on Genetic privacy and non-discrimination' <https://www.un.org/en/ecosoc/docs/2004/resolution%202004-9.pdf> accessed 22 August 2024.

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Further studies on genometric data privacy

The identification of this new category of genometric data privacy will facilitate the classification of cases and jurisprudence involving law enforcement use of genometric data and would lend ease in their further study and the deepening of the value of this concept. It also provides the treatment of genometric data its proper place and recognition given its power in identifying humans *sans* medical, or other sensitive data, especially when it entails a possibility of curtailing their freedom when subjected to law enforcement processes.

As law enforcement continues to use genometric data for criminal investigation purposes, we expect a heightened discussion in the coming years on the concept of genometric data privacy. Our findings are limited to the ECHR regime following ECtHR jurisprudence. We are interested to know the findings of other legal scholars on the concept and development of genometric data privacy in their own jurisdictions of interest. A comparative study of their similarities, as well as their differences from the ECtHR jurisprudential perspective, would help in determining whether such a category exists universally albeit with its own jurisdictional nuances.

Conclusions

This article offers two main contributions to understanding law enforcement use of DNA data in criminal investigations within the ambit of Article 8 ECHR on the right to respect for private life. First, we introduced the new term 'genometric data' as distinct from the two existing terms—genetic and biometric data—that are currently defined under the CoE Convention 108+, GDPR, and LED. We define *genometric data* as personal data resulting from specific technical processing relating to identification markers in the human genome, which allow or confirm the unique identification of an individual.

Secondly, we observe that in the course of adjudicating law enforcement use of DNA data in criminal investigations, the ECtHR has created a distinct category of genometric data privacy under the right to respect for private life. We define *genometric data privacy* as an interest that individuals and their genetic relatives have over their genetic data that can be used to identify them individually, whether directly or indirectly, within the bounds of data protection and privacy laws. We identified genometric data privacy limitations set by the ECtHR in its jurisprudence for law enforcement use of genometric data.

The use of genometric data within the boundaries of genometric data privacy allows law enforcement to focus on their criminal investigative work without getting entangled with excessive data privacy considerations. This development will be critical for the further development of data privacy law and for ensuring a continued high level of protection in view of the proliferation of DNA-based identification techniques while at the same time allowing law enforcement to solve crimes.

Conflict of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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