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Iran's Legislative Criminal Policy Toward Genetic Damages: A Comparative Study with French Law

1. Masoumeh Sadat. Yazdani[1] : Ph.D. student, Department of Law, ShK.C., Islamic Azad University, Shahrekord, Iran
2. Khatereh. Shahinfard[2*]: Department of Law, ShK.C., Islamic Azad University, Shahrekord, Iran
3. Karim. Salehi [3]: Department of Law, ShK.C., Islamic Azad University, Shahrekord, Iran
4. Abbas. Dousti [4]: Associate Professor, Biotechnology Research Center, ShK.C., Islamic Azad University, Shahrekord, Iran

*corresponding author's email: shahinfard@iau.ac.ir

ABSTRACT

Iran's legislative criminal policy regarding damages resulting from genetic actions has, over the past two decades, required reconsideration and modernization under the influence of rapid advances in the biological sciences. In Iran, existing regulations are mainly found within medical laws, bioethical guidelines, and certain scattered criminal provisions. However, a coherent and comprehensive system for prevention, liability determination, and criminal response to genetic harm has yet to be established. This research, adopting a descriptive analytical approach and a comparative study of French law, seeks to analyze the legislative frameworks of both systems and assess their effectiveness in addressing risks arising from genomic interventions. In French law, through the enactment of the Bioethics Law and its periodic revisions, the scope of criminal and civil liability in genetic matters has been more precisely defined. Genomic interventions, prohibited manipulations, protection of human dignity, and related criminal sanctions are explicitly regulated. Comparative analysis shows that Iran's criminal policy largely rests on general legal principles and broad criminal norms. Consequently, it faces significant gaps in coping with emerging technologies such as genome editing, advanced IVF, or the storage and dissemination of genetic data. The findings indicate that for Iran to establish an effective criminal policy framework, it must move toward enacting a comprehensive bioethics law, clearly delineate the responsibilities of researchers and medical institutions, criminalize specific high risk genetic behaviors, and create a specialized supervisory system. Such measures would safeguard citizens' dignity and health while enabling the legitimate development of genetic technologies.

Keywords: *Legislative Criminal Policy, Genetic Actions, Genetic Damages, Comparative Study, French Law*

Introduction

Rapid advances in genetic technologies, including genome editing and genomic data analysis, have created extensive capacities for the diagnosis, prevention, and treatment of diseases. However, these developments have simultaneously raised concerns regarding human dignity, genetic discrimination, privacy, and unknown clinical consequences (1, 2). Such challenges demonstrate that legal systems must actively move toward designing forward-looking criminal policies that can balance the legitimate use of the life sciences with control over their potential risks.

The emergence of CRISPR-Cas9 was a turning point in genome engineering, enabling precise DNA editing. Yet scientific studies continue to report off-target mutations, unpredictable effects, and uncertainty in clinical outcomes (3, 4). The persistence of such risks highlights the importance of legislative intervention to establish safety parameters, design regulatory regimes, and articulate liability in genomic interventions, particularly in areas such as human gene therapy and predictive genetic testing.

In Iran, much of the regulation of the genetic field is inferred from general principles of the Islamic Penal Code and general rules of liability. Provisions such as Articles 158 and 492, which address the legitimacy of medical procedures and fault-based liability, provide broad frameworks but lack the precision and clarity needed to address complex technologies such as genome editing or individualized genetic data analysis (5). As a result, damages arising from genomic interventions are often analyzed through broad rules such as causation, an approach that is not well suited to the nuance and complexity of modern biotechnologies.

In contrast, the French legal system, grounded in the 1994 Bioethics Acts and their later reforms, has developed a coherent and preventive structure for controlling genetic technologies (6). This system criminalizes genetic testing without consent under Article 226-25 of the French Penal Code and classifies genetic data as highly sensitive data under GDPR regulations (7, 8). Recent studies also show that restrictions, such as bans or limitations on genetic phenotyping, have been implemented to prevent privacy violations and the misuse of individuals' biological information (9).

A review of the literature reveals that most international research has focused on bioethical issues, data rights, and biomedical risks associated with genetic technologies, while less attention has been paid to analyzing the criminal policy of this field (10, 11). In Iran, research has also primarily been grounded in jurisprudential principles such as non-harm and human dignity, and has rarely attempted to analyze, in a specialized manner, the connection between emerging genomic technologies and the criminal justice system (12, 13). Moreover, existing comparative studies between Iran and France have largely remained theoretical and have not practically examined penal regulations in areas such as CRISPR, genetic databases, or predictive testing. This research gap underscores the need for a study that analyzes the criminal policies of both legal systems within the context of genetic technologies.

The innovation of the present study lies in the fact that, for the first time, it comparatively analyzes the criminal policies of Iran and France with a focus on emerging genetic technologies. By integrating Iranian jurisprudential principles, such as maslahat, human dignity, and the prohibition of harm, with France's structured bioethical framework, this research offers a model for forward-looking regulation. Through reinterpreting scattered provisions of the Islamic Penal Code from a technology-oriented perspective and comparing them with France's codified system, it proposes a new framework for defining the boundaries of legitimacy, liability, and protection of genomic data, a framework that can serve as a foundation for modern and specialized legislation in Iran.

Methodology

This study adopts a qualitative, descriptive-analytical, and comparative legal approach. In accordance with the nature of qualitative legal research, the study does not employ quantitative concepts such as independent and dependent variables or statistical hypothesis testing. Instead, the analysis is based on the interpretation of legal texts, jurisprudential principles, and regulatory frameworks related to genetic harms. The research is guided by several key questions: how genetic harms are conceptualized in Iranian and French law; what criminal policy mechanisms each legal system has developed to prevent and address such harms; what role Islamic jurisprudential

principles, particularly tasbīb, the principle of la darar, and the protection of lineage, play in establishing liability for genetic harms in the Iranian legal system; how secular bioethical principles and statutory regulations shape the French legal approach to genetic harms; what the main strengths and weaknesses of each system are from a comparative perspective; and which elements of the French regulatory model may be adaptable to the Iranian legal context. The data used in this research were collected through library-based sources, including statutory provisions, jurisprudential writings, judicial decisions, academic literature, and relevant international documents. The analytical process was carried out in three main stages. First, a descriptive stage examined the legal rules, jurisprudential foundations, and bioethical frameworks governing genetic issues in both countries. Second, a comparative stage identified and evaluated similarities and differences between the two legal systems. Third, an analytical and interpretive stage explored the underlying principles of each system in order to provide a balanced assessment of their respective strengths and limitations and to formulate practical legislative and policy recommendations suited to the Iranian legal framework in addressing genetic harms.

Results

Theoretical and Comparative Foundations

Modern genetic technologies, particularly the CRISPR-Cas9 system, represent a turning point in the life sciences and have enabled precise genome editing. These technologies offer major capacities for treating genetic diseases, modifying genomes, and improving diagnostic methods. However, alongside these achievements, concerns have arisen regarding the manipulation of future generations, unintended mutations, and potential misuse in both medical and non-medical domains. This duality between opportunity and risk highlights the necessity of ethical and legal frameworks.

In the Iranian legal system, regulations related to genetics are scattered and decentralized. Existing laws are mainly identifiable in instruments such as the 2009 Biosafety Law, the 2006 Code of Ethics for Biomedical Research, and certain provisions of the Islamic Penal Code. This fragmentation has prevented the development of a unified and coherent framework specific to bioethical issues, resulting in an approach that relies heavily on jurisprudential interpretations and general legal principles when confronting emerging technologies. Consequently, ambiguity increases regarding the boundaries of liability, mechanisms for controlling genetic consequences, and the protection of individuals' rights.

In France, the situation is entirely different. Since 1994, with the adoption of the first Bioethics Law, France has established a codified and systematic framework for regulating biotechnologies. Subsequent reforms in 2004, 2011, 2021, and 2025 have continuously updated and aligned this framework with scientific advancements. This approach has ensured that key issues such as gene editing, the use of genetic data, and liability arising from genetic interventions benefit from clear and enforceable legal foundations.

A comparison of the two countries shows that, in Iran, most legal rules stem from general and jurisprudential principles, with limited specialized legislation concerning genetic technologies. In contrast, France, by adopting an integrated and preventive legislative model grounded in international bioethical standards, has succeeded in providing a transparent and updated framework for genetic interventions. This structural difference enables the French legal system to respond more effectively to emerging genetic challenges, whereas Iran still requires the development of comprehensive and specialized legislation in this field.

Foundations of Criminal Policy: Islamic Jurisprudence in Iran and Secular Bioethics in France

In Iran, legislative criminal policy in the field of genetics is rooted in Islamic jurisprudential and religious principles. Principles such as “no harm and no harassment” (la darar wa la dirar), preservation of human dignity, protection of lineage, and public interest play central roles. Therefore, any genetic intervention must be conducted in a manner that does not harm future generations and remains consistent with human dignity. Specifically, in cases such as therapeutic somatic gene therapy, religious rulings generally permit such procedures, provided that informed consent is obtained and no harm is inflicted upon future generations. Moreover, in situations involving interventions that fundamentally alter divine creation, Islamic jurisprudence may consider criminalization mechanisms such as “corruption on earth” (fasad fi al-ard) for actions such as human cloning.

Alongside these jurisprudential principles, the rule of tasbib, or causation, also applies in genetic matters. This rule imposes legal liability in cases where a genetic intervention results in harm to another person. In the Iranian legal system, genetic interventions must align with public interest and comply with religious norms in order to maintain their legitimacy. These principles ensure that every scientific advancement in genetics remains subject to rigorous religious and ethical oversight.

In contrast, in France, the foundations of criminal policy are secular and grounded in bioethics and human rights. French laws concerning genetics are primarily based on principles such as autonomy, non-maleficence, and justice, which stem from Kantian philosophy and international human rights instruments. This approach is founded on the belief that individuals should have the ability to control and make decisions regarding genetic interventions that concern them, particularly when such interventions pose no harm to their health or life. For this reason, French legislators closely monitor genetic interventions and employ legal tools such as Article 226-25 of the Penal Code to address unlawful actions.

Furthermore, specialized institutions such as the National Consultative Ethics Committee (CCNE) and personal data protection laws such as the GDPR establish regulatory frameworks for genetic interventions in France. These institutions play a key role in overseeing genetic research and aim to balance scientific progress with the protection of individual rights. Ultimately, criminal policy in France places particular emphasis on preventing genetic harms and creating a transparent system for regulating interventions in this field.

Key Similarities Between the Criminal Policies of Iran and France

Despite the fundamental differences between the criminal policies of Iran and France in the field of genetics, notable similarities can also be observed in both legal systems. One of the most important similarities is the shared emphasis on informed consent. In both countries, before any genetic intervention is carried out, individuals must provide consent knowingly and with full awareness of the potential risks and benefits of such interventions. This principle is recognized in both systems as a fundamental ethical and legal requirement and plays an important role in protecting individual rights.

Another key similarity is the special attention given to the protection of genetic data and privacy. In Iran, this issue is generally addressed within the framework of constitutional principles and human rights, particularly with regard to safeguarding personal security and privacy. In France, strict regulations such as the General Data Protection Regulation (GDPR) exist to protect personal and genetic data, especially in the context of genetic

research and interventions. These regulations are designed to prevent misuse and violations of individual rights in relation to sensitive genetic information.

Furthermore, both countries rely on ethics committees and specialized authorities to supervise genetic interventions. In Iran, the Jurisprudential–Medical Council is responsible for reviewing ethical and religious issues related to genetics. In France, this role is undertaken by the National Consultative Ethics Committee (CCNE). These institutions function as preventive mechanisms in both countries and aim to prevent unauthorized or unethical genetic interventions. Although in Iran these principles are examined primarily from a jurisprudential and religious perspective, in France supervision is conducted from a secular bioethical standpoint. Nevertheless, the common objective in both systems is the protection of public health and individual rights.

Table 1: Key Similarities Between Iran and France in the Field of Genetic Criminal Policy

Feature	Iran	France
Informed consent	Emphasis on obtaining informed consent before any genetic intervention	Emphasis on informed consent with full disclosure of risks and benefits
Protection of genetic data	Protection based on constitutional principles and human rights norms	Strict regulations such as the GDPR for protecting genetic and personal data
Specialized oversight	Jurisprudential–Medical Council overseeing ethical and religious issues	National Consultative Ethics Committee (CCNE) overseeing genetic interventions
Common objective	Protecting individual rights and preventing harm to future generations and society	Protecting individual rights and preventing misuse and privacy violations
Oversight approach	Jurisprudential and religious	Bioethical and secular

The above table highlights the main similarities between the criminal policies of Iran and France in the field of genetics. Both countries emphasize the necessity of informed consent as a prerequisite for any genetic intervention and regard it as an important safeguard for individual rights. Moreover, the protection of genetic data and privacy is considered essential in both systems, although Iran mainly relies on constitutional and human rights principles, whereas France applies explicit regulatory frameworks such as the GDPR. Supervision of genetic interventions is also carried out through specialized institutions and ethics committees in both countries. While the Iranian approach is more strongly influenced by jurisprudential and religious considerations, the French system relies on secular bioethical principles. Nevertheless, the shared goal of both systems is the protection of individual rights, public health, and the prevention of potential genetic harms.

Structural and Functional Differences Between the Two Systems

The structural and functional differences between Iran's and France's criminal policies in the field of genetics are significant and profound. In Iran, criminal policy in this area is largely fragmented and general, and it lacks a comprehensive "bioethics mother law." In other words, there is no unified or explicit legal framework governing genetic interventions, and criminalization is mainly carried out under broad legal categories such as causation (tasbib) and corruption on earth (fasad fi al-ard). These approaches often involve severe punishments that are not aligned with the technical features and scientific complexities of genetic science. Additionally, oversight in Iran is generally limited and non-synchronous, and infrastructures such as a national DNA database, which could greatly assist in regulating and managing genetic interventions, have not yet been fully developed.

In contrast, France, as a country with a more advanced legal system in this domain, possesses an integrated and codified legal framework that is regularly updated through periodic revisions. French laws include specific and well-defined criminal provisions that are carefully tailored to the scientific and technical characteristics of genetic

interventions. Oversight in France is also specialized and institutionalized, with bodies such as the CNIL (National Commission on Informatics and Liberties), the Agence de la biomédecine (French Biomedicine Agency), and the ANSM (National Agency for the Safety of Medicines and Health Products) playing key supervisory roles. This institutional structure provides regular, timely, and systematic monitoring of genetic procedures and interventions, resulting in a more preventive and effective criminal policy.

Table 2: Structural and Functional Differences Between Iran and France in Genetic Criminal Policy

Feature	Iran	France
Legal framework	Fragmented and general; lacks a comprehensive bioethics law	Integrated and codified framework with periodic revisions
Criminalization	Broad categories such as tasbib and fasad fi al-ard	Specific and precise offences tailored to genetic technologies
Punishments	Often severe and not fully aligned with technical characteristics	Proportionate and designed according to scientific features
Oversight	Limited and irregular supervision; weak infrastructure, such as an incomplete national DNA database	Specialized and institutionalized monitoring mechanisms
Supervisory bodies	Limited and dispersed institutions	CNIL, Agence de la biomédecine, ANSM, and other regulatory bodies
Overall approach	More reactive than preventive	Preventive, systematic, and more effective

This table illustrates the fundamental structural and functional differences between Iran's and France's criminal policies regarding genetic interventions. While Iran lacks a unified legal framework and specialized laws for this domain, France, with its codified legislation, specialized oversight bodies, and precise criminal provisions aligned with scientific concepts, pursues a more preventive and effective criminal policy. These differences are clearly reflected in the systems of oversight, criminalization, and punishment, significantly influencing the overall effectiveness of each country's criminal policy in the field of genetics.

Concept and Domains of Genetic Harms

In this study, genetic harms are defined as unintended, adverse, and sometimes unpredictable consequences of genetic technologies that may produce biological, social, legal, and ethical effects. These harms include off-target mutations in gene editing, violations of genetic privacy, genetic discrimination, and ecological risks associated with the release of genetically modified organisms.

In Iran, the understanding of genetic harms is largely shaped by religious legal, or fiqh-based, principles. Concepts such as harm to future generations and compatibility with divine creation play a central role in evaluating the permissibility of genetic interventions. Under this framework, interventions must not endanger future generations and must be consistent with religious norms. The key domains of concern include medical harms, such as errors in gene therapy and prenatal screening; environmental risks, including genetically modified organisms; and issues related to data privacy and human rights.

In France, the concept of genetic harms is framed within a secular, rights-based, and bioethical perspective. Principles such as individual autonomy, justice, non-discrimination, environmental protection, and strong data privacy standards are emphasized. Although genetic harms are multidimensional in both countries, the medical domain remains the primary and most critical area of concern in each system.

Response to the Main Research Question and Sub-Questions

A comparative assessment of Iran's and France's criminal policy toward harms arising from genetic technologies reveals fundamental differences. Iran's legislative criminal policy is largely reactive, fiqh-based, and grounded in scattered regulations and broad criminal provisions. The country lacks a comprehensive bioethics law specifically addressing genetic interventions, and regulatory oversight is mostly structured through general and sometimes ambiguous provisions. As a result, there is no dedicated mechanism for precise regulation, supervision, or accountability in this domain.

In contrast, France has adopted a systematic, preventive, and codified approach. The Bioethics Laws of 2021/2025, along with their supplementary regulations, form a coherent framework for managing genetic risks. These laws include explicit prohibitions on certain genetic interventions, strict limits on germline editing, and strong protections for genetic data. The underlying principles include safeguarding individual rights, promoting justice, ensuring transparency, and protecting the environment.

The examination of sub-questions highlights Iran's structural challenges, including the absence of a comprehensive law, weak regulatory oversight, ambiguity in legal responsibility, and socio-legal uncertainties. Nevertheless, conditional adaptation of elements of the French model is feasible, provided that such mechanisms are localized and aligned with Iran's religious and cultural context.

Testing the Research Hypotheses

The study's findings confirm the main hypothesis as well as all subsidiary hypotheses. The main hypothesis stated that Iran's legislative criminal policy in the field of genetic harms is fiqh-centered, fragmented, and in need of a comprehensive law, whereas France operates within a unified and rigorous legal framework. Comparative analysis strongly confirms this hypothesis. The first subsidiary hypothesis stated that although both countries possess multiple regulations related to genetics, France demonstrates significantly greater legal comprehensiveness, coherence, and regulatory oversight. This hypothesis is confirmed. The second subsidiary hypothesis stated that structural challenges in Iran, including weak supervision, the absence of a comprehensive bioethics law, and ambiguity in responsibility and causation, are clearly identifiable. This hypothesis is also confirmed. The third subsidiary hypothesis stated that conditional borrowing from the French model is possible for Iran, provided that religious, cultural, and social considerations are respected and localized. This hypothesis is likewise confirmed.

Incomplete Coverage of Legislative Criminal Policy Components

One of the main limitations of the present study is that it does not fully address all components of legislative criminal policy. In criminal law theory, legislative criminal policy generally consists of three main dimensions: criminalization, punishment, and criminal procedure. The current analysis has mainly focused on the first two elements, namely the criminalization of harmful genetic interventions and the determination of sanctions, while the procedural dimension has received insufficient attention.

In cases involving genetic harms, the procedural framework is particularly important. It is necessary to clarify which judicial authorities have jurisdiction over such cases, whether complaints should be filed before general criminal courts or specialized medical tribunals, and how genetic evidence is collected and evaluated during the

investigation. Questions also arise regarding the role of forensic medicine institutions, the standards for expert testimony in genetic analysis, and the procedural safeguards required when handling sensitive genetic data. Without addressing these procedural aspects, the evaluation of criminal policy remains incomplete. Therefore, future research should integrate criminal procedure into the analysis in order to present a more comprehensive picture of how legal systems respond to genetic harms.

Absence of Explicit Legal Provisions in Iranian Law

Another limitation concerns the insufficient reference to specific statutory provisions in the Iranian legal system. Although the study notes that certain genetic interventions could theoretically fall under general criminal categories such as causation (tasbib) or, in extreme circumstances, corruption on earth (fasad fi al-ard), the article does not sufficiently identify concrete legal articles that explicitly regulate genetic harms.

In practice, Iranian criminal law does not contain a specific offence addressing genetic error or genetic harm as an independent crime. Instead, liability is generally derived from broader legal provisions related to bodily injury, medical malpractice, or harm caused by negligent conduct. For instance, under the Islamic Penal Code, harm to bodily integrity may lead to financial compensation in the form of diyah, or blood money, or other forms of civil liability. Consequently, the assertion that Iranian criminal law imposes particularly severe penalties for genetic harms requires careful qualification, as the legal framework currently relies mainly on general provisions rather than specialized criminal statutes.

This structural gap demonstrates the absence of a dedicated legal framework addressing the unique characteristics of genetic technologies and their potential risks.

Lack of a Unified Comparative Benchmark

A further methodological issue concerns the absence of a clearly defined comparative benchmark between the Iranian and French legal systems. In comparative legal studies, an effective comparison requires a shared analytical criterion. Examples of such criteria could include the criminal response to germline gene editing, liability for medical errors in genetic therapy, or the legal protection of genetic data.

In the present study, the comparison sometimes takes the form of a descriptive presentation of the regulatory frameworks of each country rather than a structured comparison based on a common legal issue. Without a unified benchmark, the analysis risks becoming a parallel description rather than a true comparative evaluation. Future research should therefore adopt a clearly defined comparative axis in order to provide a more rigorous and analytically coherent comparison between the two legal systems.

Insufficient Use of Judicial Decisions and Jurisprudential Opinions

The study also lacks sufficient reference to judicial decisions and authoritative jurisprudential opinions. In Iran, religious jurisprudence plays a significant role in shaping legal interpretations, especially in areas related to biomedical ethics and emerging technologies. Fatwas issued by prominent religious authorities, as well as interpretations endorsed by institutions such as the Guardian Council, often influence legislative policy and legal reasoning.

Similarly, in France, judicial decisions and the opinions of regulatory bodies can provide valuable insight into how bioethical norms are applied in practice. Decisions by administrative courts, rulings related to the protection of

genetic data, and opinions issued by regulatory authorities such as the CNIL or the National Consultative Ethics Committee contribute to the practical implementation of bioethical regulations.

The absence of such sources limits the empirical depth of the analysis. Integrating judicial precedents and jurisprudential opinions would strengthen the study and provide a clearer understanding of how legal principles operate in real cases.

Practical Implications of the Difference Between Religious and Secular Normative Frameworks

Although the study notes that Iran's legal framework is influenced by Islamic jurisprudence while France relies on secular bioethical principles, the practical implications of this distinction require deeper analysis. In many cases, both legal systems reach similar regulatory outcomes despite relying on different normative foundations.

For example, both countries impose significant restrictions on germline genetic modification, particularly when such interventions may affect future generations. However, the reasoning behind these restrictions differs. In the Iranian legal context, concerns may be framed in terms of preserving lineage, avoiding harm to future generations, and respecting the integrity of divine creation. In France, similar limitations are typically justified through principles such as human dignity, precaution, and the protection of fundamental rights.

Understanding these differences is essential for a meaningful comparative analysis, as it highlights how distinct philosophical and legal traditions can produce convergent regulatory outcomes while relying on different normative justifications.

Limitations in the Use of Criminal Law Sources

Another limitation of the research concerns the nature of the sources used. A considerable portion of the literature referenced in the study originates from fields such as bioethics, medical law, and biomedical sciences. While these sources are valuable for understanding the ethical and scientific dimensions of genetic technologies, a comprehensive analysis of criminal policy also requires stronger engagement with core criminal law scholarship.

In particular, comparative criminal law literature, theoretical discussions on criminalization, and doctrinal analyses of liability and punishment should be more extensively incorporated. The integration of these sources would provide a stronger legal foundation for evaluating how criminal law systems respond to the risks associated with genetic technologies.

Need for More Concrete and Operational Policy Recommendations

The recommendations proposed in the study remain relatively general and could benefit from greater specificity. The suggestion that Iran should adopt a comprehensive bioethics law, while valuable, requires further elaboration regarding its possible institutional structure and substantive provisions.

A more detailed proposal would address issues such as the scope of permissible genetic interventions, the criminalization of unauthorized genetic experimentation, the protection of genetic data, and the establishment of specialized oversight bodies. In addition, such legislation would need to ensure compatibility with existing jurisprudential principles and cultural considerations within the Iranian legal system. Providing clearer legislative models would increase the practical relevance of the study.

Methodological Considerations in Legal Research

The methodological framework of the research also requires clarification. Some elements of the study adopt terminology commonly associated with quantitative research, such as references to independent and dependent variables or the confirmation of hypotheses. However, doctrinal and comparative legal research typically relies on qualitative analysis rather than statistical testing.

Legal scholarship generally focuses on interpretive analysis of statutes, judicial decisions, and doctrinal arguments. Accordingly, framing the study primarily in terms of research questions and analytical discussion, rather than empirical hypothesis testing, would better align the methodology with established approaches in legal research.

Lack of Explicitly Stated Research Questions

Another structural issue concerns the absence of a clearly defined section presenting the research questions. Although the central concerns of the study can be inferred from the text, they are not explicitly formulated in a separate and transparent manner.

Clearly articulated research questions help guide the reader and structure the analysis. They also provide a clear framework for evaluating whether the objectives of the research have been successfully achieved. Future revisions of the study should therefore include a dedicated section outlining the main research question and the subsidiary questions addressed in the comparative analysis.

Balanced Comparative Evaluation

Finally, a rigorous comparative analysis requires a balanced evaluation of both legal systems. Comparative legal research should identify not only the strengths of one system but also the limitations and challenges present in each framework.

While France provides a more comprehensive and codified regulatory system for genetic technologies, it also faces ongoing debates concerning the limits of biomedical innovation, privacy protection, and ethical oversight. Similarly, although the Iranian legal system lacks specialized legislation in this field, it possesses normative resources derived from jurisprudential principles that may offer valuable perspectives for regulating emerging technologies.

A balanced approach that critically examines both systems can contribute to a more nuanced understanding of how different legal traditions address the challenges posed by modern genetic technologies.

Table 3: Balanced Comparative Evaluation of Iran and France in Regulating Genetic Technologies

Comparative aspect	Strengths of Iran	Weaknesses of Iran	Strengths of France	Weaknesses of France
Legal framework	Strong jurisprudential principles such as preservation of lineage, prohibition of harm, and precautionary reasoning	Lack of specific legislation addressing genetic technologies and genetic harm	Comprehensive and codified legal framework governing genetics and biotechnology	Regulatory complexity and occasional ambiguity in statutory interpretation
Criminal policy structure	Flexibility through jurisprudential interpretation and adaptability of Islamic legal principles	Lack of systematic criminal policy and reliance on general legal provisions	Structured and coherent criminal policy supported by detailed legislation	In some cases, restrictive policies may limit scientific innovation
Supervision and enforcement	Ethical and religious oversight can influence responsible regulation	Absence of specialized regulatory bodies dedicated to genetic technologies	Presence of specialized regulatory and supervisory institutions,	Administrative procedures can be complex and bureaucratic

			such as CNIL and bioethics authorities	
Protection of genetic data	Strong ethical emphasis on privacy and protection of personal dignity	No specific legal framework dedicated exclusively to genetic data protection	Clear and strict legal protections for genetic and biomedical data	Potential institutional disagreements in interpretation and enforcement
Scientific and medical innovation	Potential adaptability of jurisprudential reasoning to new technologies	Legal uncertainty may discourage innovation due to unclear liability frameworks	Legal support for scientific research within regulated ethical boundaries	Regulatory restrictions may sometimes slow advanced research
Balance between ethics and science	Deeply rooted moral and ethical principles guiding biomedical practices	Scientific and regulatory frameworks are less institutionalized	Attempts to balance scientific progress with human dignity and bioethical standards	Continuing ethical debates regarding the limits of biotechnology and biomedical experimentation

Discussion

Informed Consent in Genetic Interventions

In both the Iranian and French legal systems, informed consent constitutes a fundamental and indispensable principle governing genetic interventions. In Iran, this principle carries particular significance due to its alignment with religious and fiqh-based norms. Before any genetic procedure is performed, individuals must provide informed consent with full awareness of the risks, benefits, and potential consequences of the intervention. This requirement is especially emphasized in areas such as gene therapy and prenatal screening, where it functions as both an ethical and religious obligation aimed at safeguarding individual rights and human dignity.

In France, informed consent is also recognized as a foundational principle within human rights law and medical ethics. Guided by legal and ethical standards, individuals must receive complete, transparent, and comprehensible information regarding genetic interventions. This includes potential risks, expected outcomes, and possible social and legal implications. Such an approach is strongly embedded in France's bioethics policies, where informed consent is viewed as an essential mechanism for upholding individual autonomy.

In both countries, the responsibility for ensuring valid informed consent lies with physicians and genetic specialists. In Iran, Islamic jurisprudence, grounded in principles such as the protection of human dignity and the public interest, requires physicians to provide clear and comprehensive counseling so that patients are fully aware of their rights and can make decisions free from coercion. Similarly, in France, medical professionals must furnish precise, transparent, and understandable information, enabling individuals to make decisions based on full knowledge and free choice.

Ultimately, both systems emphasize that informed consent must never be obtained under pressure or coercion. In France, this requirement is explicitly embedded in the Bioethics Law of 2021/2025, mandating that genetic interventions may proceed only when consent is given freely and voluntarily. In Iran, the same principle is recognized as both a legal and religious necessity, acting as a safeguard against violations of individual rights.

Protection of Genetic Data and Privacy

The protection of genetic data and individual privacy constitutes a central concern in the criminal policy approaches of both Iran and France regarding genetic technologies. In Iran, this issue is grounded in constitutional principles and human rights norms. Existing legal provisions, particularly those addressing privacy and personal data protection, emphasize the security and confidentiality of genetic information. In contexts such as gene therapy and prenatal screening, the state and regulatory bodies are obligated to safeguard privacy and prevent unauthorized

disclosure. Moreover, fiqh-based principles such as avoiding harm to future generations and preserving human dignity reinforce the perception of genetic data protection as a serious ethical and legal responsibility.

In France, the protection of genetic data and privacy is governed by stringent rules, most notably the General Data Protection Regulation. These regulations offer robust protection for sensitive genetic information and impose strict limitations on unauthorized access or processing. In addition, France relies on supervisory bodies such as the National Commission on Informatics and Liberties, which actively monitors data protection practices, ensures compliance, and prevents misuse of genetic information. These institutions work continuously to uphold individual rights and mitigate risks of privacy violations in the handling of sensitive genetic data.

In both countries, genetic data are classified as highly sensitive personal information requiring comprehensive protection against unauthorized access, disclosure, or misuse. In Iran, this protection is largely framed within constitutional principles and religious legal norms, with a focus on safeguarding personal security and preventing harm to individuals. In France, national legislation operates alongside human rights standards and international norms, further strengthening protections for genetic data and ensuring that access to such information occurs only with informed and lawful consent.

Ultimately, both systems recognize the protection of genetic data as an ethical and legal priority. Despite the structural differences between fiqh-based and secular frameworks, Iran and France share a common objective: the protection of individual rights and the prevention of any form of unauthorized use or violation of genetic privacy.

Specialized Oversight and Ethical Committees

Specialized oversight and ethical committees play a crucial role in regulating and controlling genetic interventions in both Iran and France. In Iran, supervision over genetic interventions is primarily exercised through religious and professional bodies, including fiqh-based medical councils and advisory committees. These bodies evaluate the ethical and religious aspects of genetic technologies and make decisions grounded in Islamic jurisprudential principles such as the preservation of human dignity, the prevention of harm to future generations, and respect for divine creation. Because Iran lacks a comprehensive and specialized legal framework specifically governing genetic interventions, oversight often operates indirectly through religious authorities and professional guidance. Consequently, regulatory supervision remains relatively fragmented and is largely dependent on religious interpretations and ethical opinions rather than on a centralized institutional structure.

In France, by contrast, oversight of genetic interventions is highly institutionalized and specialized. Several regulatory bodies are responsible for supervising genetic research and medical practices, including the National Consultative Ethics Committee (CCNE), the French Biomedicine Agency (Agence de la biomédecine), and the National Agency for the Safety of Medicines and Health Products (ANSM). These institutions operate within a comprehensive and updated bioethical legal framework and conduct continuous monitoring of genetic research and the application of genetic technologies. Ethical committees in France evaluate not only the scientific and technical aspects of genetic interventions but also their ethical, social, and human rights implications. This organized and systematic oversight enables France to adopt a preventive and effective approach to the regulation of genetic technologies.

Despite the differences between the religious-based framework in Iran and the secular bioethical framework in France, both countries emphasize the necessity of ethical and specialized supervision of genetic interventions. In Iran, oversight is mainly conducted from a religious and jurisprudential perspective, whereas in France it is guided

by bioethical principles and secular regulatory standards. In both systems, the central objective of such supervision is to prevent harm to individuals, society, and future generations.

Ultimately, both legal systems recognize oversight as an essential instrument for safeguarding genetic security and protecting human rights. However, the Iranian system may benefit from strengthening specialized oversight mechanisms and establishing more independent and legally structured institutions in this field, which could enhance the effective governance of emerging genetic technologies while ensuring the protection of societal interests.

Differences Between Fiqh-Based and Secular Approaches

Fundamental differences between Iran's fiqh-based approach and France's secular framework significantly shape the criminal policy of both countries toward genetic interventions and related legal decision-making. In Iran, the dominant perspective on genetic technologies is rooted in Islamic jurisprudence and religious norms. Genetic interventions are assessed through principles such as the preservation of human dignity, the prevention of harm to future generations, and respect for divine creation. Because Iranian legislation is heavily influenced by Islamic jurisprudence, regulatory and legal decisions in the field of genetics are closely aligned with religious and fiqh-based standards. For example, in areas such as somatic gene therapy or human cloning, religious rulings, or fatwas, play a decisive role, with legal and ethical assessments grounded in religious considerations and Islamic notions of public interest. As a result, certain genetic technologies in Iran face specific religious limitations and enhanced fiqh-based oversight.

In contrast, France's approach is fundamentally secular and guided by principles of human rights, justice, and individual autonomy. Criminal policy in this context emphasizes respect for personal freedoms and social equity. Genetic interventions in France are regulated within a bioethical and human rights framework, where significant weight is placed on individual autonomy and a person's ability to make informed decisions about their own body and genetic information. In this system, no religious or theological pressure influences regulatory decisions. Instead, ethical and legal determinations rely on scientific evidence, social considerations, and human rights standards, with a focus on balancing individual welfare and broader societal interests. Consequently, legal oversight in France is grounded in secular values such as respect for individual liberty, informed consent, and social justice.

Another essential difference is the central role of jurisprudential principles in Iran, particularly the protection of lineage and the safeguarding of divine creation, both of which directly shape legal and regulatory decisions. In France, these concepts are replaced by human rights-based notions such as justice, individual autonomy, and social utility, which are analyzed primarily through rational and ethical lenses rather than religious ones. These divergent foundations influence not only the structure of legal decision-making but also the broader societal understanding and acceptance of genetic interventions and emerging genetic technologies.

Ultimately, while Iran's fiqh-based framework may generate certain limitations on the development and application of advanced genetic technologies, France's secular approach, grounded in scientific reasoning and human rights principles, allows these technologies to advance within a structured legal and bioethical framework. These differences result in distinct genetic policies in each country, reflecting their cultural, religious, and legal foundations.

The Shared Objective: Protecting Individual Rights and Public Health

The shared objective underlying the criminal policies of both Iran and France in the field of genetics is the protection of individual rights and the preservation of public health. In both systems, genetic interventions are permitted only insofar as they do not harm individuals and are capable of generating broader social benefits. In Iran, this objective is articulated within a fiqh-based and religious framework, grounded in principles such as the preservation of human dignity and the prevention of harm to future generations. Accordingly, any genetic intervention must serve the protection of future generations and safeguard the physical and psychological well-being of individuals. Legal and religious oversight is thus directed toward ensuring that such interventions neither endanger society nor contradict the overarching interests of the public.

In France, the same overarching goal is pursued, but within a secular, human rights-based framework. French genetic legislation is guided by principles such as justice, individual autonomy, and the protection of fundamental rights. Under this approach, genetic interventions must be performed in a manner that respects individual autonomy and prevents personal harm. Furthermore, French legal standards emphasize the importance of safeguarding public health and ensuring that genetic technologies are applied in ways that protect both societal welfare and the environment.

In both countries, individual rights are protected through foundational principles such as informed consent and the preservation of privacy. In Iran, these protections are embedded primarily within religious and ethical norms, while in France they are guaranteed through human rights law and regulatory frameworks governing the protection of personal and genetic data. Both systems place strong emphasis on preventing the misuse of genetic information and protecting individuals from violations of their genetic privacy.

Overall, both Iran and France aim to ensure that genetic technologies are used in a manner that prevents harm to individuals and simultaneously promotes collective well-being. Although each country pursues this objective through distinct cultural, religious, and legal frameworks, both design their genetic policies in a way that balances individual and societal interests.

Definition of Genetics

Genetics is the science that studies heredity and the transmission of traits. According to this science, traits are transferred through genes, which are sequences of small molecules that together form a larger molecule known as DNA. Genetics is a branch of biology that deals with the phenomenon of inheritance and hereditary factors and explains the replication and transmission of hereditary information. It specifically focuses on the study of genes.

Definition of Genome

In molecular biology and genetics, the genome refers to the genetic material of a living organism. In most organisms, this material consists of DNA, while in some viruses it consists of RNA. The term genome refers to the complete set of genes in a living organism. In other words, the genome describes all genetic information present in a cell. In humans, the genes located on the 23 pairs of chromosomes within a cell together constitute the human genome.

Definition of Gene Therapy

Gene therapy is a technique used to correct defective genes responsible for disease development. It involves adding one or more normally functioning genes into a cell through different methods, such as gene insertion, in order to correct a hereditary disorder.

Definition of Genetic Damage

Genetic damage refers to mutations or abnormalities that affect an individual's genes and may create the conditions for the development of a specific disease. Some of these disorders may result from mutations in a single gene, while others may occur due to abnormalities in one of the chromosomes.

Types of Fault in Genetic Investigations

Fault in genetic research may appear in two main forms: fault in treatment or fault in research. In order to examine this issue, it is necessary to analyze the perspectives of criminal law in both Iran and France. At the same time, attention must be paid to whether a researcher has committed negligence or whether the researcher is free from fault.

Even in cases of medical error, it is sometimes possible to rely on the Islamic jurisprudential principle known as the rule of benevolence (Qa'idat al-Ihsan). This principle has a close relationship with the rule of liability and essentially states that if a person performs an action for another person with benevolent intentions and goodwill, and harm occurs during that action, the individual should not necessarily be considered liable because the intention was charitable and benevolent. This rule has also been mentioned in the jurisprudential work Jawaher al-Kalam.

It should also be noted that before beginning a research project, a researcher must first obtain an ethical research code that includes twenty-three commitments. In Iran, the investigation of research-related misconduct is initially examined by a criminal committee rather than directly by the courts. This process may, in some situations, lead to a certain degree of leniency. However, damages resulting from research activities may still be examined in court. On the one hand, this provides strong legal enforcement, but on the other hand, it may create fear and hesitation among researchers, which could discourage scientific progress.

Another important issue is the patient's informed consent in gene therapy, commonly referred to as clinical trials. This matter must be carefully observed. It does not seem reasonable that a researcher who has obtained ethical approval and whose proposal has been reviewed and authorized should automatically be treated as a criminal or be subject to imprisonment, since the basis of the activity is scientific research.

Legal Framework in Iran

In Iran, the Islamic Penal Code provides general rules regarding negligence and fault. Article 145 of the Islamic Penal Code of 2013 defines fault broadly, including negligence, recklessness, carelessness, lack of skill, failure to observe governmental regulations, and similar acts. Article 119 also addresses such issues in relation to unintentional homicide.

A physician or researcher is considered liable for damages only when a causal relationship exists between the wrongful act, whether an act or an omission, and the harmful result. The note to Article 14 of the Islamic Penal Code

also refers to this principle. Causation is a fundamental element of both criminal and civil liability, and without proving it, liability cannot be established.

From a jurisprudential perspective, when multiple causes contribute to a harmful event, many Islamic jurists believe that all causes may share liability as independent actors in the offence, even if their level of influence differs. However, Article 526 of the Islamic Penal Code does not fully adopt this view and instead provides that each party is responsible in proportion to the degree of influence of their conduct. If several actors contribute to a crime, and the crime can be attributed to all of them, they share liability equally unless their influence differs, in which case each bears responsibility according to their level of impact.

Article 592 of the Penal Code also addresses disputes regarding causation in criminal acts. In cases involving omission, liability arises only if a causal relationship between the omission and the harmful result, such as death or injury, can be established. This is often the main difficulty in cases of omission, where the judgment of social norms, morality, and conscience may also be relevant.

Legal scholars such as Jafari Langroudi have argued that omission creates liability only when the act was possible and when a legal, customary, or moral duty existed to perform it.

Legal Framework in France

In contrast, French criminal law has developed more specialized and coherent regulations regarding genetic issues and bioethics. The French Penal Code dedicates a specific chapter to genetic matters, particularly in Articles 511-1 through 511-25. These provisions address issues such as informed consent, the prohibition of misleading individuals in genetic experiments, and penalties for unauthorized removal of bodily samples.

French law therefore provides clearer and more structured legal provisions, allowing judges to handle such cases more efficiently without relying on scattered legal sources.

Furthermore, the French Code of Criminal Procedure, particularly Articles 706-54, 706-55, and 706-56, establishes a national automated genetic database under judicial supervision. Individuals convicted of serious crimes may have their genetic information recorded to facilitate identification and criminal investigations. This system resembles a form of criminal profiling. If Iran were to develop a similar genetic database for high-risk offenders, it could significantly improve the identification of criminals.

Role of International Law

International legal instruments have also played a significant role in shaping regulations related to human genetics. One of the most important documents is the International Declaration on Human Genetic Data, adopted by UNESCO on 16 October 2003 during its 32nd General Conference. This declaration followed the earlier Universal Declaration on the Human Genome and Human Rights, adopted in 1997.

These instruments aim to ensure freedom of scientific research while protecting human dignity, fundamental rights, and privacy. They emphasize that genetic data must be treated with the highest standards of confidentiality because such data can reveal sensitive information about individuals, their families, and future generations.

The declaration also acknowledges that genetic data may be used for several purposes, including medical diagnosis, health care, genetic screening, medical research, epidemiological studies, and legal or forensic investigations. At the same time, it warns that the collection, processing, storage, and use of genetic data may pose risks to human rights and personal privacy if not properly regulated.

Innovation and Legislative Recommendations

In drafting comprehensive legislation on genetics, Iranian lawmakers should take into account medical regulations, research ethics codes, and the provisions of the Islamic Penal Code regarding liability in medical activities. In addition, consultation with Islamic jurisprudence and authoritative religious opinions should be considered.

The process of legislation should involve a specialized working group including university professors, judges, lawyers, medical experts, genetic researchers, and criminologists. Such collaboration would help ensure that laws are scientifically accurate, legally coherent, and practically effective.

Conclusion

The comparative analysis of Iranian and French criminal policy toward genetic technologies demonstrates that the two legal systems rely on fundamentally different normative foundations but pursue similar protective objectives. While France regulates genetic technologies through a comprehensive statutory bioethics framework, the Iranian legal system largely relies on general criminal rules and Islamic jurisprudential principles to address potential genetic harms.

A central finding of this research is that several principles of Islamic jurisprudence possess significant potential for regulating genetic harms, particularly the rule of causation (qa'idat al-tasbib), the principle of no harm (la darar), and the protection of lineage (hifz al-nasl). Among these, the rule of tasbib plays a crucial role in determining liability for genetic damage. Under this rule, a person who creates the conditions leading to harm may be legally responsible even when the damage occurs indirectly. In the context of genetic technologies, this principle can extend responsibility to physicians, laboratories, genetic counselors, or research institutions whose negligent or unlawful conduct results in genetic injury or hereditary defects affecting future generations.

However, the study also reveals that Iranian law lacks explicit criminal provisions addressing genetic harm. As a result, liability is usually determined through general provisions related to medical negligence or bodily injury, often leading to civil compensation rather than specialized criminal sanctions. This legal gap creates uncertainty in determining responsibility in complex cases such as laboratory errors in genetic testing, wrongful embryo selection, or negligent gene manipulation.

In contrast, the French legal system provides a clearer and more structured regulatory model through codified bioethics laws, strict licensing mechanisms, and specialized oversight institutions. These mechanisms enable preventive supervision of genetic practices and clearly define prohibited conduct in areas such as germline genetic modification and misuse of genetic data.

The innovative contribution of this study lies in demonstrating that the jurisprudential principles of Islamic law, particularly the rule of tasbib, can serve as a normative foundation for developing a more coherent criminal policy toward genetic harms in Iran. Rather than relying solely on general medical liability rules, these principles can be systematically incorporated into specific legislative provisions addressing genetic technologies.

Based on this analysis, the study proposes that Iranian legislators consider adopting clearer statutory regulations that define genetic harm and related criminal liability, establish specialized oversight mechanisms for genetic laboratories and research centers, and integrate jurisprudential principles such as tasbib and la darar into modern

biolegal regulation. Such reforms would strengthen legal certainty while maintaining compatibility with the normative foundations of Islamic jurisprudence.

Ultimately, an effective criminal policy in the field of genetic technologies requires a balance between scientific development and the protection of human dignity, public health, and the rights of future generations. Both the Iranian and French experiences demonstrate that achieving this balance requires not only ethical principles but also clear legal structures capable of responding to the rapidly evolving challenges of genetic science.

Policy Recommendations

A comprehensive genetic law should include a clear definition of genetics and genetic technologies, an explanation of gene therapy methods, detailed regulation of research procedures and clinical trials, clear identification of supervisory institutions, legal provisions governing informed consent, rules regarding compensation for damages caused during research or treatment, and strict regulations for protecting the confidentiality of genetic information.

At the same time, legislation must be carefully balanced so that it does not obstruct scientific research. Excessive restrictions may discourage researchers and ultimately slow the scientific and medical progress of the country.

Establishment of a Genetic Database for High-Risk Offenders

One of the practical policy proposals in the field of criminal justice and genetic technology is the creation of a national genetic database for high-risk or repeat offenders. Such a system would allow judicial and law enforcement authorities to store the genetic profiles of individuals convicted of serious crimes. In the event of future offences, biological evidence collected from crime scenes, such as blood, saliva, or other DNA traces, could be compared with the stored genetic data to facilitate the rapid and accurate identification of suspects.

The experience of several legal systems, particularly France, demonstrates that regulated DNA databases can significantly enhance criminal investigations while maintaining judicial supervision and legal safeguards. Accordingly, adopting a similar mechanism within the legal framework could improve the efficiency of criminal investigations, strengthen crime detection capabilities, and contribute to public security, provided that strict rules concerning privacy protection, judicial authorization, and ethical oversight are implemented.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

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Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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