

Bioethics teaching and discussion among adolescents: a systematic review

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Abstract

This study analyzed the available evidence on the impact of bioethics education among adolescents based on a systematic review using the PRISMA methodology, in the Scopus, Web of Science, and PubMed databases, using the search terms: “bioethics” and “adolescents” or “high-school” or “middle-school” or “junior high-school.” Of the 242 identified articles, ten met the selection criteria. Only four articles presented a clear methodology and adequate sampling, enabling reliable statistical analysis. In these, it was found that bioethics education contributed to a broader and less dogmatic view of social and scientific issues involving decision-making. Students tend to be more interested in issues related to personal circumstances. Use of a teaching plan focused on bioethics was effective in providing students with more arguments for discussion compared with their peers.

Keywords: Bioethics. Adolescent. Education, primary and secondary. Adolescent behavior. Ethics.

Resumo

Ensino e discussão bioética entre adolescentes: revisão sistemática

Neste trabalho foram analisadas as evidências disponíveis sobre o impacto do ensino da bioética entre adolescentes, a partir de uma revisão sistemática com metodologia PRISMA, nas bases de dados Scopus, Web of Science e PubMed, utilizando os termos de busca “bioethics” e “adolescents” ou “high-school” ou “middle-school” ou “junior high-school”. Foram encontrados 242 artigos, dos quais dez atenderam aos critérios de seleção. Apenas quatro artigos apresentaram metodologia clara e amostragem adequada, permitindo análise estatística confiável. Nestes, constatou-se que o ensino em bioética contribuiu para uma visão mais ampla e menos dogmática de questões sociocientíficas que implicam tomada de decisão. Há tendência de os estudantes se interessarem mais por questões que envolvam situações diretamente relacionadas a circunstâncias de sua realidade pessoal. Constatou-se que a utilização de um plano de ensino focado em bioética foi eficaz em fornecer aos alunos mais argumentos para discussão em comparação aos seus pares.

Palavras-chave: Bioética. Adolescente. Ensino fundamental e médio. Comportamento do adolescente. Ética.

Resumen

Enseñanza del debate de la bioética entre adolescentes: revisión sistemática

Este estudio analizó la evidencia sobre el impacto de la educación en bioética en adolescentes a partir de una revisión sistemática con la metodología PRISMA en las bases de datos Scopus, Web of Science y PubMed, utilizando los términos de búsqueda: “bioethics” y “adolescents” o “high-school” o “middle-school” o “junior high-school”. Se encontraron 242 artículos, de los cuales 10 cumplieron con los criterios de selección. Solo 4 artículos presentaron una metodología clara y un muestreo adecuado, lo que permitió un análisis estadístico confiable. En estos, se encontró que la educación en bioética contribuyó a una visión más amplia y menos dogmática de las cuestiones sociocientíficas que involucran la toma de decisiones. Los estudiantes suelen interesarse más por situaciones directamente relacionadas con su realidad personal. El plan de enseñanza centrado en la bioética fue efectivo para brindar a los estudiantes más argumentos en la discusión en comparación con sus compañeros.

Palabras clave: Bioética. Adolescente. Educación primaria y secundaria. Conducta del adolescente. Ética.

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Bioethics emerged as a science in the 20th century and, although impossible to mark the very moment of its birth, it responds to abuses observed in research involving human beings, mainly in the first half of the century. Scientific communities in different countries therefore understood the need for outlining specific limits for research, as highlighted in the *Declaration of Helsinki*, back in 1964^{1,2}.

Principlism in bioethics emerged from proposals for guiding values—mainly for research—and is supported by four well-known principles: autonomy, beneficence, non-maleficence, and justice. All four principles have been used as guide and reference for analyses in different fields involving humans or animals^{3,4}.

Broadly speaking, bioethics studies address both research aspects and daily and environmental issues arising from global bioethics concepts, as proposed by Potter⁵. This perspective is not limited to bioethical principles; it goes further, regarding human beings as a fundamental part of the planet's destiny, since their actions impact all species and the entire planet⁵⁻⁷.

Global or environmental bioethics implies highly complex analyses that are not limited to human actions, but also consider how said human action impacts other species and the environment, covering whole ecosystems^{5,8}.

Regarding bioethics education, formal bioethics teaching as a structured discipline is often limited to undergraduate courses⁹⁻¹². But even in academia, it tends to focus on majors related to health or biological fields. Bioethics teaching often follows a deontological approach, mostly targeting professional ethics codes and bioethical principles¹⁰⁻¹⁴.

Conversely, several countries have gradually adopted different approaches in their educational programs, consistent with global bioethics as proposed by Potter⁵. This concept highlights the sense of undertaking efforts to develop a critical spirit in the youth as to encourage them to apply specific tools and to actively interact with both their social environment and the environment itself. It also prepares them to recognize and perceive the consequences of their actions and of those around them¹⁵⁻²⁰.

Working with adolescents is therefore an assertive choice because bioethics (and related

issues) affects us all, not just healthcare providers, physicians, and scientists. These propositions somewhat adapt the United Nation's 17 goals to change the world²¹. From an educational perspective, developing moral values and virtues concerning personal and interpersonal actions configures a very desirable goal aimed at achieving harmonious and healthy environments in society. Additionally, these individuals leave childhood to become adolescents who progressively start making decisions that increasingly impact their future in the short-, medium-, and long-term^{15,21,22}.

Bioethics education should not exclusively focus on teaching facts and content, but also on developing critical thinking skills that enable considering different viewpoints and reasoning on the future consequences of present acts. Hence the importance of providing tools that enable youth to continuously reflect on and interpret their communities and different subject contents to help achieve a broader view of bioethics.

Aim

To analyze the evidence available in the literature on the impact of bioethics teaching on highschoolers. Achieving this aim means answering two questions:

1. What evidence supports bioethics teaching for highschoolers?
2. What are the impacts of teaching bioethics to highschoolers?

Method

This systematic literature review on bioethics teaching to adolescents followed the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines²³. In an attempt to answer the proposed questions, the bibliographic search employed the following descriptors: "bioethics" and "adolescent" or "high-school" or "middle-school" or "junior high-school," without publication year, language, or other restrictions. Search was conducted in October 2024 on the US National Library of Medicine National Institutes of Health (PubMed), SciVerse Scopus (Scopus) and Web of Science databases.

Sampling, inclusion, and exclusion criteria

Following excluding articles duplicated in two or three databases, book chapters, book reviews, editorials, case reports and conference proceedings were removed after abstract screening, in addition to texts not available in full in English, Portuguese, or Spanish.

Abstract and methodology of the remaining articles were assessed to determine whether they met the following inclusion criteria: original epidemiological (cohort, cross-sectional, case-control, clinical trial) and qualitative studies involving high-school, junior high-school or middle high-school students. Eligibility assessment

excluded articles about younger children, undergraduate students, or teachers, projects without results and theoretical discussions unrelated to research with adolescents.

Article search, selection, and full analysis were conducted by two independent researchers, presenting no discrepancy in their selection. Selected articles were analyzed in full, with particular attention to information regarding aims, study type, and results (Chart 1).

As a literature review, this study was not submitted to approval by a Research Ethics Committee since the used material is freely available on databases.

Chart 1. Description of the included studies.

Authors; year	Aims	Study Type	Results
Galassi and collaborators; 2024 ³⁸	Explore and analyze opinions and knowledge about rights related to both gender identity and progressive autonomy. Identify information sources, amount, and quality.	Descriptive, cross-sectional, quantitative, and qualitative	Half of the students relate self-perception to gender identity; 81% differentiate between gender and sex; and 70% consider biological sex and sociocultural gender to be different things. Most reported not discussing gender identity at school (68%) or at home (67%). Most students (73%) could elaborate an approximate definition of progressive autonomy by relating the ability to exercise rights and physical and mental development; 78% stated not discussing this topic at school and over 80% had never discussed it at home or with friends.
Rizvi, Shekhani; 2023 ³⁷	Assess students' perceptions and attitudes regarding bioethical issues related to ethics in social networks and patient rights.	Observational, cross-sectional	Most students (85%) consider the topic important and mention lack of education in bioethics. A statistically significant difference was observed for the understanding of minority rights between female and male students.
Kummuanek and collaborators; 2022 ³⁶	Assess the effect of an intervention on students' moral reasoning based on the analysis of bioethical issues related to biotechnology.	Cross-sectional, case-control	All groups presented statistically similar scores before the intervention. The intervention group significantly improved their score after the bioethics lessons ($p < 0.01$).
Fischer and collaborators; 2020 ¹⁸	Introduce a bioethical perspective from discussions based on the UN's 17 sustainable development goals	Observational, cross-sectional, qualitative	Content analysis evinced messages about warning (38%), affection (32%), environment (29%), hope (28%), design (24%), desire (22%), among others.

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Chart 1. Continuation

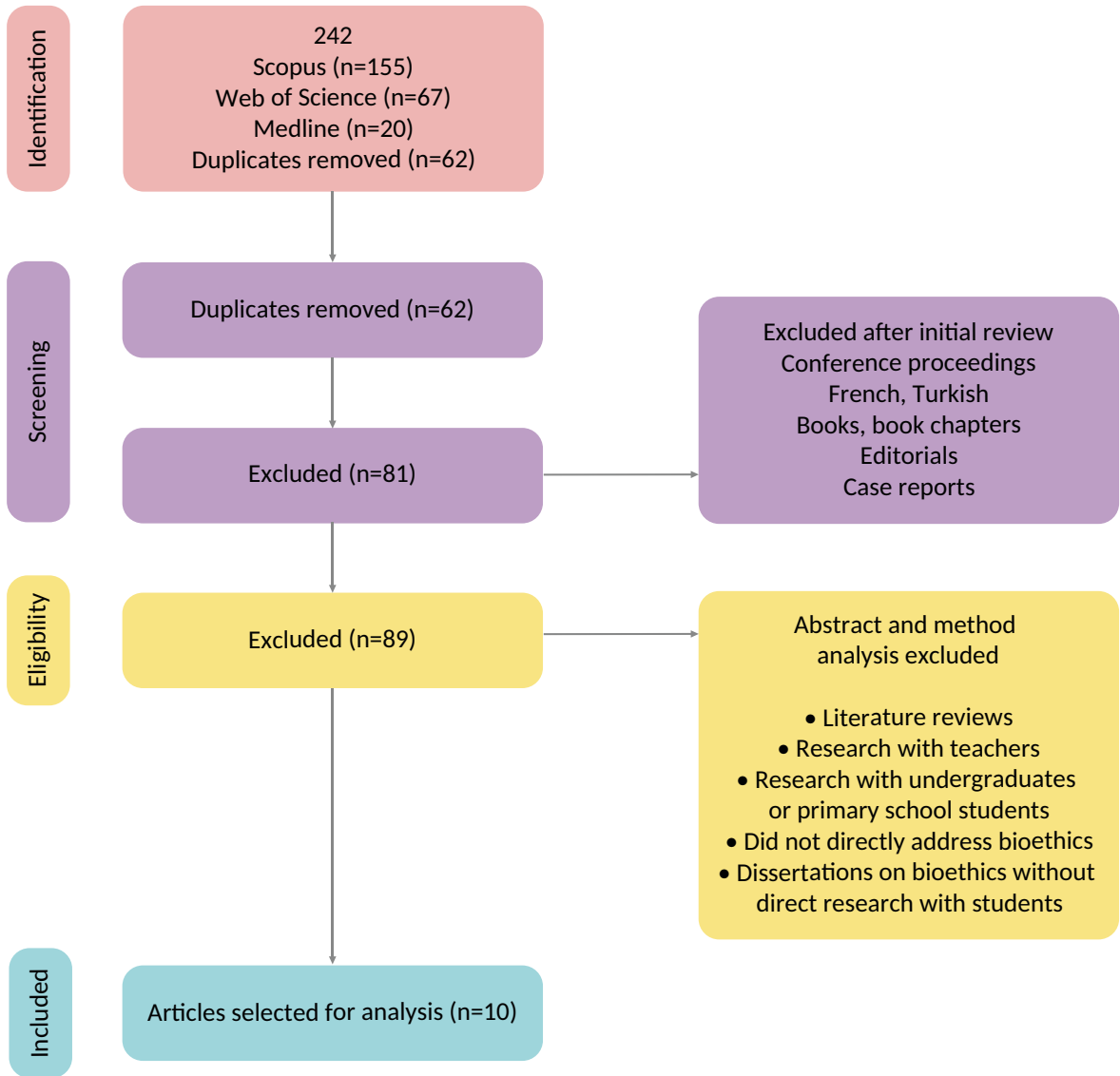
Authors; year	Aims	Study Type	Results
Araujo and collaborators; 2017 ³¹	Develop a bioethical reasoning based on the reasoning proposed by Diego Gracia.	Observational, cross-sectional	The project met the expectations of most participants, encouraged them, and increased their knowledge about bioethics. Nearly one third of students stated that the project had no significant impact on their opinions and attitudes.
Solomon and collaborators; 2016 ²²	Develop bioethical reasoning, skills; recognize the importance of scientific knowledge; develop a respectful dialogue with people with different opinions.	Exploratory, cross-sectional	74% of students enjoyed bioethics classes. Of these, 84% acknowledged the importance of bioethics for society
Nunes and collaborators; 2015 ³⁰	Help students build their personal ethics by acquiring knowledge about interpersonal relationships, human rights, social responsibility, health, sustainable development, preservation of public assets, culture and financial education. Assess the acquisition of and changes in values.	Action research, case-control	Mean knowledge scores before and after the intervention were compared (t-test). Both groups underwent three measurements (one per year) to assess knowledge gains by answering a questionnaire. The intervention group exhibited higher growth within three years, and statistically significant gains in years 2 and 3. No statistical difference between groups was observed regarding interpersonal values. Differences in personal values included: practical mentality – intervention group showed gains and control group, losses; achievement – both intervention group and control group presented losses; decision – gains in both groups, but the control group recorded significantly higher increase.
Gutiérrez and collaborators; 2015 ²⁵	Assess the impact of education based on the application of socio-scientific programs to develop decision-making skills in bioethics.	Quasi-experimental, case-control	Groups showed no differences in the applied pre-test. Mean post-test scores evinced statistically significant gains in the intervention group.
Kham and collaborators; 2013 ²⁴	Teach bioethics and assess students' understanding and ethical reasoning skills.	Quasi-experimental, cross-sectional	Most students understood the different topics in bioethics, with female participants standing out. Except for the topic 'What is bioethics,' female students' performance in understanding was 100%.
Chowning and collaborators; 2012 ¹⁵	Investigate the association between bioethics education and developing the ability to formulate bioethical reasoning with robust justifications.	Experimental case-control	Students attending the classes showed statistically significant gains in all the assessed fields.

Results

Initial search identified 242 titles, of which 62 were duplicates. Other 81 articles were excluded after preliminary analysis. All remaining texts had

their abstract and methodology assessed, resulting in another 89 titles excluded for not addressing the target population, presenting research with teachers, being theoretical reviews or projects, totaling ten articles included in the analysis sample (Figure 1).

Figure 1. Article selection flowchart



The included studies were published between 2012 and 2024, in countries from the Americas, Europe, Oceania and Asia. Evaluation instruments included Likert-type scales, questionnaires, and open-ended answer analysis. Most studies sought to assess learning gains from teaching

bioethics-related topics. Of the ten analyzed articles, two assessed over 1,000 students, two evaluated a study sample with less than 100 students, and the remaining six assessed from 100 to 431 students. One study monitored the students for three school years, measuring its results on a yearly basis.

All researchers trained the teachers working directly with students before making any intervention. While four studies conducted case-control analysis for group comparisons (one receiving bioethics lessons, the other no lessons); six studies provided bioethics lessons to all students to measure its effects.

Research instruments included socio-scientific questions in three studies, content analysis in one article, and assigning scores based on predefined scales in the remaining six studies. Of the ten analyzed studies, only five were able to measure statistically significant data.

Discussion

All ten reviewed studies developed the concept of bioethics from different aspects with their participants. They covered Global Bioethics, as proposed by Potter, emphasizing the environment and society's relationship with its surroundings and coming close to the UN's 17 goals to transform our world for sustainable development^{5,6,21}. All works addressed the four bioethical principles—autonomy, beneficence, non-maleficence and justice—to some extent, using them as background for all discussions^{3,4}.

Topics such as biotechnology, cancer research, cryogenics, environmental degradation, sustainable food, preservation of public heritage sites, conscious consumption—which broadly impact society—were discussed. Some other topics were also addressed, these being more individual-related, including orthothanasia, sexual responsibility, gender identity, teenage pregnancy, financial education, and interpersonal relationships.

All interventions started by training teachers who directly or indirectly worked with the students, as to offer them a contextualization on the proposal, to situate them about its critical aspects, and to underscore that students would not express their personal preferences but rather expose analysis based on previously discussed knowledge^{9,10,15,18,24,25}.

All studies demonstrated attention and adequate preparation. Notably, the same did not occur regarding the research instruments

adopted, sample selection, and statistical analysis. Research quality was thus determined by making use of validated questionnaires and the use of the students' native language in the questionnaires and pilot tests^{22,24-29}. Only one study monitored its participants for more than one school year, which enabled inferring how both the lessons and natural maturation affected the adolescents regarding their analysis of bioethics-sensitive content³⁰.

Research strategy ranged from qualitative approaches, such as content analysis and Likert-type questionnaires, to the classification of discursive responses based on a predefined table with designed responses and their respective scores. All instruments were capable of capturing changes brought about by bioethics teaching, but each research had an aspect considered truly significant and decisive for its results.

Nonetheless, students were sometimes unable to separate their personal opinion from a critical analysis of a hypothetical situation, as inferred by the different interpretations on the value of concepts like autonomy and justice exposed by male and female students from the same class, demonstrating how cultural and family values can overlap when approaching a problem from different angles^{22,24}.

Most studies used problem situations—also known as socio-scientific questions—to introduce or initiate the debate on bioethical topics, which can more easily predispose students to express opinions based on personal tastes rather than on due analysis. When questioned appropriately, however, students revealed enough awareness to identify that ethical issues are not absolutely relative, that not all arguments are equal and, therefore, stronger justifications exist and are usually construed from solid scientific data associated with a contextualized ethical stance^{9,10,15,22,25}.

A scope of the effects from bioethics teaching was more clearly captured when applying a questionnaire to assess personal and interpersonal values, regardless of any overlapping bioethical topic²⁶⁻²⁹. They revealed that as students became more familiar with bioethical concepts, they develop a more reflective and mature thinking and, therefore,

less absolutist, instinctive, and immediate one, as expected for their age. Concurrently, success or personal satisfaction lost importance as students began to consider other dimensions in their value system²⁶⁻³⁰.

Bioethical education of students invariably sought to develop a reasoning process by considering moral aspects, which are often difficult to evaluate since they encompass deep-rooted and dogmatic opinions³¹⁻³³. This observation move us reflect on the opportunity of including bioethics discussion and teaching earlier in school, thereby allowing youth to develop their own attitudes and thoughts and preventing indoctrination by opinion makers³¹⁻³³.

When addressing student learning, whether of bioethics or other topics, one is discussing education as a process which entails more than content acquisition and search for skills; it is an inherent social process directly related to the society in which students participate in and, therefore, condition individual positions and actions. Social individuals acting within a community is what ensure that directions are followed or not³⁴⁻³⁶. This aspect underlines both bioethics teaching and the educational process as a whole, revealing itself when we compare students from different countries and cultures^{24,37}.

As children and adolescents mature, they start feeling the demands and restrictions imposed by life in society and expressing their agreements and disagreements with these realities³⁸⁻⁴⁰. Conflicts and the manners in which they are resolved constitute common fields for debating bioethical topics. Such debate, rather than trying to determine what is right or wrong, aims to identify the aspects that lead individuals to choose diametrically opposed and often irreconcilable paths and work toward convergent points.

Finally, bioethics teaching in its multiple forms, dimensions, and topics aims at critical thinking by considering multiple and sometimes antagonistic viewpoints. These interventions led students to reconsider thoughtless decisions and to question choosing personal success over other values^{22,24,25,30,35-40}.

Final considerations

This literature review found that the retrieved field studies focused on bioethics teaching among highschoolers. A significant number of studies attest to the relevance of teaching bioethics for this population and report practices to be adopted by students, without presenting its practical application and outcomes.

All evaluated studies provided training to participating teachers, raising concerns about teachers' ability and capacity to properly apply the proposed lessons and about the research itself.

This constitutes a first difficulty in conducting this type of research. Another weak point concerns the adopted instruments: only four of the ten studies employed a minimally adequate analysis methodology presenting no, or few, biases, thereby lending credibility to their statistical analysis and conclusions.

Following intervention, developing and applying an instrument to effectively measure bioethics-related aspects among adolescents proved to be a difficult challenge to overcome.

All reviewed articles suggested that implementing projects for bioethics discussions among the youth point to their willingness to participate in such a debate despite the heterogeneous concepts. Students tend to approach socio-scientific issues that require bioethical knowledge from different perspectives by using arguments that are partly scientific and partly substantiated by other considerations.

Students are influenced by common sense and by opinions shared on social media or advocated by others, and to take them as their own. Thus, schools must occupy this space and exercise their duty to build citizens.

Knowledge production in bioethics teaching is challenging in enabling youth to have their own opinions, but also to develop them based on robust argumentation. Different audiences in different societies require creating and implementing proposals that can more effectively and productively address this knowledge gap among the youth, thereby producing future impacts on society as a whole.

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