



Original Research

Analysis of content about sexuality and human reproduction in school textbooks in Spain

J. de Irala*, I. Gómara Urdiain, C. López del Burgo

Preventive Medicine and Public Health, School of Medicine, University of Navarra, Irunlarrea 1, 31080 Pamplona, Navarra, Spain

Received 16 January 2007; received in revised form 27 August 2007; accepted 7 January 2008
Available online 9 July 2008

KEYWORDS

Sexual health education;
Condoms;
AIDS;
Sexually transmitted infections;
Multiple sexual partners

Summary Objectives: The spread of sexually transmitted infections (STIs) in adolescents and teenage pregnancy rates are increasing. A decrease in the average age of youth's first sexual experience has also been noted. Sexual education programmes in schools have an important role to play in addressing these issues. The objective of this study was to analyse the content of textbooks in the areas of sexuality and human reproduction in order to evaluate the extent to which these textbooks promote healthy reproductive lifestyles, as well as avoidance of risk behaviour among adolescent students.

Study design: Descriptive study of the content of school textbooks.

Methods: The study sample consisted of 12 textbooks (approximately 80% of all the textbooks used in Spanish secondary schools) which were edited in 2002. Content analysis evaluated the extent to which these books demonstrated reliable scientific information about: (a) condom effectiveness; (b) consequences, prevention and treatment of STIs; (c) family planning methods; (d) assisted reproductive technologies; and (e) the promotion of healthy reproductive lifestyles.

Results: All textbooks presented inaccurate information in the areas studied. One hundred and fifty one quotes were identified that facilitated incomplete perception of sexuality or risky behaviour. On average, 12.6 incorrect messages were identified in each textbook.

Conclusions: The textbooks examined are neither appropriate nor sufficiently comprehensive for adolescent education on issues of sexuality. Results suggest a need for alternative textbooks based on better scientific evidence. It is essential that textbooks empower adolescents to make healthy decisions through the promotion of useful life skills that provide a more integrated concept of sexuality. There is a need for approaches to sexual education to integrate values commonly held by parents of the youth that use such texts.

© 2008 The Royal Institute of Public Health. Published by Elsevier Ltd. All rights reserved.

*Corresponding author. Tel.: +34 948 42 56 00x6428; fax: +34 948 42 56 49.
E-mail address: jdeirala@unav.es (J. de Irala).

Introduction

There is great concern amongst political, health and educational authorities regarding teenage sexuality and associated adverse reproductive outcomes. Much contemporary research reveals that, in addition to an increase in condom use, there has also been an increase in heterosexual transmission of acquired immunodeficiency syndrome (AIDS) and other sexually transmitted infections (STIs). These outcomes have become particularly prevalent among youth aged 15–24 years.^{1–5} In Spain, the age of first sexual experience has decreased, while rates of unwanted teenage pregnancy have increased. The pregnancy rate of Spanish adolescents under 18 years of age has doubled over the last 10 years.^{6,7} Beginning sexual experimentation at an earlier age may lead to an increase in number of lifetime sexual partners, which is associated with a higher risk of STI.^{3,8–11} This has led to an increase in programmes aimed at teenagers to promote healthy sexual behaviours.

A meta-analysis published in the *British Medical Journal* reviewed the effectiveness of sexual education programmes that aimed to delay sexual activity, promote better contraceptive use and reduce the rate of teenage pregnancy. The authors reviewed studies from 22 publications, in addition to non-published data. Their conclusions affirmed that the sexual education policies established since 1970 have had little success in controlling these outcomes.¹² Another review showed that while sexual education programmes are successful in changing sexual behaviour such as increasing condom or contraceptive use among youth, they do not significantly reduce STI and unintended pregnancy rates.¹³

While several causes for the high prevalence of adverse sexual outcomes are possible, lack of information does not seem to be the problem. Research shows that the majority of pregnant teenagers had seen a healthcare professional and been given contraceptive information in the previous year.¹⁴ Other studies have suggested that although youth are now better informed on issues of contraceptive use, the prevalence of contraceptive failure remains paradoxically high.^{15–17}

The problem does not appear to be related to difficulties in contraception accessibility. In the UK, the country with the highest teenage pregnancy rate in Europe, there are more pregnancies in areas where contraception is more widely distributed.¹⁸ A Spanish national survey on youth and sexuality revealed that 81% of adolescents did not report having a problem with

contraceptive availability.⁶ While the idea that extensive distribution of contraception guarantees efficient birth control is widely accepted, the reality is more complex. For example, a study conducted in France indicated that the majority of reported unplanned pregnancies occurred among women using birth control.¹⁹ Several Spanish studies have indicated that, among adolescents, the most common reasons for requesting the emergency contraceptive pill are condom rupture and vaginal retention/slippage of the condom.^{20,21} In addition, teenagers who had a pregnancy ending in termination were more likely to have used birth control in the past, including the emergency contraceptive pill.^{22–25}

Also, developing countries with more access to condoms and information about their use are the same countries that are now facing more problems with AIDS.²⁶ It is possible that addressing certain problematic health issues without adapting the message to the intended target age group may result in behaviour that directly contradicts the intended message.

Epidemiological studies show that certain attitudes and beliefs about sexuality can lead to adverse reproductive outcomes.^{27,28} Hence, sexual education in school plays an essential role in teaching youth certain beneficial lifestyles that are in accordance with societal expectations. However, it has been documented in experimental studies that the promotion of condom use can also indirectly encourage adverse sexual behaviour.^{29,30} Therefore, the content of these sexual education programmes is of utmost importance, and discussion of the issues should continue until the rates of teenage pregnancy and STI decrease.

In middle and high schools, textbooks are the most common educational resource, making them the backbone of the official curriculum and, to a greater extent, of the culture transmitted in the classroom.³¹ In Spanish schools, sexual education is a subject that can be covered by any teacher. Sometimes, specific courses about sexuality are given by a school counsellor and aimed at parents and/or pupils. However, most education about sexuality is given in biology lessons.

Having adequate knowledge to distinguish between healthy and risky behaviour is the first step to choosing healthy behaviour.²⁷ Therefore, chapters from textbooks that deal with human reproduction and sexuality were analysed in order to evaluate if the information within these chapters is complete and promotes healthy reproductive choices.

Table 1 Textbooks evaluated.

No.	Publisher	ISBN	Title of the book	Number and title of the chapter	Pages
1	Anaya	84-667-1035-3	Biología y Geología. Ciencias de la Naturaleza. 3º Educación Secundaria	5 – Human reproduction 6 – The health of our body	86–117
2	Bruño	84-216-4303-7	Biología y Geología 3º ESO	7 – Sexuality and reproduction	198–223
3	Ecir	84-7065-691-0	Biología y Geología 3º ESO	6 – Reproduction	110–131
4	Edebé	84-236-6059-1	Biología y Geología 3	8 – Reproduction and sexuality	152–173
5	Edelvives	84-263-4754-1	Ciencias de la Naturaleza. Biología y Geología 3º ESO. Proyecto 2.2	4 – Human reproduction	88–115
6	Editex	84-7131-897-0	Biología y Geología 3º ESO	8 – Human reproduction and sexuality	170–191
7	Everest	84-241-8145-X	Biología y Geología 3	10 – Human reproduction	170–189
8	Oxford	84-8104-507-1	Biología y Geología. Ciencias de la Naturaleza. 3º Secundaria. Proyecto Exedra.	9 – Human reproduction	176–197
9	Santillana	84-294-7991-0	Biología y Geología 3º ESO	7 – Human reproduction	112–139
10	SM-Ecosfera	84-348-8294-9	Biología y Geología 3 – Proyecto Ecosfera	8 – The transmission of life	128–145
11	SM-Darwin	84-348-8359-7	Biología y Geología 3 – Proyecto Darwin	7 – Reproduction	124–143
12	Vicens Vives	84-316-6525-4	3 Biología y Geología. Biosfera	6 – Human reproduction and sexuality	94–115

Methods

The sample consisted of 12 textbooks used in Spanish secondary education (14–15-year old-students) for teaching biology (Table 1).

These 12 textbooks were the most widely distributed textbooks in Spanish public and private schools. A study published in 2001 stated that the textbooks published by Santillana, Anaya, SM (two different textbooks), Vicens-Vives and Ecir represent at least 80% of the Spanish publishing market of compulsory secondary education textbooks.³² This is probably a very conservative figure because the present study included six textbooks in addition to those cited above, and the texts that were not reviewed cover much smaller markets. The authors decided not to study these other texts with very small markets for efficiency purposes. The other textbooks analysed in this study were published by Bruño, Edebé, Edelvives, Editex, Everest and Oxford.

The analysis of textbook content was conducted through a comparison of the textbooks' content with scientific evidence published over the last 6 years in scientific journals. One of the authors (IGU) performed the evaluation using a previously designed checklist. Blinding of the editors of the texts being reviewed was not feasible. The following criteria were under examination: (a) condom effectiveness in the prevention of pregnancy and STI transmission; (b) STI consequences, prevention and treatment; (c) family planning methods; (d) assisted reproductive technologies and abortion [assisted reproductive technologies are technologies to increase fertility, and include in-vitro fertilization (IVF), intracytoplasmic sperm injection (ICSI), the transfer of frozen embryos and oocyte donation]; and (e) promotion of healthy reproductive lifestyles.

The books containing statements supported by published scientific evidence received a positive score, whereas books that included at least one piece of incorrect, confusing or incomplete information, thus implying invalid or obsolete knowledge, received a negative score. The absence of discussion concerning specific issues related to sexuality was scored as zero.

The authors did not seek moral or ethical approval of any of the scientific information being evaluated, as this was not the goal of the study.

Results

All 12 textbooks contained some information that contradicts scientific data published in the peer-

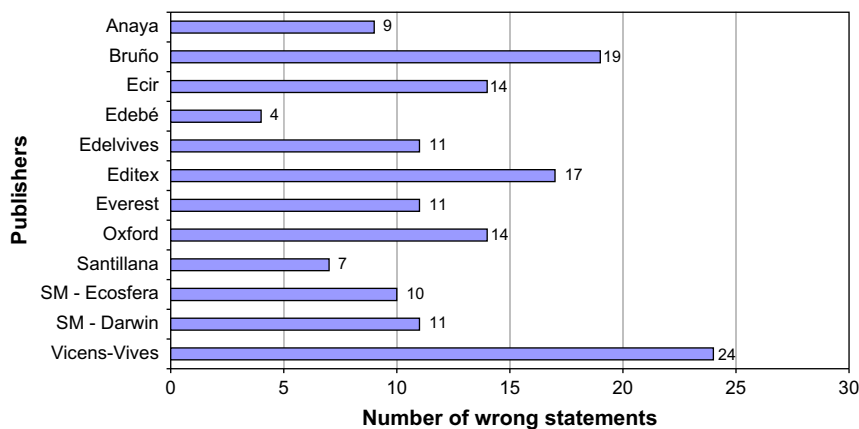


Figure 1 Number of incorrect statements in each book.

reviewed journals cited in the reference section of this paper. At least 151 statements were identified as providing an incomplete picture of human sexuality, while also failing to discourage multiple partners among teenagers. The average number of misleading statements found in each textbook was 12.6. The books published by Vicens-Vives, Bruño, Editex, Oxford and Ecir surpassed this average, whereas Edebé had the lowest number of misleading statements (Fig. 1).

Thirty-one (20.5%) statements lacked scientific accuracy about the effectiveness of condoms in the prevention of pregnancy and STI transmission, 18 (11.9%) statements did not provide adequate knowledge of STIs or of their prevention strategies, 40 (26.5%) statements were misleading with regard to various family planning methods, 19 (12.6%) statements were inaccurate about assisted reproductive technologies and abortion, and 43 (28.5%) statements indicated unhealthy reproductive

lifestyle choices (Table 2). As mentioned above, a negative sign in Table 2 indicates that at least one incorrect statement was found, and a grading of zero identifies aspects that were not discussed at all in a particular book. The most significant findings related to each issue are summarized below.

Effectiveness of condoms to prevent pregnancy and STIs

Ninety-two percent of the textbooks examined did not reference the discrepancy between the theoretical effectiveness of condoms and the decrease in this effectiveness due to user-related errors. Thirty-one statements affirmed simply that condoms are 'safe to avoid STIs and unplanned pregnancies'. Each textbook contained one or more similar statements. Other statements asserted that condoms avoid pregnancy with 'high

Table 2 Comparison of textbook content with scientific evidence published in scientific journals, and inaccuracies identified in different books.

	Books ^a												Errors ^b
	1	2	3	4	5	6	7	8	9	10	11	12	
Effectiveness of condoms in the prevention of pregnancies and STI	-	-	+	-	-	-	-	-	-	-	-	-	31
Prevention, treatment and cure of STI	-	-	-	+	-	-	-	-	-	-	-	-	18
Family planning methods	-	-	-	0	-	-	-	-	-	-	-	-	40
Assisted reproductive technologies and abortion	-	-	-	0	-	-	0	-	-	-	-	-	19
Promotion of healthy reproductive lifestyles	0	-	-	-	0	-	-	-	0	-	-	-	43
Total of errors identified													151 ^b

STI, sexually transmitted infection.

(+) Overall positive score. (-) Overall negative score. (0) Absence of explicit statements.

^aThe numbers correspond to the books and publishers described in Table 1.

^bThe number of mistakes exceeds the number of books because one book can present with several mistakes.

effectiveness' (Santillana, p. 137), 'very high effectiveness' (Vicens-Vives, p. 109), and that condom use is '98% effective' (Anaya, p. 115), or the 'safest barrier' (Bruño, p. 217), when in fact the pregnancy failure rate is 15%.³³

Textbooks were also misleading with the implication that 'condoms avoid STIs' (Oxford, p. 191). They included statements affirming that 'the use of condoms is fundamental to avoid transmission' (Everest, p. 188), or that they are 'an excellent means of protection from infection' (SM-Darwin, p. 137), or 'the best', 'the most efficient' or 'the only method' that protects from infections (Anaya, p. 98, 99 and 115; Edebé, p. 165 and 166; SM-Ecosfera, p. 138), when this is not necessarily the case.

Consequences of STI, and STI prevention and treatment

In 50% of the textbooks reviewed, many inaccuracies were detected in the discussion of AIDS treatment and the consequences of STIs. Eighty-three percent of the books did not mention Chlamydia, and 58% did not mention human papilloma virus (HPV). Just one textbook (Edebé) presented abstinence, mutual fidelity and the avoidance of multiple sexual partners as efficient alternatives in the prevention of STIs.

One textbook stated that AIDS 'is the most difficult sexually transmitted disease to cure' (Edelvives, p. 107), when it is, in fact, incurable. Another stated that 'some treatments have been developed and help patients have an almost normal life' (Santillana, p. 130), without cautioning that this is not necessarily the norm and thus what readers have to expect for their personal case if infected. A third book indicated that 'currently, all the STIs, with the exception of AIDS, have effective treatments, as they are treated with antibiotics' (SM-Ecosfera, p. 138).

Family planning methods

All 12 textbooks lacked necessary information on the side effects of many methods of contraception. Current knowledge about fertility indicators was absent from 83% of the books, as was information about Natural Family Planning (NFP). All textbooks failed to mention NFP or considered it obsolete.

The textbooks almost unanimously indicated that NFP has 'very low effectiveness' (Santillana, p. 137), 'a high number of failures' (Ecir, p. 122), and is 'absolutely not advisable' (Vicens-Vives, p. 108). One of the texts did not mention NFP as a viable birth control option (Anaya), while others

gave confusing and incomplete information (Bruño, Edebé, SM-Ecosfera, SM-Darwin). One textbook advised against NFP as it 'requires a great knowledge of your body' (Editex, p. 184).

In addition, basic information explaining female fertility was found to be inadequate. Only 17% of the textbooks explained the changes in basal body temperature and cervical secretions that occur during the menstruation cycle. The protective role of the secretions of Cowper glands, which balance the acidity of the urethra during male ejaculation, was not discussed in detail. Furthermore, little attention was paid to the possible presence of sperm in this secretion, which can occur even when the male does not actually ejaculate.

Assisted reproductive technologies and abortion

Seventy-five percent of the textbooks contained no information about the social and medical consequences associated with assisted reproductive technologies. The other textbooks simply discussed the method in terms of its legality, with statements such as 'these are regulated by law' (SM-Ecosfera, p. 137). Assisted reproductive technologies were said to be 'simple and generally harmless methods' (Bruño, p. 208), whereby 'there is hardly any technical obstacle to prevent a couple from having a baby' (Ecir, p. 129).

Direct references to abortion were avoided in 58% of the textbooks, while the remaining 42% justified abortion under certain circumstances. For example, when teenagers' 'great expectancies (such as education, their professional outlook or sports careers) could be shattered and turn them into frustrated persons' (Bruño, p. 214). None of the textbooks raised the question of what responsibility, if any, the male should take in the situation, thus holding the female solely accountable for the consequences of her actions.

Promotion of healthy reproductive lifestyles

Most of the textbooks did not address and promote healthy sexual behaviours effectively. The most severe inadequacies included a lack of critical discussions concerning various sexual behaviours (42%), and the affirmation that all behaviours are equally healthy (58%). Sixty-seven percent of the textbooks included claims or suggested activities under the assumption that teenage sexual activity is the norm. Some books only recommended condom use when 'having a sporadic sexual intercourse or with an unknown person' (Oxford, p. 193), as

well as avoiding promiscuous behaviour with 'too many partners' (Anaya, p. 99). Ninety-two percent of the textbooks made no clear statements to promote delay of first sexual activity in youth, or regarding the benefits of avoiding multiple (concurrent or sequential) sexual partners.

Discussion

Effectiveness of condoms to prevent pregnancies and STIs

Just one textbook (Ecir) explained the difference between the theoretical effectiveness of condoms and other contraceptive methods, and their actual effectiveness due to user-related failures.

The messages of these textbooks tended to suggest a high degree of confidence in condom effectiveness, while also spreading an unrealistically low awareness that sexual activity can have serious consequences. Thus, teenagers are indirectly rushed into engaging in premature sexual behaviour that seems safe and problem free, based on the content of their sexual education textbooks. This type of information has been proven to increase multiple sexual partners and its subsequent public health problems.^{29,30} Some authors have warned about the existing association between condom use and the prevalence of STIs, which is particularly prevalent among teenagers, due to the fact that condom failure is systematically bound to be more frequent when used by someone with little experience.^{34,35} All 'safe sex' messages should be replaced by 'safer sex' messages because they correspond more to reality.³⁶

Scientifically, condoms are considered 'moderately effective' to prevent pregnancy,³³ while health authorities warn that condoms offer poor protection against the transmission of three of the most common STIs: Chlamydia, Herpes and HPV.^{11,37,38} Research has shown that transmission of HPV is primarily via skin–skin transmission.^{39,40} HPV has become one of the most troubling STIs in the USA, as it is considered to be a cause of cervical cancer.⁴¹ A recent study showed that 37% of women who used condoms every time they had intercourse were still infected by HPV.⁴² Even when condom use is promoted, youth should still be advised that the safest way to prevent STIs, including HPV, is through abstinence from sexual contact or maintenance of a steady relationship.^{43,44}

In practical terms, communication of the alternative message of abstinence could positively empower youth to delay beginning their sexual relations. Teenagers should be able to acquire the

life skills necessary for love and commitment, thereby making them better equipped to make the decision about when to have sexual relations, and to have the appropriate knowledge and awareness of the possible consequences. A recent international expert consensus in *The Lancet* stated that, when targeting young people: 'for those who have not started sexual activity the first priority should be to encourage abstinence or delay of sexual onset, hence emphasising risk avoidance as the best way to prevent HIV and other STIs as well as unwanted pregnancies'. The consensus further affirmed that: 'after sexual debut, returning to abstinence or being mutually faithful with an uninfected partner are the most effective ways of avoiding infection'.⁴⁴ This prevention strategy is called the ABC approach (Abstain, Be faithful/reduce partners, use Condoms), and its AIDS prevention effectiveness has been reported to be similar to discovering an AIDS vaccine with 80% effectiveness.⁴⁵ To date, no population-based AIDS prevention programme centred exclusively on the promotion of condoms has succeeded in decreasing the incidence of AIDS. The only countries that have lowered their AIDS incidence have promoted the A and B components of the ABC approach.⁴⁶

It is highly advisable for textbooks to incorporate these guidelines in order to bring about change in the rates of pregnancy and STI among teenagers. Furthermore, textbooks should contain the caveat that the theoretical risk of human immunodeficiency virus infection, albeit small with consistent and proper condom use, is cumulative and increases with time, as well as with every new partner and sexual contact.⁴⁶ While some argue that these recommendations are not realistic, there is international epidemiological evidence that documents the success of such prevention programmes.^{47–50} In addition, no proper informed choice is possible without informing students that, if sexual activity takes place in spite of this message, condoms are associated with 85% effectiveness to prevent unexpected pregnancies and an 80% relative reduction in the probability of infection from STI, but can never eliminate these risks.³⁷

Consequences of STI, and STI prevention and treatment

The problem with the identified statements concerning the prevention of AIDS and other STIs is that the textbooks do not discuss STIs with the appropriate sense of urgency that they deserve. In direct contradiction to what is taken as fact in these textbooks, AIDS and certain STIs do not currently have a cure. Moreover, because some

STIs are asymptomatic, their diagnosis and treatment may be delayed for months or even years.

The consequences of this delay in diagnosis and lack of STI treatment can be serious. Untreated STIs are associated with a high risk of chronic pelvic inflammatory disease, ectopic pregnancy, infertility (mainly due to Chlamydia), morbidity and child mortality (due to herpes), and cervical cancer (due to HPV).⁴⁰ These facts are not presented in the textbooks, and their absence is a great disservice to its audience who may be engaging in sexual activity, unaware of the possibility of such devastating consequences.

Family planning methods

Each textbook presented either a lack of relevant information or inaccurate data about the mechanisms and possible side effects of certain contraceptives. For example, 92% of the books classified some hormonal family planning methods that can have mechanisms of action at stages between fertilization and implantation as 'contraceptives'. This terminology is not always entirely precise because fertilization is not always avoided in this case, and raises the question of whether one is being properly informed of the true nature of such methods.^{51,52} Scientifically, such methods should be called 'post-conception' methods or methods with 'post-fertilization effects', and women should be aware of such subtleties. One of the textbooks claimed that the morning after pill 'is not a contraceptive method, but a method for emergency situations' (Bruño, p. 215), while proceeding to include it in a summary chart of 'contraceptives'. The same goes for intra-uterine devices, as scientific literature has described their post-fertilization effects.⁵³ Researchers in the field of family planning argue that the decision of what type of contraception to use cannot be made without substantial accurate knowledge about the possible post-fertilization effects that are sometimes involved.⁵⁴

While several textbooks claimed that certain NFP methods were obsolete or lacking information and difficult to learn, the World Health Organization published a study which showed that illiterate women were able to successfully interpret their own fertility and use NFP.⁵⁵ Furthermore, the effectiveness of NFP has been documented in multi-centre studies. Modern NFP, such as the symptothermal method, is an effective alternative that is free of side effects, and should be covered in these textbooks.⁵⁶

The lack of explanation concerning fertility indicators and Cowper gland secretions can result

in unwanted consequences such as pregnancy. The fact that genital contact without penetration, petting or withdrawal may lead to pregnancy due to the presence of sperm in pre-ejaculatory secretions is crucial knowledge for these teenagers and should therefore be included in these textbooks.

Assisted reproductive technologies and abortion

The overwhelmingly favourable information concerning reproductive technologies is in direct contrast with research that proves otherwise. For instance, the rate of serious congenital malformations in children conceived by IVF and ICSI is double that of naturally conceived pregnancies.^{57,58} Furthermore, the IVF and ICSI failure rates average 75%, while personal and monetary costs are substantial.^{59,60}

The textbooks did not promote alternative behaviours to prevent teenage pregnancy. Perhaps even more critical is the absence of discussion relating to the social and psychological problems that are prevalent among teenagers who choose to have an abortion.⁶¹ The consequences of early parenthood were not discussed.

Promotion of healthy lifestyles

Several studies have shown that early sexual activity is a risk factor for AIDS and other STIs.⁶² Sexual education programmes that give information about abstinence, or the delay of sexual onset, and condoms should, in the authors' view, place special emphasis on abstinence and character education when speaking to youth. Programmes that mainly promote abstinence could be successful in the prevention of teenage pregnancy.⁶³ They are called 'abstinence-centred' programmes, as opposed to 'abstinence only' programmes or other programmes that convey the information on abstinence and condoms without placing any emphasis on either. Finally, some programmes do not mention abstinence as a realistic choice. A recent study discussing sexual behaviours that can be considered causes of a health burden in the USA estimated the proportion of deaths and disability that can be attributed to sexual behaviour (one in 100 US deaths). This study suggested that the ABC approach has a role to play in reducing this burden.⁶⁴

Statements recommending condom use with 'sporadic sexual intercourse or with an unknown person' or recommending youth not to be 'too promiscuous' send a clear message that having sporadic sexual relations with strangers or with

a 'moderate degree' of promiscuity is perfectly acceptable provided that this behaviour is accompanied by diligent condom use. This idea contradicts scientific evidence that shows a correlation between a decrease in the number of sexual partners with a decrease in the AIDS epidemic, irrespective of the prevalence of condom use, in some parts of the world.⁶²

Most textbooks made the problematic assumption that the majority of 14–15 year olds are sexually active. Data from the Spanish National Institute of Statistics show that no more than 15% (approximately 11.4% of women and 18.4% of men) of adults aged 18–29 in 2004 confirmed that their first sexual experience occurred before the age of 16 years.⁷ These textbooks portray teenage sexual activity in a way that is not supported by epidemiological data. Respect and tolerance towards specific views or opinions about sexuality should be compatible with giving objective advice concerning information that is in accordance with epidemiological research, therefore leading to healthier reproductive choices. These textbooks should outline and promote beneficial sexual behaviours in contrast to those that might be more risky. For instance, there is scientific evidence showing that family structures strongly influence sexual and other risky teenage behaviours.^{65,66} In order to help youth achieve an ideal family environment in their lives, schools should promote attitudes and motivations to enable empowerment and self control as well as behavioural change when necessary. Being successful in founding a healthy family environment also depends on these life skills. Furthermore, the prevention of most contemporary public health problems, such as tobacco, traffic accidents, obesity and diabetes, depends, to some extent, on whether one is able to control and modify his/her behaviour.

This study suggests that the textbooks most commonly used in Spanish school systems lack scientific accuracy that is crucial to matters concerning teenage reproductive health issues. These textbooks are neither a sufficient reference nor an adequate teaching tool for teachers to educate 14–15-year-old students on issues of sexuality. One could argue that these inaccuracies could be due to the fact that new knowledge has become available since the books were edited in 2002. However, information about issues checked in this review, such as HPV and other STIs or condom effectiveness, was available before 2002. In any case, publishers should update all the relevant information regarding youth health.

These books should make distinctions when describing different sexual behaviours and

promote the healthiest reproductive choices. In order to help teenagers make more informed decisions about when to begin sexual activity, it is necessary that they receive all the relevant information to make that decision. By providing information that outlines the benefits of abstinence or delay of sexual experience, it may be possible to achieve an increase in the average age of sexual experimentation among teenagers. The lack of explicit positive messages favouring abstinence and mutual fidelity among couples may lead teenagers to believe that there is no alternative to having sex at a young age, and that the appropriate response to sexual feelings is to act on them, even when impulsive.

Limitations and strengths

This study has some limitations that have to be taken into account by the reader. The scoring system has its limits because the authors intended to give a numerical significance to sometimes qualitative data. However, the study tried to evaluate items using clear-cut criteria. For instance, the absence or presence of information or the presence of clearly incorrect information was evaluated. The authors tried not to engage in evaluating aspects that could be more difficult to assess or that could have different interpretations. This study aimed to strike a balance between what was reasonable to achieve with the resources available.

One of the authors (IGU) performed the evaluation. Blinding the editors of a given book was not feasible because editors have well-known editorial styles that can be identified upon reading any chapter. Furthermore, there was no double check of the review (no intercoder reliability) and no quantitative evaluation or measure of the reliability of this review. However, to avoid forgetting aspects that had to be reviewed from one text to another, and/or to minimize a biased and/or differential evaluation, a checklist of the criteria and aspects to be looked for in the evaluation was designed with the help of the Education Department of the University of Navarra, without having read the textbooks to be evaluated.

The examples cited in the results and discussion section should not be considered as a reflection of the proportion and degree of seriousness of the mistakes in the books reviewed. This study did not aim to describe errors in a representative manner. Instead, this study intended to highlight that books have serious errors; even one such error in one textbook is, in the authors' opinion, important enough to draw the attention of the public. For

example, it is important to know that a book affirms that 'all STIs have a cure', because this could have serious health consequences for youth that read such statements.

This study is an invitation to consider the overall integration of the different people and groups involved in the sexual education of young people: parents; teachers; textbook authors and editors; young people; and educational and health authorities. The clear contrast between scientific evidence and the information imparted in the majority of these textbooks is of concern from the public health standpoint, and emphasizes the importance of access to accurate and relevant information. Without accessibility to reliable information that details issues related to sexual activity and its consequences, it is impossible to have freedom of choice in the decision making of issues related to sexuality.

The authors encourage other researchers to perform similar studies to stimulate the debate among editors, teachers and parents.

Acknowledgements

The authors wish to thank Tesandra Cohen for her help in revising the English version of the manuscript.

Ethical approval

None sought.

Funding

Institute of Sciences for the Family of the University of Navarra.

Competing interests

None declared.

References

- Centers for Disease Control and Prevention. STD surveillance report. Atlanta, GA: U.S. Department of Health and Human Services; 2006.
- Monasch R, Mahy M. Young people: the centre of the HIV epidemic. *World Health Organ Tech Rep Ser* 2006;**938**:15–41.
- Pettifor AE, Rees HV, Kleinschmidt I, Steffenson AE, MacPhail C, Hlongwa-Madikizela L, et al. Young people's sexual health in South Africa: HIV prevalence and sexual behaviors from a nationally representative household survey. *AIDS* 2005;**19**:1525–34.
- Tripp J, Viner R. Sexual health, contraception and teenage pregnancy. *BMJ* 2005;**330**:590–3.
- Weinstock H, Berman S, Cates WJ. Sexually transmitted diseases among American youth: incidence and prevalence estimates, 2000. *Perspect Sex Reprod Health* 2004;**36**:6–10.
- Lopez Blasco A, Cachon L, Comas D, Andreu J, Aguinaga J, Navarrete L. *Informe Juventud en España 2004*. Madrid: Instituto de la Juventud; 2005.
- Instituto Nacional de Estadística. *Salud y hábitos sexuales. La conducta sexual desde la perspectiva del sida*. Boletín Informativo del instituto nacional de estadística; 2004.
- Mehta SD, Erbeling EJ, Zenilman JM, Rompalo AM. Gonorrhoea reinfection in heterosexual STD clinic attendees: longitudinal analysis of risks for first reinfection. *Sex Transm Infect* 2003;**79**:124–8.
- DiClemente RJ, Crosby RA, Wingood GM, Lang DL, Salazar LF, Broadwell SD. Reducing risk exposures to zero and not having multiple partners: findings that inform evidence-based practices designed to prevent STD acquisition. *Int J STD AIDS* 2005;**16**:816–8.
- Khan A, Hussain R, Schofield M. Correlates of sexually transmitted infections in young Australian women. *Int J STD AIDS* 2005;**16**:482–7.
- Vaccarella S, Franceschi S, Herrero R, Muñoz N, Snijders PJ, Clifford GM, et al. Sexual behavior, condom use, and human papillomavirus: pooled analysis of the IARC human papillomavirus prevalence surveys. *Cancer Epidemiol Biomarkers Prev* 2006;**15**:326–33.
- DiCenso A, Guyatt G, Willan A, Griffith L. Interventions to reduce unintended pregnancies among adolescents: systematic review of randomized controlled trials. *BMJ* 2002;**324**:1426.
- Kirby D, Laris B, Rolleri L. *Impact of sex and HIV education programs on sexual behaviors of youth in developing and developed countries*. Youth Research Working Paper No. 2. Research Triangle Park, NC: Family Health International; 2005.
- Churchill D, Allen J, Pringle M, Hippisley-Cox J. Teenagers at risk of unintended pregnancy: identification of practical risk markers for use in general practice from a retrospective analysis of case records in the United Kingdom. *Int J Adolesc Med Health* 2002;**14**:153–60.
- Fu H, Darroch JE, Haas T, Ranjit N. Contraceptive failure rates: new estimates from the 1995 National Survey of Family Growth. *Fam Plann Perspect* 1999;**31**:56–63.
- Free C, Ogden J. Contraceptive risk and compensatory behaviour in young people in education post-16 years: a cross-sectional study. *J Fam Plann Reprod Health Care* 2004;**30**:91–4.
- Santelli JS, Morrow B, Anderson JE, Lindberg LD. Contraceptive use and pregnancy risk among U.S. high school students, 1991–2003. *Perspect Sex Reprod Health* 2006;**38**:106–11.
- Chaya N, Johnston B, Engelman R, Ethelston S, Green M. *The PAI report card 2001: a world of difference: sexual and reproductive health & risks*. Washington: Population Action International; 2001.
- Bajos N, Leridon H, Goulard H, Oustry P, Job-Spira N. Contraception: from accessibility to efficiency. *Hum Reprod* 2003;**18**:994–9.
- Lete I, Cabero L, Alvarez D, Olle C. Observational study on the use of emergency contraception in Spain: results of a national survey. *Eur J Contracept Reprod Health Care* 2003;**8**:203–9.
- Ruiz Sanz S, Guell Perez E, Herranz Calvo C, Pedraza Moreno C. Emergency contraception. Characteristics of the demand. *Aten Primaria* 2002;**30**:381–7.

22. Churchill D, Allen J, Pringle M, Hippisley-Cox J, Ebdon D, Macpherson M, et al. Consultation patterns and provision of contraception in general practice before teenage pregnancy: case-control study. *BMJ* 2000;**321**:486-9.
23. Black KI, Mercer CH, Johnson AM, Wellings K. Sociodemographic and sexual health profile of users of emergency hormonal contraception: data from a British probability sample survey. *Contraception* 2006;**74**:309-12.
24. Truong H-HM, Kellogg T, McFarland W, Kang M-S, Darney P, Drey EA. Contraceptive intentions among adolescents after abortion. *J Adolesc Health* 2006;**39**:283-6.
25. Jones RK, Darroch JE, Henshaw SK. Contraceptive use among U.S. women having abortions in 2000-2001. *Perspect Sex Repr Health* 2002;**34**:294-303.
26. Hearst N, Chen S. Condom promotion for AIDS prevention in the developing world: is it working? *Stud Fam Plann* 2004;**35**:39-47.
27. Marston C, King E. Factors that shape young people's sexual behaviour: a systematic review. *Lancet* 2006;**368**:1581-6.
28. Kirby BD. Understanding what works and what doesn't in reducing adolescent sexual risk-taking. *Fam Plann Perspect* 2001;**33**:276-81.
29. Cassell MM, Halperin DT, Shelton JD, Stanton D. Risk compensation: the Achilles' heel of innovations in HIV prevention? *BMJ* 2006;**332**:605-7.
30. Kajubi P, Kanya MR, Kanya S, Chen S, McFarland W, Hearst N. Increasing condom use without reducing HIV risk: results of a controlled community trial in Uganda. *J Acquir Immune Defic Syndr* 2005;**40**:77-82.
31. Gavidia V. La educación para la salud en los manuales escolares españoles. *Rev Esp Salud Pública* 2003;**77**:275-85.
32. Prats J, Trepal i Carbonell C, Peña J, Valls R, Urgell F. Los jóvenes ante el reto europeo. Colección de Estudios Sociales, vol. 7. *Barcelona: Fundación "La Caixa"*.
33. Trussell J. Contraceptive efficacy. In: Hatcher R, Trussell J, Stewart F, editors. *Contraceptive technology*. New York: Ardent Media; 2004.
34. Crosby RA, DiClemente RJ, Wingood GM, Salazar LF, Rose E, Levine D, et al. Condom failure among adolescents: implications for STD prevention. *J Adolesc Health* 2005;**36**:534-6.
35. Lindberg LD, Sonenstein FL, Ku L, Levine G. Young men's experience with condom breakage. *Fam Plann Perspect* 1997;**29**:128-31.
36. de Irala J, Alonso A. Changes in sexual behaviors to prevent HIV. *Lancet* 2006;**368**:1749-50.
37. Weller S, Davis K. Condom effectiveness in reducing heterosexual HIV transmission. *Cochrane Database Syst Rev* 2002; 1:CD003255.
38. Fitch JT, Stine C, Hager WD, Mann J, Adam MB, McIlhane J. Condom effectiveness: factors that influence risk reduction. *Sex Transm Dis* 2002;**29**:811-7.
39. Winer RL, Lee SK, Hughes JP, Adam DE, Kiviat NB, Koutsky LA. Genital human papillomavirus infection: incidence and risk factors in a cohort of female university students. *Am J Epidemiol* 2003;**157**:218-26.
40. Genuis SJ, Genuis SK. Managing the sexually transmitted disease pandemic: a time for reevaluation. *Am J Obstet Gynecol* 2004;**191**:1103-12.
41. Munoz N, Castellsague X, de Gonzalez AB, Gissmann L. Chapter 1: HPV in the etiology of human cancer. HPV vaccines and screening in the prevention of cervical cancer. *Vaccine* 2006;**24**:S1-10.
42. Winer RL, Hughes JP, Feng Q, O'Reilly S, Kiviat NB, Holmes KK, et al. Condom use and the risk of genital human papillomavirus infection in young women. *N Engl J Med* 2006;**354**:2645-54.
43. Centers for Disease Control and Prevention. *Human papillomavirus: HPV information for clinicians*. Atlanta, GA: U.S. Department of Health and Human Services; 2006.
44. Halperin DT, Steiner MJ, Cassell MM, Green EC, Hearst N, Kirby D, et al. The time has come for common ground on preventing sexual transmission of HIV. *Lancet* 2004;**364**:1913-5.
45. Stoneburner RL, Low-Beer D. Population-level HIV declines and behavioral risk avoidance in Uganda. *Science* 2004;**304**:714-8.
46. Green E, Westport C. *Rethinking AIDS prevention: learning from successes in developing countries*. USA: Praeger; 2003.
47. Hogle J, Green E, Nantulya V, Stoneburner R, Stover J. *What happened in Uganda? Declining HIV prevalence, behavior change, and the national response*. Washington DC: USAID; 2002.
48. UNAIDS. *Report on the global AIDS epidemic. Executive summary*. Geneva: UNAIDS; 2006.
49. Green EC, Halperin DT, Nantulya V, Hogle JA. Uganda's HIV prevention success: the role of sexual behavior change and the national response. *AIDS Behav* 2006;**10**:335-46.
50. Gregson S, Garnett GP, Nyamukapa CA, Hallett TB, Lewis JJ, Mason PR, et al. HIV decline associated with behavior change in eastern Zimbabwe. *Science* 2006;**311**:664-6.
51. Larimore WL, Stanford JB. Postfertilization effects of oral contraceptives and their relationship to informed consent. *Arch Fam Med* 2000;**9**:126-33.
52. Kahlenborn C, Stanford JB, Larimore WL. Postfertilization effect of hormonal emergency contraception. *Ann Pharmacother* 2002;**36**:465-70.
53. Stanford JB, Mikolajczyk RT. Mechanisms of action of intrauterine devices: update and estimation of postfertilization effects. *Am J Obstet Gynecol* 2002;**187**:1699-708.
54. Trussell J, Ellertson C, Stewart F, Raymond EG, Shochet T. The role of emergency contraception. *Am J Obstet Gynecol* 2004;**190**:530-8.
55. A prospective multicentre trial of the ovulation method of natural family planning. I. The teaching phase. *Fertil Steril* 1981;**36**:152-8.
56. The European Natural Family Planning Study Groups. European multicenter study of natural family planning (1989-1995): efficacy and drop-out. *Adv Contracept* 1999;**15**:69-83.
57. Bonduelle M, Wennerholm UB, Loft A, Tarlatzis BC, Peters C, Henriot S, et al. A multi-centre cohort study of the physical health of 5-year-old children conceived after intracytoplasmic sperm injection, in vitro fertilization and natural conception. *Hum Reprod* 2005;**20**:413-9.
58. Hansen M, Kurinczuk JJ, Bower C, Webb S. The risk of major birth defects after intracytoplasmic sperm injection and in vitro fertilization. *N Engl J Med* 2002;**346**:725-30.
59. Katz P, Nachtigall R, Showstack J. The economic impact of the assisted reproductive technologies. *Nat Cell Biol* 2002; 4(Suppl):S29-32.
60. Andersen AN, Gianaroli L, Felberbaum R, de Mouzon J, Nygren KG. Assisted reproductive technology in Europe, 2002. Results generated from European registers by ESHRE. *Hum Reprod* 2006;**21**:1680-97.
61. Fergusson DM, Horwood LJ, Ridder EM. Abortion in young women and subsequent mental health. *J Child Psychol Psychiatry* 2006;**47**:16-24.

62. Shelton JD, Halperin DT, Nantulya V, Potts M, Gayle HD, Holmes KK. Partner reduction is crucial for balanced 'ABC' approach to HIV prevention. *BMJ* 2004; **328**:891–3.
63. Cabezón C, Vigil P, Rojas I, Leiva ME, Riquelme R, Aranda W, et al. Adolescent pregnancy prevention: an abstinence-centered randomized controlled intervention in a Chilean public high school. *J Adolesc Health* 2005; **36**: 64–9.
64. Ebrahim SH, McKenna MT, Marks JS. Sexual behaviour: related adverse health burden in the United States. *Sex Transm Infect* 2005; **81**:38–40.
65. Lammers C, Ireland M, Resnick M, Blum R. Influences on adolescents' decision to postpone onset of sexual intercourse: a survival analysis of virginity among youths aged 13 to 18 years. *J Adolesc Health* 2000; **26**:42–8.
66. Bacon JL. Adolescent sexuality and pregnancy. *Curr Opin Obstet Gynecol* 2000; **12**:345–7.

Available online at www.sciencedirect.com

