

Article

Knowledge about Sex Education in Adolescence: A Cross-Sectional Study

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Abstract: (1) Background: In adolescence, the onset of physical signs of sexual maturity and early sexual contact have become increasingly common. However, most adolescents are not adequately prepared for this event, which can lead to significant negative consequences for young people. This study aimed to evaluate knowledge about sexuality during adolescence. (2) Methods: A quantitative, descriptive, and correlational design was used, with 289 students from a school in the northern region of Portugal. From an online questionnaire, sociodemographic information and the Sexuality Knowledge Questionnaire were used to collect data. (3) Results: Most adolescents (54.0%) were female and aged between 15 and 17 years, with an average knowledge score of 17.04. The worst results were found in the dimensions of first sexual intercourse and sexual concerns, with men scoring lower, and the dimension of sexually transmitted infections and HIV / AIDS, where women performed better. The best scores were in the sexuality and sexual pleasure dimension, with women performing better, and the counseling and care in sexual and reproductive health dimension, where men performed better. (4) Conclusions: The approach to sexuality education must be constant throughout the life cycle, and it is essential to provide appropriate information to adolescents about issues related to sexuality.

Keywords: sexuality; adolescence; knowledge



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1. Introduction

Adolescence is a period characterized by a range of physical, emotional, and psychological changes, representing a transitional phase from childhood to adulthood [1]. This stage of life is generally considered healthy, yet it can also be a time of complexity [2], serving as a bridge between childhood and adulthood. During adolescence, individuals typically experience the first signs of sexual maturation, which is often associated with a newfound sense of independence. Unfortunately, despite earlier sexual activity becoming increasingly common among adolescents, many are ill-prepared for this experience [2].

Adolescence is a time of significant physical, emotional, and social transformations. During this period, young individuals are exploring and learning how to cope with new sensations and emotions. Understanding sexuality is a crucial aspect of healthy adolescent development, with positive implications for their lives, such as reducing the risk of sexually transmitted diseases (STDs), making informed decisions, establishing healthy relationships, improving self-esteem and confidence, preventing unwanted pregnancies, and building a foundation for fulfilling relationships [3,4]. It is imperative that adolescents have access to accurate and current information about sexuality to enable them to make informed choices [3–5].

The consequences of inadequate knowledge about sexuality during adolescence can be significant, leading to risky sexual behaviors, emotional and psychological challenges, and long-term impacts that can extend into adulthood [6].

A systematic review has shed light on the importance of understanding adolescent sexuality and the need for comprehensive sex education programs. The review examined trends and patterns in adolescent sexual behavior. It highlighted the increasing prevalence of early sexual initiation and inadequate adolescent knowledge regarding safe sexual practices. These findings reinforce the urgency of implementing comprehensive sex education programs that address gender and power dynamics to promote healthy sexual behaviors and reduce risky practices [7]. The study underscores the significance of up-to-date knowledge and effective educational interventions in addressing the sexual health needs of adolescents [7].

Another systematic review examined the relationship between parent–adolescent sexual communication and adolescents' sexual behaviors. The review proposed a conceptual model and analyzed the existing literature on this topic. The findings highlighted the positive impact of parent–adolescent sexual communication on adolescents' knowledge, attitudes, and behaviors regarding sexuality. The review emphasized the importance of effective communication between parents and adolescents in promoting healthy sexual behaviors and reducing risky practices. These findings support incorporating parent–adolescent sexual communication into comprehensive sex education programs to improve adolescent sexual health outcomes [8].

Furthermore, an integrative review of adolescents' perceptions of sexual health education programs synthesized the existing literature to explore how adolescents perceive and experience sexual health education interventions. The findings revealed that adolescents value comprehensive and inclusive programs providing accurate and relevant information, promoting open and non-judgmental discussions, and addressing their needs and concerns. The review emphasized the importance of tailoring sexual health education programs to adolescents' preferences and ensuring active participation in learning. These findings underscore the significance of considering adolescents' perspectives when designing and implementing sexual health education interventions [9].

Educating about sexuality transcends the mere transfer of knowledge and information about reproduction and sexuality. It involves providing adolescents with the conceptual, attitudinal, communicative-participatory, and evaluative tools that enable them to make responsible decisions regarding their sexuality [2]. Promoting and preventing adolescent health issues is critical to ensuring they engage in safe and risk-free sexual activities.

School health programs play a fundamental role in promoting sex education and encouraging healthy sexual behaviors among adolescents. By providing accurate information, promoting positive attitudes, and addressing sexual health issues, schools can help students learn about sensitive sexuality topics and ask related questions [10]. Although parents and families are primary sources of sexual health information, schools provide a supportive environment for students to learn and ask questions about sexual health topics [11]. Comprehensive sex education programs offered in schools cover topics such as anatomy, reproduction, contraception, and sexually transmitted infections. Evidence-based knowledge from such programs enables students to make informed decisions about their sexual health [12].

In the context of Portugal, the promotion of sexual and reproductive health among adolescents is a priority. Since 1994, Portugal has been part of the European Network of Health Promoting Schools (SHE), which aims to promote synergies between health and education. Since 2005, schools have been required to include health education in their educational projects. Since 2009, each school grouping requires an interdisciplinary team for health and sexual education. Sex education is integrated into the priority areas of action in the context of school health. The PRESSE Program, promoted by the Northern Regional Health Administration (NRHA), supports the implementation of sex education in schools in a structured and sustained way, involving joint work between school health professionals

and teachers. This program is implemented in public and private schools in the Northern region, in partnership with the Northern Regional Education Directorate (NRED). It targets students in the second and third cycles of basic education and secondary education. This program is a unique model, with a registered trademark, that stands out for its structure, sustainability, and permanent support for health and for the education professionals who apply it [13]. The PRESSE Program focuses on promoting comprehensive sexual education, including topics related to sexual health, the prevention of HIV/AIDS and other sexually transmitted infections (STIs), healthy relationships, and personal safety. It aims to involve school health professionals and teachers in joint efforts to deliver effective sex education, ensuring that students receive accurate and up-to-date information [13].

Research on adolescent knowledge of sexuality in Portugal has been limited, highlighting the need for further investigation. However, a few studies have provided valuable insights into this topic. For instance, one study explored the sexual knowledge and attitudes of Portuguese adolescents, revealing gaps in their understanding of contraceptive methods and sexually transmitted infections [14]. This study emphasized the importance of addressing the knowledge gaps and promoting comprehensive sex education among Portuguese adolescents. Another review investigated the importance attributed by Portuguese adolescents to sexual education and its correlation with attitudes, knowledge, and sexual behavior. The study found that adolescents who perceived sexual education as necessary demonstrated more positive attitudes, better knowledge, and healthier sexual behaviors [15]. Furthermore, our study aims to investigate the specific mechanisms through which comprehensive sexual education programs influence the outcomes of Portuguese adolescents, providing insights into the potential causal pathways and addressing existing gaps in the literature.

These studies underscore the importance of addressing the knowledge gaps and promoting comprehensive sex education among Portuguese adolescents. Despite these contributions, there remains a need for more extensive research to comprehensively understand the factors influencing adolescent knowledge of sexuality and develop tailored interventions in the Portuguese context.

This study aims to assess adolescents' knowledge of sexuality during adolescence in a school located in northern Portugal. By exploring adolescents' knowledge in this context, we can contribute to the existing literature, bridging knowledge gaps and informing tailored interventions to enhance adolescent sexual health.

2. Materials and Methods

2.1. Research Design

The current study utilized a cross-sectional, descriptive, correlational, and quantitative research approach for its specific utility in addressing our research objectives. This choice was predicated on the study's aims of gaining a comprehensive perspective of adolescent sexuality knowledge levels in our chosen demographic, which, when quantified, provides an objective, encompassing view of the issue at hand.

Moreover, the implementation of a cross-sectional design aligns with the practical considerations of our study environment. An efficiently administered questionnaire suits the time constraints and the need for robust data collection in this school setting.

2.2. Participants

The study participants comprised students aged 15 to 17 years, attending grades 10 through 12, at a secondary school in Northern Portugal. A Sample Size Calculator was utilized to calculate the required sample size to fulfill the desired statistical criteria, which aimed to achieve a 95% confidence level and a precision of $\pm 5\%$. Consequently, a minimum sample size of 270 was determined.

To be included in the study, participants had to be currently attending the designated secondary school. The exclusion criterion was failing to provide informed consent signed by

their legal guardians on the day of data collection, which had been previously distributed for validation.

2.3. Sampling Method and Procedure

The sampling method employed in this study was non-probabilistic convenience sampling. Given the practical constraints of conducting research in a school setting, participants were selected based on their availability and accessibility to participate in the study. The questionnaire was administered during a designated class period, and students were given a time limit of 20 min to complete it.

To optimize data collection, we implemented a structured approach where students were required to answer each question before proceeding to the next one. This ensured that participants could respond to as many questions as possible, maximizing the data obtained.

While we provided an average time frame of 20 min for survey completion, we recognized the individual differences in students' response times and allowed for flexibility. Students who needed additional time to complete the questionnaire were accommodated, ensuring they had sufficient opportunity to provide thoughtful and comprehensive responses.

2.4. Data Collection Tools

The data collection instrument consisted of a two-part questionnaire. Part 1 captured sociodemographic details, while Part 2 employed the Sexuality Knowledge Questionnaire (QCS) [16].

The sociodemographic profile included age, gender, field of study, living arrangements, parents' academic qualifications, occupation, and parents' marital status.

To assess adolescents' knowledge about sexuality, the validated Portuguese version of the Sexual Knowledge Questionnaire (QCS) was employed. The QCS questionnaire has previously undergone development and validation procedures and has demonstrated reliability in measuring knowledge in the context of sexual education. The QCS is an assessment tool used to measure an individual's knowledge level about sexuality, encompassing questions about reproductive anatomy and physiology, contraception, sexually transmitted diseases, pregnancy, gender identity, sexual orientation, and other related topics. The questionnaire is composed of 25 true/false questions, organized into six dimensions (D1: First sexual intercourse and sexual concerns; D2: Sexuality and sexual pleasure; D3: Contraception and safe sexual practices; D4: Pregnancy prevention; D5: Sexually transmitted infections and HIV/AIDS; D6: Counseling and assistance in sexual and reproductive health). One point is awarded for each correct answer, with a maximum score of 25 points. The higher the score, the greater the level of knowledge about sexuality.

Using the validated QCS tool allowed us to assign numerical values to the participants' knowledge, enhancing the objectivity of the data collected and enabling rigorous statistical analysis. This quantitative approach facilitated precise, replicable, and comparably measurable outcomes, furthering the study's credibility and potential for replication in different contexts.

The validation study of the QCS in Portuguese adolescents [16] demonstrated the questionnaire's satisfactory internal consistency and good discriminant and convergent validity. The study involved 546 adolescents, with a mean age of 15.8 years, and indicated that the QCS is a reliable and valid tool to assess knowledge about sexuality in Portuguese adolescents. The Cronbach's alpha coefficient of 0.78 showed the questionnaire's questions consistently measured knowledge about sexuality. The study also demonstrated that the QCS has good discriminant validity, as it assesses different aspects of knowledge, and good convergent validity, as it is positively correlated with other measures of knowledge about sexuality.

In terms of QCS subscale validity, the author found that the three subscales (sexual anatomy and physiology, contraception, and sexually transmitted diseases) exhibited good discriminant validity, meaning that each subscale evaluates different aspects of sexuality

knowledge, which is crucial for a comprehensive assessment of adolescents' knowledge on the topic [16]. Additionally, the study demonstrated that the QCS subscales had good convergent validity, with scores on the subscales positively correlating with other measures of sexuality knowledge, indicating that the QCS is a valid instrument for evaluating adolescents' knowledge about sexuality [16].

2.5. Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 28.0.1.0, a computer program designed to transform collected data into statistical results. A significance level of $p < 0.05$ was chosen to determine statistical significance. Sociodemographic variables were analyzed using descriptive statistics, including frequencies and percentages. To assess the relationship between the QCS subscales and sociodemographic variables, a correlation test was conducted. Pearson's correlation coefficient was employed since the sample data exhibited a normal distribution.

2.6. Ethics and Consent

In order to ensure the ethical conduct of this study involving adolescents, we followed international ethical guidelines to protect the rights and well-being of participants. Informed consent was obtained from the adolescents and their legal representatives, ensuring they were fully aware of the study's purpose, procedures, and their rights as participants. Confidentiality and privacy were strictly maintained throughout the research process, with all data anonymized and stored securely. Measures were taken to minimize any potential risks or discomforts associated with participating in the study.

We also recognized the importance of actively involving adolescents in the research process, empowering them to have a voice and contribute to the study's findings. Adequate support and resources were provided to ensure the well-being of participants, and any concerns or questions raised by the adolescents were addressed promptly.

The study was conducted with the ethics committee of University Fernando Pessoa's approval, and the study protocol was registered under the number FCS/PI-06/20. By adhering to these ethical considerations, we aimed to ensure the research's validity, reliability, and integrity while respecting the rights and dignity of the participants involved.

3. Results

Based on the information presented in Table 1, the sample for this study comprised 289 participants aged between 15 and 17 years, with an average age of 15.48 years. It can be observed that the sample was predominantly composed of female students, accounting for 54% of the total ($n = 156$), while male students represented 46% ($n = 133$). Regarding cohabitation, most students (81.7%, $n = 236$) reported living with both parents. Most students reported that their parents were married (76.8%, $n = 222$). When asked about whom they talk to regarding sexuality, more than half of the participants (50.9%, $n = 147$) reported talking to their friends. Our study shows similarities with the demographic data reported by another study regarding the approach to sexuality in the dialogue between parents and adolescents [17].

Table 1. Characterization of the sample.

Variables	n (%)		M (SD)
Age			15.48 (0.572)
15	162	56.1	
16	116	40.1	
17	11	3.8	

Table 1. *Cont.*

Variables	n (%)		M (SD)
Sex			1.54 (0.499)
Female	156	54.0	
Male	133	46.0	
Cohabitation			
Both Parents	236	81.7	0.82 (0.388)
Father	2	0.7	0.1 (0.83)
Mother	41	14.2	0.14 (0.350)
Siblings	91	31.5	0.31 (0.465)
Parents' marital status			2.25 (0.817)
Single	20	6.9	
Married	222	76.8	
De facto union	6	2.1	
Divorced	37	12.8	
Widower	4	1.4	
Who do they talk to about sexuality?			
Mother	66	22.8	0.23 (0.421)
Father	27	9.3	0.09 (0.292)
Friends	147	50.9	0.51 (0.501)
Girlfriend	18	6.2	0.06 (0.242)
Teachers	4	1.4	0.01 (0.117)
Siblings	14	4.8	0.05 (0.215)
Nurse/Doctor	3	1.0	0.01 (0.102)
Others	29	10.0	

Table 2 presents the results of the participant's knowledge about sexuality measured by the QCS. The data show that the participants' average score on the QCS is 17.04 out of a maximum of 25 points, indicating a higher level of knowledge about sexuality. Specifically, female adolescents have an average score of 17.29 points, while male adolescents have an average of 16.74 points.

Table 2. Results of the QCS total and subtopics.

	Total	D1	D2	D3	D4	D5	D6
	17.04	2.96/5	2.66/3	4.72/6	1.36/2	3.90/7	1.44/2
Sex							
Male	16.74	2.96/5	2.58/3	4.69/6	1.36/2	3.70/6	1.45/2
Female	17.29	2.95/5	2.74/3	4.75/6	1.36/2	7/4.07	1.42/2

D1 = First sexual relation and sexual preoccupations (maximum score: 5 points). D2 = Sexuality and sexual pleasure (maximum score: 3 points). D3 = Contraception and safe sexual practices (maximum score: 6 points) D4 = Pregnancy prevention (maximum score: 2 points). D5 = Sexually transmitted infections and HIV/AIDS (maximum score: 7 points). D6 = Counseling and care in sexual and reproductive health (maximum score: 2 points).

When dissected into the various subthemes, it was noted that scores were below expectations in subtheme D1 (First sexual intercourse and sexual concerns), with an average of 2.96 out of 5. Interestingly, male adolescents had a marginally higher average score (2.96)

in this area compared to females (2.95). The results were unsatisfactory in the sub-topic D5 of Sexually Transmitted Infections and HIV/AIDS, with an average score of 3.90 out of 7. However, female adolescents had a higher level of knowledge in this area, with an average score of 4.07 compared to male adolescents who scored an average of 3.70.

On a different note, participants exhibited stronger performance in subtheme D2, which pertains to sexuality and sexual pleasure, achieving an average score of 2.66 out of 3. Female adolescents displayed a higher level of knowledge in this area, with an average score of 2.74, while male adolescents obtained an average score of 2.58.

Furthermore, the results were more favorable in subtheme D6, which focuses on counseling and care in sexual and reproductive health, with an average score of 1.44 out of 2. Male adolescents demonstrated a higher level of knowledge in this domain, achieving an average score of 1.45 compared to female adolescents who scored an average of 1.42.

The correlations between sociodemographic variables and adolescents' knowledge of sexuality are shown in Table 3. The findings indicate that age exhibits a significant inverse correlation with knowledge in dimensions D1 (First sexual intercourse and sexual concerns) and D2 (Sexuality and sexual pleasure) with significance levels of 0.016 and 0.042, respectively.

Table 3. Correlations between sociodemographic and QCS subtopics variables.

Variables	D1	D2	D3	D4	D5	D6
Age	C. −0.141 Sig. 0.016	C. −0.12 Sig. 0.042	C. −0.015 Sig. 0.795	C. −0.006 Sig. 0.921	C. 0.039 Sig. 0.507	C. 0.061 Sig. 0.301
Sex	C. −0.007 Sig. 0.906	C. 0.146 Sig. 0.013	C. 0.026 Sig. 0.657	C. −0.001 Sig. 0.981	C. 0.175 Sig. 0.003	C. −0.024 Sig. 0.683
Cohabitation	C. 0.024 Sig. 0.686	C. −0.030 Sig. 0.616	W. 0.027 Sig. 0.649	W. −0.025 Sig. 0.671	W. −0.036 Sig. 0.537	W. −0.029 Sig. 0.621
Parents' marital status	C. −0.055 Sig. 0.348	C. 0.041 Sig. 0.492	C. 0.027 Sig. 0.653	C. −0.061 Sig. 0.300	C. −0.011 Sig. 0.851	C. −0.054 Sig. 0.359

D1 = First sexual intercourse and sexual concerns; D2 = Sexuality and sexual pleasure; D3 = Contraception and safe sexual practices; D4 = Pregnancy prevention; D5 = Sexually transmitted infections and HIV/AIDS; D6 = Counseling and assistance in sexual and reproductive health.

The study's findings revealed interesting relationships between sociodemographic variables and adolescents' knowledge of sexuality. Specifically, age demonstrated a significant inverse correlation with knowledge in both the D1 (First sexual intercourse and sexual concerns) and D2 (Sexuality and sexual pleasure) dimensions ($p < 0.05$). This suggests that knowledge in these dimensions tends to decrease as age increases.

Additionally, gender was found to be significantly correlated with knowledge in the D2 dimension (Sexuality and sexual pleasure) ($p < 0.05$). The results indicated that female adolescents exhibited higher knowledge levels in this area than their male counterparts. On the other hand, no significant correlations were observed between knowledge of sexuality and the sociodemographic variables of cohabitation or parental marital status.

In summary, the results emphasize the significant impact of age and gender on adolescents' knowledge about sexuality. However, the study did not find evidence to support a significant relationship between knowledge of sexuality and the sociodemographic variables of cohabitation or parental marital status.

4. Discussion

This study aimed to explore the influence of sociodemographic factors on adolescents' knowledge of sexuality. Adolescence is widely recognized as a period of identity and autonomy seeking. The existing literature shows that adolescents tend to move away from their families and towards their peers to share experiences and concerns, creating a bond of closeness among them [18,19].

In our study, we utilized the terms 'male' and 'female' as descriptors for the levels of the variable 'sex.' These terms accurately represent the biological sex of the participants in our sample. While we acknowledge that gender is a multifaceted construct influenced by social and cultural factors, our study examined the association between biological sex and the outcomes of interest. By using 'male' and 'female,' we aimed to maintain consistency with established terminology and ensure clarity in our findings regarding the biological sex of the participants. It is important to note that our study does not directly explore the complexities of gender identity or gender-related factors. Future research could further investigate the influence of gender-related factors on the outcomes under investigation by considering a more diverse range of gender identities.

As previously suggested, knowledge has the potential to shape adolescents' attitudes and behaviors, leading to a reduction in risky behaviors [20]. Adolescents are particularly vulnerable to engaging in risky sexual behaviors, including early sexual intercourse, unprotected sex, and the acquisition of sexually transmitted infections (STIs) [18,20]. It is well-established that adolescents with higher levels of knowledge about sexuality and sexual health tend to exhibit healthier sexual behaviors, such as increased contraceptive use, delayed sexual initiation, and reduced rates of STI transmission [20]. According to a study on sex education among Portuguese adolescent students, it was found that adolescents with higher levels of knowledge about sexuality are more likely to engage in fewer risky behaviors [20]. Conversely, adolescents with lower levels of knowledge often find themselves ill-equipped to navigate the complexities of sexual relationships and make informed decisions regarding their sexual health [20].

The questionnaire utilized in our study to evaluate six dimensions of sexual education for adolescents has provided valuable insights into the areas where they struggle to acquire knowledge. While dimension 1 (D1) showed lower scores, our findings indicated that male adolescents were interested in seeking information about sexuality and its effects on themselves and females, actively pursuing and preserving their health [18]. This highlights the importance of tailoring sexual education programs to address male adolescents' specific needs and concerns.

However, dimension 5 (D5) continued to yield negative results, emphasizing the importance of addressing concerns and providing accurate and current information on this subject. To achieve this, it is crucial to reflect on the topic and ensure access to comprehensive and reliable information that effectively meets the needs of adolescents. Therefore, we recommend that schools and nurse consultations continue to engage in discussions on sexuality. At the same time, collaborative efforts are necessary to ensure adolescents have access to the information they need to make informed and responsible decisions regarding their sexual health [17,18].

In dimension 2 (D2), our findings suggest that adolescents are gaining a better understanding of sexuality, which suggests that the concept of sexuality is becoming more defined and less focused on physical aspects alone. It now includes emotions, feelings, and affections [17,18]. Additionally, although only a small percentage of adolescents reported discussing sexuality with a nurse or doctor, those who did demonstrated better knowledge in dimension 6 (D6). However, it is crucial to emphasize the importance of seeking accurate information and advice to prevent risky behavior. Lack of confidence and fear of being judged continue to be significant barriers for adolescents seeking healthcare services. They often feel uncomfortable seeking such services and prefer to discuss sexuality with friends of the same age [21].

Lack of confidence and fear of being judged are significant barriers for adolescents seeking healthcare services. Adolescents may feel uncomfortable discussing their sexual health concerns with healthcare professionals due to concerns about privacy, stigma, and potential judgment. This discomfort often stems from a fear of being perceived as sexually active or engaging in behaviors that may be considered socially unacceptable. As a result, many adolescents rely on peer networks and discussions with friends of the same age as their primary source of information and support regarding sexuality [18].

It is essential to recognize and address these barriers to promote adolescents' access to accurate information, confidential healthcare services, and appropriate guidance. Healthcare providers and educators should create a safe, non-judgmental environment, fostering open and honest communication with adolescents. By actively listening to their concerns, providing comprehensive and accurate information, and respecting their autonomy, healthcare professionals can help alleviate the fears and discomfort that hinder adolescents from seeking the healthcare services they need [22].

In addition, peer support and peer-led interventions can play a crucial role in addressing the information-seeking behavior of adolescents. Encouraging open and non-judgmental discussions among peers can provide a valuable platform for adolescents to share experiences, seek advice, and learn from one another. Peer-led initiatives, such as peer education programs, have effectively promoted positive sexual health outcomes by addressing adolescents' unique needs and preferences and fostering a sense of trust and relatability [6].

Furthermore, efforts should be made to increase adolescents' awareness of the confidential nature of healthcare services and their rights to seek and receive non-judgmental care. Educating adolescents about their rights, confidentiality laws, and the role of healthcare professionals in supporting their sexual health can empower them to seek healthcare services without fear or hesitation [23].

Addressing the lack of confidence and fear of judgment as barriers, we can create a supportive environment encouraging adolescents to seek healthcare services, access accurate information, and make informed decisions regarding their sexual health. This can contribute to improved sexual health outcomes and overall well-being among adolescents.

To improve knowledge about sexuality and reduce the risks associated with certain behaviors, nurses must develop strategies to help adolescents feel more at ease and provide them with the necessary advice. Health services must be equipped to offer a welcoming and safe environment for these young people, encouraging them to seek out accurate information and make responsible decisions regarding their sexual health and lives [18].

Analyzing the correlation between adolescents' age and their knowledge in D1 and D2 revealed an interesting trend where knowledge tends to decrease as age increases. This finding may be attributed to the earlier onset of sexual activity among adolescents, which prompts them to seek information about sexuality at an earlier age. The need for knowledge about sexual health and relationships becomes more apparent as adolescents navigate their developing sexuality [24].

However, it is essential to note that studies have also indicated that adolescents around 15 years old may possess a higher level of knowledge than previously assumed. This suggests that they are more informed about sexuality due to various factors such as exposure to comprehensive sexual education programs, access to reliable information through multiple sources (e.g., school, media, peers), and greater engagement in discussions about sexuality [24].

It is crucial to recognize that the relationship between age and knowledge is not linear and is influenced by various contextual factors. Cultural norms, educational systems, and access to sexual health resources can significantly impact adolescents' knowledge acquisition. For instance, adolescents in regions or communities with limited access to comprehensive sexual education programs or where discussions around sexuality are stigmatized may experience knowledge gaps regardless of their age.

These findings highlight the need for targeted interventions that consider the unique needs of different age groups. Early adolescence is critical for initiating comprehensive sexual education and providing age-appropriate information that addresses younger adolescents' specific concerns and developmental stages. As adolescents mature, the focus should shift towards reinforcing knowledge, addressing advanced topics, and promoting critical thinking skills to support informed decision-making regarding sexual health.

Moreover, it is essential to ensure that sexual education programs continue to provide updated and evidence-based information as adolescents progress through different age groups. Recognizing the evolving landscape of sexuality, including emerging issues such as technology-mediated communication, consent, and diverse sexual orientations and identities, is vital in equipping adolescents with accurate and relevant knowledge.

Further research is warranted to explore the nuanced relationship between age and knowledge about sexuality among adolescents in the specific cultural context of Portugal. Longitudinal studies can provide insights into how knowledge develops and changes over time and the impact of different factors, such as educational interventions or societal changes, on adolescent sexual knowledge.

Regarding the correlation between gender and knowledge in D2, our findings support previous research indicating that female adolescents tend to exhibit higher knowledge about sexuality [18,19,24]. This finding may be attributed to several factors, including a more significant curiosity and interest among female adolescents in sexuality-related topics. Society often places a greater responsibility on females for their sexual and reproductive health, leading them to seek information and engage in discussions about sexuality actively [18,19,22].

However, it is important to acknowledge that knowledge alone is insufficient to bring about behavioral change among adolescents. While knowledge is a crucial component, it is just one piece of the puzzle in promoting informed and healthy decisions regarding sexuality. Simply knowing about sexual health does not guarantee that adolescents will engage in responsible sexual behaviors. Other factors, such as individual beliefs, social norms, peer influence, and access to resources, also play significant roles in shaping adolescents' attitudes and behaviors [18,19,24].

Furthermore, it is essential to recognize that knowledge is dynamic and continually evolving. Given the rapid advancements in technology, changing societal norms, and emerging sexual health issues, it is crucial to provide adolescents with accurate and up-to-date information through comprehensive sex education programs. This includes addressing topics such as consent, healthy relationships, sexual diversity, and digital safety, which are increasingly relevant in today's digital age [23,25].

Additionally, promoting comprehensive sex education that encompasses a broad range of topics beyond basic knowledge is critical. This includes discussing communication skills, negotiating sexual boundaries, decision-making, and promoting positive sexual health behaviors. By providing a comprehensive understanding of sexuality and equipping adolescents with practical skills, sex education programs can empower them to make informed choices and engage in healthy relationships [26].

Future research should explore the complex interplay between knowledge, attitudes, and behaviors among adolescents, considering the influence of gender, cultural factors, and contextual elements. Longitudinal studies tracking changes in knowledge, attitudes, and behaviors over time can provide valuable insights into the effectiveness of sex education interventions and shed light on the factors contributing to positive sexual health outcomes among adolescents.

Age and gender emerged as significant factors influencing the level of knowledge about sexuality among adolescents, aligning with patterns observed in diverse cultural and geographic settings [25]. Our study provides valuable insights specific to the Portuguese context, reaffirming that older adolescents and females tend to demonstrate higher knowledge about sexuality. These findings are consistent with previous research conducted in Portugal, indicating a consistent trend within the country [14,15,20]. However, it is essen-

tial to note that these results are particularly representative of the adolescent population within the city where the study was conducted. The influence of local cultural and societal factors on these outcomes invites further research to deepen our understanding of their applicability in the Portuguese adolescent population.

Research has consistently demonstrated the effectiveness of school-based sex education programs in improving adolescents' knowledge, attitudes, and sexual behaviors. A scoping review has highlighted the positive impact of comprehensive sex education in schools, contributing to increased knowledge and healthier sexual behaviors among adolescents [5,9–11,20,26–28]. The study demonstrates that school-based interventions significantly impact long-term behavioral changes, and that continuity was critical in promoting healthy sexuality [26]. Our research aligns with these previous studies, further supporting the importance of implementing evidence-based sex education programs in Portuguese schools.

It is worth noting that cultural and societal factors specific to Portugal may influence the effectiveness of sex education programs and the overall sexual knowledge of adolescents. With its rich cultural heritage and diverse social norms, Portugal presents a unique context where attitudes, beliefs, and behaviors regarding sexuality may differ from other countries. Religious influence, traditional gender roles, and prevailing societal taboos can shape adolescents' understanding and engagement with sexual health education. Therefore, it is essential to consider these contextual factors when interpreting the results and generalizing them to the broader Portuguese population.

Research has consistently demonstrated the effectiveness of school-based sex education programs in improving adolescents' knowledge, attitudes, and sexual behaviors [15–19]. For instance, the PRESSE Program has been implemented in schools to provide comprehensive sex education through joint efforts between school health professionals and teachers. This structured and sustained approach allows for confidential information and services to be offered within the school environment, addressing the transportation and financial barriers that young people may face [10,29–32]. The availability of such services within schools has been found to increase the utilization of healthcare services by young people and improve their sexual and reproductive health outcomes [32].

To ensure the success of sex education programs in schools, it is crucial to empower and train educators to address issues related to adolescent sexual and reproductive health. Teachers and school health professionals should receive comprehensive training that equips them with accurate and unbiased information, enabling them to create a safe and inclusive learning environment. Special attention should also be given to training educators on addressing the specific needs of LGBTQ+ youth sensitively and inclusively, fostering an environment that respects and embraces diverse sexual orientations and gender identities [27].

In addition to school-based interventions, community involvement is vital in promoting adolescent sexual and reproductive health. Engaging community and religious leaders in interventions can facilitate the dissemination of sexual health information and contribute to its acceptance within the community. Collaboration with local organizations, community centers, and religious institutions can help reach a wider audience and foster a supportive environment for open discussions on sexual health topics [33].

To ensure the continued effectiveness of sex education programs, it is essential to conduct regular evaluations and assessments. Monitoring the impact of interventions and incorporating feedback from both students and educators allows for necessary adjustments and improvements. Additionally, research is needed to address adolescents' evolving needs and evaluate the long-term impact of sex education interventions in Portuguese adolescents.

Parents and guardians play a crucial role in supporting sex education programs in schools. Research has shown that parents can be an essential source of information and support for young people regarding sexual health issues [17]. Therefore, providing parents with access to relevant resources and information, such as pamphlets, workshops, or online

platforms, is essential. Additionally, organizing meetings or events where parents can discuss sexual health topics and receive professional guidance can strengthen their role in promoting the sexual well-being of their children [17].

To summarize, school-based sex education can effectively promote adolescent sexual and reproductive health as long as it is inclusive and comprehensive, involving students, their families, and communities. By considering Portugal's unique cultural and societal factors, empowering educators, involving community stakeholders, conducting evaluations, and actively engaging parents, we can create a supportive and informed environment that promotes positive sexual health outcomes for Portuguese adolescents.

Our study contributes to the growing body of knowledge on adolescent sexual health by examining the influence of sociodemographic factors on knowledge about sexuality in a specific context. By addressing this research gap, we provide valuable insights that can inform educational interventions, health policies, and further research in the field, ultimately contributing to the promotion of healthy sexual behaviors among adolescents [29–31].

Our findings align with previous studies that highlight the importance of comprehensive sex education programs and up-to-date knowledge in promoting healthy sexual behaviors among adolescents. The increasing prevalence of early sexual initiation and the lack of adequate knowledge about safe sexual practices among adolescents have been consistently identified in the literature [10,15,18,26–28]. Therefore, our study reaffirms these patterns and underscores the urgency of providing accurate and comprehensive sexual health education to address these issues effectively [34].

Moreover, our study goes beyond confirmation and offers nuanced insights specific to the Portuguese context. Focusing on a single school in northern Portugal, we capture the unique sociocultural dynamics and educational landscape that may influence adolescents' knowledge of sexuality [32–36]. This localized perspective adds depth to the existing literature and highlights the need for context-specific approaches in addressing sexual health issues among Portuguese adolescents.

However, it is important to acknowledge the limitations of our study when interpreting its findings. The cross-sectional design, limited to a single school in the north of Portugal, restricts the generalizability of our results to other adolescent populations. Future research should aim for larger and more diverse samples to enhance the generalizability of findings.

Additionally, our study employed a quantitative approach which, although robust and precise, may not fully capture the complexity and diversity of individual experiences and perspectives surrounding the sensitive topic of sexuality. Combining quantitative data with qualitative insights through a mixed-methods design in future studies can provide a more comprehensive understanding of adolescents' knowledge and perceptions about sexuality.

Furthermore, the reliance on a non-probabilistic convenience sampling technique, while practical within our study's context, needs to be revised in the generalizability of our findings. Future research should consider using more representative sampling methods to ensure a broader representation of the adolescent population.

The study's design also leaves it susceptible to various forms of bias. Given the sensitive nature of the subject matter, participants' responses could have been influenced by recall bias and acquiescence bias. The potential for social desirability bias, where participants respond in a manner they perceive as socially acceptable rather than truthful, should also be acknowledged.

Moreover, due to the correlational nature of our data, caution should be exercised when extrapolating the results to other contexts or populations. Future research should consider employing experimental or longitudinal designs to establish causality and examine changes in knowledge over time.

To overcome these limitations in future research, employing a mixed-method design that integrates quantitative and qualitative approaches is recommended. This combination would enable a more comprehensive and nuanced understanding of adolescents' knowl-

edge and perceptions regarding sexuality. By adopting a holistic approach, researchers can gather numerical data and in-depth insights, which would be valuable in informing educational strategies and interventions. Given the topic's sensitive nature, this approach would allow for tailoring interventions to meet the specific needs of adolescents in different contexts.

We also acknowledge certain limitations related to our selection of demographic variables. While we focused on evaluating the general level of sexual knowledge among adolescents, we did not specifically investigate how various demographic factors such as race, sexual orientation, and ability status might influence this knowledge. We recognize that these demographic variables are deeply interconnected with an individual's sexuality and can considerably impact sexual behaviors and understanding. Due to the research focus and constraints encountered during data collection, these variables were initially excluded. Future studies could benefit from incorporating these aspects to gain a more nuanced understanding of adolescent sexuality knowledge across diverse demographic groups.

Moreover, it is essential to emphasize the contextual specificity of our research. Our study was conducted in a single city in Portugal. While our findings provide valuable insights into adolescents' knowledge about sexuality within this context, they may not directly apply to different geographic or cultural settings. This study does not account for the potential diversity in sexual knowledge among adolescents across various regions, cultures, or societal groups within Portugal or internationally. Cultural norms, societal attitudes, educational curricula, and access to information about sexuality can vary greatly, all of which could significantly influence the outcomes of similar studies conducted elsewhere. Therefore, while our study strengthens the understanding of age and gender effects on sexual knowledge, it also highlights the need for future research to consider the influence of geographic and cultural factors in greater depth.

5. Conclusions

Promoting adolescent sexual health is crucial for their overall well-being and development. It requires collaborative efforts from various sectors, including education and health, to ensure that adolescents have access to accurate information and opportunities for reflection on sexuality. By identifying the specific needs of young people and implementing targeted interventions, we can enhance access to effective healthcare and promote positive health outcomes.

Several key interventions can be adopted to promote adolescent sexual health. Providing sexual health services within schools can facilitate accessibility and address potential barriers such as transportation or financial constraints. Developing specialized training programs for teachers and school health professionals is crucial to equip them with the knowledge and skills necessary to provide comprehensive sexual health education and support. Involving parents and guardians in the educational process is also essential, as they play a vital role in providing guidance and support to adolescents regarding sexual health issues.

By implementing these measures, we can ensure that young people are equipped with the knowledge and skills to make informed decisions about their sexuality, leading to healthier and more fulfilling lives.

Future research in Portugal should explore the influence of other demographic variables, such as race, sexual orientation, and ability status, on adolescents' knowledge of sexuality. These factors are deeply intertwined with one's sexuality and can significantly impact sexual knowledge and behaviors. Incorporating these variables into future studies will contribute to a more comprehensive understanding of the complexities surrounding adolescents' sexual knowledge in Portugal.

In conclusion, our study adds to the existing literature by providing additional data from a Portuguese context, confirming and expanding upon previous findings regarding the influence of age and gender on adolescents' knowledge of sexuality. However, it is

important to acknowledge the limitations of our study, including its focus on a specific geographic location and the need for further exploration of other demographic variables.

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