



Analysing menstrual education in Spanish adolescents: Perspectives from menstruating and non-menstruating individuals

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ABSTRACT

Often shrouded in stigma and myth, menstruation requires a comprehensive understanding that takes into account biological, psychological, and social dimensions. We used a descriptive and cross-sectional survey to engage 300 adolescents from two high schools to assess their knowledge, beliefs, and sources of information concerning menstruation and the myths surrounding this issue. Our findings revealed a significant gap in menstrual education, with 79.33 % of participants expressing the need for more comprehensive information. A preference for disposable menstrual products was also observed, primarily influenced by cultural norms and a lack of awareness. The main sources of menstrual information for the participants were their mothers and friends, with educational institutions playing a lesser role. This study underscores the complexity of menstrual education, the influence of gender identity, and the prevalence of menstrual myths, which perpetuate a cycle of misinformation and stigma. Our research highlights the urgent need for inclusive and comprehensive menstrual education programs in schools. It also calls for initiatives that foster a positive menstrual experience, seek to destigmatize menstruation, and promote gender equality.

1. Introduction

Menstruation is a phenomenon that has historically been laden with stigmas, prejudices and myths. Despite it being a natural biological process, the social perception surrounding menstruation has predominantly been negative or overlooked.

The World Health Organization (WHO) has called for three key actions on menstrual health: 1) to recognize menstruation as a health issue, not a hygiene issue; 2) to ensure that menstruating individuals have access to education and 3) to include menstrual health and related services in governmental policies and budgets. This call comes after years of grassroots activism worldwide. Increasingly, menstruation is being recognized not only as a health issue but also as one deeply affected by social taboos and stigmas, which have hindered open conversation and access to essential resources.

The conceptualization of menstrual stigma refers to conceiving menstruation and those who menstruate in a negative way (Johnston-Robledo & Chrisler, 2013). According to a recent review on exploring the impact of menstruation on various societal spheres in the United States, there is a general lack of open debate about menstruation due to multiple factors, among these factors the

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contribution of menstrual stigmas, rooted in cultural taboos and historical beliefs, is emphasized. These stigmas are perpetuated by myths surrounding menstruation, which often portray it as a "dirty" or "shameful" process (Ramaiyer et al., 2023). A systematic review on the impact on education of the menstrual experiences of university students reveal that both qualitative and quantitative research highlight the students internalized menstrual stigma related to visible menstrual blood, generating experiences of shame, which negatively affected their confidence in attending university or going out in public (Munro et al., 2021). Menstrual stigma reinforces misogynistic stereotypes, perceiving menstruators as "irrational", "too emotional", "hysterical" and, as a result, generating the myth that they are less capable (King S).

However, the awakening of feminist movements, as evidenced by the works of Marieskind (1975), initiated a transformation in the social understanding of this process. These movements seek to replace prevailing social paradigms with a new perspective that acknowledges and respects the body and its processes while promoting a deeper understanding of the relational and personal dynamics linked to menstruation.

Bobel (2010) examines how activists and organizations utilize art, education, and activism to challenge menstrual taboos, advocating for a transformative approach to policies on menstrual product access and social justice for menstruating individuals of diverse gender identities. This study emphasizes self-awareness, sustainability, and self-determination, underscoring the significance of addressing menstruation through an inclusive and empowering lens within educational contexts.

In light of this reality, an urgent need arises to integrate educational programmes that address menstruation beyond its mere conceptualisation as a recurring physical event. Gómez Nicolau & Marco Arocas (2020) highlight the importance of incorporating an expanded vision of menstruation into education, while recognising it as an integral process that affects and reflects physical, psychological and social conditions. It is crucial to include this perspective in educational programmes in order to demystify menstruation, promote a comprehensive understanding of the phenomenon, and foster a culture of respect and self-awareness among adolescents (Haque et al., 2014).

Human fertility is manifested through two interrelated cycles: the menstrual and the reproductive. The menstrual cycle, which has an average duration of roughly 28 days and is divided into four phases, can be altered only by exceptional situations such as illness, surgery, strenuous exercise, medication, stress or changes in diet (Haroun, 2016). The reproductive cycle comprises conception, pregnancy, childbirth and the postpartum period, which marks a continuity in the sequence of fertility (Salvia, 2019). Beyond its biological dimensions, the menstrual cycle is a complex phenomenon that incorporates a wide range of mutual influences. This multidimensionality is reflected in the interaction between biological, psychological, social and cultural elements that form a unique experience for each individual (Botello-Hermosa & Casado-Mejia, 2015; Hennegan et al., 2023). Factors such as prior personal experiences, knowledge on menstruation, as well as the myths and cultural taboos that surround it, play a crucial role in how the menstrual cycle is experienced and understood.

Social advancements have increased the availability of products for managing menstruation, thus helping to minimise its impact on everyday life. The most common menstrual hygiene products include inorganic pads, which adhere to underwear to absorb blood; inorganic tampons, which are inserted into the vagina for the same purpose; and the menstrual cup, which is made of a soft, flexible material that is inserted into the vagina and creates a suction seal to prevent blood leakage. Unlike pads and tampons, which are used once and then discarded, the menstrual cup is designed to be reused in each menstrual cycle, thus making it an economical and sustainable option in the long term (Alma, 2020). Although the use of menstrual cups has been normalised by the influence of culture and the hygiene/pharmaceutical industry (Peberdy et al., 2019), this normalization has led to a negative perception and the concealment of menstruation, both of which are exacerbated by advertising and insufficient information, thereby increasing the stigma surrounding the menstrual cycle (Gómez Nicolau & Marco Arocas, 2020). In this line, although the use of the menstrual cup leads to distance users, to some degree, from its stigmatizing discourse and symbolic oppression, also lead to produce a notable paradoxical effect. While users could "forget" they were menstruating during the day and in professional environments, they encountered menstrual blood more directly once at home, thereby enclosing the female reproductive body in a different way (Owen, 2022).

1.1. Menstrual education

Although sexual education in Spain has progressed, instruction on menstruation – which is limited to a simplistic biological approach that fails to take into account other relevant factors. Understanding these other factors as the right to an innovative menstrual education that mitigates the inequalities and violence experienced by menstruating individuals in our society, considering including all menstruating individuals, thus contributing to the construction of identities and true gender equity – remains inadequate (López García & Pena Lima, 2020). While some countries provide information on menstruation, in others there is a widespread need for specific menstrual education programmes that are essential for sexual and reproductive health (Hawkey et al., 2020). In developing countries, menstruation is usually seen as something "dirty" (a view held by 70 % of mothers in studies from low-income countries), which reinforces the shame and stigma associated with it (WSSCC, 2013). According to Sommer & Sahin (2013), proper menstrual hygiene management involves not only cleanliness and the use of sanitary products but also respect for fundamental rights such as access to water and gender equality (Human Right Watch, 2017). However, this perspective is still reductive since it misses the full range of experiences surrounding menstruation and excludes transgender individuals, who also experience this process.

After adapting the above definitions and taking into account new lines of research on menstrual hygiene and our experience on gender equality, we can affirm that menstruation management should be understood comprehensively. Not only should biological knowledge of the menstrual cycle and hygienic practices be encompassed but all menstruating individuals, including trans men and non-binary people who menstruate, should be allowed to manage this process with dignity and without discomfort, fear or stigma. Implementing comprehensive menstrual education that takes into account all the factors that influence the menstrual experience is

vital to minimise the impact of menstruation on daily life and promote a positive experience.

A suitable educational model aligns with the approach taken by the Comprehensive Model of Menstrual Experience (Hennegan, 2017), which integrates personal backgrounds with menstrual experiences and their impacts on individual lives, including those of trans men and non-binary people. Education should dismantle entrenched beliefs and taboos, and expand understanding beyond cisgender women and girls by including all menstruating individuals. Studies conducted in different contexts, such as Spain (Botello-Hermosa & Casado-Mejía, 2015; Garduño et al., 2014), indicate that the quality of menstrual education significantly influences the menstruation experience, thus highlighting the need to dismantle myths and provide complete and objective information. Menstruating individuals continue to hide everything related to menstruation from non-menstruating individuals (Moncayo, 2023). This generates limited knowledge of menstruation and promotes stigmatisation, taboos and false beliefs (Rajak, 2015).

In the field of menstrual studies, Bobel (2019) emphasizes that addressing menstruation involves not only demystifying and normalizing this biological process but also understanding how gender norms and power dynamics have historically shaped its perception and management. She argues that this approach may reflect Western biases, diverting attention from broader structural issues. Bobel underscores the importance of adopting a critical and inclusive perspective that challenges and transforms the cultural and social narratives associated with this natural process. She examines menstrual activism and adopts a critical stance toward menstrual health interventions, questioning the dominant focus on hygiene and products.

1.2. The present study

The main aim of this study was to examine the level of knowledge demonstrated by a sample of adolescents in the city of Tarragona, Spain, on the subject of menstruation. We aimed not only to identify the information these young people possess about the menstrual cycle and its associated myths but also to determine what information is essential for menstruating individuals to enable them to experience their cycle comprehensively while ensuring that its influence on their daily lives is minimal. Specifically, we aimed to analyse the knowledge, myths, beliefs and sources of information in relation to menstruation, menstruating individuals and non-menstruating individuals in order to identify gaps and informational needs in this area.

Our main hypothesis was that menstruating individuals possess a broader and deeper knowledge of menstruation than non-menstruating individuals and that this could reflect differences in their perception and understanding of the menstrual process. Specifically, we expected that the most frequently used menstrual hygiene products would be inorganic pads and tampons. We also expected that experiences related to menarche would often be described in negative terms by menstruating people.

2. Method

The methodology employed in this research was data collection through a descriptive and cross-sectional survey conducted at two high schools in the city of Tarragona, Spain.

2.1. Participants

To achieve the main goal of this study, we collected data from a sample of 304 adolescents from two public high schools in the city of Tarragona (Spain). However, four participants were discarded for responding randomly. This resulted in a final sample of 300 participants aged from 15 to 19 years old, with an average of 16.11 years ($SD = 1.10$). Participants' reported gender identity was as it follows: 95 cisgender men (31.67 %), 188 cisgender women (62.67 %), three transgender or transsexual men (1 %), seven non-binary individuals (2.33 %), and seven individuals who identified with another gender (2.33 %). Considering menstruating status, 202 participants (67.33 %) were menstruating individuals.

In this study we registered answers from 304 participants. However, four of them were discarded for responding randomly. The study involved 304 participants, four of whom were discarded for responding randomly. This resulted in a sample comprising 300 participants aged from 15 to 19 years, with an average age of 16.11 years ($SD = 1.10$), 202 of whom were menstruating individuals (67.33 %) and 98 were non-menstruating individuals (32.67 %). Participants' reported gender identity was as it follows: were divided into six categories according to their self-reported gender identity: 95 cisgender men (31.67 %), 188 cisgender women (62.67 %), three transgender or transsexual men (1 %), seven non-binary individuals (2.33 %), and seven individuals who identified with another gender (2.33 %). The sampling method was non-probabilistic and intentional. All participants were from medium socioeconomic levels and were fourth-year compulsory secondary education students or first- or second-year post-compulsory secondary education from two public high schools in the city of Tarragona, Spain.

2.2. Instrument

We designed a specific questionnaire to collect the data for this study consisting of 31 items divided in four sections: socio-demographic data, general items about menstruation, items about myths and realities on menstruation, and personal opinions on the topic. The questionnaire was designed to address a broad adolescent audience, including both menstruating and non-menstruating individuals. To capture the unique perspective of menstruating individuals, some questions were only addressed to them. In designing the questionnaire, the original wording aims to reflect the presence of specific social discourses, regardless of whether respondents support them or not. The goal is not to encourage participants to express agreement with these statements but rather to capture their perception of the existence of these social discourses without implying their endorsement by the participants.

The questionnaire was based on an exhaustive review of the literature that used academic sources from Scopus and Web of Science to ensure that the questions were supported by prior research on menstruation. Moreover, two questions (items 15 and 16) were adapted from a previous study on attitudes towards menstruation (Torres-Banco, 2019) to compare and contrast responses and analyse similarities and differences with regard to perceptions and attitudes towards menstruation among the surveyed adolescents.

The sociodemographic section included data regarding age, gender identity, at what age they experience the menarque, and what products they used more often when menstruating. This last question included several options (i.e. tampons and menstrual cup), and participants could also provide their own. The next section comprised 11 five-point Likert scales items (1 = strongly disagree, 5 = strongly agree) regarding general knowledge about menstruation, and an open-ended question about the Toxic Shock Syndrome (TSS).

The section about myths and realities on menstruation comprised 9 items in a five-point Likert scale (1 = strongly disagree, 5 = strongly agree) regarding common myths and beliefs about menstruation. We also included a multiple-choice item regarding the names given to menstruation participants used or heard, and another five-point Likert scale item to assess if participants consider themselves informed about menstruation after responding the questionnaire. In the last section, open-ended questions were included to capture participants' personal opinions on menstruation. For instance, we collected participants' opinion on why blood from wounds or illnesses is perceived less unpleasant than blood in menstruation, and about how advertisements portray menstruation. In addition, we asked menstruating individuals for their sensations they experienced during menarque. The questionnaire used is provided in Table 1.

A specific questionnaire was administered consisting of 32 questions divided into four sections: sociodemographic data, general items, items distinguishing between myths and realities, and personal opinions. This questionnaire was designed to address a broad adolescent audience that included both menstruating and non-menstruating individuals and gather detailed information about various facets of the menstrual cycle. It includes questions for all participants as well as optional questions specifically for menstruating individuals in order to capture their unique perspectives on menstruation.

The questionnaire is structured around five different types of questions to facilitate a comprehensive assessment: four short-answer items to capture concise information; four long-answer items to capture more detailed explanations; one single-choice item, where participants choose one answer from several options; four multiple-choice items, where participants can select more than one answer; and twenty items based on a 1-to-5 Likert scale intended to measure the participant's level of agreement with various statements.

En la elaboración del cuestionario, se busca que la redacción original refleje la presencia de determinados discursos sociales, independientemente de que los encuestados los respalden o no, y no incitarlos a expresar su acuerdo con estas afirmaciones. Sino simplemente capturar la percepción de la existencia de estos discursos sociales, sin que esto implique su aprobación por parte de los participantes.

2.3. Procedure

This study is based on a cross-sectional survey design and the sample collection method was non-probabilistic and intentional. We decided to use this method in this study for two main reasons: first, self-reported measures can capture personal thoughts and beliefs that otherwise would not be accessible for research purposes (Short et al., 2009). Second, non-probabilistic studies can provide relevant descriptive information that can be used to design wider research projects and have a lower demand of resources compared to other types of studies.

The sample for this study was obtained from two public high schools in Tarragona, Spain. Members of the research team contacted the high school's directive team to explain the study and ask for collaboration. After their agreement, specific dates and times to collect the data were agreed upon so students could complete the questionnaire in person during their normal schedule. During the administration of the questionnaires, members of the research team explained that the study aimed to assess the level of knowledge on menstruation in adolescents and that there were no right or wrong answers to the questionnaire. The purposes of the questionnaire was clarified to ensure that the students recognised the importance of their participation and understood how their contribution would support the study's objectives. Participants were given and informed consent form and an explanatory sheet of study's implication, so participants could keep this information. The importance of informed consent was emphasised by explaining to students that their participation was completely voluntary and that they could withdraw from the study without any repercussions. Research team members were also available in case participants had doubts during the administration. All participants gave their consent to participate in the study.

The questionnaire was completed by the participants on their laptops, tablet or mobile phone. This way, we provided the privacy to answer the questionnaire. Students completed the questionnaire individually to ensure that their responses were authentic and avoid external influences. Anonymity of participants' responses was ensured because no personal data that could identify them was included and because of the online administration of the questionnaire. After we had received the necessary approval from the schools, the participants were given an informed consent form and an explanatory sheet on the study's implications. The anonymity of the participants' responses was ensured in order to preserve their privacy and the permission for data collection was signed. Communication was then established with tutors of the relevant classes to arrange a specific date and time for students to complete the questionnaire in person. The project was evaluated and approved by the Ethics Committee for Research on People, Society and the Environment (CEIPSA).

The procedure for administering the questionnaire in class was conducted in stages to ensure that students understood the process and agreed to take part. It began with a brief introduction about the study in which its context and relevance was explained in order to engage students and foster their interest. The purposes of the questionnaire were clarified to ensure that the students recognised the

importance of their participation and understood how their contribution would support the study's objectives. The importance of informed consent was emphasised by explaining to students that their participation was completely voluntary and that they could withdraw from the study without any repercussions. Students completed the questionnaire individually to ensure that their responses were authentic and avoid external influences. Support was provided to students to clarify any questions or concerns they had while completing the questionnaire, thereby ensuring the accuracy and validity of the information gathered.

2.4. Data analysis

Data were collected through Google Forms and imported into IBM SPSS Statistics version 29, where descriptive analyses for each variable were conducted. These analyses comprised calculations of means, standard deviations, and minimum and maximum values.

Demographic variables such as age and age at menarche were treated as discrete quantitative variables, while gender and being a menstruating person were considered nominal qualitative variables. Questionnaire items based on the Likert scale were considered ordinal quantitative variables.

One-way ANOVA analysis was used to examine differences between groups, while Tukey's post-hoc test was used when necessary, primarily to assess the significance between items and sociodemographic variables such as gender. The independent-samples *t*-test compared responses between menstruating and non-menstruating individuals, while Cohen's-*d* effect size was used to measure the magnitude of observed differences.

Items formulated in a negative sense were recalculated to align them with the scoring direction of the other items, thereby ensuring consistency in the analysis. The mean for knowledge items (items 8–14 and 17–26) was calculated to determine the overall level of knowledge about menstruation, with results ranging from 1.0 to 5.0. Finally, total menstrual knowledge scores were divided into three groups: low knowledge, intermediate knowledge and high knowledge. This enabled us to determine the proportion of participants within each knowledge range and provided a clearer understanding of the educational needs and levels of information among the adolescents studied.

3. Results

Table 1 presents the means and standard deviations obtained for the items examined in the questionnaire.

Table 2 shows the participants' preferences regarding menstrual hygiene products. These results clearly show that disposable pads and inorganic tampons are the products most used (89.60 % and 52.97 % usage, respectively) by adolescents to manage their menstruation. Cloth pads and sea sponges, on the other hand, are the products least used (only 1.49 % usage), which reflects a low acceptance among the studied population or a low availability of these more sustainable or alternative methods. A division is also observed in relation to the number of products menstruating adolescents use to manage their menstruation, since 50.99 % report using only one type of product while 49.01 % report using two or more types. The most common choices among those who prefer using a single product are pads, tampons and menstrual cups.

Table 3 presents the sources of information on menstruation used by menstruating individuals. These results indicate that the primary source of information, both before and after the menarche, are mothers (83.16 % before and 91.58 % after). Friends are the second most common source (63.86 % before and 75.24 % after). A divergence is observed in relation to the third most common source

Table 1
Mean and standard deviation of the questionnaire items analysed.

#	Item	M	SD
1	I have used or am familiar with the following menstrual hygiene products: disposable pads, tampons, menstrual cups, cloth pads, and menstrual panties.	3.67	0.87
2	I believe I have the necessary information about menstruation.	3.43	1.14
3	I acknowledge that some trans men (transsexual or transgender) can experience menstruation.	3.41	1.57
4	I consider menstruation to be an indication of optimal health.	4.29	0.9
5	It is common to experience pain, such as cramps or discomfort, during menstruation.	4.31	0.94
6	I have the necessary information about Toxic Shock Syndrome.	1.51	0.96
7	It is generally perceived that menstrual blood has an unpleasant smell.	3.23	1.18
8	Pads and tampons are made using plastics, detergents, and various chemicals.	3.79	1.05
9	There are menstruating individuals who can control the release of their menstrual blood.	2.47	1.25
10	Generally, I believe menstruation is viewed as something dirty, shameful, and that needs to be hidden.	2.41	1.54
11	If you are menstruating, there's a belief that you cannot become pregnant.	2.58	1.53
12	There's a notion that taking a bath in a bathtub while menstruating can cause the blood to clot	2.03	1.3
13	There's a belief that if two menstruating individuals spend a lot of time together, their menstrual cycles will synchronise, and they will menstruate at the same time.	3.74	1.33
14	It is considered that there can be a change in the tone of voice during menstruation.	1.85	1.06
15	There's a perception that it is not possible to have sexual intercourse during menstruation.	1.69	1.18
16	It is believed that sexual activity can have analgesic effects on menstrual pain.	3.4	1.17
17	There's a notion that using a tampon can affect a person's virginity status.	1.37	0.79
18	There's a belief that it is necessary to remove the menstrual cup before urinating.	1.85	1.27
19	There's an idea that one should not undergo hair removal during menstruation.	1.47	1.01
20	After answering this questionnaire, I believe I have adequate information about menstruation.	3.36	1.04

Table 2
Percentage of product usage during menstruation.

Products	Frequency	(%)
Sanitary pads	181	89.6
Tampons	107	52.97
Menstrual cup	11	5.45
Cloth pads	3	1.49
Menstrual underwear	4	1.98
Sea sponge	3	1.49
Organic cotton pads or tampons	4	1.98

Table 3
People or institutions from which information was received.

Who?	Before menarche N	Before menarche (%)	After menarche N	After menarche (%)
Mother	168	83.16	185	91.58
Father	11	5.44	16	7.92
Sister(s)	34	16.83	30	14.85
Brother(s)	2	0.99	3	1.48
School/High School	96	47.52	78	38.61
Friends (Female)	129	63.86	152	75.24
Friends (Male)	5	2.47	10	4.95
Advertisements	42	20.79	34	16.83
Books	23	11.38	24	11.88
Internet/Social Media	85	42.07	121	59.9
Healthcare/Professionals	43	21.28	50	24.75

of information before and after the first bleeding episode: before, it is the school or institute (47.52 %) while after it is the internet and social media (59.90 %). The representativeness of male figures (fathers, brothers and friends) is clearly low: the percentages reported for these sources of information on menstruation were the lowest both before and after the first bleeding episode (5.44 %, 0.99 %, and 2.47 % before and 7.92 %, 1.48 %, and 4.95 % after, respectively).

Table 4 shows the results of an analysis of variance (ANOVA) test that assessed the differences in responses to various questionnaire

Table 4
Analysis of Variance (ANOVA). Gender-Based Differences in Questionnaire Item Responses.

Item	Cisgender Male		Cisgender Female		Trans Male		Non-binary Gender		Other Gender		F	p	
	M	SD	M	SD	M	SD	M	SD	M	SD			
2	I believe I have the necessary information about menstruation.	2.85	1.22	3.7	0.98	3.67	1.53	3.14	0.38	4.14	1.46	10.77	<0.001
3	I acknowledge that some trans men (transsexual or transgender) can experience menstruation.	2.59	1.55	3.81	1.42	3.67	2.31	3	1.63	4.29	1.25	11.66	<0.001
5	It is common to experience pain, such as cramps or discomfort, during menstruation.	4	0.96	4.46	0.89	4.67	0.58	4.29	0.95	4.14	1.07	4.2	<0.01
8	Pads and tampons are made using plastics, detergents, and various chemicals.	3.34	1.17	3.99	0.92	3.67	0.58	4	1	4.29	0.95	7.28	<0.001
11	If you are menstruating, there's a belief that you cannot become pregnant.	2.98	1.56	2.33	1.47	3	1.73	2.71	1.11	3.57	1.62	3.84	<0.01
12	There's a notion that taking a bath in a bathtub while menstruating can cause the blood to clot	2.53	1.18	1.71	1.21	2	1	3.14	1.86	2.86	1.86	9.14	<0.001
13	There's a belief that if two menstruating individuals spend a lot of time together, their menstrual cycles will synchronise, and they will menstruate at the same time.	3.22	1.42	4.02	1.2	2.67	1.52	4.43	0.79	3.29	1.6	7.41	<0.001
14	It is considered that there can be a change in the tone of voice during menstruation.	2.29	1.11	1.59	0.86	2	1.73	2	1.16	2.86	2.04	9.85	<0.001
15	There's a perception that it is not possible to have sexual intercourse during menstruation.	2.01	1.32	1.49	1.05	1.33	0.58	2.29	1.25	2	1.73	3.81	<0.01
16	It is believed that sexual activity can have analgesic effects on menstrual pain.	3.17	1.02	3.47	1.21	4.67	0.58	4	1	3.57	1.62	2.54	<0.05
17	There's a notion that using a tampon can affect a person's virginity status.	1.48	0.86	1.28	0.65	1.33	0.58	2	1.53	1.71	1.5	2.62	<0.05
18	There's a belief that it is necessary to remove the menstrual cup before urinating.	2.19	1.21	1.65	1.22	2	1.73	1.71	1.25	2.86	2.04	4.18	<0.01
19	There's an idea that one should not undergo hair removal during menstruation.	1.76	1.18	1.27	0.77	1.67	1.16	2.29	1.5	2.14	1.95	6.09	<0.001

items based on the gender of the participants. The table lists the means (M) and standard deviations (SD) of responses for each item according to gender group, i.e. cisgender men, cisgender women, transgender men, non-binary individuals, and other gender identities. This analysis shows that 14 of the 20 items evaluated showed significant differences between groups (p-values below 0.05).

For instance, for item 2 (“I believe I have the necessary information about menstruation.”), cisgender women reported a higher mean ($M = 3.70$) than cisgender men ($M = 2.85$). For items related to myths and misconceptions about menstruation, such as item 11 (“If you are menstruating, you cannot take a bath in a bathtub because the blood can clot”, cisgender females also show lower levels of agreement with these myths ($M = 2.33$ SD = 1.47) than cisgender men ($M = 2.98$). With regard to item 13 (“There’s a belief that if two menstruating individuals spend a lot of time together, their menstrual cycles will synchronise, and they will menstruate at the same time.”), this belief is more widespread among cisgender women ($M = 4.02$) and non-binary individuals ($M = 4.43$) than among cisgender men ($M = 3.22$). Tukey’s post-hoc test found significant discrepancies between cisgender men and cisgender women regarding the perceptions and knowledge of these two groups in relation to menstruation.

Table 5 shows the results of the independent-samples *t*-test, where 12 items exhibited significant differences between the category of menstruating or non-menstruating individuals and the responses given on the items. In all comparisons, statistically significant differences were obtained. Finally, the effect size was determined using Cohen’s *d* test. A large effect size was obtained for item 7, a medium effect size was obtained for items 13, 20, 21 and 25, and a small effect size was obtained for items 6, 11, 12, 22, 23 and 24. An insignificant effect size was found for items 14 and 17. We also conducted a student’s *t*-test to compare the category of menstruating individuals in relation to the menstrual knowledge available but no significant differences were found.

Diverse perceptions emerged when participants were asked about words that are used to describe how messages about menstruation are conveyed in advertisements. A sizeable 27.67 % of respondents see menstruation as being presented in an idealised manner associated with images of happiness and activities such as gymnastics. This suggests that menstruation is portrayed in a way that is detached from the real experiences of many individuals. Conversely, 20.33 % provided no concrete response or indicated a lack of knowledge about how menstruation is represented in advertisements. This reflects a possible disconnection or a lack of meaningful representation in the media. A further 13 % believe that menstruation is a taboo subject whose reality is not reflected in advertisements, while 6 % believe it is a dirty, unpleasant subject that should be concealed, thus highlighting how damaging stigmas surrounding menstruation are persisting. Interestingly, only 1.33 % focus on how the messages on menstrual blood are specifically presented, which underscores the variability in public attention and interpretation related to these messages.

When the participants were asked which categories they would like to obtain more information about, they expressed a strong interest in delving more deeply into the topic. However, 38 % expressed no interest in receiving further information about menstruation, while 26.33 % sought general information on the subject. Areas of interest include the relationship between menstruation and sexual intercourse, the causes and consequences of menstruation, menstrual products, and questions such as the feasibility of consuming menstrual blood. These results indicate an apparent demand for education and clarification on several menstruation-related topics.

4. Discussion

The main aim of this study was to explore knowledge, myths, beliefs, and sources of information about menstruation among a sample of adolescents in Catalonia, Spain. We also sought to identify deficiencies and specific needs regarding menstrual education within this demographic group. Our results show that 79.33 % of the participants are in need of adequate menstrual education. This is a problem since previous studies suggest that menstruating individuals require more knowledge about menstruation to be properly psychologically prepared during the menstrual period (Abioye-Kuteyi, 2000). This deficiency in menstrual education is reflected in the persistence of myths and misunderstandings about menstruation, which can have negative consequences for the physical and emotional well-being of adolescent menstruating individuals.

Table 5
Student’s *t*-test based on menstrual category for significant items in the questionnaire.

Item	Menstruating Individuals		Non-Menstruating Individuals		F	p	Cohen’s D
	M	SD	M	SD			
I believe I have the necessary information about menstruation.	3.72	0.81	3.55	0.99	7.18	<0.01	0.2
I acknowledge that some trans men (transsexual or transgender) can experience menstruation.	3.71	0.97	2.85	1.24	9.2	<0.01	0.81
It is generally perceived that menstrual blood has an unpleasant smell	1.58	1.02	1.36	0.82	7.97	<0.01	0.23
Pads and tampons are made using plastics, detergents, and various chemicals.	3.34	1.21	3.01	1.08	12.74	<0.001	0.28
There are menstruating individuals who can control the release of their menstrual blood.	4	0.91	3.35	1.17	9.35	<0.01	0.65
If you are menstruating, there’s a belief that you cannot become pregnant.	2.44	1.59	2.35	1.44	5.31	<0.05	0.06
It is considered that there can be a change in the tone of voice during menstruation.	3.99	1.22	3.24	1.41	6.66	<0.01	0.58
There’s a perception that it is not possible to have sexual intercourse during menstruation.	1.62	0.93	2.33	1.15	9.67	<0.01	-0.71
It is believed that sexual activity can have analgesic effects on menstrual pain.	1.52	1.06	2.03	1.34	13.56	<0.001	-0.44
There’s a notion that using a tampon can affect a person’s virginity status.	3.5	1.21	3.19	1.04	7.74	<0.01	0.27
There’s a belief that it is necessary to remove the menstrual cup before urinating.	1.3	0.7	1.52	0.92	13.23	<0.001	-0.28
There’s an idea that one should not undergo hair removal during menstruation.	1.65	1.22	2.27	1.27	5.2	<0.05	-0.5

Our results also reveal that participants prefer disposable menstrual products over reusable ones. These findings align with previous research that reported that disposable pads are the most often used hygiene product and that disposable tampons are the second (Ortiz, 2018; Peberdy et al., 2019). Indeed, the majority of menstruating individuals in Spain use non-reusable products, though this may change in future years thanks to the introduction of menstrual cups for menstruating women. In March 2024, free reusable menstrual products began to be distributed in Catalonia (Spain), alongside health education workshops and advertising campaigns to raise awareness about them.

Another important aspect is the relationship between recurrent vaginal infections and the use of disposable pads and tampons (Phillips-Howard et al., 2016; Potenziani et al., 2015). It is therefore recommended that reusable menstrual products should be used that do not alter the pH or vaginal flora rather than inorganic materials whose composition increases the prevalence of bacterial vaginosis (Phillips-Howard et al., 2016). Reusable menstrual products are therefore recommended because fewer diseases are associated with their use. Moreover, the economic and environmental impact of using reusable menstrual products is also much lower (Ortiz, 2018).

Our data reveal that menstruating individuals receive information from their mothers or friends, or from websites and social media, both before and after their first menstruation. These results are consistent with those from other studies conducted in similar settings to ours (Amat San Martín & Torres Torres, 2019; Torres-Blanco, 2019). They also agree in that the figures from whom the least information about menstruation is received are fathers and siblings, which suggests that the male gender is not strongly involved in menstrual education and that although gender roles are changing, female figures still tend to be more associated with education on taboo topics such as menstruation cycles.

Although 47.52 % of our participants received information from their high school before their first menstruation, only 38.61 % did so afterwards. Many menstruating individuals may therefore be unable to raise their doubts or concerns regarding menstruation with a healthcare professional or to share their experiences with their peers to ensure that this event is treated as completely normal (Rajak, 2015). The information transmitted from generation to generation may also contain misconceptions, myths and taboos. Even culture and traditions influence thinking, so those beliefs need to be questioned and the information compared with reliable sources that reflect knowledge based on the most recent scientific evidence (Amat San Martín & Torres Torres, 2019).

Our data reveal differences between menstruating and non-menstruating individuals in responses to questionnaire items. For example, non-menstruating individuals are more influenced by menstrual myths than menstruating individuals. This contributes to the presence of myths and erroneous beliefs about menstruation that perpetuate over time (Amat San Martín & Torres Torres, 2019). It is important, therefore, that individuals receive comprehensive menstrual education with accurate and validated information so that the experience of menstruation among menstruating individuals can be improved (Rajak, 2015).

In our sample 75.27 % of the menstruating individuals used adjectives with a negative connotation to describe their first experience of menstruation. These data align with those from other studies; in a study conducted in 2020, for example, 65.6 % of participants also used negatively connoted adjectives, while only 16 % used positive ones (Serret-Montoya et al., 2020), i.e. over half of the participants held a negative attitude towards menstruation. Research conducted by Marván & Molina-Abolnik (2012) on menstruating individuals in Mexico further demonstrates a propensity towards negative or discreet feelings more than positive ones (Coast & Lattof, 2018). Importantly, participants who used positive adjectives to describe menarche are predominantly those who experienced their first menstruation episode later than their peers. These participants primarily referred to adjectives such as joy and relief because their peers had already begun menstruating whereas they had not. Similar results were obtained in a study conducted in 2014 in which positive feelings about menstruation were associated with girls who experienced menarche later than usual (Coast & Lattof, 2018).

The four words most often used to describe menarche are pain, fear, shame and strange. Marván & Molina-Abolnik (2012) concluded that as well as feeling more prepared for menstruation, individuals with better menstrual knowledge exhibited fewer negative feelings, thereby directly linking preparation and menstrual education with an increase in positive adjectives for both menarche and menstruation (Coast & Lattof, 2018). This underscores the importance of providing quality education based on scientific evidence and avoiding the assumption that some knowledge is universally known. On the other hand, another study reported that menarche is experienced differently depending on one's level of prior knowledge, such that negative attitudes towards menstruation may be transformed into negative attitudes towards women or menstruating individuals, which can affect an individual's body image and self-concept (Hermosa & Mejía, 2017). These results highlighted a concerning trend towards the negative perception of menarche and menstruation in general. This prevailing attitude could significantly affect the psychological well-being and menstrual health of those affected. The consistency of these results across studies and populations suggests that negative attitudes towards menstruation are a widespread phenomenon that requires attention. Educational efforts and public health interventions must focus on destigmatising menstruation and promoting a healthier, more positive understanding of this natural process.

The way menstruation is represented in advertising continues to perpetuate a negative connotation with regard to this natural process. Only 12 % of our participants believe that the message about menstrual blood is conveyed appropriately in advertisements, whereas 67.67 % believe it is not. This discrepancy highlights a significant issue concerning how menstruation is portrayed in media and advertising, where there is a clear need for more accurate, respectful and positive depictions. The feedback we received from participants indicates a widespread desire for advertising to move away from stigmatising or ignoring the realities of menstruation towards a more inclusive and educative approach that normalises this natural bodily function. This shift is crucial not only for improving the portrayal of menstruation in the public sphere but also for supporting broader efforts to destigmatise menstruation and promote menstrual health and wellness.

Our findings show that there are notable disparities in the menstrual knowledge of different groups and that both menstrual experience and gender identity are related to this knowledge. Rejection of the null hypothesis shows that differences in menstrual knowledge between menstruating and non-menstruating individuals are not statistically significant. Also, the distinction in menstrual

knowledge based on self-defined gender highlights significant gaps between cisgender men and women and between cisgender women and individuals of non-binary or alternative genders. The fact that no significant differences were found in menstrual knowledge within the menstruating category illustrates the lack of sexual and menstrual education available to menstruating individuals, since the experience of menstruating does not provide menstruating individuals with more menstrual knowledge than those who do not menstruate.

A study conducted in a similar context to ours showed that a higher level of education was associated with fewer fears about menstruation and highlighted a general lack of knowledge about sexual and reproductive health that included fundamental aspects of menstruation (Botello-Hermosa & Casado-Mejia, 2015). It is essential to develop and implement educational programmes in schools and high schools that are targeted at children in the preadolescent stage. These programmes should provide menstruating individuals with detailed information about the physiological, emotional, cognitive and physical changes associated with menstruation to adequately prepare them before they experience the cyclical phase of the menstrual cycle and so help transform the way menstruation is perceived and experienced. Moon et al. (2020) suggested that menstrual education programmes that go far beyond one-hour talks should be created. These should be based on the constructivist model whereby the student's knowledge is first assessed and then a multi-experiential menstrual programme is designed in order to intervene in their menstruation education.

The primary model for processing information in menstrual education could be based on that proposed by Hennegan et al. (2019), which takes into account all the backgrounds and experiences that influence menstruation. This means it is necessary to focus on the individual's sociocultural context, menstrual practices, physiological aspects and chosen menstrual products, and to address all the stigmas, myths and taboos that still exist today. It is also necessary to conduct further research on menstruation from the gender perspective because, as we have shown, while differences exist in menstrual knowledge, attitudes and forms of experiencing menstruation, the data and samples needed to explore those differences are insufficient.

5. Conclusion

The present study sheds light on several critical dimensions of adolescent menstrual education. A primary conclusion of our analysis is the marked deficiency in menstrual education, as is evidenced by the 79.33 % of participants who expressed the need for adequate menstrual education. This deficiency is reflected in the persistence of myths and misunderstandings about menstruation, which can have negative repercussions on the physical and emotional well-being of menstruating adolescents. Moreover, a strong preference for disposable menstrual products over reusable ones was identified that may be attributed to culture, the influence of the hygiene/pharmaceutical industry, and a lack of education about the healthiest and most sustainable options. Mothers stand out as the primary source of information about menstruation. These are followed by friends, though the school or high school and digital media play a minor role. This highlights the crucial role played by the family in menstrual education and indicates an opportunity to improve formal education in this area.

5.1. Practical implications

The practical implications of this study are clear. There is an urgent need to integrate and improve menstrual education programmes in schools in order to foster a comprehensive understanding of menstruation that encompasses the biological and psychosocial aspects. Reusable menstrual products should also be actively promoted and people should be informed about their benefits for health and the environment. Including male figures in menstrual education could also destigmatise this topic and foster a broader culture of respect and understanding.

5.2. Limitations

The limitations of this study include its geographic and demographic scope since its focus on a specific sample of adolescents in one region of Spain restricts the generalisation of the results. Also, the data-collection methodology, based on self-administered questionnaires, can introduce social desirability biases. Moreover, the complexity and diversity of experiences in relation to menstruation suggest that additional research to explore the psychological, cultural and gender dimensions associated with this topic is needed.

CRedit authorship contribution statement

Andrea Mejías-Blasco: Writing – review & editing, Investigation. **Rosa Dolores Raventós Torner:** Writing – review & editing, Supervision. **Ainara Blanco-Gómez:** Writing – review & editing. **Sergi Martín-Arbós:** Writing – review & editing. **Marina Gómez de Quero Córdoba:** Writing – review & editing, Methodology. **Jorge-Manuel Dueñas:** Writing – review & editing, Writing – original draft, Investigation, Formal analysis, Data curation, Conceptualization.

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