

# ‘Don’t be scared,’ how community clubs could better support adolescent menstrual health for physical activity: realist inquiry

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## Research Article

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***‘Don’t be scared,’ how community clubs could better support adolescent menstrual health for physical activity: realist inquiry***

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## **Abstract**

### **Background**

Globally women and girls are less physically active than men and boys. For adolescents this difference is widening with girls less active than boys in most countries. This increases the risk of non-communicable diseases such as diabetes, heart disease and cancer with significant economic health-related costs. Menstrual (period related) symptoms are a recognised barrier to adolescents engaging in physical activity. Programme theories from our previous rapid realist review describe how interventions including: education; appropriate facilities, adapted clothing and period products; menstrual cycle tracking tools; and medical support (if needed) could address these barriers. Our aim was to use contextual qualitative data from Welsh community club participants to refine these initial programme theories and understand what would work, for whom and in what circumstances.

### **Methods**

We used realist methodology to test and refine the initial programme theories (context-mechanism-outcome configurations), structured with self-determination theory constructs (competence, relatedness, autonomy). Adult participants were recruited for interview via a qualitative online survey; adolescents were recruited through the adult participants. Realist interviews were conducted online or in person, transcribed, anonymised, then analysed in NVIVO15. Explanatory data accounts were extracted as 'if-then-because' statements. Weekly team meetings were held to discuss findings.

## **Results**

Data were included from 19 female interview participants (n=9 adults, n=10 adolescents (aged 12-18); n=10 ethnic communities, n=9 White Caucasian) and 21 adult survey responses. Refined programme theories describe how tailored context-specific menstrual health education and support resources are needed for different settings (land-based, water-based and remote outdoor activities) and for different population groups (ethnic diverse communities and performance athletes). Key mechanisms include: understanding different period product options for water sports; how to manage lack of facilities in remote outdoor settings; cultural respect and trust in ethnic diverse communities; and managing symptoms around training and performance for competitive athletes. Context-specific advice is also needed on how to deliver menstrual health education, encouraging role models, peer support, and creating safe spaces for communication.

## **Conclusion**

Our refined programme theories describe key mechanisms for menstrual health support needed in different contexts. Interventions developed from these programme theories need robust evaluation.

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**Keywords** Adolescent, Physical activity, Menstruation

## Background

Globally women and girls are less physically active than men and boys.(1) For adolescents this difference is widening with more girls (85%) inactive than boys (77.6%) in most countries.(1,2) This increases the risk of non-communicable diseases such as diabetes, heart disease and cancer with significant economic health-related costs.(3) There are many reasons for this inactivity including cultural expectations, family responsibilities and limited time.(4) Menstrual-related symptoms are however increasingly being recognised as a significant barrier to engaging in physical activity, with 50% of women and girls restricting activities before or during menstruation.(5)

The World Health Organization recommends that to improve global physical activity levels by 2030 one focus should be on women, but guidelines do not include any advice on addressing these menstrual-related barriers.(6,7) There are however national policy drives to address this and improve women's health, including menstrual health as a priority.(8-10) In the Welsh context, the Period Proud Action Plan aims to end period poverty and achieve period dignity in Wales: Action 10 focusses on the impact on sport and exercise and how to improve and maintain participation levels for those who menstruate.(11)

Research evidence to support such guidance is however lacking due to historical under-representation of women and girls in sport and exercise studies.(12) We previously conducted a review of 15 systematic reviews (totalling 222 separate primary studies) looking at interventions to support women, girls and people who menstruate to participate in physical activity but no studies were identified that targeted the

menstrual cycle.(13) We therefore used an alternative methodological approach and conducted a rapid realist review including a range of literature sources (peer-reviewed journal articles, opinion pieces and grey literature) to develop initial programme theories, described as context-mechanism-outcome configurations, to describe how to support adolescent menstrual health with physical activity.(14-16) The review included 63 articles, and identified four interventions: education; practicalities such as facilities, clothing and free accessible period products; menstrual cycle tracking and screening tools; and medical support if needed. We structured the initial programme theories with self-determination theory constructs (competence, relatedness, autonomy), to help describe how these interventions could improve mechanisms of change. These were namely: menstrual health confidence and understanding, communication and trust, to empower individuals to enhance their own menstrual health and potentially improve participation rates and performance in physical activity.(17,18)

## **Aim**

Our aim for this study was to test and refine these initial theories with primary qualitative data from Welsh community physical activity club settings; to explore in more depth why and how, in different contexts, these menstrual health support interventions are likely to work, for whom, and in what circumstances, to inform context-specific recommendations.

## Methods

### Design

We used realist methodology, a theory-driven approach, to test and refine initial theories developed through a rapid realist review (Box 1, Table 2).(14-18) These initial theories are described as context-mechanism-outcome (CMO) configurations that explain why and how mechanisms (M) that are triggered in certain contexts (C) relate to outcomes (O), to develop refined programme theories. Primary data were collected and analysed to inform refinement of these theories. We followed RAMESES reporting and publication standards (Appendix 1).(19) Clinical trial number: not applicable.

#### **Box 1: Realist Definitions** (14,15)

**Context:** Pre-existing and current conditions which influence the success or failure of different interventions or programmes. The system within which the programme or intervention is implemented

**Resource:** The intervention

**Mechanism:** People's reaction to the intervention (reasoning and behaviour)

**Outcome:** Intended and unintended results of a mechanism, created by exposure to the intervention that is operating within a context

**Context-Mechanism-Outcome Configuration (CMO):** A statement describing how a specific context may trigger a mechanism that affects response of an intervention resulting in an outcome

**Initial programme theory:** An early theory, informed by available evidence describing why, how and for whom the intervention is thought to work using a context-mechanism-outcome configuration

**Refined programme theory:** An initial programme theory that has been refined using primary or secondary evidence

## **Recruitment process and data collection**

As per realist methods, we used diverse approaches to collect data for the refinement of the initial programme theories. A short qualitative Jisc Online survey was developed with questions based on early findings from the rapid realist review for theory testing, targeted at adult (>18 years) leaders/helpers from Welsh community clubs that involve physical activity with girls and/or young people assigned female at birth. It was shared via social media networks, Sport Wales and voluntary groups from 7<sup>th</sup> September – 26<sup>th</sup> November 2025, see Appendix 2. Participants had the opportunity to provide contact information if they wished to be invited to an online interview to discuss their responses in more detail and/or to arrange a visit to their club to give young people the opportunity to participate in the study. The first page of the survey clarified inclusion criteria, provided participant information and required informed consent to proceed with the survey (Appendix 2). For the interviews, young people were recruited through adult leaders/helpers in their clubs and offered an online or in person individual or small group interview according to preferences. In addition, AC was invited to an ethnically diverse community centre where several in person interviews were conducted. All participants were given information leaflets about the study and provided informed written consent (Appendices 3&4). Parental/guardian consent was required if <16 years. The interviews were realist for theory testing and refining with the interview guide developed from review findings, (Appendix 5).(20) All were conducted by AC in English.

## **Data analysis**

Interviews were transcribed verbatim, anonymised and imported into NVIVO 15 (QSR International) for analysis, along with the anonymised survey data. AC analysed all

data, CT/AM double coded 53% (8/15) of interview transcripts. Weekly meetings were held February – March 2026 (AC, CT, AM) to discuss findings and theory development. The coding framework in NVIVO 15 was based around the review's initial theories, categorised around self-determination theory constructs (competence, relatedness, autonomy) for positive and negative outcomes. We coded data using explanatory 'if, then, because statements' to capture the nuance of different contexts, mechanisms and outcomes and synthesised these statements into higher level Context-Mechanism-Outcome configurations for theory refining.(14,15) We based our synthesis on Pawson's theory-building processes (juxtaposition, reconciliation, adjudication and consolidation),(14,15) and by asking three questions,(21):

1. Is this account novel and therefore reasonable to convert directly into a CMO?
2. If not entirely novel, does this account challenge the explanations made in related accounts i.e. is it a rival theory?
3. Does this account add important refinements to the understanding of contexts, mechanisms, or outcomes made in related accounts for theory refining?

### **Validation of findings**

Findings were discussed with Sport Wales and public contributor co-authors.

### **Ethical approval**

Ethical approval was provided by Cardiff University School of Medicine Research Ethics Committee 7<sup>th</sup> September 2025, reference 25/35.

### **Public involvement**

LB and MF were named on the original grant proposal and contributed to the design of the study, and interpreting findings.

## Results

### Interview and survey participants

Details of interview participants are shown in Table 1. Participants included 19 females (n=9 adults, n=10 adolescents (aged 12-18); n=10 ethnic communities, n=9 White Caucasian). Most were conducted online (n=9) with one participant present. Two interviews included more than one adolescents as their preference. Interviews lasted 9-41 minutes.

Table 1: Interview participants

| No. | Interview Participant       | Type of physical activity                    | Ethnicity     | Interview type | Interview length (mins) |
|-----|-----------------------------|----------------------------------------------|---------------|----------------|-------------------------|
| P1  | Adult leader community club | Various land-based activities                | White British | Online         | 35                      |
| P2  | Adult leader community club | Various land and water-based activities      | Asian         | Online         | 41                      |
| P3  | Adult coach                 | Outdoor water sports                         | White British | Online         | 25                      |
| P4  | Adult leader                | Cycling                                      | White British | Online         | 22                      |
| P5  | Adult leader                | Hiking                                       | White British | Online         | 32                      |
| P6  | Adult leader                | Outdoor water sports                         | White British | Online         | 31                      |
| P7  | Parent                      | Community club various land-based activities | Bangladeshi   | In person      | 15                      |
| P8  | Parent                      | Community club various land-based activities | Black African | In person      | 15                      |
| P9  | Adult player                | Netball                                      | White British | Online         | 24                      |
| P10 | Female aged 15 yrs          | Netball and football                         |               |                |                         |
| P11 | Female aged 17 yrs          | Tennis                                       | Bengali       | In person      | 13                      |
| P12 | Female aged 17 yrs          | Tennis                                       | Bengali       |                |                         |
| P13 | Female aged 15 yrs          | Swimmer                                      | Bangladeshi   | In person      | 20                      |
| P14 | Female aged 14 yrs          | Basketball                                   | Pakistani     |                |                         |
| P15 | Female aged 14 yrs          | Gym                                          | Sudan         |                |                         |
| P16 | Female aged 13 yrs          | Netball                                      | Bangladeshi   | In person      | 10                      |
| P17 | Female aged 12 yrs          | Football and swimming                        | Bangladeshi   | In person      | 9                       |
| P18 | Female aged 14 yrs          | Outdoor water sports                         | White British | Online         | 31                      |
| P19 | Female aged 18 yrs          | Swimmer                                      | White British | Online         | 33                      |

Data from the 21 adult survey respondents from community clubs geographically spread across Wales was also included for theory refining. Clubs included water sports, land-based and remote outdoor activities. Survey participants were aged 18 to over 55 years; White British (n=20), Asian (n=1); female (n=20), male (n=1). Participants held multiple roles within the clubs including coaches (n=12), adult helpers (n=9), CEO (n=4), safeguarding officer (n=2), parent (n=2) and athletes (n=2). Responses varied from short bullet points to paragraphs. Most respondents completed all free text questions with two not completing any sections (including the male participant) and three missing out two or more questions. 14/21 respondents provided contact information and were invited for an interview, seven of whom were interviewed and recruited the adolescents (Table 1).

## **Refined Theories**

The refined theories are presented in Table 2 and summarised in Figure 1. These are described in more detail below:

### **1. Competence: a sense of control over one's environment**

To improve menstrual health support in clubs, the data highlighted the need for general menstrual health education for both males and females, young and older (Resource) to improve general understanding and consideration (M) and menstrual health support (O). However, practical context-specific education was needed for different activity settings e.g. land-based, water-based or remote outdoor; and specific population groups e.g. ethnic diverse communities and performance athletes.

**Context: Land-based activity e.g. football**

Examples were given emphasising current *lack of facilities and available period products* (Resources) that directly impact young people's ability to participate in sport. For example, a 15 years old footballer described how she started her period unexpectedly at the start of the match. There were no period products available but she borrowed a pad from a friend. However, when she went to use the changing rooms, they were locked.

*"It was like a few weeks ago. Start the season. I was playing football and I was like, late on my period... And then my period came right before the match and there was like, nothing." Footballer aged 15 (P10)*

Information on how access to *free period products* (Resource) for clubs featured in 12 survey responses. Participants whose clubs did provide free products described how they were accessed from local authorities, and made visible and accessible in the club to use if needed (M). Advice on appropriate *dark and comfy clothing* (Resource) was described to improve confidence (M) when engaging in physical activity with many girls describing how they wore layers (Resource) to reduce the risk of leaking (O).

**Context: Water-based activity e.g. swimming**

Brief swimming costumes and a *more limited use of period products* (Resource) *contributing to the fear of leaking* (M) were described as barriers to swimming while menstruating. A competitive swimmer reflected on such an experience when she was younger.

*“There was an instance I think I was about 12 or 13 ... we got out the pool and I leaked, but I didn't notice. And so when we went to get back in the pool my coach came over and was like, “You know, I think you need to go to the toilet.” And I was really confused 'cause I was like, why? And he's like, you need to go to the toilet. And I was like, no, I don't. I'm fine. And then he was like, look at the floor and I'd like left a trail of blood...”*

*Swimmer aged 18 (P19)*

Girls described not wishing to use tampons at a young age and even if they did, not being educated about how to use them appropriately (Resource), resulting in discomfort and leaking (O). Period swimwear was described as expensive (Resource) and therefore inaccessible to some (M) while others were not aware of such products (M). Education on appropriate clothing and period products options (Resource) for water-based activities was reported in three survey responses and discussed in three interviews. One survey respondent also highlighted a need for guidance on managing small blood leaks in swimming pools (Resource).

### ***Context: Remote outdoor activities e.g. hiking***

Managing periods in remote outdoor settings with no toilet or changing facilities available (Resource) was a barrier highlighted in interviews with two outdoor water sport instructors and a hiking expedition instructor.

*“The problem is for youngsters, if they, you know, suddenly come onto their period while they're out actually out on an expedition, it can be quite stressful for them,” Hiking instructor (P5)*

They emphasised the need to be prepared (M) as group leaders and have products available (Resource) in case someone got their period unexpectedly. Hand hygiene and managing waste in remote settings (C) were common themes discussed and resources to manage these were therefore essential aspects of personal ‘period kits’ (Resource). Key items were described to be needed for a club level ‘period kit’, Box 2. These were also described to have potential to improve accessibility to period products in other less remote settings e.g. rugby away matches.

**Box 2: Outdoor ‘period kit’ essentials**

- Alcohol gel
- Pads and tampons various sizes
- Biodegradable wipes
- Biodegradable waste bags (e.g. dog waste bags)
- Pain killers (e.g. paracetamol, ibuprofen)

Planned public toilet stops communicated to the group (Resource), were described to help people manage their menstrual health and dispose of waste appropriately.

*“I operate under kind of like the leave no trace principle... So we talk about that in terms of you know how you manage your waste. We take in everything, so we take out everything we bring in.” Outdoor water sports instructor (P6)*

**Context: Ethnic diverse communities**

Different cultural beliefs about not engaging in physical activity in general for girls and women and how to behave when menstruating were both described to influence people’s attitudes to participating in physical activity. Changing the narrative and promoting periods as a sign of good health and fertility (M) were suggested by one

parent as a method to reverse the stigma about periods. Also, *not being scared* and just 'going for it' was the message from a young footballer.

*"Don't be scared of it (your period) because if it happens, it happens," Bangladeshi footballer aged 12 (P17)*

Education (Resource) including practical guidance on what to wear including when swimming, and period product options (Resource) were described to encourage girls from diverse ethnic communities to stay active (O). If clubs have members with additional menstrual needs e.g. disability or transgender (C) then menstrual health education (Resource) using inclusive terms, cultural respect and varied products that are easily accessible (M) were suggested to help support menstrual health by a survey respondent. Sharing learning on how to best to manage additional menstrual health needs (Resource) was also suggested to improve menstrual health support.

### **Context: Performance athletes**

Menstrual symptoms negatively affecting athletes' sports performance was described in several interviews. These included physical symptoms such as pain or heavy bleeding and mood symptoms. For example, a footballer described how her pain affects her performance.

*"I mean, for me, I get like really bad back pain and like sometimes it literally just hurts to walk... So yeah, like I would say it does affect my sport." Footballer aged 15 (P10)*

**Table 2: Refined Programme theories from primary qualitative data structured with Self-Determination theory constructs**

| Self-determination construct (17) | Initial Programme theory (18)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Refined programme theory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Examples of supporting verbatim quotes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>COMPETENCE</b>                 | <p>In settings where there is a lack of infrastructure and guidance on how to support menstrual health with physical activity (C)...</p> <p>...introducing organisational level resources and policies such as menstrual health education and appropriate facilities, clothing and availability of period products, can improve understanding, confidence and normalisation (M) ...</p> <p>...about menstrual health with potential to improve rates of participation and performance in physical activity (O).</p> | <p>In <b>different</b> settings</p> <ul style="list-style-type: none"> <li>- Land-based activities</li> <li>- Water-based activities</li> <li>- Remote outdoor activities</li> </ul> <p>And for <b>different population groups</b></p> <ul style="list-style-type: none"> <li>- Ethnic communities</li> <li>- Performance athletes</li> </ul> <p>where there is a lack of infrastructure and guidance on how to support menstrual health with physical (C) ...</p> <p>... introducing <b>practical context-specific</b> organisational level resources and policies such as menstrual health education <b>with adequate information</b> and appropriate facilities, <b>clothing and period product options</b>, can improve understanding, confidence and normalisation (M) ...</p> <p>...about menstrual health with potential to improve rates of participation and performance in physical activity (O).</p> | <p><i>“When we train at the local Comp...there's no menstrual products or anything like that and we were only training for two hours, but if you turned up and had that problem (your period) there'd be nothing. No way to deal with that except to go home. When we went to this specialised Sports College this week...there was an array of menstrual products there. In fact, you know, there were tampons, there were, there were, there were pads, there was a real selection in every single toilet on every single floor”</i> Parent of footballer aged 15 (P9)</p> <p><i>“Well, I didn't really know anything about what to wear when on my period... still don't really know what to use, so I feel like if there was like more recommendations or more stuff like that, that would be really useful for a lot of girls.”</i> Outdoor water sports aged 14 (P18)</p> <p><i>“Occasionally we will find that the young lady will come on earlier than she thinks. And she'll sort of think, oh, crikey, I can't carry on now.”</i> Hiking instructor (P5)</p> <p><i>Bangladeshi aged 15 (P13), “You can't really swim on your period.”</i><br/>Interviewer, “Okay, so you wouldn't swim on your period?”<br/>Swimmer, “No, I would avoid that.”<br/>Interviewer, “I know in some cultures like tampons are not encouraged?”<br/>Swimmer, “It's more like you're just introduced to pads and you don't know how to put a tampon in or anything like that.”</p> <p><i>“I think the more we know then training schedules and the way we approach training in general can be adapted, but if we don't know, then you don't know how to manage it,”</i> Footballer aged 15 (P10)</p> |

|                           |                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>RELATEDNESS</b></p> | <p>When there is menstrual health stigma (C)...</p> <p>...menstrual health education to encourage a safe space, with cultural respect and trust (M)...</p> <p>...could improve communication about menstrual health support needs with potential to improve rates of participation and performance in physical activity (O)</p> | <p>When there is menstrual health stigma (C)...</p> <p>...menstrual health <b>education including advice on</b></p> <ul style="list-style-type: none"> <li>- <b>education delivery methods</b></li> <li>- <b>encouraging role models and peer support</b></li> <li>- <b>and how</b> to encourage a safe space, with cultural respect and trust (M)...</li> </ul> <p>...could improve communication about menstrual health support needs with potential to improve rates of participation and performance in physical activity (O)</p> | <p><i>"We don't really talk about that (periods) much, it's kind of like a taboo kind of thing... It's not like we go to people and ask, what can I do for this and that? You kind of just find out for yourself and sometimes you don't know what works for you, that kind of thing."</i> Pakistani basketball player aged 14 (P14)</p> <p><i>"I think in person (education) it's a bit more engaging and a bit more personal,"</i> Outdoor watersports, aged 14 (P18)</p> <p><i>"Even if it's like an introduction to the club, there's stuff in there if you need it. Like, come and chat to us. We're more than happy to, like, be open and welcome to, like, if you want to talk to us about being on your period or that where you are in the cycle and how that impacts the activity like... even just like a simple sentence like that,"</i> Outdoor water sports coach (P3)</p> <p><i>"As a club perspective, we're trying to be just sort of, I guess, as friendly and inclusive as possible. So that hopefully people feel that they can, you know, have those conversations. I'm sure it doesn't go right every time, but hopefully people feel that they can."</i> Cycling instructor (P4)</p> |
| <p><b>AUTONOMY</b></p>    | <p>As individual menstrual health experiences and needs vary (C)...</p>                                                                                                                                                                                                                                                         | <p>As individual menstrual health experiences and needs vary (C)...</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <p><i>"It feels like, periods are something that affects every single month, it's a big part of our lives. And to act like it doesn't exist, it's like, it's not representative of who we are, you know?"</i> Bengali tennis player aged 17 (P12)</p> <p><i>"I had a cousin who used to... have really bad period cramps and stuff like that. And everybody would tell her, Oh, you know it's the norm. But after the pain got really bad, she went to the doctors and found out she got endometriosis."</i> Bengali tennis player aged 17 (P11)</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>...interventions such as education and menstrual cycle tracking, can promote self-awareness and empower individuals (M)...</p>                                                          | <p>...interventions such as</p> <ul style="list-style-type: none"><li>- <b>reliable and accessible</b> menstrual cycle tracking to promote self-awareness</li><li>- <b>availability of appropriate period products and understanding of management options</b></li><li>- <b>information on how to communicate menstrual health needs and to whom</b></li></ul> <p>can empower individuals (M)...</p> | <p><i>“I was talking to my friend last week and I feel like tracking apps are quite hard because I think a lot of us are quite irregular. So like she'll say, she'll have it one week and then all of a sudden have it another week and then won't have it for a few months, which is really weird. And I was like. Yeah, it's a similar experience to me and a lot of other girls as well.” Outdoor water sports, aged 14 (P18)</i></p> <p><i>“I really believe that like knowledge is power. And if I had been educated more when I was younger probably. Get like nine years old around medical kind of options. Then I might not have made or I might have made different decisions which would have put me in a more empowered place in my life.” Community club adult leader (P1)</i></p> <p><i>“The older ones that I coach now will really openly tell me I'm on my period this week...we'll be doing a physical and they're like, oh, I'd rather not do quite that much tonight because I'm feeling really tired and sluggish because I'm on because I'm on and it's like, OK, cool. We'll just change the session slightly.” Outdoor water sports coach (P3)</i></p> |
|  | <p>...to make personal decisions about what works best to manage their own menstrual health with potential to improve rates of participation and performance in physical activity (O).</p> | <p>...to make personal decisions about what works best to manage their own menstrual health with potential to improve rates of participation and performance in physical activity (O).</p>                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

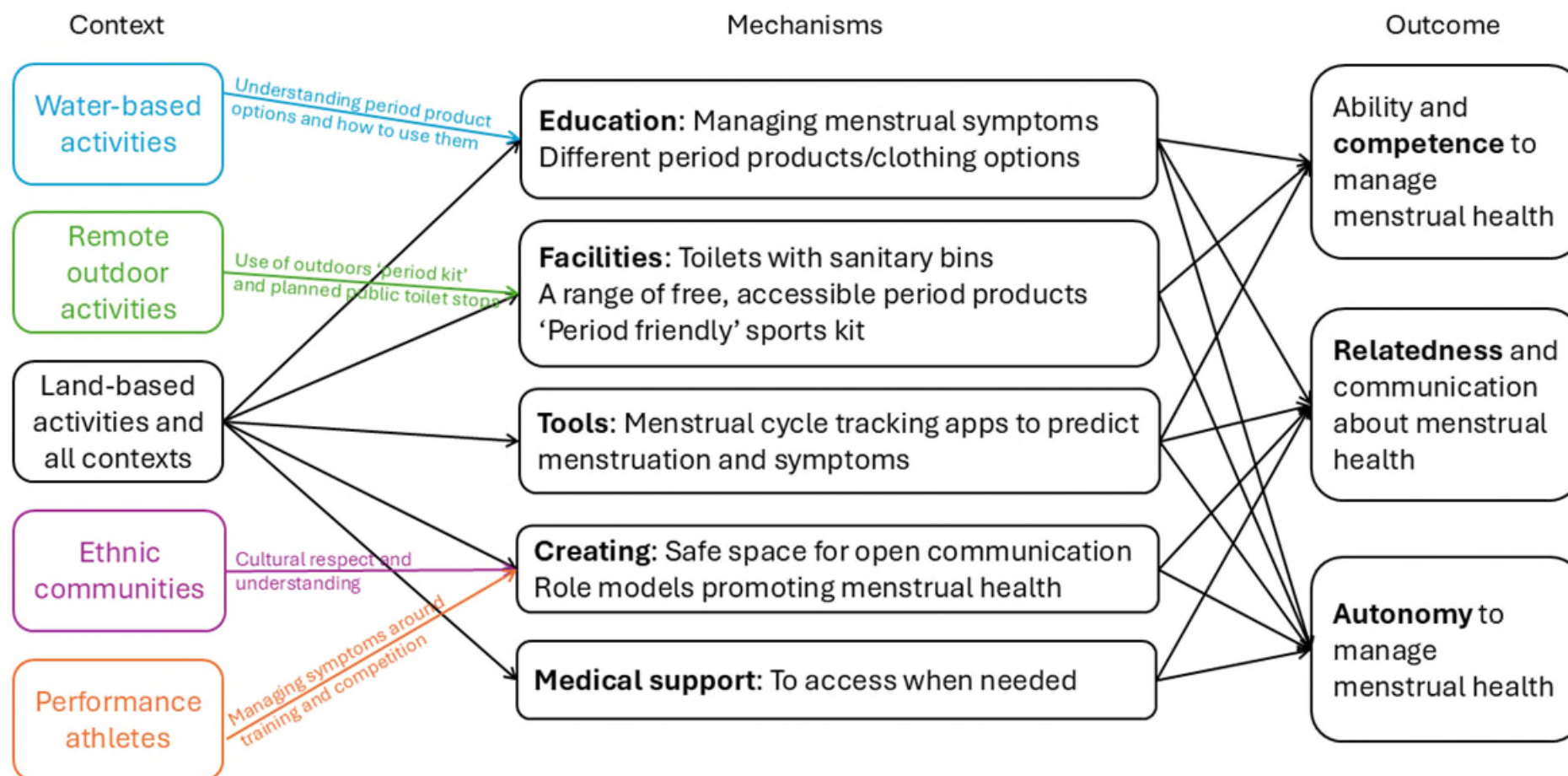


**Figure 1: Programme theories (context-mechanism-outcome configurations) to highlight key mechanisms needed to support menstrual health with physical activity in different contexts.**

Understanding how to manage both physical and emotional menstrual-related symptoms (M) was described in several interviews and survey responses. Related educational needs (Resource) included nutritional advice, body image, injury risk and how these along with menstrual cycle hormonal fluctuations can influence training and benefit performance (O).

## **2. Relatedness: a connection with others**

In the context of menstrual health stigma (C), communication about menstrual health, especially with men and boys, can be uncomfortable (O), so advice on how to create a safe space was needed (M) to allow open communication (O). This was described as particularly relevant in male dominated sports where most coaches are male.

*“It's mainly a lot of the male coaches... I see them all wriggle if anyone ever brings it up... you'll see in their body movement and the way that they are, there will be a little bit of a hesitation or a little bit of a squirm,” Outdoor water sports coach (P3)*

In some cultures, menstrual health was not discussed with males within the family (C) and therefore the thought of discussing menstrual health with males outside the family caused unease (O).

*“I was going to swim today and my brother asked me how I didn't go, I can't just say oh because I got my period. I feel like I would feel awkward and he wouldn't know what to do as well.” Bengali swimmer aged 15 (P13)*

Safeguarding concerns (C) were also raised about the appropriateness of an older male coach discussing personal menstrual health issues with younger female athletes and

advice on how to manage this (Resource). Suggestions for how to manage these barriers were again context-specific.

### ***Educational Delivery***

Female only in-person sessions (Resource) with a trusted female teacher (Resource) were suggested by several adults and young people to make young girls feel more comfortable to ask questions (M) and therefore improve knowledge (O). This was highlighted as important for diverse communities (C).

*“So I think it’s really important that you have a woman PE teacher so that you feel comfortable talking to them,” Bangladeshi netball player aged 13 (P16)*

In-person sessions for young people (Resource) also gave the opportunity to understand practical management options such as being able to touch and feel different types of period swimwear (Resource). Parents also being present (C) to support young people (M) but also educate themselves (M) about available options was described as beneficial (O).

*“That was the only time I’ve ever been taught about it (menstrual health). But then they got a man, a middle-aged man, to come and talk to a group of teenagers about periods - like I feel it’s a bit silly if you ask me.” Footballer aged 15 (P10)*

Depending on the population (C) however there may need to be a flexible approach in how the education is delivered (Resource), with or without the male coaches and boys, and parents, whatever makes people feel more comfortable to engage (M). For adult

coaches and the wider team (C), menstrual health education delivered online (Resource) may more accessible (M) and therefore improve understanding (O). Easy read posters and links to resources visible in clubs (Resource) were suggested to improve accessibility to education (M) and therefore improve knowledge (O).

### ***Role models and peer support***

Role models visibly promoting open communication about menstrual health (Resource) were described to take many forms. These included sisters, aunts, mothers, older teenagers, adult helpers, coaches, and elite athletes (M). Sharing their own experiences (M) was described as a method of connecting to others to create reassurance (M) and promote open communication (O).

*“I think being female yourself and having that, you can in a sense relate to what they're going through. I think that kind of builds a confidence and a reassurance. So it's like, well, if (...) can do it, I can do it,” Outdoors water sport instructor (P6)*

Understanding that elite athletes must and do manage their menstrual symptoms to train and compete was described as inspiring (M). For those from different cultural backgrounds (C) more elite athlete role models from their own culture (M) was described as needed to inspire girls to engage in sport in general (O). Peer support (Resource) was also described as being a useful tool to support menstrual health. This could help with practical aspects such as sharing period products (M) or providing encouragement and understanding why (M) someone is not feeling 100%.

### ***Creating a safe space for communication within a club***

One swimmer reflected on why it is important to be able to talk about menstrual health and how to manage symptoms with physical activity.

*“When you're 11, like no one really speaks about their periods, it can feel like it's just you,” Swimmer aged 18 (P19)*

Initiating conversation about the topic in a routine way to all club members (Resource) was described as a useful approach to introduce the topic (M) and then young people know it is safe (M) to mention it if they wish (O). Young people (C) described being comfortable (M) discussing menstrual health (O) if they had got to know and trusted the adults (M). A friendly and inclusive environment (C) was described to make people feel more comfortable (M) for such conversations (O). Some sports were described as lending themselves towards conversation in general – e.g. long-distance biking (C) therefore creating a safe space (M) to discuss menstrual health (O).

*“I think it's cycling as a sport. You've got time. It's sociable... So I think it just feels like a nice relaxed environment where people can talk about, you know, whatever they want to. And quite often you know, you have these conversations with women you don't particularly know very well and it doesn't really matter.” Cycling instructor (P4)*

Male and female leaders both being available (Resource) was described as a useful option if young people would prefer to talk to a female about menstrual health (M) or having a nominated person within the club (Resource). Older athletes (C) described feeling less embarrassed (M) which made it easier to communicate with their coach about menstrual health (O).

### **3. Autonomy: ownership over one's own actions**

A key context described in the data was acknowledging the variability of menstrual symptoms (from minimal and not bothersome to severe and interfering with daily activities) and therefore the need for individualised management (O). Having adequate information on how to manage physical and emotional symptoms (Resource) to make informed decisions (O) on individual management (M) was described. This included information on when it was appropriate to seek medical advice.

*“Periods are such an individual experience that not one person's period experiences is the same.” Bengali tennis player aged 17 (P12)*

#### ***Menstrual Cycle Tracking***

The use of menstrual cycle tracking apps (Resource) was described to be helpful for competitive athletes (C) in improving self-awareness of how cycles can affect their body, mood, strength and stamina (M) and allow planning for sports training and competitions (O).

*“It would help the girls understand their bodies and how their cycle can affect strength and stamina.” Survey participant 12*

However, the data highlighted barriers (O), such as financial payments for apps (Resource) and issues such as reliability (O) for younger or older people with irregular cycles (C). Additionally, individual cycle tracking information may not be translatable into club level training approaches (O).

### ***Appropriate period products and understanding management options***

Availability of different types and sizes of period products (Resource) was described to promote menstrual health autonomy (O) and allow access to preferred products (M). In outdoor sports (C), being encouraged to have your own 'period kit' with your own preferred products (Resource) was described to improve comfort (M) and therefore promote engagement in the sport (O)

*"I think that's quite important because using your own things, you're always more comfortable than using somebody else's, aren't you?" Outdoor water sport instructor(P6)*

### ***Communicating menstrual health needs***

Education including giving communication skills to people (Resource), so they have the confidence (M) to discuss their menstrual health needs (O) was described as necessary to promote advocacy (O)

*"I think a bit part of it is being able to give those who bleed the skills to be able to advocate for what they want and need in relation to their menstrual cycle. Knowledge of the cycle itself is important but without the skills to be able to discuss it then we can't facilitate progress." Survey participant 5*

Promoting open communication in a flexible way (e.g. verbal or logged in a training diary) (Resource), between athletes and sports coaches (C), whatever made people feel more comfortable (M) was described to influence adaptations to training schedules (O). In ethnic communities (C), conflicting views (M) from cultural beliefs on participating in sport whilst menstruating and advice from school or sporting institutions (Resource) were described to negatively influence personal decision-making and autonomy (O)

## **Discussion**

### **Main findings**

Our initial programme theories describing how existing interventions (education, facilities/period products, menstrual cycle tracking tools and medical support if needed) could support adolescent menstrual health with physical activity were robust but required refinement for diverse contexts. Key mechanisms include: understanding different period product options for water sports; how to manage the lack of facilities in remote outdoor settings; cultural respect and trust in ethnic diverse communities; and managing symptoms around training and performance for competitive athletes. Further mechanisms that may be influenced by organisational and club settings include choice of education delivery methods, how to encourage role models and peer support, and provide a safe space for communication, to empower individuals to make informed autonomous decisions.

### **Strengths and limitations**

Strengths of this study include robust realist methods building on initial theories developed from a previous literature review,(18) structured by self-determination theory's constructs (competence, relatedness, autonomy) and diverse data sources to inform programme refinement.(17) The study team included a range of gender, experience and ethnicity and held weekly meetings to discuss developing findings. Interviews were all conducted by the same researcher (AC) enabling a consistent approach.

Limitations include the small number of survey responses and male participants despite wide advertising across Wales, including clubs not related to specific sports. Respondents were largely involved in water-based activities and several in remote outdoor activities. This may be related to personal connections or recognition that menstrual health-related barriers are exacerbated in these settings. A qualitative survey requesting free text responses may have deterred participation (the only male response did not complete any of these fields). Adult interview participants recruited through the survey contributed rich data and recruited adolescents from a range of activities across Wales willing to share their experiences. These included several participants from diverse ethnic communities. No data however were collected from people with disabilities, transgender and/or other additional menstrual needs.

### **Comparison with the literature**

Findings from this qualitative work have added contextual refinement to the programme theories describing how to support menstrual health for physical activity developed through our review.(18) The literature describes menstrual health-related barriers with physical activity,(5) and a lack of intervention studies on how to address these barriers.(13)

Studies focusing on swimming reflect our findings, suggesting formal menstrual health education is needed and the positive influence of female coaches and peer support.(22,23) A recent systematic review also described the presence of female coaches, role models, trust and positive experiences of discussing the menstrual cycle as facilitators for the coach-athlete relationship for healthy sport participation.(24)

Studies focussing on outdoor activities reflect a lack of guidance on how to manage menstrual health in remote outdoor activity settings with a call for knowledge, resources and normalisation of the topic to enable inclusivity and increase female participation in outdoor activities.(25,26) Outdoor ‘period kit’ essentials outlined by participants reflect those suggested by The British Mountaineering Council.(27) Women’s menstrual health literacy in general is recognised to be low, with a call for educational and health promotion interventions to improve this.(28) Other studies have focussed on widening menstrual education to men,(29) and recommended implementation of this in schools to reduce stigma and improve communication about menstrual health.(30) Athlete ethnicity is rarely included or discussed as part of studies on menstrual health in sports; a recent scoping review reported 81% of such research articles do not consider athlete ethnicity.(31) Comparison evidence to our findings is therefore limited but these findings contribute towards this understudied area.

### **Practice and policy implications**

These findings align with Welsh Government Period Proud Round Table discussions which will inform Sport Wales’ menstrual health recommendations. The refined programme theories can be used to develop and evaluate context-specific policy and organisational menstrual health support interventions for physical activity.

## **Further work**

Further work is needed to understand how to support populations not included in this study including those with disabilities, transgender and /or additional menstrual needs.

## **Conclusion**

Our refined programme theories describe key mechanisms for menstrual health support needed in different contexts. Interventions developed from these programme theories need robust evaluation.

## Declarations

1. **Ethics approval and consent to participate:** Ethical approval for this study was provided by Cardiff University School of Medicine Research Ethics Committee 7<sup>th</sup> September 2025, reference 25/35, in accordance with the Universities UK Concordat to support Research Integrity. Participants provided informed written consent to participate in the study, with informed written parental/guardian consent provided for interview participants under 16 years of age.
2. **Consent for publication:** Not applicable
3. **Data availability:** Data supporting the findings of this study are available within the paper and its Supplementary Information. Interview manuscripts are not publicly available due to participant confidentiality.
4. **Competing interests:** Co-authors: Molly Fenton is founder of the Love Your Period Campaign, Natalie Brown is funded by Sport Wales. There are no other competing interests to declare.
5. **Funding** This work was supported by Health and Care Research Wales grant number AR-2402.
6. **Author statement:** AC led the work, developed the protocol, survey and interview guides and conducted all interviews. NB, LB, MF, AE, JB made substantial contributions to the design of the project and interpretation of data. CT and AM made substantial contributions to data analysis and interpretation. All authors contributed to and approved the final manuscript.
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## **Abbreviations**

C      Context

M      Mechanism

O      Outcome

CMO   Context-Mechanism-Outcome Configuration

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