BMC Women's Health

RESEARCH Open Access

A multifaceted menstrual health intervention to improve psychosocial outcomes and menstrual practices among secondary schoolgirls in Northwest Tanzania: a pilot intervention study

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Abstract

Introduction Schools provide an important opportunity to sustainably reach and improve menstrual experiences and outcomes among adolescent girls. This study examined changes in psychosocial outcomes and menstrual practices after a pilot menstrual health intervention in schools in Northwest Tanzania.

Methods We conducted a pre/post evaluation of a pilot menstrual health intervention in four schools in Mwanza region. The intervention included: (i) 10-hours comprehensive menstrual sexual and reproductive health (MSRH) education curriculum delivered over 5 days, (ii) distribution of menstrual management kits, (iii) improvement of school WASH facility guided by needs, and (iv) training on menstrual pain management strategies, supply of pain killers and training a specific teacher on dispensing. The primary outcome was measured using the Menstrual Practices Need Scale (MPNS). We assessed seven secondary outcomes: menstrual pain management practice; self-efficacy in managing menstruation; menstrual-related anxiety; self-reported urogenital infection symptoms; MSRH knowledge; participation in school during menstruation; and school climate score. We used linear (for MPNS, and school climate score), and logistic (for remaining secondary outcomes) random-effect regression models to examine changes in outcomes between baseline and endline.

Results A total of 486 schoolgirls (mean age 15.6 years [SD 1.3]) were recruited for the baseline survey; of these 396 participated in the endline survey. At 12-months follow up, menstrual experience improved for MPNS-36 subscales of transport and menstrual material needs, (mean difference (MD), 0.52; 95% CI 0.38–0.66), and menstrual material reuse needs, (MD 0.32; 0.14–0.50), while menstrual materials reuse insecurity did not change, (MD -0.08; -0.27–0.11). For the secondary outcomes, there was an increased use of analgesics for menstrual pain management, (OR 2.21; 95% CI 1.33–3.67); improved self-efficacy for managing menstruation, (OR 2.02; 1.35–3.04); MSRH knowledge, (OR 5.23;

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3.25–8.39), participation in school (OR 2.80; 1.89–4.16) and reduced menstrual-related anxiety, (OR 0.38; 0.25–0.59). There was no evidence of change in self-reported urogenital symptoms, (OR 0.71; 0.49–1.01) or school climate, (MD 0.05; -0.19–0.28).

Conclusion The pilot intervention showed improvements in menstrual practices, psychosocial outcomes and school participation among schoolgirls but had no effect on school climate or self-reported urogenital symptoms. Stronger evidence from rigorously designed trials is needed to confirm the effectiveness of the intervention and scalability of these findings.

Keywords Menstrual health, Adolescent girls, School, Menstrual practices and needs scale, Pilot, Intervention, Wellbeing

Introduction

There is increasing global recognition of the contribution of good menstrual health in achieving international development goals related to gender equality and global health [1, 2]. Menstrual health has been defined as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in relation to the menstrual cycle" [3], denoting its multidimensional nature. Poor menstrual health is associated with negative consequences for psychological and physical health, education, and social participation [3–8].

Poor menstrual health amongst women in low- and middle-income (LMIC) countries has been attributed to a lack of facilities, knowledge and material for managing menstruation [3, 7, 9–11]. The recent World Health Organization (WHO) and United Nations Children's Fund (UNICEF) joint progress report indicates that less than 49% of schools in LMICs had basic access to water services, and only 50% of schools in Sub-Saharan Africa had a basic sanitation service. In SSA, only 1 in 8 schools have menstrual materials available for free or purchase [12]. Studies on menstrual health literacy have shown that adolescent girls' ability to access, understand, and use information about menstruation to manage health is limited. Potential interventions targeting to address this problem should include provision of practical knowledge about menstrual physiology and pathology, social and health care support [13, 14].

Accumulating evidence shows that menstrual experience intersects with physical, mental, and social health. Poor menstruation experiences, specifically a lack of private space to manage menstruation, impact the frequency of changing menstrual products, and has been associated with urinary and genital tract infections [15, 16]. Such environmental constraints are more pronounced in workplaces and schools where menstruating women and girls spend considerable amounts of time. The lack of menstrual knowledge and products to manage menstruation in LMICs has been linked to stress, anxiety, and depression [17–19]. Among adolescent schoolgirls, menstruation is associated with school absenteeism due to menstrual pain, lack of facilities to wash and change menstrual products, and stigma within the school environment [7, 20].

Research among adolescent schoolgirls in Tanzania has documented high levels of menstrual stigma and shame, lack of menstrual knowledge, and menstrual pain, and the resulting impact on participation in school [21, 22]. Data from the Tanzania education sector performance review highlighted that in 2016 only 67% of girls completed the four years of secondary school, most commonly due to truancy, but also for reasons such as teenage pregnancy [23]. Furthermore, a study conducted in twelve secondary schools in Tanzania found that poor WASH facilities were a key factor that contributed to the non-attendance among adolescent girls due to the inability to manage their menstruation at school [24].

The study also highlighted the need for menstrual education to be integrated into the school curriculum, particularly at a younger age prior to menarche. Comprehensive efforts to improve the menstrual health of adolescent girls should be incorporated into the school setting where adolescent school-going girls spend most of their time, and they should also involve all relevant educational stakeholders in charge of these schools [25]. This recommendation aligns with WHO's work on the Health Promoting School framework illustrating how educational stakeholders can be involved towards a common goal of improving health [26]. Studies conducted in sub-Saharan Africa have suggested that multicomponent menstrual health interventions have the potential to improve health and social outcomes among adolescent girls in the school environment [5, 27–29]. However, further research is needed to show how public health interventions within a school context in sub-Saharan Africa can improve both menstrual health and broader social, educational, and health outcomes [30].

In response to this need, we adapted a menstrual health intervention, with the participation of menstrual health practitioners, and educational stakeholders in Tanzania [31]. This study aimed to pilot test and evaluate the effect of this intervention on menstrual practices and psychosocial outcomes among secondary schoolgirls attending four government schools in Northwest Tanzania. We

also assessed the effect of the intervention on the overall school climate - including both physical and social aspects - in supporting menstruating girls.

Methods

Study setting, design and participants

This pilot study was conducted in four government schools in Nyamagana and Misungwi districts in Mwanza region of northwest Tanzania. Nyamagana and Misungwi districts combined have a total of 57 government (public) secondary schools [31, 32]. The schools were purposively selected from medium-sized, gender-mixed, government secondary schools. This pilot was a single-arm longitudinal study with pre- and post-evaluation. Participants self-completed a paper-based quantitative survey at baseline (January/February 2022) and endline (February/March 2023).

Schoolgirls were eligible to participate in the study if they were enrolled in the second or third years of secondary education (form 2 or 3) in the selected schools during the baseline survey, and provided individual consent or assent. All participants who participated in the baseline survey were eligible to be assessed in the endline survey which was conducted 12 months later.

The potential participants were informed that participation was voluntary and that they were free to withdraw, without justification, from the study at any time without consequences. All participants provided written informed consent or assent before any study procedures. Headteachers provided overall consent on behalf of adolescents aged below the age of 18 years before they assented. Each respondent was assured of confidentiality and privacy during data collection, management, and analysis. Personal data were anonymized using ID numbers, and stored data were stripped of any identifiable information.

The study protocol, tools, and consent/assent forms were reviewed and approved by the Tanzanian National Institute for Medical Research (NIMR) ethics committee (Ref: NIMR/HQ/R.8a/Vol.IX/3647) and LSHTM ethics committee (LSHTM Ethics Ref: 22 854). Permissions to conduct the study were obtained from the Mwanza Regional Administrative Secretary, the regional and district education offices, and school administrations.

Sample size calculation allowing for a 20% loss to follow up between baseline and follow up showed that recruiting 500 girls would provide 80% power to detect a difference of 0.075 points in the MPNS-36 score assuming a mean score of 1.82 (SD 0.37) at baseline [33]; a two-tailed test at 5% significance level; and an intracluster correlation of 0.05. To the best of our knowledge, there were no published studies conducted in our setting to assess the impact of menstrual health interventions – that are similar to our intervention – on MPNS outcome. We anticipated small to moderate changes in MPNS; thus, we used a difference of 0.075 to allow us to detect changes of the expected magnitude.

Intervention description

The menstrual health intervention was initially developed by Femme International, a local nongovernmental organisation (NGO) and the implementing partner for the pilot project [34]. The intervention was developed by a collaborative team of teachers, public health specialists, and evaluation specialists and the Femme local team, which consisted of women with firsthand experience of the menstrual and reproductive health needs of women and girls. As part of this pilot study, we conducted formative research that involved key stakeholders (teachers, students, and local government authorities in Mwanza and Kilimanjaro) to refine the intervention. We utilised focus group discussions, teacher's meetings, and key informant interviews with intervention implementers to document the experience of previous intervention beneficiaries and identify gaps in the intervention. A total of twelve students' focus group discussions, disaggregated by gender, were conducted in six secondary schools in Kilimanjaro and Mwanza regions. Additionally, we conducted three teacher and two local government authority meetings to provide input to the intervention refinement process [35, 36].

The refined intervention, which was delivered by Femme International, consisted of five key components:

i) Comprehensive MSRH education, which consisted of a total of 10-hour student education sessions delivered over 5 days. The sessions involved both gender-mixed and gender-disaggregated sessions covering menstruation, including the menstrual cycle, ovulation tracking, premenstrual syndrome, pain management, products, normal versus abnormal flow, reproductive health [urinary tract infections (UTIs), reproductive tract infections (RTIs), sexually transmitted infections (STIs) symptoms], pregnancy and pregnancy prevention, and gender issues including healthy relationships and gender-based violence (GBV), with a focus on harmful aspects of traditional masculinity. During the session, students were also provided with a workbook. The five-day sessions were followed by two "booster" sessions in weeks six and twelve, during which facilitators returned to the schools for question-and-answer short sessions with students to clarify issues and support girls with product use-related challenges.
ii) Menstrual management kits were provided to all girls in the intervention classes. The kit included two reusable menstrual products: a menstrual cup

(Saalt cup) and a pack of washable pads (AFRIpads), two pairs of underwear, a bar of soap in a container, a small wash towel, and a small metal bowl, all in a cloth bag for convenient storage and transportation.

iii) Pain management: In addition to the pain management sessions delivered as part of the education sessions, one teacher at each school was selected and given additional training on pain management and dispensing of analgesic drugs. Using the existing essential medicine procurement system, which allows the schools to procure basic first aid kits, each school was supplied with two conventional over-the-counter analgesics. The analgesics were available to all students, boys and girls, who requested them, without requiring justification. Teachers responsible for dispensing painkillers were trained and provided with dispensing guidelines.

iv) School WASH improvements: Minor WASH improvements were implemented in each school. The improvements were guided by school needs and involved repairing toilets and/or menstrual rooms, providing locks on doors, soap, and buckets, and improving access to water in the toilets and/or menstrual rooms.

v) Stakeholder engagement and involvement: We implemented extensive stakeholder engagement throughout, involving students, teachers, parents, and local government leadership. This process was important not only for buy-in and acceptability of intervention but also for a discussion and co-creation platform for normalising menstrual health conversations, breaking down menstrual stigma, and creating a more menstruation-friendly school social environment.

Measures

Primary outcome

The primary outcome was menstrual practices and perceptions among schoolgirls assessed using the Menstrual Practices and Needs Scale (MPNS-36). The MPNS-36 comprises 36 items arranged in six subscales of which 13 items found in three subscales were used in defining the primary outcomes this study. We excluded three subscales that assessed the home environment as this intervention targeted the school environment, and used the following three subscales: 'transport and school environment needs' (5 items); 'reuse needs' (5 items); and 'reuse insecurity' (3 items). Each item in the MPNS-36 [33] tool is scored between 0 (never) and 3 (always) with negatively worded items being reversed before calculating the mean score for the subscale. The mean subscale score ranges between 0 and 3 with higher mean scores representing a more positive experience – a score of 3 would indicate that a respondent has no unmet menstrual practice needs. The menstrual practice needs in our analysis relate to: transporting and changing menstrual material at school (transport and school environment needs); washing and drying menstrual material in the school environment (reuse needs) and privacy and drying time for menstrual material in school environment (reuse insecurity).

Secondary outcomes

There were seven secondary outcomes:

Management of menstrual pain This was assessed using a numerical rating scale [37] to assess reported prevalence and severity, plus 3 questions drawn from Femme routine monitoring and evaluation (M &E) tools to assess the management of pain.

Self-efficacy in managing menstruation Assessed using 4 questions drawn from the Self-Efficacy in Address Mensural Needs Scale (SAMNS) [38]. The questions assess the confidence to ask friend, female teacher for menstrual related help, predict when the period would start and to stand up and respond to questions in class.

Menstrual-related anxiety We used the generalized anxiety disorder (GAD7) questionnaire, to assess self-reported level of nervousness, worries, tension, irritability, fear and duration of such feelings during the last menstruation period.

Self-reported UTI/STI symptoms We used 9 questions from Femme routine M & E tools to assess reported presence of a series of reproductive and urinary tract infection symptoms. The questions list a range of UTI/ STI symptoms including vaginal itchiness, discharges for which participants respond whether they have experienced the listed symptom or not.

MSRH knowledge We used 10 multiple choice questions drawn from MENISCUS feasibility study in Uganda [7] to assess knowledge of puberty in general and menstrual sexual and reproductive health.

School participation during menstruation We used 8 questions to assess school and social participation. Schoolgirls were asked if they missed school on any day during the last period, left school early on any day, or failed to participate in activities they would otherwise have participated in during menstruation.

School climate score The school climate was measured using eight items adopted from the Beyond Blue School Climate 28 item Questionnaire (BBSCQ) [39] adapted by

Shinde and others [40]. The possible range for the school climate score in this study was between 0 and 8 based on the eight selected BBSCQ items. The assessment focussed on the quality of interpersonal relationships among students, and between teachers and students with additional questions to assess the prevalence of bullying and teasing during menstruation, reasons, and perpetrators of bullying.

School facilities Observation checklist was used to capture the presence and access to toilets, water sources, hand washing facilities and disposal methods. The observations were conducted by research staff who were not involved in intervention delivery. In addition to the observation checklist, 8 questions were included in the survey questionnaire to assess availability, access and condition of WASH facilities in school.

Analgesic management of menstrual pain, UTI/ STI symptoms, and school participation during the most recent menstrual period were all self-reported based on participant recall.

Data management and analysis

The survey data were double entered into a study specific database by trained data staff, using the OpenClinica (an open-source clinical data management system). Data checks and data cleaning were done by a trained data manager under the supervision of a senior data manager. Final data extracted from OpenClinica were transferred to STATA version18 (Stata Corp. College Station, Texas, USA) for cleaning and analysis.

Descriptive analysis was conducted with baseline and endline data using the mean (SD) or median (range) to summarise participant attributes measures using continuous variables. Frequency and percentages were used to describe participants' characteristics collected using categorical variables. The effect of the intervention on the primary outcome of MPNS - a continuous outcome - was assessed with a random-effects linear regression model. The participant was added in the model as a random effect and the school was included as a fixed effect to account for clustering. For the binary secondary outcomes, random-effects logistic regression was used to estimate adjusted ORs with random effects for individuals and fixed effects for school, while school environment score - a continuous secondary outcome – was analysed using a linear random effects regression model. All models used in our analysis were adjusted for participant age and school; *p*-values below 0.05 were determined as statistically significant.

Results

Sociodemographic characteristics

A total of 486 girls were recruited from four schools at baseline and of these 396 (81.5%) participated in the endline survey (Fig. 1). The mean age of participants at baseline was 15.6 years (SD 1.3) with an age range from 13 to 20 years. The mean age for menarche was 14.2 (SD 1.1) and 424 (87.2%) girls had started menstruating at

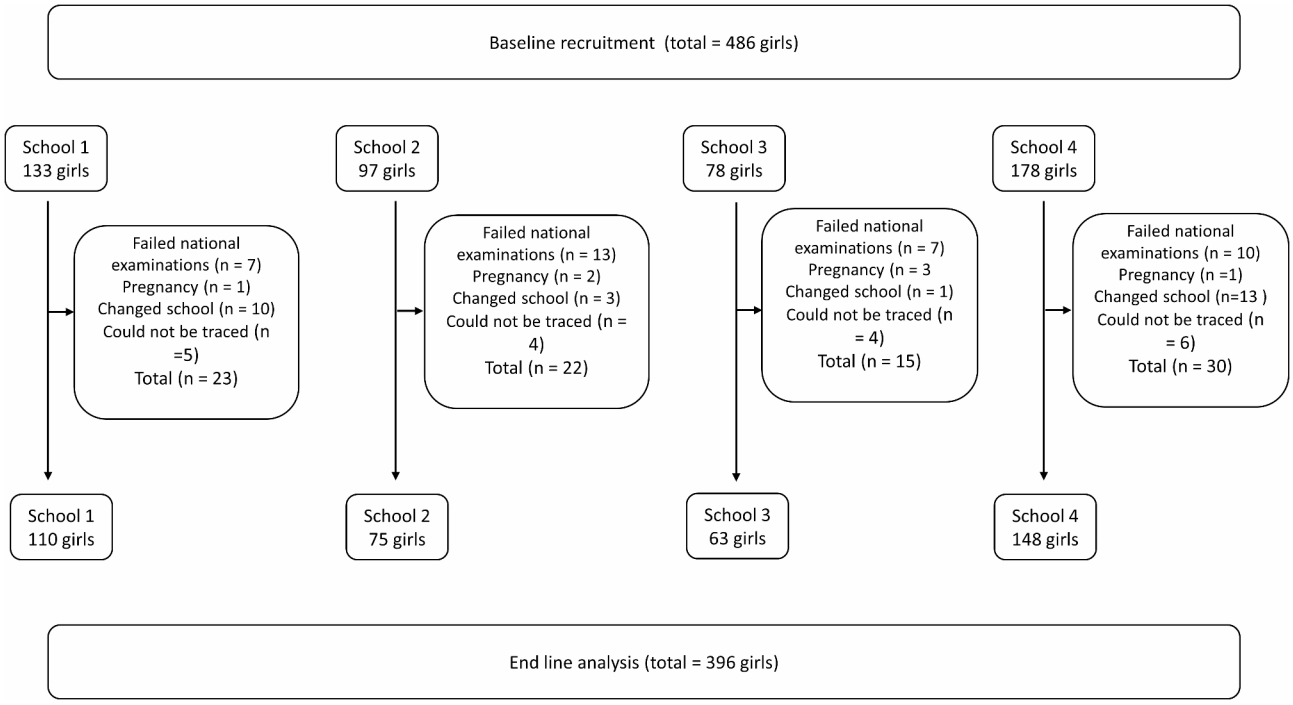

Fig. 1 Flowchart of participant recruitment and retention in the MSRH pilot intervention

Table 1 Characteristics of schools and schoolgirls participating in an MSRH pilot study in Mwanza, Tanzania

	Survey	
	Baseline	**12-month follow up**
N	486	396
School		
School 1	133 (27.4%)	110 (27.8%)
School 2	97 (20.0%)	75 (18.9%)
School 3	78 (16.0%)	63 (15.9%)
School 4	178 (36.6%)	148 (37.4%)
Location of School		
Urban	311 (64.0%)	258 (65.2%)
Rural	175 (36.0%)	138 (34.8%)
Mean age in years (SD)	15.6 (1.3)	16. 8 (1.0)
Current year of study		
Form two	261 (53.7%)	0 (0.0%)
Form three	225 (46.3%)	184 (46.5%)
Form four	0 (0.0%)	212 (53.5%)
What is your religious affiliation?		
Christian	390 (80.6%)	324 (81.8%)
Muslim	93 (19.2%)	71 (17.9%)
Other (Specify)	1 (0.2%)	1 (0.3%)
Have you started your periods?		
No	55 (11.3%)	8 (2.0%)
Yes	424 (87.4%)	387 (98.0%)
Not sure	6 (1.2%)	0 (0.0%)
Mean age at menarche in years (SD)	14.2 (1.1)	14.5 (1.1)

baseline compared to 387 (97.7%) at endline (Table 1). Most participants at baseline (64.0%) and endline (65.2%) were attending schools located in urban settings and were Christians (80.6% and 81.8%, at baseline and endline respectively).

Primary outcome

At baseline, the mean scores for the three MPNS-36 subscales - out of a maximum score of 3.0 for each subscale - were 1.41 (SD 0.99) for transport and material needs, 1.61 (SD 1.16) for menstrual material reuse needs, and 1.15 (SD 1.03) for menstrual material reuse insecurity. The menstrual experience of schoolgirls improved between baseline and endline for two out of the three subscales of the MPNS measured in the study (Table 2). The mean difference in transport and material needs between baseline and endline was 0.52 (95% CI 0.38–0.66), and menstrual experience measured by reuse needs improved on average by 0.32 (0.14–0.50). There was no evidence of change in the mean reuse insecurity score between baseline and endline surveys, -0.08 (-0.27–0.11).

Secondary outcomes

Pain management practices among school girls who needed analgesics for menstrual pain improved with 140 (45.6%) girls reporting that they used painkillers to manage menstrual pain at endline compared to 58 (26.6%) at baseline (OR 2.21; 95% CI 1.33–3.67), (Table 3). Self-efficacy for managing menstruation increased from 55.2 to 68.7% (OR 2.02; 1.35–3.04), whilst menstrual related

Table 2 Effect of MSRH intervention on menstrual perception needs scale (MPNS-36) subscales among schoolgirls participating in MSRH pilot study in Mwanza, Tanzania

	Baseline	**12-month follow up**	***Mean difference (95% CI)**	***P* value**
MPNS subscales				
N	423	387		
Mean transport and material needs score (SD)	1.41 (0.99)	2.03 (0.95)	0.52 (0.38–0.66)	< 0.001
N	239	323		
Mean reuse needs score (SD)	1.61 (1.16)	1.88 (1.16)	0.32 (0.14–0.50)	0.001
N	238	323		
Mean reuse insecurity score (SD)	1.15 (1.03)	1.14 (1.07)	-0.08 (-0.27–0.11)	0.401

* Intervention effects are adjusted for age of participant, and school attended

Table 3 Effect of MSRH intervention on secondary outcomes among schoolgirls in Mwanza, Tanzania

	Baseline	**12-month follow up**	***OR (95% CI)**	***P* value**
Analgesics use for managing menstrual pain	58/ 218 (26.6%)	140/307 (45.6%)	2.21 (1.33–3.67)	0.002
Self-efficacy for managing menstruation (≥ 6 out of 12 efficacy items)	234/ 424 (55.2%)	266/ 387 (68.7%)	2.02 (1.35–3.04)	0.001
Menstrual related anxiety	165/ 424 (38.9%)	114 / 387 (29.5%)	0.38 (0.25–0.59)	< 0.001
UTI or STI symptoms	185/ 486 (38.1%)	150/ 396 (37.9%)	0.71 (0.49–1.01)	0.060
MSRH knowledge (≥ 5 out of 10 items scored correctly)	258/ 486 (53.1%)	338/ 396 (85.4%)	5.23 (3.25–8.39)	< 0.001
Participation in school	188/ 424 (44.3%)	224/ 387 (57.9%)	2.80 (1.89–4.16)	< 0.001
Mean school climate score (SD)†	6.15 (1.86)	6.32 (1.90)	0.05 (-0.19–0.28)	0.706

* Intervention effects are adjusted for age of participant, and school attended

†Values are mean (SD) and intervention effect is mean difference (95% CI)

Table 4 Availability of WASH facilities for supporting menstruating girls assessed by observation in four secondary schools in Mwanza during pilot intervention

	Baseline	Midline	Endline
Toilets or latrines were available at the school	4 (100%)	4 (100%)	4 (100%)
Toilets or latrines at school provided privacy for menstruating girls*	1 (25%)	3 (75%)	3 (75%)
School had a dedicated convenience/ changing room for girls with a lockable door	1 (25%)	4 (100%)	4 (100%)
Was the convenience/ changing room at the school functional?	0 (0%)	4 (100%)	4(100%)
Disposable mechanisms for menstrual waste was available at the school	1 (25%)	2(50%)	2(50%)
The school had handwashing facilities	0 (0%)	0 (0%)	0 (0%)
The main water source for the school was found within the school grounds†	3 (75%)	3(75%)	3 (75%)
Water was available at the main source all the time	3 (75%)	3(75%)	3 (75%)

* Toilets or latrines were exclusively for girls' use, had a full door, was lockable from inside, and had high walls and a roof. † One school had no specific main source of water in or outside the school ground, students fetched water from different sources

anxiety declined from 38.9 to 29.5% (OR 0.38; 0.25–0.59). For MSRH knowledge, 53.1% of girls responded correctly to more than half of the ten knowledge items at baseline compared to 85.4% who responded correctly at endline (OR 5.23; 95% CI 3.25–8.39). Participation of girls in school improved from 44.3 to 57.9% (OR 2.80; 1.89–4.16).

There was no evidence of changes in participant-reported UTI or STI symptoms or in school climate scores between baseline and endline survey. Self-reported occurrence of UTI or STI symptoms was comparable at baseline (38.1%) and endline (37.9%), (OR 0.71; 95% CI 0.49–1.01). The mean school climate score that assessed both physical and social environments did not change following the intervention (mean difference 0.05; 95% CI -0.19–0.28), Table 3.

School WASH facilities during intervention

All four schools had toilets or latrines available at baseline, but only one had toilets or latrines that provided privacy for menstruating girls (Table 4). This increased to 3 schools during spot checks conducted at midline and endline. Only one school had a convenience/changing room with a lockable door for use by menstruating girls before the intervention. The existing changing room was however not functional at baseline. Midline and endline spot checks at all four schools showed they had a lockable changing room in use. Disposable mechanisms for menstrual waste were available at a single school before the intervention and in two schools at midline and endline. None of the schools had handwashing facilities at any time point.

Discussion

The pilot study showed that it is feasible to deliver a school-based menstrual health intervention in secondary schools in Tanzania and the survey findings suggest that the intervention improved menstrual experiences and psychosocial outcomes among secondary schoolgirls in Tanzania. Specifically, we noted improvement in menstrual practices with an increase in the average scores for the three menstrual practice needs sub-scale one-year post-intervention. There was also significant increase in the proportion of schoolgirls with MSRH knowledge and those reporting self-efficacy for menstrual management, analgesic use for menstrual pain management, and participating in school activities during menstruation. Menstrual-related anxiety among schoolgirls was reduced following the intervention. However, there was no improvement in urogenital symptoms and the school climate score.

The menstrual practices domains that improved after the intervention were transportation and storage of menstrual material, and menstrual material reuse needs, which corresponded to areas which the intervention aimed to improve in the school through the provision of menstrual kits (in a discreet bag), convenience rooms, and improving WASH facilities [31]. The reuse insecurity domain, which did not improve following the intervention, assessed participants' concerns around privacy during the washing and drying of reusable menstrual material [33]. The absence of effect could be plausibly explained by the fact that although girls change menstrual material in the convenience rooms at school, the washing and drying of reusable menstrual material is likely to happen at home rather than in school. Literature shows that menstrual product washing and drying is driven by the availability of washing and drying infrastructure, privacy for washing, cultural beliefs and stigma surrounding menstruation [41–43]. This suggests that a more holistic approach is needed to support changes at school and home. In addition, despite the changes in school WASH infrastructure to provide privacy and security during changing of menstrual products there still existed scope for further improvements in the available convenience rooms and toilets.

Five out of the seven secondary outcomes improved, specifically pain management, self-efficacy, MSRH knowledge, menstrual related anxiety and participation in school. However, two outcomes (self-reported UTI or STI symptoms, and the school social environment) did not change. The outcomes that changed were directly targeted by specific intervention components [38, 44–46],

and support the pathways to intervention effectiveness contained in our theory of change [31]. However, the remaining outcomes that did not show the desired change were much broader and possibly influenced by multiple factors beyond the intervention. Whilst the training component of the intervention covered knowledge on MSRH including UTI/ STI symptoms it did not include a treatment component to address UTI/ STI symptoms nor include any referral to or delivery of physical health checks and services for schoolgirls, which could have limited its effect on this outcome.

Similar to previous school studies in sub-Saharan Africa and Tanzania, there were major gaps in WASH infrastructure to support menstruating girls before the intervention [12, 24, 47]. Significant changes were noted in the availability of infrastructure for supporting menstruating girls within the school environment following the intervention. These changes were low-cost and implemented through the school administration with support from the intervention project team. However, the WASH changes were modest due to resource availability within the project. Recent surveys confirm that there remains significant scope for improving WASH facilities within schools in LMICs [12]. The WASH infrastructure improvement was sustained throughout the 12-month intervention period.

Sensitisation of teachers and school administration on menstrual health issues in the school environment could help achieve significant improvements at minimal costs [48]. With proper engagement and sensitisation, such costs can be covered by existing funding mechanisms for maintaining and repairing school WASH facilities that are in operation within Tanzanian schools [47, 49]. However, survey data on school climate (focusing on student-teacher relationships) assessed through self-reporting by individual participants did not show a corresponding improvement. This may be explained by the narrow focus of the intervention, which was specifically intended to improve teachers' support for menstruating girls and not focused on broader improvement of the teacher-student relationship.

This pilot intervention received support from the education and health authorities in Mwanza region demonstrating the feasibility of conducting menstrual health interventions in the school setting in low-income countries. We enrolled participants at four schools in diverse settings within Mwanza region, with all the schools accepting the initial invitation to participate, and remaining engaged during the entire 12-month intervention period, providing further support for the feasibility of conducting menstrual health interventions within schools.

Strengths and limitations of the study

The main strengths of the study included: (i) incorporating recent evidence on development of complex interventions [50]; and (ii) collaborative development of the intervention by experienced menstrual health actors and stakeholders. The iterative approach used to develop this intervention involved key stakeholders, including parents, teachers, and local government authorities.

However, various limitations should be considered when interpreting the results, including the study being conducted in a small number of schools in a single region, and the loss- to-follow-up. There was approximately 20% attrition; this loss-to-follow-up was accounted for in the sample size calculation and did not affect the final results. Secondly, the use of an uncontrolled before-after design to evaluate the pilot intervention makes it difficult to distinguish the effect of the intervention on menstrual practices from trends in menstrual practices over time. A more robust study design such as a randomized controlled trial using a large sample of schools could provide a more accurate estimate of the intervention effect. Apart from employing rigorous study designs there is need for studies that will assess how intervention effects can be optimised through examining important factors related to intervention delivery such as the broader teacher-student relationship. Thirdly, we did not calculate an overall MPNS-36 score across domains because our data collection focused on menstrual practices in the school environment and left out 3 domains that relate to menstrual practices at home. However, these MPNS subscales have shown sufficient reliability and had good construct validity even when considered independent of the overall MPNS-36 score [32]. The use of self-reported measures e.g. analgesic use and school participation could be subject to recall bias. The potential for recall bias was minimised by restricting the recall period to the current or most recent menstrual period. Future research studies would benefit from using validated questionnaires–which are lacking at present.

Conclusion

The pilot findings show that implementation of a multifaceted menstrual health intervention was feasible in secondary schools in Northwest Tanzania. Delivering this co-developed menstrual health intervention in the schools was followed by changes in menstrual practices and psychosocial outcomes among schoolgirls in the participating schools although some of the targeted outcomes did not change as expected. Further evidence from rigorously designed trials using larger samples in a variety of school settings to confirm the effectiveness and scalability of our piloted multifaceted menstrual health intervention can contribute to efforts to achieve SDG

goals related to good health and wellbeing, quality education, and gender equality.

Abbreviations

DHSC	Department of health and social care
MPNS	Menstrual practices and needs scale
MRC	Medical research council
MSRH	Menstrual, sexual, and reproductive health
PASS MHW	Partnering to support schools to promote good menstrual health and well being
RTI	Reproductive tract infection
SGDs	Sustainable development goals
STI	Sexually transmitted infection
UTI	Urinary tract infection
WASH	Water sanitation and hygiene

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12905-025-03723-1.

Supplementary Material 1

Acknowledgements
We are grateful to our funder, the Medical Research Council UK; the Regional and District Local Government Authorities in Mwanza, school Administrations, the intervention implementation and the evaluation teams; and the study participants.

Author contributions
Conception and design of the study: EO, PA, JR, JR, SK, GG, BT; study implementation: EO, JR, JR, JRL, GG, OM, RH; statistical analysis: PA, RH; Writing the original draft: EO, PA; critical revisions of the manuscript for important intellectual content: JR, BT, SK, KAT, GG, RH, OM. All authors read and approved the final manuscript.

Funding
This research is jointly funded by the UK Medical Research Council (MRC) and the Foreign Commonwealth and Development Office (FCDO) under the MRC/FCDO Concordat agreement, together with the Department of Health and Social Care (DHSC), Grant reference: MR/T040297/1. The contents of this manuscript are the responsibility of its authors and do not necessarily reflect the views of funding agencies or the UK Government. The funder had no role in the conduct of the study and the publication of its findings.

Data availability
The datasets used/analysed for this manuscript are part of an on-going project but are available from the corresponding author on request.

Declarations

Ethics approval and consent to participate
The study protocol, tools, and consent/assent forms were reviewed and approved by the independent Tanzanian National Institute for Medical Research (NIMR) ethics committee (Ref: NIMR/HQ/R.8a/Vol.IX/3647) and LSHTM ethics committee (LSHTM Ethics Ref: 22 854). Permissions to conduct the study were obtained from the Mwanza Regional Demonstrative Secretary, the regional and district education offices, and school administrations.
All participants provided written informed consent/assent. Headteachers provided overall consent on behalf of adolescents aged below the age of 18 years before they assented. Participants were informed that study participation was voluntary and that they were free to withdraw, without justification, from the study at any time without consequences. Each respondent was assured of confidentiality and privacy during data collection, management, and analysis. Personal data were anonymised using ID numbers, and stored data were stripped of any identifiable information.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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Received: 30 November 2024 / Accepted: 7 April 2025
Published online: 18 April 2025

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