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## The impact of Menstrual Hygiene Management and gender on psychosocial outcomes for adolescent girls in Kenya

Claire Fialkov <sup>a</sup>, David Haddad<sup>b</sup>, Adetutu Ajibose<sup>c</sup>, Charlotte Le Flufy<sup>d</sup>, Mary Ndungu<sup>e</sup> and Robert Kibuga<sup>e</sup>

<sup>a</sup>Clinical Psychology Department, William James College, Newton, MA, United States; <sup>b</sup>Counseling Psychology, William James College, Newton, MA, United States; <sup>c</sup>William James College, Newton, MA, United States; <sup>d</sup>Procter and Gamble (P&G) 47, Geneva, Switzerland; <sup>e</sup>The Bethel Network, Nairobi, Kenya

### ABSTRACT

This research measures the psychosocial impact of a Menstrual Hygiene Management (MHM) program in Kenya by assessing change in self-efficacy, authenticity, and hope in adolescent girls. Trained researchers administered baseline and end-line assessments, 16 weeks apart, to 311 participants in the Always Keeping Girls in School Program. The schools were assigned to one of three program versions: only period products, only menstrual health education, or both menstrual health education and period products; in all-girls or coed classes. When girls received MHM education and pads in coed classes, there was no change in their self-efficacy or hope scores, but in all-girls classes, self-efficacy and hope scores significantly increased. Authenticity in girls decreased in coed classes unless period products were distributed, and then girl's authenticity scores increased. The role of gender in assessing change in self-efficacy, authenticity and hope has provided a useful frame for evaluating MHM programming.

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Adolescents; education; gender; kenya; menstruation; psychosocial

In the field of adolescent health, it is widely assumed that menstrual health and hygiene management (MHM) combined with a supply of period products increases confidence in girls, especially girls in lower and middle-income countries (LMICs) and/or marginalized communities with little or no access to MHM education or period products. However, studies of the effect of MHM on girl's psychosocial development indicate the evidence base is scant, not statistically significant, and largely inconclusive, citing a combination of small sample sizes and an over-reliance on self-report and anecdotal data (Hennegan et al., 2016; Mahon et al., 2015; UNICEF, 2019). Tellier and Hyttel (2017) report that psychosocial measures are often absent from program assessments, with the general assumption being that these programs build confidence in girls. The term *confidence* while widely used, is a nondescript term that refers to strength of belief but does not necessarily specify what the certainty is about. Perhaps in part because the construct of confidence itself is amorphous and, therefore, its measurement ill-defined, there have been few empirical studies that have successfully measured psychosocial change. The need for validated, rigorous measures to assess the potential impact of menstruation and MHM on psychological and social well-being is well substantiated (Sommer et al., 2019).

**CONTACT** Claire Fialkov  [Claire\\_Fialkov@williamjames.edu](mailto:Claire_Fialkov@williamjames.edu)

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The current research deconstructs confidence and instead explores change in well-being as reflected through self-efficacy, authenticity and hope in adolescent girls. It is our intention that the use of unambiguous outcome measures will provide a more constructive understanding of what has generally been termed *confidence* and represent more than merely lexical preferences. We believe that a better understanding of these factors will help clarify program evaluation and operational guidance.

**Gender.** Educational programs that validate the experiences of both sexes and encourage dialogue among pupils is important for healthy psychosocial development. Furthermore, intentionally disrupting the unidirectional flow of information from teacher to pupil to integrate pupil thoughts, feelings and behaviours, provides opportunities for student expression, exploration, and development in both boys and girls. Feminist psychologists (Brown & Gilligan, 1992) have long posited that the congruence between what one thinks and feels and what one does and says in relational contexts, is integral to self-esteem and well-being. In a longitudinal study of 183 adolescent girls, it was found that girls who had more relational authenticity in Standard 8 had higher levels of self-esteem upon high school graduation. They went on to experience greater increases in self-esteem over the course of their adolescent years. Girls with lower levels of relational power tended to silence their own thoughts and feelings when in relationship with others (Impett et al., 2008).

In addition to the assessment of psychosocial impact measures, this study addresses questions raised by UNICEF (2019) regarding the inclusion of boys in MHM classes. We evaluated the differential impact of single versus mixed gender classes on self-efficacy, authenticity and hope to fill a knowledge gap about the presence of boys in MHM education. The UNICEF report asks the question: What effect do boys have on girls? Specifically, the *Learning, Monitoring, Reporting and Evaluation* section in the UNICEF Guidance calls for MHM outcome measures for girls' ability to comfortably participate in mixed gender classes. We wondered, does the presence of boys in educational sessions about menstruation and period products serve as an enabling classroom environment; does it support or hinder girls? Does the presence of boys differentially impact the development of our outcome measures of self-efficacy, authenticity and hope? This research compares single and mixed gender classes and measures change in self-efficacy, authenticity, and hope before and after delivery of the Always Keeping Girls in School Program.

**The Always Keeping Girls in School Program.** Puberty is one of the most challenging times for girls as the body goes through multiple neurological and biological changes all at once as it makes the transition to adulthood. However, many girls enter puberty unprepared and what little information they receive is often incomplete and filled with taboos. A UNESCO (2014) report states 'often the education sector avoids the issue by considering it a private matter or a problem to be addressed within the family. Puberty is not a problem to be solved. Rather, it is a complicated time of accelerated physical growth and sexual development. But by facing this pivotal phase of life unprepared, learners are left confused and unsupported, which in turn affects the quality of their education'. A disturbing statistic from the Zana Africa Foundation indicates that 1 in 4 girls in Kenya do not know that they can get pregnant once starting their periods.

The Always School Program (ASP) has been active in Kenya since 1993. It provides teacher training, skill-based health, puberty and life-skills education, a safe learning environment, and samples of pads to girls. The program has reached over 11 million girls. The complementary program, the Always Keeping Girls in School Program (AKGIS), has reached 120,000 young women over the past 11 years. The educational aspects of this program are the same as the Always School Program, but instead of a sample of pads, long-term supplies of pads are provided to the most in-need girls (i.e. those who come from lower resourced families and communities). Adolescent girls learn about puberty and menstruation via trained nurses and teachers who initially give a 60-min talk during class-time. The pupils learn about health and hygiene, changes in their bodies, critical thinking and decision-making, character strengths, relationships, and the importance of being able to communicate openly with parents and teachers. The trainers also demonstrate how to use and dispose of the sanitary pads. A previous survey of 362 girls who participated in the AKGIS program

(Fialkov & Haddad, 2018) suggested that demonstrations of sanitary pad use, information about menstruation and puberty, and open dialogue with teachers, parents and guardians created a sense of agency in girls. Anecdotally, girls reported feeling more in charge of their periods and able to talk about the changes going on in their bodies. They reported an increase in well-being and a decrease in shame and fear. Following the initial introductory talk, there is a 16-week curriculum that teachers follow, and at the end of the program, trainers return with additional supplies and engage in end-line evaluations.

## Psychosocial constructs

**Self-efficacy** is the belief that you can effectively reach the goals you have, whether successfully preparing and succeeding in your exam, or managing your period. The construct of self-efficacy can be used as a predictor of adaptation and as an indicator of quality of life at a set point in time. In addition to goal attainment, self-efficacy reflects an optimistic belief that one can perform novel or difficult tasks, much like those that pupils are asked to accomplish in school. It is indicative of one's ability to cope with adversity in various areas of human functioning and facilitates effort and grit in the face of barriers or setbacks. It has been called a 'positive resistance resource' (Schwarzer, 1992).

The Nia Project (Muthengi & Austrian, 2018) implemented a randomized controlled trial consisting of a baseline survey with a cohort of Class 7 girls, a school quality survey, qualitative data collection, school attendance tracking, and post-survey at the completion of the 18-month intervention period with the same cohort. The study involved 140 public primary schools in three rural sub-counties of Kilifi County in the Coastal area of Kenya. Provision was made for period products and reproductive health education, including MHM as an extracurricular program for girls enrolled in schools. The authors hypothesized that period product distribution and reproductive health education, individually and in combination, would improve girl's educational and sexual and reproductive health (SRH) outcomes. Preliminary findings suggested that there remains a significant need for products to manage menstruation, there is a large amount of disinformation, and feelings of shame and discomfort regarding menstruation persist. The Nia study did not address psychosocial impact factors, except for self-efficacy. The measure they used was the General Self Efficacy Scale (see Schwarzer, 1992) but it was administered and scored with a 'True/False' response template rather than the intended and validated 4-point Likert scale. Therefore, conclusions about the impact of MHM on self-efficacy were limited.

When Bandura (1997) developed the theoretical construct of self-efficacy, he stated that 'It should be noted that the construct of self-efficacy differs from the colloquial term "confidence" ... Self efficacy refers to one's belief in one's agentive capabilities, that one can produce given levels of attainments (1997, p. 392).' Self-efficacy has been found to be inversely correlated with depression and positively associated with all psychological well-being dimensions in adolescents (Tommasi et al., 2018). A study among Indian youth found that self-efficacy is significantly positively correlated with mental health. A regression analysis demonstrated that self-efficacy and hope were able to predict mental health and psychological well-being in youth (Bai et al., 2018). We wondered if the interventions of period products and/or MHM education would increase girl's self-efficacy. It was reasonable to assume that the provision of period products would increase the girl's belief in her agentive capabilities, and the belief that she could manage her periods. While this sense of agency is no doubt important for bolstering one's sense of well-being, we thought that self-awareness and speaking up might also be important for Kenyan girls who have traditionally been taught to quiet their voices in mixed gender groups. We wanted to examine the impact of MHM programming on elevating a girl's voice to speak her truth and authentically connects to her inner most feelings and values.

**Authenticity** is a measure of what researchers have called 'voice' which has been correlated with performance, achievement and well-being. Authenticity is a psychosocial construct that involves

being true to oneself in most situations and living in accordance with one's values and beliefs. Authenticity also measures the extent to which girls feel free to express their actual perceptions, thoughts, and emotions to others (Harter et al., 1998).

In mainstream clinical and counselling psychology (Rogers, 1961; Winnicott, 1965; Yalom, 1980), authenticity is seen as the most fundamental aspect of well-being. Authenticity is not simply an aspect or precursor to well-being but has been described as the very essence of well-being and healthy functioning. As such, departures from authenticity are seen to involve increasing instances of mental distress and illness. Problems of inauthenticity often arise not because a person hides her emotional reactions from others (as this may sometimes be the best or safest course of action) but because she hides them from herself. Cultural contexts that too strongly discourage self-expression in girls might inadvertently discourage the development of the ability to notice and articulate one's own inner life. This might limit achievement, creativity and persistence.

In Peterson and Seligman's (2004) assessment of 24-character strengths, the strength of authenticity is yet again one of the strongest predictors of well-being. Interestingly, it falls under the broader virtue category of courage, strengths that require the exercise of will to accomplish goals in the face of adversity or opposition. The authors argue that it is important to consider the context within which authenticity emerges, namely looking for authenticity in situations and circumstances in which the easy thing to do is not the right thing to do. A wider social lens would show attempts to cultivate authenticity with admonitions to tell the truth, follow the rules, and be true to oneself. When considering the social context of girls in Kenya, we need to wonder how these early dictums are reconciled with the emerging courage and authenticity of young adulthood. How might girls honour both their inner selves and their relational selves both within their families and in the classroom? From a positive psychology perspective (Handelsman & Gottlieb, 2002), research indicates that educational interventions that pay attention to what one *should* do to be authentic as opposed to what one *should not* do to avoid being inauthentic would be most effective.

**Hope** represents a cognitive, emotional and motivational stance towards the future. Hope is broader and a different variable from self-efficacy, which reflects the belief that one can successfully complete a specific behaviour. Ciarrochi et al. (2015) suggest that hope 'is likely to underpin psychological well-being ... goal-directed nature of hope seems particularly suited to the development and maintenance of well-being in youth (p. 2)'. Similarly to many youth, Kenyan girls are balancing the need for autonomy with dependency on caregivers and teachers and have an increasing need for psychological strength and motivation. The authors longitudinal study of gender differences in hope revealed that compared to boys, girls started out with higher levels of hope and then experienced a precipitous drop in hope by Grade 10.

Hope means that you have optimism that desired events and outcomes will occur which in turn, galvanizes goal-directed actions. Hope has been recognized as a character strength, a transcendent strength, and one that helps individuals forge connections to the larger universe and make meaning in their lives (Peterson & Seligman, 2004). Is hope impacted by MHM in similar ways to self-efficacy and authenticity, or does it tap into a different strength or capacity? According to Snyder (2002), hope involves pathway and agency thinking. Individuals who score high on pathway thinking quickly act when faced with a challenge and identify realistic routes to their goals. Agency is perceived motivation to pursue a goal and the belief in one's capacity to achieve the goal (Snyder et al., 1997). Individuals who score high in agency, when faced with obstacles, are self-motivated, and able to focus their energy on what they feel is the best course of action. Snyder argues that the components of hope are acquired sequentially, first pathways and then agency. It is suggested that hope develops naturally in young children unless adverse or traumatic events derail the process. In general, one's explanatory style can turn from hopeful to pessimistic following sustained failure. It is relevant to the current research to explore under what conditions girls might feel most hopeful about their futures and the ways in which MHM informs this attitude.

## Method

### Participants

This study had a pre- and post-test design that compared six cohort groups of girls from Nairobi and Kiambu Counties, Kenya. Across the schools, there was a total of 6,442 pupils, of whom 3,284 (51%) were boys and 3,158 (49%) were girls. There were 311 girls in the final participant pool. Some classes were co-ed and others were *girls only*. Participants were 13–14 years of age, and given baseline self-efficacy, authenticity, and hope assessments and post-program assessments following the completion of the Always Keeping Girls in School program after a 4-month period. The no intervention group received neither products nor education. The schools were similar in socioeconomic status, general geographic location, and curricula. All schools were public, mixed-gender day schools, but some schools segregated girls for the educational component of the AKGIS curriculum.

All participants were Kenyan whose primary language was Kiswahili or Swahili and secondary language was English. The study was conducted in English. Trained researchers who knew both languages were present to assist with any translation issues, which were minimal. The research protocol went through rigorous IRB review at William James College (protocol # 20,180,117). The Ministry of Education in Kenya as well as the school districts also reviewed and approved the program. Precautions were taken to protect participants by removing identifying data and protecting confidentiality. Parents were informed about the curriculum and routine measures at the beginning of the school year as part of the enrolment process, and they agreed to have their children participate. Children were given the opportunity to give their assent and were free to decline without consequence. The study protocol was reviewed by the local school sub-county. All data gatherers were certified by the Collaborative Institutional Training Initiative (CITI).

### Measures

#### Self-efficacy

The *Generalized Self-Efficacy Scale* (Schwarzer & Jerusalem, 1995) is a self-report unidimensional measure of self-efficacy with a Cronbach's alpha internal reliability between .76 and .90. The scale is correlated with optimism, and negative coefficients are found for depression and anxiety. Responses are made on a 4-point scale and scoring is done by calculating the sum of all 10 items ranging between 10 and 40, with a higher score indicating more self-efficacy. Among a group of 3494 German students 12–17 years of age, the mean was found to be 29.60 with a standard deviation of 4.0. The measure has been used internationally for over 20 years, and while it has been translated into 33 languages, Kiswahili and Swahili are not among them.

#### Authenticity

The *Authenticity Scale* (Wood et al., 2008) was chosen to measure authenticity in girls. The scale uses a tripartite conception of authenticity, comprised of self-alienation, authentic living, and accepting external influence, which was supported with exploratory factor analysis. The authors indicate that this assessment has been used globally, including in Southern Africa, and the multi-group confirmatory factor analysis showed that the factor loadings were invariant across sample, ethnicity, and gender. The scale showed substantial discriminant validity from the Big Five personality traits, nonsignificant correlations with social desirability, and 2- and 4-week test–retest correlations ranging from  $r$  .78 to .91. The Authenticity Scale consists of 12 items, with each item expressed as a statement (e.g. 'I am true to myself in most situations'). Participants are asked to rate their agreement on a 1 (does not describe me at all) to 7 (describes me very well) Likert-type scale. The Authenticity Scale seems to have good psychometric properties with test–retest reliability ranging from .78 to .91.

## Hope

The *Child Hope Scale* (Snyder et al., 1997) provides a culturally sensitive and validated scale from which to assess hope in girls. The CHS is a six-item questionnaire, with three questions for pathways thinking, and three questions for agency. The original questionnaire was designed for children ageing from 8 to 16 but subsequent studies have shown that the CHS is valid up to age 19. Each item on the scale is rated with a six-point Likert scale ranging from none to all of the time. Internal consistency estimates for scores on pathways ranged from .72 to .86 (median = .77). For the CHS total score, the standard error of measurement is 0.46. Convergent validity was established by comparing CHS to several other child measures and it was shown that the CHS scores correlated positively with a student's perceived sense of competence and control. Cross cultural studies of the CHS have supported the two-factor model of pathways and agency. Guise et al. (2016), in their study of the CHS with South African Youth found the CHS total score to be a reliable measure for research purposes (Cronbach's alpha = .73). They concluded that the CHS has satisfactory psychometric properties and their results demonstrate the viability of the CHS in the Kenyan context.

## Data collection

The AKGIS program includes two intervention components: 1) provision of Always brand sanitary pads, and 2) the 16 week health and hygiene curriculum as part of the school curriculum. While the Kenyan Ministry of Education, Science, and Technology started a sanitary towel provision program in 2011, there is little evidence that girls receive regular and/or quality pads. Anecdotal narratives indicate that the product is sub-standard and the distributions are irregular. The AKGIS program supplies each girl with a 4-month supply of sanitary pads and underwear, and they return with additional supplies on a regular basis. For the purposes of this study, some groups received period products while others only received the educational component, and a third group received both.

The AKGIS program begins with a 2-day intensive training for teachers during which time they review and study the program manual and curriculum. The program teaches decision-making and speaking up for oneself, and focuses on change through life skill development, puberty and menstrual hygiene and health (MHM) education for boys and girls. Topics include puberty and period information, character strengths, self-awareness, sexuality, self-esteem and goal setting. In addition to teacher training, nurses are recruited from the community and trained for 2–3 days on the content and delivery of the program. These nurses go into the classrooms to deliver two lessons, one at the beginning of the program and a refresher 16 weeks later. The rest of the 16-week AKGIS curriculum is integrated into existing class material and delivered by the teachers, either in mixed or single sex classes. Our intention was to use cell phones and have the data entered directly into a Qualtrics program. When this was not possible because of low internet connectivity, then researchers used a parallel pencil and paper survey and the data was later entered in the Qualtrics platform. The assessments were administered by trained researchers at the start and end of the program.

## Research design

The design for this research was a pre- and post-test study that compared six cohort groups of girls from Nairobi and Kiambu Counties, Kenya. There were 311 girls in the participant pool assigned to one of six cohort conditions (see *Figure 1*). All participants were between 13 and 14 years of age and given baseline and post-intervention assessments on measures of self-efficacy, authenticity, and hope. Study participants came from schools previously identified by the AKGIS program and a local NGO partner, in collaboration with the Kenyan Ministry of Education, Science and Technology.

| Condition | No Intervention | Period Products | MHM Education | MHM Education | Period Products + MHM Education | Period Products + MHM Education |
|-----------|-----------------|-----------------|---------------|---------------|---------------------------------|---------------------------------|
| Gender    | Coed            | Girls           | Girls         | Coed          | Girls                           | Coed                            |
| # Schools | 1               | 3               | 1             | 2             | 2                               | 4                               |
| # Girls   | 16              | 53              | 34            | 47            | 56                              | 105                             |

Figure 1. Participant groups.

## Results

The researchers used SPSS for the data analysis and estimated a series of two-factor mixed ANOVA models, one for each outcome measure. For the ANOVA models, the two factors were time and treatment condition, where time was modelled as the within-subject factor and treatment condition was modelled as the between-subject factor. To determine significant effects, the authors examined  $F$ -statistics and their associated probabilities for both tests of within-subject effects (i.e. *time* and *time\*treatment condition*) and tests of between-subjects effects (i.e. *treatment condition*). To determine practical significance, the authors examined partial eta-squared values using the following conventional guidelines given by Miles and Shevlin (2001): small = 0.02; medium = 0.13; large = 0.26. Given that there are only two levels in the repeated measures independent variable, the researchers did not need to examine if the assumption of sphericity had been met via Mauchly's sphericity test.

If the mixed ANOVA revealed a significant interaction effect between time and treatment condition, researchers subsequently conducted Tukey's honestly significant difference (HSD) post-hoc analyses from a one-way ANOVA using change scores as the outcome variable and treatment condition as the between-subjects factor. Change scores were calculated as follows:

$$Y_{\text{post-test}} - Y_{\text{pre-test}}$$

Where  $Y$  is the outcome measure of interest and the subscript denotes time. The post hoc analyses from the one-way ANOVA with change scores as the outcome measure allowed researchers to examine for specific treatment group differences in score change over time. In addition to these post hoc analyses, the researchers evaluated estimated marginal means for treatment condition by time and plots of the pre- and post-test score changes by treatment condition.

### Self-efficacy effects

There was a statistically significant difference in pre- and post-test scores on the Self-Efficacy Scale  $F(1, 305) = 48.24, p < .001$ . There was a statistically significant interaction effect,  $F(5, 305) = 9.70, p < .001$  indicating that the change in performance from pre- to post-test on the general self-efficacy scale differed across treatment conditions. Table 1 shows estimated marginal means for self-efficacy measure by group and time point. We see that the *Girls Period Products* condition grew the most from pre- to post-test. The results of post hoc analyses from a one-way ANOVA using change scores as the outcome variable and treatment condition as the between-subjects factor (Table 2.) showed that The *Girls Period Products* condition increased significantly in general self-efficacy over time, whereas the *No intervention* condition remained relatively the same over time ( $p < .005$ ). We also found that in the *Period Products & MHM* conditions the self-efficacy scores for girls increased when they were in single sex but not coed classes with a mean difference of 3.95,  $p < .001$ .



**Table 1.** Estimated marginal means – self-efficacy x time.

| Condition                            | Time | Mean   | Std. Error | 95% Confidence Interval |             |
|--------------------------------------|------|--------|------------|-------------------------|-------------|
|                                      |      |        |            | Lower Bound             | Upper Bound |
| No Intervention                      | pre  | 27.688 | 1.233      | 25.262                  | 30.113      |
|                                      | post | 27.375 | 1.493      | 24.437                  | 30.313      |
| Girls Period Products                | pre  | 28.245 | .677       | 26.912                  | 29.578      |
|                                      | Post | 34.132 | .820       | 32.518                  | 35.746      |
| Girls MHM                            | Pre  | 17.529 | .846       | 15.865                  | 19.194      |
|                                      | Post | 21.618 | 1.024      | 19.602                  | 23.633      |
| Girls and Boys MHM                   | Pre  | 19.447 | .719       | 18.031                  | 20.862      |
|                                      | Post | 23.255 | .871       | 21.541                  | 24.970      |
| Girls Period Products & MHM          | Pre  | 30.125 | .659       | 28.828                  | 31.422      |
|                                      | Post | 33.786 | .798       | 32.215                  | 35.356      |
| Girls and Boys Period Products & MHM | Pre  | 26.800 | .481       | 25.853                  | 27.747      |
|                                      | Post | 26.514 | .583       | 25.367                  | 27.661      |

**Table 2.** Self-efficacy one way ANOVA.

| Tukey HSD                   | Group Compared Against               | Mean Difference | Std. Error | Sig.  |
|-----------------------------|--------------------------------------|-----------------|------------|-------|
| Control Group               | Girls Period Products                | -6.19929        | 1.73278    | .005* |
|                             | Girls MHM                            | -4.40074        | 1.84164    | .163  |
|                             | Girls and Boys MHM                   | -4.12101        | 1.75825    | .180  |
|                             | Girls Period Products & MHM          | -3.97321        | 1.72199    | .194  |
|                             | Girls and Boys Period Products & MHM | -.02679         | 1.63026    | 1.000 |
| Girls Period Products & MHM | No Intervention                      | 3.97321         | 1.72199    | .194  |
|                             | Girls Period Products                | -2.22608        | 1.16412    | .397  |
|                             | Girls MHM                            | -.42752         | 1.32071    | 1.000 |
|                             | Girls and Boys MHM                   | -.14780         | 1.20169    | 1.000 |
|                             | Girls and Boys Period Products & MHM | 3.94643*        | 1.00518    | .001  |

### Hope effects

There was a statistically significant difference in performance from pre- to post-test on the hope scale  $F(5, 289) = 3.91, p < .01$  across treatment conditions. Table 3 shows estimated marginal means for the hope measure by group and time point. From Table 3, we see that the *Girls Period Products* condition increased the most in hope from pre- to post-test; furthermore, we see that the *Girls Period Products & MHM* condition experienced the second most growth in hope from pre- to post-test.

The results of post hoc analyses from a one-way ANOVA (Table 4.) showed the comparison between the Period Products & MHM girls only condition versus the Girls and Boys Period Products & MHM condition, and we found that there was a significant difference ( $p < .01$ ).

**Table 3.** Estimated marginal means – hope x time.

| Condition                            | Time | Mean   | Std. Error | 95% Confidence Interval |             |
|--------------------------------------|------|--------|------------|-------------------------|-------------|
|                                      |      |        |            | Lower Bound             | Upper Bound |
| No Intervention                      | 1    | 23.438 | 1.308      | 20.863                  | 26.012      |
|                                      | 2    | 22.750 | 1.421      | 19.954                  | 25.546      |
| Girls Period Products                | 1    | 23.667 | .755       | 22.180                  | 25.153      |
|                                      | 2    | 28.125 | .820       | 26.511                  | 29.739      |
| Girls MHM                            | 1    | 13.882 | .897       | 12.116                  | 15.648      |
|                                      | 2    | 15.853 | .974       | 13.935                  | 17.771      |
| Girls and Boys MHM                   | 1    | 16.489 | .780       | 14.954                  | 18.024      |
|                                      | 2    | 18.822 | .847       | 17.155                  | 20.489      |
| Girls Period Products & MHM          | 1    | 26.000 | .733       | 24.558                  | 27.442      |
|                                      | 2    | 30.020 | .796       | 28.454                  | 31.586      |
| Girls and Boys Period Products & MHM | 1    | 23.168 | .521       | 22.144                  | 24.193      |
|                                      | 2    | 23.248 | .565       | 22.135                  | 24.360      |

**Table 4.** Hope one way ANOVA.

| Tukey HSD                   | Group Compared Against               | Mean Difference | Std. Error | Sig   |
|-----------------------------|--------------------------------------|-----------------|------------|-------|
| No Intervention             | Girls Period Products                | -5.14583        | 2.05565    | .127  |
|                             | Girls MHM                            | -2.65809        | 2.15886    | .821  |
|                             | Girls and Boys MHM                   | -3.02083        | 2.07271    | .692  |
|                             | Girls Period Products & MHM          | -4.70711        | 2.04048    | .195  |
|                             | Girls and Boys Period Products & MHM | -.76671         | 1.91607    | .999  |
|                             | Girls Period Products & MHM          | 4.70711         | 2.04048    | .195  |
| Girls Period Products & MHM | No Intervention                      | 4.70711         | 2.04048    | .195  |
|                             | Girls Period Products                | -.43873         | 1.43203    | 1.000 |
|                             | Girls MHM                            | 2.04902         | 1.57661    | .785  |
|                             | Girls and Boys MHM                   | 1.68627         | 1.45641    | .856  |
|                             | Girls and Boys Period Products & MHM | 3.94040*        | 1.22325    | .018  |

### Authenticity effects

There was a statistically significant difference in pre- and post-test scores on the Authenticity scale ( $F(1, 293) = 4.00, p = .05$ ). There was a statistically significant interaction effect,  $F(5, 293) = 4.84, p < .001$ . Table 5 shows estimated marginal means for the authenticity measure by group and time point. The coed MHM Education condition decreased over time and none of the other conditions decreased, with the exception of the no intervention group, making comparisons with the control group questionable on this measure.

The results of post-hoc analyses from a one-way ANOVA (Table 6.) showed in the Girls and Boys MHM condition, the authenticity scores for girls decreased from 49.29 to 46.44 but in the Girls and Boys MHM & Period Products condition, the scores increased from 47.92 to 52.66 ( $p < .005$ ).

**Table 5.** Estimated marginal means – authenticity x time.

| Group                                | Time | Mean   | Std. Error | 95% Confidence Interval |             |
|--------------------------------------|------|--------|------------|-------------------------|-------------|
|                                      |      |        |            | Lower Bound             | Upper Bound |
| No Intervention                      | 1    | 52.313 | 2.093      | 48.193                  | 56.432      |
|                                      | 2    | 46.688 | 1.832      | 43.083                  | 50.292      |
| Girls Period Products                | 1    | 45.708 | 1.208      | 43.330                  | 48.087      |
|                                      | 2    | 49.292 | 1.057      | 47.210                  | 51.373      |
| Girls MHM                            | 1    | 40.735 | 1.436      | 37.909                  | 43.561      |
|                                      | 2    | 45.235 | 1.256      | 42.762                  | 47.708      |
| Girls and Boys MHM                   | 1    | 49.289 | 1.248      | 46.833                  | 51.745      |
|                                      | 2    | 46.444 | 1.092      | 44.295                  | 48.594      |
| Girls Period Products & MHM          | 1    | 48.870 | 1.139      | 46.628                  | 51.113      |
|                                      | 2    | 54.074 | .997       | 52.112                  | 56.036      |
| Girls and Boys Period Products & MHM | 1    | 47.922 | .829       | 46.290                  | 49.553      |
|                                      | 2    | 52.657 | .725       | 51.229                  | 54.085      |

**Table 6.** Authenticity one way ANOVA.

| Tukey HSD          | Group Compared Against               | Mean Difference | Std. Error | Sig  |
|--------------------|--------------------------------------|-----------------|------------|------|
| Girls and Boys MHM | No Intervention                      | 2.78056         | 3.44217    | .966 |
|                    | Girls Period Products                | -6.42778        | 2.45385    | .096 |
|                    | Girls MHM                            | -7.34444        | 2.68721    | .072 |
|                    | Girls Period Products & MHM          | -8.04815*       | 2.38697    | .011 |
|                    | Girls and Boys Period Products & MHM | -7.57974*       | 2.11634    | .005 |

### Comparison tables of girls and coed conditions

Figure 2. below provides a summary of the Girls and Coed classroom conditions when the MHM and the MHM & Period Product conditions are combined. This highlights the importance of the Girls in single-sex versus coed classrooms, which will be further discussed.

|  | Self-Efficacy | Authenticity | Hope | Composite Change Scores |
|--|---------------|--------------|------|-------------------------|
| <b>Girls</b><br>MHM with<br>Period Products<br>& MHM<br>condition          | +8            | +10          | +6   | +24                     |
| <b>Girls and Boys</b><br>MHM with<br>Period Products<br>& MHM<br>condition | +4            | +2           | +2   | +8                      |

**Figure 2.** Summary of change scores separated by girls and coed classes.

## Discussion

This research explored adolescent psychosocial health through the assessment of self-efficacy, authenticity and hope before and after of the provision of period products and MHM education. We also explored if the presence of boys had a differential impact on the outcome measures. This research was not without *limitations*. Although the schools were matched for economic and demographic similarities, future research looking at different cohorts of girls and boys within the same school and with the same teachers would be useful. The attitudes of the teachers would then be held constant and a deeper exploration of the role of pedagogy would be possible. This is especially relevant because the AKGIS curriculum asks the classroom teachers to continue to deliver the lessons in the interim weeks between baseline and follow up assessment measures. The willingness and capacity of the teachers to create a safe and open space for dialogue, and effectively reinforce behaviour change is relevant. Furthermore, while the assessment tools were reliable and valid, they were offered in English and not in the mother-tongue (Swahili or Kiswahili) of the pupils. While the pupils were fluent in English, linguistic differences might have accounted for some variance. The no intervention group was small, due to the financial and transportation challenges in LMIC's of reaching schools that were not going to receive any intervention.

Our research suggests that when girls received Period Products, self-efficacy increases. While this finding is not surprising, it is important because it explicitly measures change in self-efficacy and lends a deeper understanding to the global construct of confidence. Also, this finding has implications for program evaluation since self-efficacy is a measurable construct that is tied to the belief that one can facilitate goal setting, effectively reach goals, and cope with adversity.

Period products give girls the chance to cope with their periods and effectively reach the goals of movement and school attendance. When we compared the groups that received Period Products & MHM in coed classes, we found girl's self-efficacy remained essentially unchanged at 26.80 to 26.51; but when no boys were present (Girls only condition), self-efficacy increased from 30.12 to 33.76 ( $p < .001$ ). The positive impact of Period Products & MHM on self-efficacy for girls might be diminished by the presence of boys.

To have hope is to have confidence that desired outcomes and events will occur. Girls who score high in hope are self-motivated and can act when faced with challenges. We anticipated that exposure to an educational program that describes choices and options for girls and the need to orient to education for a brighter tomorrow, would elevate hope in girls, but there were no significant changes in hope scores when compared with the control group. To further explore the effect of mixed gender classes, we compared the condition in which Period Products & MHM were provided in girls only versus coed classes, and we found that there was a significant difference insofar as when boys were present, hope scores for girl's remained unchanged (23.17 to 23.25), but scores in the girl's only condition increased in hope (26.00 to 30.00). When boys were present under

this condition, hope in girls did not increase, suggesting again that perhaps there is a positive impact for hope when girls are in same gender groups.

The authenticity data reveals some interesting layers about what facilitates and hinders 'voice' in the classroom. When we look at the change scores in authenticity for Girls in Coed classes getting only MHM, as is the reality in most Kenyan schools where girls do not receive sanitary pads, girl's authenticity scores fell from 49.29 to 46.44. In other words, when girls received MHM education in the presence of boys, without the benefit of period products, their authenticity scores decreased. Under the same condition, if pads were distributed, girl's scores rose from 47.92 to 52.66. This has implications for the delivery of the health and hygiene curriculum in Kenyan coed classes and suggests that period product delivery might be a protective factor that elevates girls' authenticity. This is another data point that indicates period products might serve to support and encourage girls not only on a physical level, but as an important component of psychosocial support as well.

## Conclusions

Many programs in LMIC's deliver period products to girls through the schools. This is usually accompanied by a Menstrual Hygiene Management educational component. Our findings suggest that all girl's classrooms (Girls condition) are optimal for the growth of self-efficacy and the cultivation of hope in adolescent girls. UNICEF calls for us to better understand girl's ability to comfortably participate in mixed gender classes. In Kenya, where there has recently been the institutionalization of hygiene education in the national curriculum, decisions need to be made regarding classroom structures and processes. We suggest that health and hygiene lessons taught in the presence of boys might not always serve the development of healthy functioning for girls.

We were surprised by our finding that authenticity for girls *decreased* in Coed MHM classes. We had anticipated that girl's voices would be elevated and enlivened through classroom discussion with both sexes. Our findings were clear, however, that authenticity decreased under this condition. This suggests again that the optimal MHM learning environment for adolescent Kenyan girls might be in single sex, girl's only classrooms. An interesting finding was that when period products were introduced under the above condition, the negative impact of learning with boy's present diminished. This is to say that if girls are going to learn about MHM in coed classrooms, the distribution of sanitary pads might act as a protective factor that might afford girls a context within which to regain or gain their voices. It is important to understand the opportunity structures that give girls the chance to talk openly about topics related to their bodies. The importance of this cannot be overstated. When young women openly express themselves to parents, guardians and teachers, they are better equipped to address their academic and personal needs. This ability to be more self-reflective and expressive has been linked to scholastic, professional and economic success.

Although the presence of boys in MHM classes was not found to have a positive impact on these factors, this does not mean that boys should not be taught about MHM. In fact, teaching boys about MHM likely plays a critical role in addressing persistent stigma around periods. Future research needs to explore the educational practices that elevate self-efficacy, authenticity and hope in boys as well as girls. We call for an increased focus on the dialogical processes that encourage communication and reciprocity between genders. A deeper dive into useful processes and teaching practices is suggested. For example, an emphasis on classroom interaction versus the more traditional lecture style structure might be a good adjunctive pedagogy to traditional practices of MHM education. Perhaps girls and boys need to first learn MHM material and receive period products in separate gender classes, and only later join to discover shared meaning around common adolescent issues. Perhaps the antecedents of hope, especially agency, will be more fully explored in future research. The motivation to pursue a goal and the belief in one's capacity to achieve the goal when faced with obstacles could be taught through student-centred learning models that teach ways to focus one's energy on the best course of action. A shift to a pedagogy that encourages dialogue is well suited for the widespread social, cultural and

economic change that is dependent on a deeper understanding of the contexts within which all children learn.

This research explored self-efficacy, authenticity and hope and found these to be constructive measures for assessing psychosocial impact in MHM programs. We discovered that the inclusion of boys in the classroom plays a complex role in the development of these factors in girls. We suggest that what has traditionally been called *confidence* in MHM research is an amorphous construct that offers little value for program development or targeted psychosocial impact. Instead, assessing self-efficacy, authenticity and hope seems to provide a more complete understanding of an adolescent girl's development in relation to MHM programming.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Notes on contributors

**Claire Fialkov**, Ph.D. is a Professor in the Clinical Psychology Department and the Center for Multicultural and Global Mental Health at William James College in Newton, Massachusetts, United States. She is also a co-founder of Appreciative Action ([www.AppreciativeAction.com](http://www.AppreciativeAction.com)) a global consultancy that provides program development, evaluation, and research, with a focus on increasing mental health access and women's empowerment.

**David Haddad**, Ed.D. is Professor in the Counseling and Behavioral Health Department and the Center for Multicultural and Global Mental Health at William James College. He is the Co-founder of Appreciative Action and works with non-governmental organizations (NGO's), educational institutions, healthcare agencies, and local community based groups. Appreciative Action creates dialogical practices that build resilience within the global development community.

**Adetutu Ajibose**, M.A. is a doctoral candidate in Clinical Psychology at William James College. Her doctoral research explored resources for positive growth in Kenyan girls, and she is currently pursuing a career in clinical psychology and global mental health.

**Charlotte LeFluffy** is the Global Social Impact Director, Always/Procter & Gamble. She is dedicated to gender equality and inclusion. Her work creates opportunities for elevating the voices of youth and improving the standard and intentionality of MHH education.

**Mary Ndungu** is a founding member of the Bethel Network and leader of Program Operations in Eastern Africa. She is highly skilled in capacity building, conflict resolution, peace building, and menstrual health and hygiene education.

**Robert Kibuga** is the Bethel Network Project Manager, with many years of experience in education, healthcare, and marketing throughout Eastern Africa. He is skilled at implementing complex research protocols in schools and communities.

## ORCID

Claire Fialkov  <http://orcid.org/0000-0002-3326-9685>

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