Slow but Not Steady? Transitioning of Gender Norms and Agency Through Community-Based Empowerment Interventions for Adolescent Girls in India

Revised title for full paper:

Impact of community-based empowerment program on transforming gender role attitudes and self-efficacy among adolescent and young girls in rural Jharkhand, India

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Abstract

The study aimed at examining impact of efforts led by community-based girls' empowerment program in shifting gender role attitudes among them and also modifying their sense of self efficacy signifying leadership behaviour. Program included play-based intervention including girls group meeting, and light touch community interaction. The long run program goal was to reduce early marriage in study area which are hard to reach but can be influenced by modifying social norms.

The study used the data form the evaluation study conducted by primary data collected to understand the impact community-based approach on key outcomes impacting girls' life decision and leadership. PC adopted a mixed method quasi experimental design in one of the community-based intervention area in Hazaribagh district of Jharkhand, where the program was implemented by Mahila Mukti Sanstha (MMS). The baseline and endline cross-sectional survey were conducted among the girls aged 12-21 years in 2022, and 2024 respectively in Hazaribagh district of Jharkhand. An overall 3975 girls were interviewed during both the rounds. The primary outcome of this paper is the gender role attitude and self-efficacy which was measured using battery of questions asked in the survey and analysed using the bivariate and multi-variate analysis.

Findings highlighted how girl's participation in the gender transformative program on improving their gender role attitude and self-efficacy. The difference-in-difference (DID) analysis suggests that program has modest impact on improving the gender role attitude while the improvement was significantly visible on sense of self-efficacy (14.6 percentage points). Multivariate regression analyses further revealed that, after adjusting for socio-demographic factors, program participation was significantly associated with higher gender-equitable attitudes (β=0.34) and improved self-efficacy (β=0.19). Notably, girls who regularly attended group meetings showed the greatest gains across both outcomes, indicating a strong dose–response effect.

Overall, the program effectively strengthened girls' confidence, improved their ability to navigate challenging situations, and enhanced their decision-making autonomy. These findings highlight the transformative potential of gender empowerment interventions in challenging entrenched social norms and promoting adolescent agency, thereby contributing longstanding goal of reducing child marriage and improved educational outcomes.

Key words: GFF, MMS, India, Agency, Gender Role Attitude, self-efficacy, Jharkhand

Introduction

Indian society is largely patriarchal, where men typically hold the dominant power and women are expected to assume submissive roles, particularly within marriage and household settings (Kandiyoti, 1988). These gendered expectations are socially constructed and reinforced through traditions that confine women to domestic roles such as caregiving and household work (Walby, 1989). Within such a structure, women face restricted mobility, limited decision-making autonomy, and reduced access to economic resources (Jejeebhoy & Sathar, 2001). These constraints contribute to lower educational attainment, fewer economic opportunities, early marriages, adolescent pregnancy, and increased vulnerability to marital violence (Desai & Andrist, 2010). Additionally, women in patriarchal settings often experience limited access to healthcare services, leading to adverse maternal and child health outcomes, which further exacerbate gender inequalities (Jejeebhoy et al., 2013; Okigbo et al., 2018). These outcomes are largely driven by deeply ingrained inequitable gender norms, which perpetuate systemic inequalities and hinder women's empowerment.

Inequitable gender role attitudes remain widespread across India, especially in regions characterized by strong patriarchal traditions (Shukla, 2015). These norms manifest in various forms—including son preference, justification of wife-beating, seclusion practices (*purdah*), and customs such as women eating last—reinforcing the idea of male superiority within households (Desai & Andrist, 2010; Hathi et al., 2021). Cultural expectations compel individuals to adhere to traditional gender roles, limiting their ability to question or reject oppressive practices (Ford et al., 2002; Cislaghi & Heise, 2020). However, evidence shows that progressive gender role beliefs are linked to improved social connections, greater freedom of movement, enhanced digital access, and protection from marital violence (Raj et al., 2021). Conversely, inequitable gender norms are associated with restricted mobility, diminished decision-making power, and limited health empowerment (Gopalakrishnan et al., 2024). The persistence of patriarchal gender norms, coupled with deeply ingrained male favouritism, continues to uphold gender inequality in India (Jayachandran, 2015).

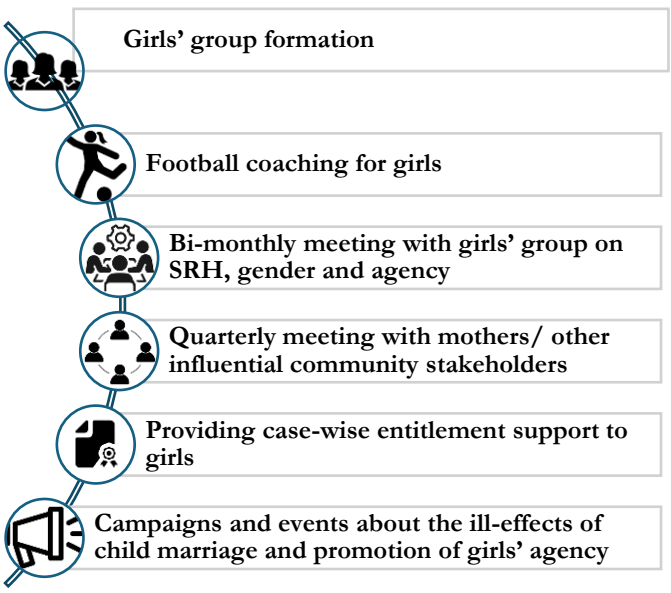
In recent years, empowerment programs targeting adolescents have shown potential in transforming gender norms across various contexts. A study from Bangladesh found that adolescents with parental support and education were significantly more likely to express egalitarian beliefs compared to their unexposed peers (Streatfield et al., 2023). Similar in Kenya sustained engagement in community-based programs combining life skills, health education, and financial literacy significantly improved agency and gender norm attitudes among adolescent girls (Austrian et al., 2020). In African countries, Adolescent Girls Empowerment Program (AGEP), Berhane Hewan, and the Adolescent Girls Initiative-Kenya (AGI-K)—have consistently emphasized empowerment with focus on sexual and reproductive health education demonstrated positive effects, particularly in delaying marriage.

Evidence from similar settings in India highlighted the effectiveness of girl-centred empowerment programs in reducing child marriage. Examples include the Umang program by ICRW in Jamtara and Godda district of Jharkhand (Verma et al, 2024), and project RISTHA- a community-based program delivered by trained youth leaders which included sessions on

adolescent marriage, the health effects of early pregnancy and childbirth, family planning and contraception, and vocational training (Jackson et al, 2017). Similarly, the More Than Brides Alliance (MTBA) program showed that community-based, girl-centred initiatives with empowerment and sexual health components can significantly reduce child marriage (Melnikas et al. 2023). Similarly, Indian research highlights that adolescent-related programs such as life skills education, school health initiatives, and community-based interventions have contributed to shifting girls' perceptions of gender roles (Patel et al., 2021). Though most empowerment-related programs have been implemented as part of multi-component interventions, leaving limited evidence on the standalone impact of gender rights and life skills training. Moreover, the impact of community-led initiatives, especially those targeting marginalized groups, is still underexplored.

Jharkhand, India's 16th largest state, is predominantly rural, with 26% of its population from Scheduled Tribes. Despite a decline in child marriage rates from 38% (NFHS, 2015-16) to 32% (NFHS, 2019-21), it remains among the top states with high child marriage prevalence. Among the states of Jharkhand, which was the state with fourth fourth-highest prevalence of child marriage in India. Patriarchal traditions are strong and deeply ingrained in the community, which leads to dampening adolescent girls' aspirations through gender norms and unequal access to educational and economic opportunities (Roy, Morton et al. 2016). Despite the government's initiatives for girl's empowerment schemes, many multilateral and bilateral agencies donors have implemented multifaceted programs to support girls and women.

Figure 1: GFF intervention



The Girls First Fund (GFF) supports community-led initiatives to combat child marriage by empowering girls and shifting community norms. In India, organizations like Mahila Mukti Sanstha (MMS) in Jharkhand play a crucial role in addressing child marriage and gender-based violence. MMS, active since 1994, works through capacity building, skills development, and advocacy to address child marriage, gender-based violence, and related issues and to promote gender equality. With GFF support, MMS has implemented a gender transformative intervention (Henceforth Program) targeting girls aged 12-21 years, focusing on gender-transformative life skills education, sports coaching, and community engagement to challenge norms around early marriage and promote girls' agency. This program not only empowers girls but also engages parents, local leaders, and community stakeholders to foster egalitarian attitudes and awareness of educational and social rights, contributing to broader societal change. The detailed about the program were highlighted in Figure 1 and mentioned in the evaluation reports (Median et al, 2024)

This paper focused on assessing the impact of the GFF supported MMS program on adolescent girls' equitable gender role attitudes and self-efficacy—two critical dimensions of agency and

empowerment. In particular, the study examines the role of community-based interventions in shaping progressive attitudes and building personal agency among girls from socio-economically marginalized communities and in underserved areas. Addressing inequitable norms and enhancing girls' confidence and decision-making capacity are essential to preventing harmful practices such as child marriage and gender-based violence.

Data and Methods

Study Design and Data Collection

This study employed a quasi-experimental design to assess the impact of the program on adolescent girls' gender role attitudes and self-efficacy. Data were collected in two phases from 20 villages located in Ichak and Daru blocks of Hazaribagh district, Jharkhand, India. The intervention was implemented in Ichak block, while Daru block served as a comparison area. The baseline survey was conducted in 2022, followed by an endline survey in 2024. The survey aimed to assess the program's impact on shifting gender norms and enhancing opportunities for girls. Additionally, interviews were conducted with girls who did not participate in the program within intervention villages to evaluate potential community-level effects. A total of 3,975 girls aged 12–21 years were interviewed across both phases. The distribution of survey participants across these two blocks and phases based on their participation in Program is presented in Table 1.

Outcome variables

Our study included two key outcome variables: (a) equitable gender role attitudes and (b) self-efficacy.

Equitable gender role attitudes were assessed using a set of 18 statements covering four key dimensions: education, gender roles, justification of violence, and relationship power dynamics. Each question was dichotomized; girls who responded progressive attitudes to these statements were assigned as '1' and those who responded non-progressive attitudes coded as '0'. Then, all 18 questions were summed to construct an index of equitable gender role attitudes, reflecting the extent of their endorsement of gender equality. The internal consistency of the index was acceptable, with a Cronbach's alpha of 0.68.

Similarly, Self-efficacy was measured using a composite index based on five questions assessing girls' confidence in handling challenges. The questions focused on their ability to manage difficult situations, stay committed to their goals, remain calm under pressure, and find solutions to problems. Each question was constructed into binary variables. Then, all five binary variables were summed to create an index. The score of this index ranges from 0-5; higher scores indicate a stronger sense of self-efficacy and personal agency, and vice versa. The index demonstrated good internal reliability, with a Cronbach's alpha of 0.70.

The detailed questions used in the construction of gender role attitude and self-efficacy score were mentioned in **Annexure 1.**

Exposure variables

Our primary exposure variable was girls' participation in the MMS program. We categorized this variable into four groups: (a) non-participants at baseline, (b) participants at baseline, (c) non-participants at endline, and (d) participants at endline.

Our secondary exposure variable was the frequency of attending the girls group meeting which is a part of intervention. Girls who participated in the meeting were further asked about the frequency of attending the program. The variable is categorized into four groups: (a) non-participants, (b) rarely, (c) occasionally, and (d) almost all meetings.

Confounding variables

We controlled socio-demographic variables to assess the net impact of the program on outcome variables. Our control variables include age (12-14, 15-17, 18-21 years), marital status (unmarried/married), social groups (SC/ST, OBC/other), religion (Hindu/others), girls' education (below primary, secondary, above secondary), father's education (no education, primary, secondary, above secondary, Don't know), mother's education (no education, primary, secondary, above secondary, Don't know), father's occupation (not working, labour, service, informal worker, not alive) mother's occupation (Homemaker, labour, service, not alive), and wealth tercile (poor, middle, rich), and block (Intervention/Comparison).

Analytical strategies

We adopted a multi-step analytical approach to assess the impact of the MMS intervention on equitable gender role attitudes and self-efficacy among adolescent girls. First, descriptive statistics were used to present the background characteristics of study participants. Next, mean scores for gender role attitudes and self-efficacy were calculated across different exposure groups to examine variations by program participation. To assess the association between program, participation and outcome variables, we applied linear regression models, both unadjusted and adjusted for potential confounders.

Difference-in-Differences (DID)

To estimate the causal effect of the program, we employed a DID approach using repeated cross-sectional data collected at two time points (baseline and endline) from 12-21 years old girls from the intervention (Ichak) and comparison (Daru) blocks. This quasi-experimental method compares changes in outcomes over time between the two groups, controlling for common time trends and unobserved time-invariant differences between blocks. The DID specification included binary indicators for the intervention block, the post-intervention period, and their interaction term (the DID estimator). Adjusted models also controlled for key socio-demographic variables: age, caste, religion, girls' education, and household wealth. The DID estimator captures the differential change in outcomes attributable to the intervention, under the assumption that the intervention and comparison groups would have followed parallel trends in the absence of the program. To further validate the comparability between treated and untreated girls and reduce selection bias, we employed Propensity Score Matching (PSM) using the kernel logit method. Following score estimation, we applied kernel matching, a non-parametric method that uses a kernel function to assign weights to all comparison group individuals based on their distance in propensity scores from each treated unit. We followed matching without replacement, meaning that each control individual was used only once in the matching process.

This ensures that matches are unique and prevents over-representation of specific control cases. After the matching process, we calculated the Average Treatment Effect on the Treated (ATT), which represents the mean difference in outcomes between the treatment group and their matched counterparts in the comparison group.

Linear Regression

The results of unadjusted and adjusted linear regression models were presented in coefficient values with 95% confidence intervals (CIs). The significance level was set at <0.05. All analyses were conducted using Stata 16.

Results

Characteristics of study participants

Overall, about 51% girls in intervention group were participants of the Program, with about 53% at baseline and 49% at endline (Table 1). A detailed background of girls surveyed in both round of study are detailed in Table 2. Most of the girls in the study were unmarried (86%), belonged to OBC or other social groups (72%), and were affiliated with the Hindu religion (86%). Approximately two-thirds had completed secondary education (66%), while about one-fourth had attained education beyond the secondary level (24%). Nearly half of the participants' fathers worked as labourers (47%), followed by informal workers (30%). Over half of the mothers were homemakers (55%), and about one-third of them were labourers (35%). More than one-third of the girls came from lower economic group of households (36%). The number of study participants was almost evenly distributed across the two study blocks. (Table 2).

Table 1: Study participants across two waves and blocks

Phase	Exposure to the program	Intervention (%)	Comparison (%)	Total
Baseline	Yes	519 (52.7%)	—	1998
	No	466 (47.3%)	1013	
Endline	Yes	494 (49.2%)	—	1977
	No	510 (50.8%)	973	
Total	Yes	1,013 (50.9%)	—	3975
	No	976 (49.1%)	1,986	

Table 2: Descriptive statistics for the study participants

	Program Participants - Number (%)				
Variables	**Non-participants (baseline)**	**Participants (Baseline)**	**Non-participants (Endline)**	**Participants (Endline)**	**Total sample**
Age					
12-14	533 (36.0)	170 (32.8)	417 (28.1)	184 (37.3)	1304 (32.8)
15-17	509 (34.4)	242 (46.6)	503 (33.9)	222 (44.9)	1476 (37.1)
18-21	437 (29.6)	107 (20.6)	563 (38.0)	88 (17.8)	1195 (30.1)
Marital status					
Unmarried	1,246 (84.3)	512 (98.7)	1168 (78.8)	486 (98.4)	3,412 (85.8)
Married	233 (15.8)	7 (1.4)	315 (21.2)	8 (1.6)	553 (14.2)
Social group					
SC/ST	372 (25.2)	164 (31.6)	407 (27.4)	161 (32.6)	1104 (27.8)

	Program Participants - Number (%)				
Variables	**Non-participants (baseline)**	**Participants (Baseline)**	**Non-participants (Endline)**	**Participants (Endline)**	**Total sample**
OBC/Others	1107 (74.9)	355 (68.4)	1076 (72.6)	333 (67.4)	2871 (72.2)
Religion					
Hindu	1304 (88.2)	420 (80.9)	1291 (87.1)	407 (82.4)	3422 (86.1)
Others	175 (11.8)	99 (19.1)	192 (13.0)	87 (17.6)	553 (13.9)
Girls' education					
Below primary	163 (11.1)	25 (4.8)	145 (9.9)	34 (6.9)	367 (9.3)
Secondary (6-10)	987 (67.0)	389 (75.2)	887 (60.3)	359 (72.7)	2622 (66.3)
Above secondary (10+)	323 (21.9)	103 (19.9)	440 (29.9)	101 (20.5)	967 (24.4)
Father's education					
No education	285 (19.3)	69 (13.3)	258 (17.4)	68 (13.8)	680 (17.1)
1-5 years	189 (12.8)	107 (20.6)	216 (14.6)	82 (16.6)	594 (14.9)
6-10 years	623 (42.1)	227 (43.7)	618 (41.7)	233 (47.2)	1701 (42.8)
11 years & above	202 (13.7)	53 (10.2)	232 (15.6)	71 (14.4)	558 (14.0)
DK/NR	180 (12.2)	63 (12.1)	159 (10.7)	40 (8.1)	442 (11.1)
Mother's education					
No education	602 (40.7)	196 (37.8)	547 (36.9)	161 (32.6)	1506 (37.9)
1-5 years	236 (16.0)	132 (25.4)	228 (15.4)	106 (21.5)	702 (17.7)
6-10 years	464 (31.4)	152 (29.3)	521 (35.1)	177 (35.8)	1314 (33.1)
11 years & above	73 (4.9)	17 (3.3)	104 (7.0)	26 (5.3)	220 (5.5)
DK/NR	104 (7.0)	22 (4.2)	83 (5.6)	24 (4.9)	233 (5.9)
Father's occupation					
No working	21 (1.4)	10 (1.9)	23 (1.6)	11 (2.2)	65 (1.6)
Labour	692 (46.8)	239 (46.1)	696 (46.9)	250 (50.6)	1877 (47.2)
Service	193 (13.1)	47 (9.1)	268 (18.1)	70 (14.2)	578 (14.5)
Informal worker	487 (32.9)	192 (37.0)	390 (26.3)	132 (26.7)	1201 (30.2)
Not alive	86 (5.8)	31 (6.0)	106 (7.2)	31 (6.3)	254 (6.4)
Mother's occupation					
Homemaker	864 (58.4)	263 (50.7)	786 (53.0)	258 (52.2)	2171 (54.6)
Labour	465 (31.4)	208 (40.1)	546 (36.8)	186 (37.7)	1405 (35.4)
Service	42 (2.8)	23 (4.4)	55 (3.7)	16 (3.2)	136 (3.4)
Informal worker	74 (5.0)	18 (3.5)	63 (4.3)	26 (5.3)	181 (4.6)
Not alive	34 (2.3)	7 (1.4)	33 (2.2)	8 (1.6)	82 (2.1)
Wealth tercile					
Poor	544 (36.8)	224 (43.2)	467 (31.5)	175 (35.4)	1410 (35.5)
Middle	688 (46.5)	215 (41.4)	687 (46.3)	224 (45.3)	1814 (45.6)
Rich	247 (16.7)	80 (15.4)	329 (22.2)	95 (19.2)	751 (18.9)
Block					
Intervention (Ichak)	466 (31.5)	519 (100)	510 (34.4)	494 (100)	1989 (50.0)
Comparison (Daru)	1013 (68.5)	0 (0)	973 (65.6)	0 (0)	1986 (50.0)
Total	**1,479 (37.2)**	**519 (13.1)**	**1,483 (37.3)**	**494 (12.4)**	**3,975 (100.0)**

Program overall effect on intervention community

Table 3 presents the results from Difference-in-Differences (DID) models estimating the impact of the intervention on gender role attitudes and self-efficacy among adolescent girls. The adjusted DID estimates suggest a modest improvement in gender role attitudes, with a 0.2-point

increase in the attitude score and a 4-percentage point rise in the proportion of girls expressing egalitarian views. However, these effects were not statistically significant, indicating limited program influence on shifting gender norms at overall community level within the study period. In contrast, change observed in sense of self-efficacy was more pronounced and statistically significant impact was observed. In the unadjusted model, we found an increase of 0.4 points (95% CI: 0.3–0.6), increase in self-efficacy score while 14.6 (95% CI: 9.7–19.4), percentage point increases in proportion of girls displayed self-efficacy. These findings indicate that the intervention was effective in enhancing girls' confidence and belief in their ability to make decisions, even if shifts in gender attitudes were less pronounced.

Table 3: Unadjusted and adjusted models showing *Difference-in-Differences (DID)* estimates of the impact of the program on gender role attitudes and self-efficacy among adolescent girls

Indicators	Intervention (Baseline)	Comparison (Baseline)	Intervention (Endline)	Comparison (Endline)	Unadjusted DID[3]	Adjusted DID effect (Coefficient)[4]
Gender role attitude score	10.4 (10.2-10.6)	10.3 (10.1-10.4)	10.3 (10.1-10.5)	10.0 (9.8-10.2)	0.2	0.2 (-0.2-0.6)
Girls showing gender egalitarian attitude[1] (%)	61.6 (58.6-64.7)	60.6 (57.6-63.6)	59.3 (56.3-62.3)	54.3 (51.1-57.4)	4.0	4.0 (-2.0-9.9)
Self-efficacy score	1.9 (1.8-2.0)	2.2 (2.1-2.3)	2.0 (1.9-2.1)	1.9 (1.8-2.0)	0.4***	0.4* (0.3-0.6)
Girls displayed self-efficacy attitude[2] (%)	76.0 (73.4-78.7)	86.0 (83.9-88.2)	81.5 (79.1-83.9)	77.1 (74.4-78.0)	14.4***	14.6*** (9.7-19.4)

[1] Girls showing gender egalitarian score (10 or more) [2] Showing any of the self-efficacy score (1 or more) [3] Unadjusted DID= ((Intervention-Comparison) at Endline- (Intervention-Comparison) at Baseline) [4]Based on linear regression model controlled for age, caste, religion, girls' education, and wealth.

Program effect on participant group

The constructed score for the gender role attitude and self-efficacy by participation in program has been presented in Table 4. The mean score for equitable gender role attitudes was significantly higher among program participants (baseline: 10.9; endline: 10.6) compared to non-participants at both baseline (10.1) and endline (10.0). Similarly, the mean self-efficacy score was higher among endline participants (Baseline 2.0; endline 2.2). When disaggregated by meeting attendance, girls who attended regularly had the highest gender role attitude scores (11.5) compared to non-participants (10.0) and similarly, relatively higher self-efficacy (2.2) observed among regular participant compared to non-participants (1.9). Overall, it suggests gains in self-efficacy and gender role attitudes, particularly among attendees.

Regression analysis showed that participation in the program was positively associated with higher scores for equitable gender role attitudes in both survey rounds, even after adjusting for socio-demographic characteristics (Table 5). The impact was more pronounced at baseline (β = 0.66; 95% CI: 0.32–0.99) compared to endline (β = 0.34; 95% CI: 0.05–0.68). Regarding self-efficacy, girls surveyed at endline—regardless of program participation—reported higher levels than non-participants at baseline. However, participants at endline showed a significantly greater

improvement in self-efficacy (β = 0.19; 95% CI: 0.04–0.34) compared to non-participants at the same time point. Detailed regression analyses were shown in Annexure 2.

Table 4: Gender role attitude score and self-efficacy score by program participation and frequency of attending program.

	Gender role attitudes score				Self-efficacy score			
Program Participation	Mean	Std. Err.	[95% Conf. Interval]		Mean	Std. Err.	[95% Conf. Interval]	
Non-Participants (Baseline)	10.1	0.1	10.0	10.3	2.1	0.0	2.0	2.2
Participants (Baseline)	10.9	0.1	10.6	11.1	2.0	0.1	1.9	2.2
Non-Participants (Endline)	10.0	0.1	9.9	10.2	1.9	0.0	1.9	2.0
Participants (Endline)	10.6	0.1	10.4	10.9	2.2	0.1	2.1	2.3
Frequency of attending girls' group meetings								
Non-Participants	10.0	0.1	9.8	10.3	1.9	0.1	1.8	2.0
Rarely	10.5	0.2	10.1	10.8	2.1	0.1	2.0	2.3
Occasionally	10.1	0.3	9.6	10.7	2.2	0.1	1.9	2.4
Almost all meetings	11.5	0.3	10.9	12.1	2.2	0.1	2.0	2.5

Table 5: Linear regression showing the association of program participation with gender-equitable attitudes and self-efficacy among adolescent girls

Intervention	**Gender role attitudes score**	**Self-efficacy score**
Unadjusted Model		
Program Participation	**Co-eff. (95% CI)**	**Co-eff. (95% CI)**
Non-participants (baseline) (ref.)		
Participants (Baseline)	0.73 (0.43, 1.03)*	-0.06 (-0.19, 0.07)
Non-participants (Endline)	-0.12 (-0.34, 0.10)	-0.17 (-0.27, -0.08)*
Participants (Endline)	0.50 (0.19, 0.81)*	0.08 (-0.06, 0.21)
Adjusted Model		
Program Participation	**Co-eff. (95% CI)**	**Co-eff. (95% CI)**
Non-participants (baseline) (ref.)		
Participants (Baseline)	0.66 (0.32, 0.99)**	0.04 (-0.11, 0.19)
Non-participants (Endline)	-0.26 (-0.48, -0.05)*	-0.22 (-0.31, -0.13)*
Participants (Endline)	0.34 (0.05, 0.68)*	0.19 (0.04, 0.34)*

*p<0.05; Note: Adjusted models were controlled for age, caste, religion, girls' education, parental education and occupation, household wealth, and phase (baseline/endline)

Effect of regular participation in Program on girls' gender role attitudes and self-efficacy

The frequency of participation in girls group meetings also showed a significant association with both equitable gender role attitudes and self-efficacy scores. Compared to non-participants, girls who attended girls group meetings rarely (coefficient: 0.46; 95% CI: 0.00–0.92) or attended almost all meetings (coefficient: 1.33; 95% CI: 0.73–1.94) were more likely to hold equitable gender role attitudes. Likewise, girls who attended meetings rarely (coefficient: 0.29; 95% CI: 0.14–0.66) or regularly (coefficient: 0.28; 95% CI: 0.04–0.55) demonstrated higher levels of self-efficacy (Table 6). Detailed regression analysis are shown in Annexure 3.

Table 6: Linear regression showing association of the frequency of attending girls group meetings with gender-equitable attitudes and self-efficacy among adolescent girls

Intervention	**Gender role attitudes**	**Self-efficacy**
Unadjusted Model		
Frequency of attending girls group meetings	**Co-eff. (95% CI)**	**Co-eff. (95% CI)**
Non-participants (ref.)		
Rarely	0.46 (0.01, 0.91)*	0.23 (0.03, 0.43)*
Occasionally	0.14 (-0.44, 0.73)	0.26 (0.00, 0.53)*
Almost all meetings	1.54 (0.94, 2.13)**	0.33 (0.06, 0.60)*
Adjusted Model		
Frequency of attending girls group meetings	**Co-eff. (95% CI)**	**Co-eff. (95% CI)**
Non-participants (ref.)		
Rarely	0.46 (0.00, 0.92)*	0.29 (0.14, 0.66)*
Occasionally	-0.01 (-0.60, 0.58)	0.23 (-0.03, 0.50)
Almost all meetings	1.33 (0.73, 1.94)**	0.28 (0.01, 0.55)*

*p<0.05; **p<0.01; Note: Adjusted models were controlled for age, caste, religion, girls' education, parental education and occupation, household wealth, and phase (baseline/endline)

Discussion

This study examined the impact of community-based gender transformative program on adolescent girls' gender role attitudes and self-efficacy using cross-sectional survey data from two time points in the Hazaribagh district, Jharkhand. Our regression results indicate that participation in the program was positively associated with more equitable gender attitudes and higher self-efficacy among adolescent girls. These results remained consistent even after adjusting for key socio-demographic variables and using propensity score matching to reduce selection bias.

The significantly higher scores of gender role attitudes among program participants compared to non-participants underscore the potential of community-based interventions in shifting traditional gender norms. The effect of the program on gender role attitudes was evident at both baseline and endline, though more pronounced at baseline. This may reflect a saturation or ceiling effect over time or varying levels of engagement as the program matured. Notably, girls who attended group meetings more frequently exhibited even stronger gender-equitable attitudes, suggesting that the depth of program exposure plays a critical role in shaping outcomes. Similarly, girls' participation in program was positively associated with self-efficacy — an essential component of adolescent empowerment. Girls in the endline survey, regardless of program participation, reported higher self-efficacy than those at baseline, indicating a possible secular trend. However, participants those received intervention showed significantly higher self-efficacy levels compared to non-participants at endline, highlighting the added value of the intervention.

Our DID analysis further demonstrated a statistically significant positive effect of the intervention on self-efficacy, indicating that girls in the intervention block experienced meaningful gains in confidence and personal agency following program implementation. However, the DID estimate for gender role attitudes was positive but not statistically significant, suggesting that while the program may have contributed to attitudinal improvements, these changes were modest and not uniformly experienced across the block.

In contrast, PSM results revealed a significant and positive impact of the program participation on both gender role attitudes and self-efficacy. Girls who actually participated in the program had substantially higher gender-equitable attitudes and self-efficacy scores than matched non-participants, highlighting the importance of direct program exposure and suggesting that individual engagement plays a critical role in driving. These findings are consistent with earlier studies demonstrating the effectiveness of life skills education and gender-transformative programs in enhancing adolescent agency and confidence (Amin et al., 2016; Mmari et al., 2023, 2024).

The results also revealed a clear dose-response relationship: girls who attended girls group meetings regularly or almost always had better outcomes in both gender role attitudes and self-efficacy, compared to those who attended rarely or not at all. This finding aligns with prior research emphasizing that consistent exposure to empowerment programs is crucial for producing meaningful shifts in adolescents' attitudes and behaviors (Bandiera et al., 2020). For instance, Streatfield et al. (2023) found that adolescents in Bangladesh who participated more frequently in life skills programs were significantly more likely to adopt egalitarian gender beliefs. Similarly, in India, Patel et al. (2021) observed that regular attendance in adolescent-focused interventions was associated with improved agency, self-confidence, and negotiation skills. These findings highlight the importance of program intensity and sustained engagement as key drivers of impact in adolescent development interventions.

From a policy perspective, the findings suggest that gender-focused community-based interventions supported by GFF, can make significant contributions to broader adolescent health, education, and empowerment agendas. Programs that combine life skills education, gender norm discussions, and the creation of safe, supportive spaces have the potential to shift deeply ingrained social norms, foster critical thinking, and enhance girls' sense of agency, particularly in socio-economically disadvantaged settings where structural barriers are most pronounced. Engaging parents, community leaders, and peer networks not only helps to reinforce the messages delivered to adolescents but also creates an enabling and supportive environment for sustainable change (Svanemyr et al, 2015). Such interventions also have a larger impact on transforming regressive social norms. For instance, gender-transformative programs in similar contexts showed a positive impact in preventing early marriage practices (Amin et al., 2016; ICRW, 2024; Navad et al., 2024). These findings align with global evidence showing that community-driven interventions, when well-designed and inclusive, can help dismantle harmful gender norms and reduce practices like early marriage and gender-based violence (Cislaghi & Heise, 2019; Marcus & Brodbeck, 2021). Therefore, policymakers should prioritize and scale up integrated, community-based programs that target both adolescents and their surrounding ecosystems.

However, the study has some limitations which need to be mentioned. First, the cross-sectional nature of the data limits causal inferences, despite the use of matching techniques. Second, It is important to note that the MMS program was already operational before the baseline survey. As such, while the study employed a quasi-experimental design, the absence of a true pre-intervention baseline limits the ability to attribute causal effects solely to the intervention. Nevertheless, the use of multiple analytic strategies and comparative groups helps to strengthen the inference of program impact. Third, self-reported measures may be subject to social

desirability bias, particularly in contexts where gender norms are rapidly evolving. Fourth, program exposure was based on self-reported frequency of attendance, which may not capture the quality or depth of participation. Finally, while the study attempted to include non-participants within intervention villages to assess community-level effects, potential spillover effects from program diffusion may have diluted observed differences between treated and untreated groups. This could underestimate the true impact of the intervention.

Despite these limitations, the study contributes valuable evidence on the effectiveness of gender-transformative programs for adolescents. It provides a nuanced understanding of community-based program's impact on important aspects of girls' agency, which could help to shift norms against child marriage and gender-based violence and other harmful practices. Future research using longitudinal designs could strengthen causal attribution and explore the long-term effects of such interventions on educational attainment, health outcomes, and transitions to adulthood.

Conclusion

This study highlights the positive impact of the program on adolescent girls' equitable gender role attitudes and self-efficacy. Participation in the program, particularly regular engagement, was associated with more progressive gender attitudes and higher self-efficacy, even after adjusting for key socio-demographic factors. These findings underscore the importance of gender-transformative interventions in promoting adolescent empowerment and challenging traditional gender norms. By promoting critical thinking, life skills, confidence, and agency among girls, and such intervention can play a vital role in advancing gender equity and adolescent well-being. Scaling up such initiatives, particularly in socio-economically disadvantaged settings, holds promise for broader social change. Continued investment in evidence-based, community-driven programs is essential to empower the next generation of girls and support their journey toward a more equitable future.

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**********Annexure**********

Annexure 1: Outcome Measure

Indicators	**Items**
Gender Role Attitude Score	If there is not enough food for everyone in the family, brothers should be given more food than sisters Who is smarter in Math, boys or girls Boys/young men are allowed to say no in an arranged marriage Girls/young women are allowed to say no in an arranged marriage. Who is smarter in reading and writing, boys or girls? A child's mother is very busy with the harvest. Father has just come home from work. Their baby is hungry and wants to eat rice, and has to be fed. Who should feed the baby- the mother or the father Who needs more education between sons and daughters A woman's most important role is to take care of her home and cook for her family A male and a female family member fall sick at the same time in your family then who gets better treatment /care A woman should tolerate violence in order to keep her family together. If someone insults a man, he should defend reputation, with force if he has to. To be a man, you/they need to be tough. People should be treated the same whether they are male or female. A woman should always obey her husband. A man should have the final say in all family matters. Men should share the work around the house with women such as washing dishes, cleaning and cooking. Women should have the right to divorce her husband.
Self-Efficacy	I can always manage to solve difficult problems if I try hard enough. It is difficult for me to focus on my aims and accomplish my goals.

	I can remain calm when facing difficulties because I can rely on my own abilities. If I am in trouble, I can usually think of a solution.

Annexure 2: Linear regression showing the association of program participation with gender-equitable attitudes and self-efficacy among adolescent girls

	Gender role attitudes				Self-efficacy			
Program Participation	**Coefficient**	**P value**	**95% CI**		**Coefficient**	**P value**	**95% CI**	
Non-participants (baseline) (ref.)								
Participants (Baseline)	0.66	0.000	0.33	1.00	0.04	0.580	-0.11	0.19
Non-participants (Endline)	-0.26	0.014	-0.47	-0.05	-0.22	0.000	-0.31	-0.13
Participants (Endline)	0.34	0.047	0.00	0.68	0.19	0.015	0.04	0.34
Age								
12-14 (ref.)								
15-17	0.66	0.000	0.42	0.89	0.37	0.000	0.26	0.47
18-21	0.45	0.008	0.11	0.78	0.30	0.000	0.15	0.45
Marital status								
Unmarried (ref.)								
Married	-0.95	0.000	-1.28	-0.62	-0.13	0.075	-0.28	0.01
Social group								
SC/ST (ref.)								
OBC/Others	0.43	0.000	0.22	0.65	0.16	0.001	0.06	0.25
Religion								
Hindu (ref.)								
Others	0.01	0.928	-0.26	0.29	0.03	0.683	-0.10	0.15
Girls' education								
Below primary (ref.)								
Secondary (6-10)	0.69	0.000	0.36	1.01	0.24	0.001	0.09	0.38
Above secondary (10+)	1.51	0.000	1.09	1.92	0.53	0.000	0.34	0.71
Father's education								
No education (ref.)								
1-5 years	-0.22	0.181	-0.55	0.10	0.14	0.054	0.00	0.28
6-10 years	-0.04	0.764	-0.32	0.24	0.05	0.456	-0.08	0.17
11 years & above	0.16	0.413	-0.22	0.53	0.27	0.001	0.11	0.44
DK/NR	-0.41	0.033	-0.79	-0.03	0.03	0.738	-0.14	0.20
Mother's education								
No education (ref.)								
1-5 years	0.22	0.099	-0.04	0.49	0.13	0.027	0.01	0.25
6-10 years	0.61	0.000	0.36	0.85	0.15	0.007	0.04	0.26
11 years & above	1.01	0.000	0.54	1.49	0.27	0.013	0.06	0.48
DK/NR	-0.06	0.804	-0.49	0.38	-0.04	0.696	-0.23	0.15
Father's occupation								
No working (ref.)								

Labour	0.10	0.787	-0.62	0.81	-0.15	0.344	-0.47	0.16
Service	0.60	0.119	-0.15	1.34	-0.05	0.751	-0.38	0.28
Informal worker	0.27	0.465	-0.46	1.00	0.01	0.942	-0.31	0.33
Not alive	0.30	0.450	-0.48	1.09	-0.23	0.195	-0.58	0.12
Mother's occupation								
Homemaker (ref.)								
Labour	-0.18	0.080	-0.39	0.02	-0.10	0.029	-0.19	-0.01
Service	0.31	0.237	-0.21	0.83	0.14	0.232	-0.09	0.37
Informal worker	-0.18	0.416	-0.62	0.26	-0.01	0.946	-0.20	0.19
Not alive	-0.09	0.780	-0.74	0.56	-0.15	0.322	-0.43	0.14
Wealth tercile								
Poor (ref.)								
Middle	0.27	0.013	0.06	0.48	0.06	0.212	-0.03	0.15
Rich	0.79	0.000	0.50	1.07	0.15	0.021	0.02	0.27
Block								
Intervention block (ref.)								
Comparison block	0.05	0.637	-0.17	0.28	0.21	0.000	0.11	0.31

*ref: reference group

Annexure 3: Linear regression showing the association of frequency of participation with gender-equitable attitudes and self-efficacy among adolescent girls

	Gender role attitudes				**Self-efficacy**			
Program Participation	**Coefficient**	**P value**	**95% CI**		**Coefficient**	**P value**	**95% CI**	
Frequency of attending girls group meetings								
Non-participants (ref.)								
Rarely	0.46	0.047	0.01	0.92	0.29	0.006	0.08	0.50
Occasionally	0.00	0.990	-0.60	0.59	0.23	0.086	-0.03	0.50
Almost all meetings	1.34	0.000	0.74	1.94	0.28	0.041	0.01	0.55
Age								
12-14 (ref.)								
15-17	1.24	0.000	0.77	1.72	0.50	0.000	0.29	0.72
18-21	0.85	0.014	0.17	1.52	0.51	0.001	0.21	0.82
Marital status								
Unmarried (ref.)								
Married	-0.89	0.008	-1.55	-0.23	-0.40	0.009	-0.69	-0.10
Social group								
SC/ST (ref.)								
OBC/Others	0.14	0.519	-0.28	0.55	0.12	0.214	-0.07	0.31
Religion								
Hindu (ref.)								
Others	0.38	0.141	-0.13	0.88	0.20	0.090	-0.03	0.43
Girls' education								
Below primary (ref.)								

Secondary (6-10)	0.52	0.127	-0.15	1.20	0.21	0.171	-0.09	0.52
Above secondary (10+)	1.52	0.000	0.70	2.35	0.45	0.017	0.08	0.83
Father's education								
No education (ref.)								
1-5 years	0.48	0.148	-0.17	1.13	0.01	0.926	-0.28	0.31
6-10 years	0.38	0.197	-0.20	0.95	-0.19	0.158	-0.44	0.07
11 years & above	0.39	0.284	-0.33	1.11	-0.03	0.836	-0.36	0.29
DK/NR	0.49	0.226	-0.30	1.28	0.25	0.175	-0.11	0.60
Mother's education								
No education (ref.)								
1-5 years	-0.04	0.891	-0.56	0.49	0.12	0.309	-0.11	0.36
6-10 years	0.79	0.001	0.32	1.26	0.20	0.062	-0.01	0.42
11 years & above	1.38	0.001	0.53	2.22	0.28	0.156	-0.11	0.66
DK/NR	0.09	0.845	-0.82	1.00	-0.07	0.738	-0.48	0.34
Father's occupation								
No working (ref.)								
Labour	-1.05	0.126	-2.40	0.30	-0.01	0.964	-0.63	0.60
Service	-0.61	0.400	-2.03	0.81	-0.20	0.545	-0.84	0.44
Informal worker	-0.66	0.347	-2.04	0.72	-0.02	0.947	-0.65	0.60
Not alive	-0.55	0.461	-2.03	0.92	-0.27	0.430	-0.93	0.40
Mother's occupation								
Homemaker (ref.)								
Labour	0.00	0.995	-0.42	0.41	-0.39	0.000	-0.57	-0.20
Service	-0.50	0.308	-1.46	0.46	0.19	0.398	-0.25	0.62
Informal worker	-0.67	0.144	-1.57	0.23	-0.08	0.710	-0.48	0.33
Not alive	-0.65	0.341	-1.98	0.69	-0.08	0.804	-0.68	0.53
Wealth tercile								
Poor (ref.)								
Middle	0.09	0.674	-0.33	0.52	0.05	0.636	-0.15	0.24
Rich	0.61	0.028	0.06	1.15	0.23	0.062	-0.01	0.48