Gender Diverse Attitudes Fade with Time: A Longitudinal Study on Communication Skills and Professionalism among MBBS Students in the Era of AETCOM Training

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ABSTRACT

Background: The longitudinal Attitude, Ethics, and Communication AETCOM module was introduced as a part of the competency based medical education curriculum to enhance students' ethical reasoning, communication, empathy, and professional conduct. While gender differences in communication and professionalism are widely reported, it is unknown how AETCOM training influences these differences over time.

Purpose: To measure attitudes toward communication skills and professionalism among medical students during AETCOM training and to find gender differences, if any, and their change with time.

Methods: A prospective study was conducted among 150 MBBS students from two Kolkata medical colleges, one government and one private. Attitudes were measured at baseline during Phase I MBBS and at endline during Phase III using the Communication Skills Attitude Scale and the Pharmacy Professionalism Instrument. Gender wise differences were tested using non-parametric methods, and correlations among scales were examined using Spearman's rho.

Results: At baseline, female students reported significantly higher positive attitude scores (p = .016) and professionalism scores (p < .001), and lower negative attitude scores (p = .001). By endline, these gender differences diminished (p > .05). Both genders showed overall declines in professionalism scores, while median positive and negative attitude scores remained stable for male students. A consistent negative correlation existed between positive and negative attitude scales across time (ρ ≈ −.40 to −.50).

Conclusion: Early gender differences were attenuated with time during AETCOM exposure, with a lowering of favourable attitudes among female students as opposed to steady attitudes among male students. The overall non improvement or decline in scores points toward limited retention and potential curricular gaps in sustaining positive attitudes. Integrating reinforcement based, reflective learning and longitudinal mentorship may strengthen the impact of AETCOM.

1. Introduction

There is a deep interconnection between communication skills and professionalism (CSP) in medical education and practice. Health communication is defined as the study and use of communication strategies to inform and influence individuals and communities about decisions that enhance health (Medical Subject Headings, 2011). On the other hand, the American Board of Internal Medicine ABIM considers professionalism to be a multi domain construct which includes altruism, accountability, excellence, honour and integrity, duty, and respect (Sattar *et al.*, 2021). Undoubtedly, effective professional communication is the

building block for the complex physician patient relationship (Street *et al.*, 2009). There are personal factors that affect communication skills, but training and experience can considerably enhance these abilities. Like other academic disciplines, acquiring professionalism and communication skills involves a series of learned competencies (Berman *et al.*, 2016; Ranjan *et al.*, 2015; Kurtz *et al.*, 2017).

Until recent years, training medical undergraduate students on (CSP) was part of a hidden curriculum in India; it was learned from mentors and role models in classrooms and at the bedside. However, from the 2019–2020 academic year, the National Medical Commission (NMC) of India

implemented competency based medical education (CBME) for Bachelor of Medicine and Surgery (MBBS) students (National Medical Commission, 2020a). As a part of (CBME), the Attitude, Ethics, and Communication module (AETCOM) trains medical undergraduates in essential communication skills and professionalism (National Medical Commission, 2020b). (CBME) also advocates early clinical exposure (ECE), thus integrating clinical medicine with basic sciences and (AETCOM) early in the (MBBS) curriculum (National Medical Commission, 2020c).

Research conducted in medical schools of European countries shows a gender difference in communication skills (Vogel *et al.*, 2018; Groene *et al.*, 2022; Löffler Stastka *et al.*, 2016). However, two studies conducted in India do not report any difference in scores on communication skills attitudes between male and female students (Ratnaprabha *et al.*, 2021; Venkatesh *et al.*, 2014). On the contrary, a study conducted in Kerala after the introduction of (AETCOM) reports that female students have a higher positive attitude towards communication skills (Sreelatha & Manjula, 2021).

Gender differences in communication and professionalism learning can be understood through motivational and sociocultural lenses. Self Determination Theory (SDT) posits that intrinsic motivation arises when learners' needs for autonomy, competence, and relatedness are fulfilled, leading to sustained engagement and positive attitudes toward learning (Ajlouni *et al.*, 2022; Zhang & Lin, 2020). Evidence suggests that female students often display higher intrinsic motivation and empathy, contributing to stronger initial attitudes toward communication and professionalism (Ajlouni *et al.*, 2022). However, without reinforcement or meaningful assessment, these intrinsic drivers may wane over time. Social Role Theory (SRT) further explains that societal gender norms shape expectations and behaviours, with women socialised toward communal and empathetic roles and men toward agentic and task-oriented roles (Bleakley, 2013; Squires, 2005). Structured curricular interventions like AETCOM may thus serve as a levelling mechanism, moderating gendered learning differences through uniform professional identity formation. In this context, examining gender differences in learning trajectories offers valuable insight into how AETCOM training shapes professional identity formation among medical undergraduates. If AETCOM effectively nurtures autonomy, empathy, and ethical reasoning across diverse learners, gender related disparities in communication and professionalism should narrow over time, along with an increase in favourable attitudes for all. Conversely, persistent or declining attitudes could indicate motivational or structural limitations in curriculum delivery. Therefore, this study aimed to measure gender specific differences in attitudes toward communication skills and professionalism and to assess how these evolve during AETCOM exposure.

2. Methodology

2.1. Study Design and Setting

The study design was prospective and analytical, conducted among MBBS students at two medical colleges in Kolkata, a government medical college Medical College Kolkata (MCK) and a private medical college Jagannath Gupta Institute of Medical Sciences and Hospital (JIMSH). The study report follows the Strengthening the Reporting of Observational Studies in Epidemiology guidelines (STROBE).

2.2. Participants and Sampling

The inclusion criterion was students of the 2022–2023 MBBS batch studying at either of the two aforementioned medical colleges. Students who were unwilling to participate, absent during any phase of data collection, and those who did not provide information for five or more variables were excluded.

The sample size was calculated to detect a two-point difference between the mean PAS for male and female students at the five percent level of significance. Standard deviations for the Positive Attitude Scale (PAS) score between male (6.28) and female students (5.82) from a survey conducted among medical students of Kerala were used for the determination of sample size (Sreelatha & Manjula, 2021). With these inputs, the sample size calculated by the online calculator OpenEpi was 71 in each group with group sizes 1:1 and a minimum sample size of 142 students.

2.3. Data Collection Instrument

Data were collected through self-administered questionnaires that gathered information on demographic and academic details, attitudes towards communication skills using the validated Communication Skills Attitude Scale (CSAS), and attitudes towards the professional role using the Pharmacy Professionalism Instrument (PPI). The average time to complete the questionnaire was approximately 40 minutes. Additionally, data were collected on students' attendance in AETCOM classes during phases I to III and were reported as the percentage of total attendance across three hierarchical categories.

Demographic variables included age, residence, religion, type of family, and education and occupation of parents. Self-reported gender was the grouping variable.

The 26 item CSAS was developed in 2002 by Rees, Shears, and Davies (Rees *et al.*, 2002; Rees & Sheard, 2003) with a reported Cronbach's alpha of 0.84 in an Iranian study (Yakhforoshha *et al.*, 2018) and a two-factor structure with Positive Attitude Scale PAS and Negative Attitude Scale NAS from multiple psychometric analyses (Busch *et al.*, 2015).

The 18 item PPI measures attitudes on the professional role based on six tenets of professionalism identified by ABIM. Principal component analysis with oblique rotation yielded a six factor construct and a Cronbach's alpha of 0.82 for this scale (Chisholm *et al.*, 2006). Initially developed and tested among pharmacy students, the PPI has later been validated among cross cultural groups of medical students (Nakamura *et al.*, 2014; Al Khater, 2021; Akhund *et al.*, 2014). Both instruments measure self-reported attitudes on a five-point Likert scale.

Outcome variables in this study were PAS, NAS, and PPI scores, which were compared by grouping variables gender male versus female and timeline baseline versus endline.

2.4. Data Collection Procedure

Baseline data were collected during January to March 2023, when the students were in phase I MBBS, and endline data were collected in February to March 2025, when the same students were in phase III. Medical College Kolkata had 250 students per batch, while JIMSH had 200 students per batch. These students attended tutorial classes in batches of 50, and the composition of these batches remained fixed throughout the MBBS curriculum. Therefore, two batches of students from MCK and one batch from JIMSH were randomly recruited for the study. Participant flow is further described in Figure 1. If AETCOM training were implemented following NMC guidelines, students would have been exposed to 94 hours of AETCOM activity by the end of phase III MBBS (National Medical Commission, 2023; Annadurai & Sharath, 2023). The questionnaires were identified by students' roll numbers as tear off slips for linking questionnaires at two timelines and capturing data on attendance, and attendance category was extracted from the attendance register by teachers not involved in the present study. The roll number slips were removed before data entry for de identification.
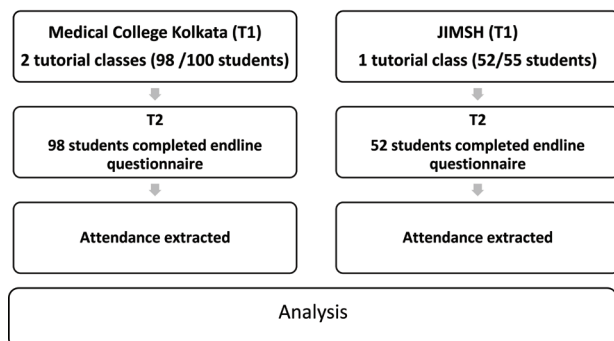

Figure 1: Flowchart of Data Collection

2.5. Data Analysis

After data cleaning, the numerator was adjusted for any missing values. Continuous variables, such as age, PAS, NAS, and PPI scores, were summarised by mean, median, standard deviation SD, and interquartile range IQR, and their distribution was checked using the Kolmogorov Smirnov test of normality with Lilliefors significance correction. These measures from the study sample did not follow a normal distribution.

The dataset was then split and compared by gender and timeline. For categorical variables, the chi square test was used, and for continuous variables, the test for difference of medians or the Mann Whitney U test was applied. The non-parametric correlation coefficient Spearman's rho was calculated to assess correlations between PAS, NAS, and PPI scores. Finally, violin plots were generated to visualise score distributions.

All analyses were performed using Statistical Package for the Social Sciences SPSS version 23 (IBM Corp., 2015) and Python version 3.11 (Python Software Foundation, 2023).

2.6. Ethical Considerations

The study was conducted in compliance with the Declaration of Helsinki. Participation was voluntary, and informed consent was obtained from all participants, with anonymous data collection and de identified data entry. The study protocol was approved by the Independent Ethics Committee of Medical College Kolkata with approval number MC KOL IEC NON SPON 1524 09 2022 dated 07 September 2022.

3. Results

3.1. Background Characteristics of Students

The present study had a 100 percent retention rate, with 150 students enrolled and retained at endline. The sample included 77 male students (51.3 percent) and 73 female students (48.7 percent). Male students were slightly older, with a mean age of 22.35 ± 1.18 years at endline, while the mean age of female students was 21.89 ± 1.11 years. However, the median age and age range were identical.

The male to female ratio differed between the two colleges, with 22 to 18 at MCK and 9 to 12 at JIMSH. Table 1 presents a gender disaggregated comparison of demographic and scholastic variables. The groups were comparable for all variables except residence, as a lower proportion of male students resided in urban areas. Current living arrangement also differed, with a higher proportion of female students residing in hostels.

Table 1: Gender Disaggregated Comparison of Demographic and Scholastic Variables of Undergraduate Medical Students (n = 150)

Demographic and Scholastic Variables	Male [n1 = 77] Number (%)	Female [n2 = 73] Number (%)	Pearson's Chi Square Test of Independence X² (Degrees of Freedom); P
Median Age in Years (Range) At Endline	22 (5)	22 (5)	-----
Type of College			
Government	54 (70.1)	44 (60.3)	1.61 (1); 0.21
Private	23 (29.9)	29 (39.7)	
Residence			
Urban	55 (71.4)	63 (86.3)	4.9 (1); 0.02*
Rural	22 (28.6)	10 (13.7)	
Religion			
Hindu	67 (87.0)	65 (89.0)	0.14 (1); 0.70
Others	10 (13.0)	8 (11.0)	
Type of Family			
Nuclear	60 (77.9)	62 (84.9)	1.21 (1); 0.27
Joint	17 (22.1)	11 (15.1)	
Characteristics of Parents			
Father Completed Graduation or Higher Degree	59 (62.1)	62 (84.9)	1.65 (1); 0.20
Mother Completed Graduation or Higher Degree	52 (67.5)	56 (76.7)	1.56 (1); 0.21
Mother Engaged in Gainful Employment	25 (32.5)	30 (41.1)	1.20 (1); 0.27
At Least One Parent in Medical Profession	14 (18.2)	19 (26.0)	1.34 (1); 0.25
Medium of Schooling			
English	46 (59.7)	52 (71.2)	2.19 (1); 0.14
Vernacular	31 (40.3)	21 (28.8)	
Board of Schooling			
Central Board	26 (33.8)	30 (41.1)	1.36 (2); 0.51
State Board	40 (51.9)	31 (42.5)	
Other Boards	11 (14.3)	12 (16.4)	
Identified Bengali as Mother Language	65 (84.4)	55 (75.3)	1.93 (1); 0.17
Studying Medicine on Own Choice	57 (74.0)	54 (74.0)	0.000 (1); 0.99
Current Living Arrangement			
Hostel	32 (41.6)	45 (61.7)	7.6 (2); 0.02*
Home	29 (37.6)	22 (30.1)	
Rental	16 (20.8)	6 (8.2)	
Had Prior Learning Experience in Communication or Ethics Courses	8 (10.4)	6 (8.2)	0.21 (1); 0.65
Attendance at AETCOM Class at Endline			
≥ 75%	23 (29.8)	28 (38.4)	1.34 (2); 0.51
≥ 50% To < 75%	22 (28.6)	20 (27.4)	
< 50%	32 (41.6)	25 (34.2)	

Note: p < 0.05

3.2. Comparison of Baseline and Endline Attitudes

Table 2 presents PAS, NAS, and PPI scores according to gender and timeline, while Table 3 shows the level of significance for differences in score distributions. At baseline, there were significant gender differences in attitudes toward communication skills and professionalism. Female students reported higher positive attitude and professionalism scores and lower negative attitude scores compared to male students.

By endline, these gender differences in attitude and professionalism scores were no longer statistically significant. This indicates that the differences observed at the beginning of the MBBS course diminished over time.

Both male and female students demonstrated changes in their communication and professionalism attitude scores from baseline to endline. Among male students, a significant change was observed due to a decrease in professionalism scores. Among female students, significant changes were observed across all three scales, with reduced positive attitude and professionalism scores and increased negative attitude scores.

Table 2A: Distribution of Positive Attitude Scale PAS, Negative Attitude Scale NAS, and Professionalism Scale Scores According to Timeline Among Male Students

Timeline	PAS Median (IQR)	PAS Mean (SD)	NAS Median (IQR)	NAS Mean (SD)	Professionalism Median (IQR)	Professionalism Mean (SD)
Baseline	55.0 (7.0)	54.7 (6.4)	34.0 (8.0)	34.0 (6.5)	71.0 (8.0)	72.0 (7.5)
Endline	55.0 (7.0)	52.6 (10.6)	34.0 (7.8)	33.7 (8.5)	69.0 (10.0)	68.9 (11.2)

Table 2B: Distribution of Positive Attitude Scale (Pas), Negative Attitude Scale (Nas) and Professionalism Scale Scores According to Timelines Among Female Students

Timeline	PAS Median (IQR)	PAS Mean (SD)	NAS Median (IQR)	NAS Mean (SD)	Professionalism Median (IQR)	Professionalism Mean (SD)
Baseline	58.0 (7.0)	57.0 (6.3)	30.0 (9.0)	30.5 (5.9)	75.0 (10.0)	76.2 (6.4)
Endline	54.0 (9.0)	53.4 (6.6)	33.0 (5.5)	33.7 (6.4)	72.0 (13.0)	70.7 (9.2)

Table 3: Mann-Whitney U Test for Comparison of Scores Distribution of Scales between Gender and Timelines

Distributions for Timeline and Gender	PAS Significance	NAS Significance	Professionalism Significance
Baseline distribution of scores between gender	.016*	.001**	.000**
Endline distribution of scores between gender	.989	.523	.110
Change in score distribution between baseline and endline (Male)	.197	.741	.038*
Change in score distribution between baseline and endline (Female)	.001**	.005**	.001**

Note: * $p < 0.05$, ** $p < 0.01$

3.3. Correlation between Scores

Table 4 presents correlations between PAS, NAS, and PPI scores. A consistent negative correlation was observed between positive and negative attitude scales for both genders at both time points, indicating that students with higher positive attitudes tended to have lower negative attitudes.

Among male students, positive attitude showed a consistent positive correlation with professionalism, while negative attitude showed a consistent negative correlation with professionalism at both baseline and endline. This suggests that male students with higher positive attitudes and lower negative attitudes tended to demonstrate higher professionalism.

Table 4A: Correlation Matrix (Spearman's Rho) showing Correlation between Scales for Female Students

	PAS	NAS	Professionalism
Baseline			
PAS	1.00		
NAS	−.557**; p = .000	1.00	
Professionalism	.189; p = .184	−.089; p = .533	1.00
Endline			
PAS	1.00		
NAS	−.314**; p = .007	1.00	
Professionalism	.410**; p = .000	−.499**; p = .000	1.00

Note: ** $p < 0.01$

Table 4B: Correlation Matrix (Spearman's Rho) showing Correlation between Scales for Male Student

	PAS	NAS	Professionalism
Baseline (Male)			
PAS	1.00		
NAS	−.490**; p = .000	1.00	
Professionalism	.524**; p = .000	−.316**; p = .001	1.00
Endline (Male)			
PAS	1.00		
NAS	−.366**; p = .001	1.00	
Professionalism	.450**; p = .000	−.253*; p = .028	1.00

Note: * p < 0.05, ** p < 0.01

3.4. Distribution of Scores

Figure 2 presents violin plot visualisations of PAS, NAS, and PPI scores at baseline and endline, stratified by gender, coded as 1 for male and 2 for female students.

Each violin represents a kernel density estimation of the score distribution, with width indicating data density. The embedded box plots display the median as the central bold dashed line and the interquartile range as peripheral fine dashed lines.

For PPI scores, endline distributions were wider and more variable, particularly among male students, indicating increased dispersion over time. Female students showed a more uniform distribution, with slightly higher central tendency at both time points.

For PAS scores, endline distributions for both genders were broader and more left skewed than baseline, suggesting increased variability and the presence of lower scoring outliers. Median PAS scores showed a slight decline over time, with female students maintaining narrower dispersion than male students.

For NAS scores, endline distributions varied by gender. Male students demonstrated a wider distribution with a lower tail, suggesting that some individuals exhibited substantially reduced negative attitudes. Female students showed a more symmetric and concentrated distribution. Median NAS scores remained relatively stable across time points and gender groups.
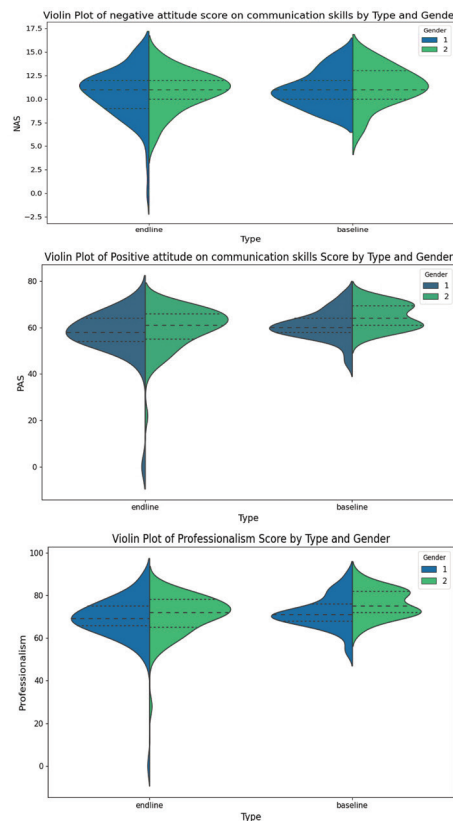
Figure-2: Violin Plots Showing Distributions of PAS, NAS And PPI Scores (Gender-1: Males; Gender-2: Females)

4. Discussion

4.1. Summary of Findings

This longitudinal study was conducted at two time points between 2023 and 2025 and involved 77 male and 73 female MBBS students from one private and one government medical college. The study compared attitudes toward communication skills and professionalism during AETCOM training. The results show that both male and female medical students initially held favourable attitudes toward communication skills and professionalism, with female students reporting significantly higher attitude scores. Notably, gender differences in attitudes diminished over time. This reduction was primarily due to a general decline in favourable attitudes among female students, whereas male students maintained the same median scores for communication skills at both time points. However, both groups demonstrated a decline in professionalism attitude scores. These findings highlight gender specific learning trajectories and the absence of improvement in favourable attitudes, indicating potential gaps in the implementation of AETCOM.

4.2. Positive, Negative Attitudes and Professional Identity

The findings of the present study are consistent with results from Kerala, where medical students demonstrated more positive than negative attitudes toward communication skills and female students scored higher on positive attitudes (Sreelatha & Manjula, 2021). Endline mean PAS scores in the present study for female students at 53.4 and for male students at 52.6 were comparable to those reported in the Kerala study at 54.61 and 53.15, respectively. Studies conducted in Poland, Iran, and Zambia have also consistently reported higher PAS scores among female students (Pochrzęst Motyczyńska *et al.*, 2025; Kandevani *et al.*, 2024; Ezeala & Volk, 2023). Interestingly, NAS scores in these countries were somewhat higher than those observed in the present study, which may be attributed to data collection occurring concurrently with AETCOM training in the present setting.

Previous studies have demonstrated a gendered understanding of professional identity. A Slovenian study reported significantly higher professionalism scores among female students after adjusting for personality and values (Selic *et al.*, 2019). Female medical students in Saudi Arabia showed stronger agreement with sanctions for professional lapses (Sattar *et al.*, 2021). Regardless of gender differences, professional identity is dynamic, and favourable attitudes may diminish over time, as reported in studies from Indonesia and Pakistan (Reimer *et al.*, 2019; Alamgir

et al., 2025). A Chinese study among nursing students similarly reported a decline in professional commitment after internships (Zhao *et al.*, 2022). The findings of the present study parallel these results, indicating that female students initially demonstrated stronger attitudes toward communication skills and professionalism, although scores for both genders declined over time.

4.3. Theoretical Basis of Observed Gender Differences

This study highlights differences in the learning trajectories of male and female students. Male students demonstrated lower but stable scores, while female students showed higher but declining scores. From the perspective of self-determination theory, female medical students often demonstrate stronger intrinsic motivation and self-determination than male students, which may explain the higher favourable attitudes observed at baseline (Ajlouni *et al.*, 2022). Motivation may be intrinsic, such as learning for personal satisfaction, or extrinsic, such as achieving higher grades (Fryer, 2019). Over time, both intrinsic and extrinsic motivation may decline due to the low assessment weightage assigned to AETCOM and reduced interest resulting from suboptimal implementation. Socialisation processes also differ by gender, shaping learning behaviours, orientations, and goals, which in turn influence academic motivation (Zhang & Lin, 2020).

Empathy is a critical dimension common to both communication skills and professionalism. Several studies have reported higher empathy scores among female students and physicians based on external assessment (Graf *et al.*, 2017; Hojat *et al.*, 2002). However, male students may overestimate their competence and overrate items on self-reported scales (Blanch *et al.*, 2008; Graf *et al.*, 2017), which may explain the consistency of male students' scores observed in the present study. Two influential studies by Hojat *et al.*, conducted eleven years apart, reported a consistent decline in empathy during the third year of undergraduate medical training (Hojat *et al.*, 2009; Hojat *et al.*, 2020). While students often begin medical training with idealism and enthusiasm, they may become increasingly cynical about campus life and the profession over time. Female students are also more susceptible to burnout and emotional exhaustion during their academic journey (Kilic *et al.*, 2021). This may explain the reduction in favourable attitudes among female students, reflected by both decreased positive attitudes and increased negative attitudes.

The increasing proportion of women in medical schools worldwide represents a structural shift within the profession (Bleakley, 2013). A systematic review of curricular interventions found no significant gender differences in learning or application of communication

skills in twelve out of sixteen interventions (Driscoll *et al.*, 2024). This suggests that structured training programs such as AETCOM should benefit male and female students equally. However, feminist analyses suggest that curricular reforms may incorporate women into traditionally male dominated structures without fundamentally transforming them (Squires, 2005). Gender influences in medical education are multilayered and often disadvantage women (Winkel *et al.*, 2021). Consequently, women may initially adopt highly idealistic professional attitudes that gradually evolve toward more realistic perspectives (Alamgir *et al.*, 2025). A study from Pakistan further suggests that differences in care ethics attributed to gender are rooted in collectivist social norms rather than biological differences (Bilwani & Anjum, 2022), underscoring the importance of cultural and peer influences.

Demographic differences, including residence and living arrangements, may also explain baseline gender differences that became less pronounced over time due to uniform exposure within medical schools. However, the overall decline or lack of improvement in favourable attitudes at endline suggests that communication skills, ethics, and professionalism may remain undervalued within the medical education environment. Limited faculty engagement and insufficient institutional prioritisation may have contributed to these findings. Neither gender demonstrated gains in favourable attitudes, which may be related to uniformly low attendance across both groups. This highlights the need for process evaluation alongside attitudinal assessment.

4.4. Correlation between Scores

The observed correlations between attitudes toward communication skills and professionalism likely reflect shared underlying factors such as motivation, empathy, personality traits, and ethical orientation (Fryer, 2019; Selic *et al.*, 2019). Teaching communication skills and professionalism within a continuous professional identity formation framework such as AETCOM may therefore enhance mutual reinforcement of these domains.

4.5. Limitations

While this study contributes to understanding gender influences on AETCOM learning, its scope remains limited. Gender roles, attitudes, communication skills, and professional identity are complex and dynamic constructs, and it is not possible to account for all influencing factors within a single study. The findings should be interpreted with caution due to potential biases related to self-reporting, repeat testing, and diffusion effects.

5. Conclusion

The apparent reduction in gender related disparities in communication skills and professionalism over time resulted from static or declining favourable attitudes. Reduced motivation and structural limitations in AETCOM delivery may explain this phenomenon. The findings underscore the need for iterative reinforcement, meaningful assessment, and mentorship-based integration of ethics and communication within competency-based curricula. Evaluation of implementation quality and motivation drivers will be critical for optimising the long-term impact of AETCOM in shaping future physicians.

6. Recommendation and Future Scope

The decline in favourable attitudes toward communication skills and professionalism, coupled with low attendance, indicates gaps in AETCOM implementation at the institutional level. As a relatively new curricular component within the competency based medical education framework, AETCOM requires continuous faculty development, active institutional leadership, and structured monitoring to ensure achievement of its educational objectives. Incorporating team based reflective exercises in mixed gender jigsaw groups may facilitate empathy transfer, mutual respect, and collaborative professionalism among students. Embedding these activities within routine teaching and assessment processes may enhance engagement and sustain positive attitudes over time. Reinforcement through mentorship and formative evaluation may further consolidate learning.

At the policy level, the National Medical Commission may consider implementing periodic quality audits and facilitating faculty capacity building programs to standardise and strengthen AETCOM implementation across medical colleges in India.

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Authorship Contribution

All authors contributed equally to the work, reviewed the manuscript, and approved the final version for submission.

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Ethical Approvals

The study protocol was approved by the Independent Ethics Committee of Medical College Kolkata with approval number MC KOL IEC NON SPON 1524 09 2022 dated 07 September 2022.

Declarations

The authors declare that this work is original and has not been submitted elsewhere for publication. All data, methodologies, and system components have been developed and reported in adherence to academic standards. All referenced materials have been duly cited, and the authors accept full responsibility for the integrity and accuracy of the findings presented.

Conflict of Interest

The authors declare no conflict of interest related to this study.

Data Availability Statement

The authors declare that the data supporting the conclusions of this study can be obtained upon reasonable request from the corresponding author, MD. The data are not publicly accessible due to restrictions by WBUHS on individual data dissemination before PhD approval.

AI Usage Statement

A large language model was used for minor grammatical corrections and language editing.

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