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The influence of gender-based perceptions on females joining a bachelor of medicine, bachelor of surgery in Rwanda

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Abstract

Through progressive policies, Rwanda has made significant strides in promoting girls' education and empowerment. However, female enrollment in Bachelor of Medicine and Bachelor of Surgery (MBBS) programs remains disproportionately low. This cross-sectional study investigates the influence of gender stereotypes and girls' self-perceptions on female engagement in MBBS programs in Rwanda. The data analyzed for this study has been used and published in BMC Medical Education in a study with a different but clearly related focus, under the title "Gender-based support systems influencing female students to pursue a bachelor of medicine, bachelor of surgery (MBBS) in Rwanda" (Neil KL, BMC Med Educ 24:641,2024). While the previous analysis focused on the presence and gaps in gender-based support systems, the current research has a new focus on gender based self-perceptions influence in girls interest in pursuing medical school training. Conducted across 13 secondary schools and 3 universities offering MBBS degrees, the study engaged 8–12 students, parents/guardians, and teachers in each focus group discussion in a total of thirty-four focus group discussions and sixteen semi-structured interviews. Twenty-eight discussions took place at the secondary school level, and six were conducted at the MBBS level. Data analysis utilized inductive coding to identify recurring themes. The study identified three overarching themes: society's role in shaping gendered expectations about domestic and professional roles, girls' self-perceptions regarding their ability to pursue sciences and MBBS within these norms, and internalized stereotypes affecting girls' career aspirations. Drawing on gender schema and social cognitive theory, the research underscores how societal expectations and stereotypes shape and constrain girls' career choices. The findings highlight the necessity of dismantling gender-based perceptions that hinder girls' participation in scientific disciplines, including MBBS.

Keywords Self-perception, Medical school, Gender equality, Career choice

Background

Rwanda has taken significant strides in improving the participation of women across various echelons and all sectors of society, including parliament and local leadership positions. For example, in senior government official roles, women comprise 33.3% of permanent secretary roles in ministries and 30.3% of heads of public institutions (National Institute of Statistics of Rwanda (NISR), [44]). Furthermore, recognizing the limited engagement of women in some sectors, such as medicine, the Government of Rwanda has been promoting policies and strategies conducive to improving women's and girls' participation in these sectors. However, as data from the Ministry of Education of Rwanda indicates, there are less percentage of female students (36.9%) in higher education taking STEM as compared to male students (63.1%)

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in the 2022/23 academic year (MINEDUC, [42]). The proportion of females in Medical School training is also less compared to that of males, with the ratio of female to male medical students in Rwanda 1 to 2.3 in 2018 (Gender Monitoring Office, [24]).

A review of female students' participation in technical and vocational training in Rwanda indicated that gender stereotypes continue limiting their engagement in various fields, thereby restricting females' involvement in "soft trades," including tailoring, hairdressing, nursing, food, and nutrition. On the other hand, boys dominate occupations such as construction and mechanics (Gender Monitor Office [24], p.36). There is a recognition that more efforts are needed to enhance women's engagement in medicine, such as medical doctors (Boniol et al. [14]), and in health facility leadership roles by academic institutions such as the University of Global Health Equity (Women in Global Health [52]). Self-perceptions play a vital role in career choice and career advancement. Aschbacher et al. ([1]) conducted a study using latent class analysis to examine middle school students' career aspirations in science, technology, engineering, and medical (STEM) fields across urban and suburban schools in the U.S. They found that students who believed in their scientific abilities and valued science were more inclined towards STE-M careers, with socioeconomic status influencing this association. The strong association between students' self-perception and career interests have been corroborated by other studies (Barmby et al. [8]; Haussler & Hoffmann, [28]; Nugent et al. [46]). Studies on underrepresentation in STEM fields suggest that differences in personal goals and self-conceptions, rather than in academic achievement, play crucial roles in facilitating the underrepresentation of females and ethnic minorities in certain careers (Archer et al. [1]; Downey et al. [19]; Riegle-Crumb et al. [48]).

Two theoretical frameworks have been utilized to understand how self-perceptions impact career choices and advancements, including gender schema theory (GST) and social cognitive theory (SCT). Gender schema theory (GST) posits that individuals in society develop gendered perceptions from an early age, influencing their cognitive processes and behaviors throughout their lives (Bem [9]). GST begins with the understanding that children learn their culture's definitions of femininity and masculinity, which can extend beyond biological characteristics, such as anatomy or reproductive function, to include associations tangentially related to sex, such as the shape of abstract objects.

Children then engage in 'gender-schematic processing,' a cognitive process where they use such associations (gender schemas) to interpret and categorize new information into gender-based classifications, irrespective of its original context. This process anticipates and integrates incoming information into schema-relevant terms, influencing the categorizing of attributes and behaviors as masculine or feminine. Furthermore, GST explains how this processing influences children's self-perceptions. As children internalize societal gender schemas, they learn which attributes are associated with their gender, leading to "sex typing," where they adopt sex-appropriate preferences, skills, behaviors, and self-concepts. Self-evaluation then becomes aligned with gendered criteria, where one's worth as a person is assessed based on how closely they conform to the gendered ideas stored within the schema. As Bem said, "The gender schema becomes a prescriptive standard or guide, and self-esteem becomes its hostage."

Empirical research on GST reveals mixed findings regarding its predictions. Bem ([9]) described several studies demonstrating that sex-typed individuals exhibit a greater readiness to process information, including self-related information, through the lens of gender schema. For instance, one study examined whether gender connotations are more "cognitively available" to sex-typed individuals than non-sex-typed individuals, as proposed by GST. The study involved forty-eight male and female undergraduates categorized as sex-typed or non-sex-typed based on the Bem Sex Role Inventory (BSRI)[1]. The participants completed a memory task with sixty words categorized by gender associations. The results showed that sex-typed individuals were more likely to recall items associated with their gender in clusters, supporting GST's predictions about memory processing. Additionally, another study explored how sex-typed individuals quickly associated themselves with attributes that align with their gender schemas. In the study, another set of forty-eight male and forty-eight female undergraduate participants categorized as sex-typed or non-sex-typed based on the BSRI were shown sixty attributes from the BSRI and given the choice of pushing one of two buttons, "Me" or "Not Me," to indicate whether the attribute was or was not self-descriptive. The study found that sex-typed subjects are significantly faster than non-sex-typed subjects when claiming sex-appropriate attributes and when rejecting sex-inappropriate attributes

[1] The Bem Sex Role Inventory (BSRI; Bem, 1974) is a tool used to classify individuals based on their self-perceptions or self-assessments of personal traits. Respondents rate 60 attributes on a 7-point scale to indicate how well each trait describes themselves. Unbeknownst to the respondent, 20 attributes align with cultural definitions of masculinity (e.g., assertive) and 20 with femininity (e.g., tender), while the remaining serve as filler. Each respondent receives scores for masculinity and femininity, and those scoring above the median on the congruent scale and below on the incongruent scale are categorized as sex-typed. Those displaying the opposite pattern are considered cross-sex typed; those scoring above the median on both scales are classified as androgynous; and those below the median on both scales are termed undifferentiated.

for themselves. These results supported the theory that sex-typed individuals spontaneously classify information according to gender schemas, rather than engaging in a deliberate process that involves recalling behavioral evidence from memory and assessing its relevance to reach a decision.

More recent studies have examined how gender schemas impact career experiences and choices from early childhood. One study conducted among Dutch families found that parents' gender-typical career and family involvement— reflected in their occupation, work hours, and task division in the home— was associated with children's gender-typical perceptions of future career and family life (Endendijk and Portengen [21]). Another study tracked British children from early childhood through early adolescence and revealed that the extent of gender-typed play behaviors— such as playing with dolls, swords, and guns, or pretending to be female characters— can predict their occupational interests during adolescence (Kung [31]). Additional studies have shown that sex-typed personality traits and gender identity perceptions are important predictors of young adults' career interests (Dinella et al. [18]; Bain et al., [12]).

While several studies support GST, other research has yielded mixed results (Starr and Zurbriggen [51]). Many articles have tried to replicate Bem's findings, test GST, or compare it with Spence's (1993) multifactorial gender identity theory or Markus's self-schema theory. While certain studies affirmed GST's hypotheses (Forbach et al. [22]; Haaga [26]), others presented findings that diverged from these expectations (Lobel [40]; Schmitt et al. [49]), including in some cases when researchers attempted to exactly replicate Bem's study (Deaux et al. [17]). One study found evidence that aligned with GST predictions and other evidence that did not (Koivula, 1995).

The second theoretical perspective is social cognitive theory (SCT). SCT attributes gender disparities in fields like engineering and technology to differences in self-efficacy between males and females. According to SCT, individuals avoid activities perceived as beyond their capabilities and pursue those within their perceived abilities (Bandura [3]). The theory identifies four sources shaping self-efficacy: 1) experiences with success and failure and how these affect their ability to keep trying (performance achievements), 2) observing modeled behaviors from individuals similar to oneself, thereby reinforcing or discouraging one's own attempts (vicarious learning), 3) verbal encouragement, while keeping in mind that negative messages have greater influence than the positive ones (social persuasion), and 4) interpreting stress reactions and emotional states positively, perceiving them as energizing rather than debilitating (emotional arousal) (Bandura, 1977 [6]). Bandura's ([4]) 'triadic reciprocal causation interaction model' categorizes these sources into three classifications: personal factors (e.g., gender-linked conceptions and self-regulatory influences), behavioral patterns, and environmental events (i.e., societal influences). Behavioral patterns can constitute performance accomplishments, while vicarious learning and social persuasion can be considered as environmental and emotional arousal as personal (Litzler et al. [39]). The three categories of the triadic reciprocal causation model all influence each other bidirectionally while shaping an individual's self-efficacy (Bandura [4]).

Empirical research supports the link between self-efficacy and career choices. For instance, a study involving Taiwanese college athletes found positive correlations among social support, career self-efficacy, career exploration, and career choice (Chan [16]). Similarly, a study of Vietnamese students confirmed the critical role of self-efficacy in shaping career paths (Pham et al. [47]). Moreover, research indicates that girls tend to exhibit higher self-efficacy in fields related to education, health, and social services (Bandura et al. [5]), while feeling less efficacious in traditionally male-dominated occupations like engineering (Cech et al. [15]). Additional studies by Fouad and Santana ([23]) and Lent et al. ([36]) emphasize the relevance of self-efficacy theory in understanding career choices, suggesting that it is an important factor in addressing gender disparities across various occupations.

All four sources of efficacy proposed by Bandura have been confirmed by studies including one that investigated their effects on Japanese college students' self-efficacy in math (Matsui et al. [41]). Notably, environmental factors play a crucial role in forming an individual's self-efficacy (Bandura [4]; Zimmerman [53]); interactions where teachers and mothers reinforce gender stereotypes about children's math competence can undermine females' achievements and aspirations in careers or activities not traditionally associated with females (Gunderson et al. [25]; Simpkins et al. [50]; Bleeker and Jacobs [13]). As part of the triadic interaction, environmental influence is crucial as it supports or hinders the development of self-efficacy. Bandura ([4]) and Zimmerman ([53]) argue that environmental support is essential for sustaining perceptions of self-efficacy. Hackett and Betz ([11]) also note that societal norms often discourage females from pursuing STEM fields by perpetuating lower career-related self-efficacy expectations.

Given the role of gender schemas in influencing self-perceptions and behaviors according to GST, as well as the importance of self-efficacy and environmental factors in influencing career choices according to SCT, there is a need to identify individual and societal factors affecting female students' decisions to join Bachelor of Medicine and Bachelor of Surgery (MBBS) programs in Rwanda.

Recognizing existing gaps in girls' enrollment in medical school programs, this study analyzed girls' self-perceptions about their capacity to join medical school programs in Rwanda to improve their participation in such programs.

Methods

Design

Employing a qualitative interpretive methodology and a grounded theory approach, this study explored girls' self-perceptions on their ability to study science streams in high school and, therefore, pursue an MBBS university program. Through this, the study aimed to propose mechanisms for strengthening the enrollment of female students in MBBS programs. The qualitative methods utilized aligned with the methodological approach to deeply probe students' perceptions in a contextually relevant and holistic way.

Study setting

This cross-sectional study took place at selected secondary schools in Rwanda and three universities in Rwanda that offer MBBS degrees. Across the study setting, participants included students, parents/guardians, and teachers.

Sampling and recruitment

The sampled schools were selected using the National Institute of Statistics of Rwanda's *Fifth Integrated Household Living Survey*, which measures national trends in citizens' socioeconomic well-being. The survey indicates that Kigali is the highest-resourced province in the country, while the Eastern province is the lowest-resourced province. Considering that resources contribute to educational capacity and intending to represent both high- and low-resourced schools, the study sampled secondary schools from these two provinces. After identifying the provinces to be sampled from, secondary schools were identified using the Ministry of Education's ranking of secondary schools (Ministry of Education, 2018). Overall, fifteen secondary schools were selected, but four were not considered, as they were either closed or declined to participate in the study. Two of the excluded schools were replaced with the next school that best fit the criteria, but the remaining two could not be replaced without compromising the study's adherence to the selection criteria. Table 1 outlines the thirteen schools that were sampled in this study.

Table 1 Breakdown of selected schools

Province	School Name	Gender Mix	Legal Status
Kigali	APACE Secondary School	Co-ed	Private
	King David Academy	Co-ed	Private
	Lycée de Kigali	Co-ed	Public
	Rugunga Secondary School	Co-Ed	Public
	FAWE Girls School	Girls only	Private
	Lycée Notre Dame de Citeaux	Girls only	Public
Eastern	Institut Don Bosco Kabarondo	Co-ed	Private
	Gahini Secondary School	Co-ed	Private
	GS Kabarondo B	Co-ed	Public
	Agape Musha Secondary School	Co-ed	Public
	Gashora Girls Academy	Girls only	Private
	Maryhills Girls Academy	Girls only	Private
	New Explorers Girls Academy	Girls only	Public

Three universities were also selected based on the following criterion: universities registered in Rwanda that offer an MBBS degree program at the time of data collection. These universities comprised the Adventist University of Central Africa (AUCA), the University of Global Health Equity (UGHE), and the University of Rwanda (UR). After selecting the thirteen secondary schools and three universities, the data collectors collaborated with school administrators to sample student, parent, and teacher participants based on the inclusion criteria.

Data Collection

A semi-structured focus group discussion (FGD) tool was developed through gender-based theoretical frameworks, considering the socioeconomic, societal, and other potential constraints to females pursuing an MBBS, after the study protocol was approved by the University of Global Health Equity IRB under ref no. *UGHE-IRB/2021/034.* Following the development and pilot of the data collection tool, thirty-four FGDs were conducted, including twenty-eight at the secondary level and six at the MBBS level. The FGD participant breakdown included single-sex FDGs (male and female) with students in an MBBS program; single-sex FGDs (male and female) with students in secondary grades 10–12, in science and non-science combinations; and co-ed FGDs with science and non-science secondary school teachers. Six semi-structured interviews were conducted with parents and legal guardians of female secondary students in science and non-science combinations. For this manuscript, as the focus was on analysis of self-perceptions, only discussions with female students were reviewed. However, the data from the interviews with parents, teachers, guardians and male as well as female students was used to produce a second manuscript on Gender-based support systems influencing female students to pursue a bachelor of medicine, bachelor of surgery (MBBS) in Rwanda (Neil et al. [45]).

In terms of participant selection, secondary school administrators were given criteria of selecting equal number of students from STEM and non-STEM combinations. Therefore, the sample integrated different categories as per the national standards, such as Physics-Chemistry-Biology (PCB), Math-Chemistry-Biology (MCB), or Biology-Chemistry-Geography (BCG)], and non-biology combinations. Students from different grades levels in secondary level education were also picked, making the focus group discussions diverse in terms of grade and combination selection. Female and male focus group discussions were done separately to encourage open discussions.

Ethical considerations

This study has ethical approval from the University of Global Health Equity's Institutional Review Board (Protocol Reference #131). As required by UGHE's IRB, informed consent from all participants and assent from minors were obtained.

The researchers secured consent from gatekeepers (e.g. teachers, guardians, and school administration, to protect vulnerable populations, in this case secondary students who are 18 and below. Assent forms were also signed by each student who took part in the focus group discussions and interviews. During the data collection process, the researchers, with experience in conducting interviews with children, were attentive to student behavior for discomfort with any of the questions or responses. Students were also allowed to withdraw from the study, anytime they wanted to, although all participants decided to finish the focus group discussions. The research also de-identified student information to ensure confidentiality.

Data analysis

Two researchers inductively coded each transcript and then validated it by three additional researchers for consistency across the coding process. After this coding process, a codebook was developed through common themes and patterns in the transcripts.

Findings

Three overarching themes were extracted from the data: society's influence in shaping gendered expectations about domestic and professional roles, girls' self-perceptions regarding their ability to pursue sciences and MBBS within these norms, and internalized stereotypes affecting girls' career aspirations.

Theme 1: role of society in creating girls' self-perceptions

The role of society in shaping girls' self-perceptions emerged as a prominent theme from the data. Gender-based societal expectations were highlighted as factors that discourage female students from pursuing an MBBS. These expectations are ingrained from childhood. Participants of the study noted that children are given chores as activities that prepare them for their anticipated societal roles and align them with future job prospects. From an early age, girls are predominantly assigned household chores, while boys are encouraged to engage in non-domestic activities. For instance, one participant elaborated:

> *When you grow up here in Rwanda, we are raised to do different tasks, and for a girl…she is expected to do the cleaning, she is expected to take care of the kids, so we are all raised in such way that a girl must do this preparing for the future, and the man has to work hard… He takes care of his family; he does not do the home stuff but all things outside the home…[these] are things that need energy. (FGD with male secondary students)*

This early division of labor influences educational and career choices later in life; male students stated that female students tend to gravitate towards non-science disciplines due to their extensive exposure to and experience in domestic roles from a young age. According to male participants, girls tend to choose careers aligned with their familiar experiences.

> *They [girls] like such [non-science] combinations because they are a little bit similar to activities they had done even before starting school… They have done those things all their whole life. They cooked. They welcomed visitors and chose to study the same things that relate to how they lived. (FGD with male secondary students).*

The association of certain disciplines with gender roles appears to reinforce itself, as indicated by some male participants who chose careers based on gender stereotypes to affirm their masculine identity. According to them, societal expectations also dictate that women do not prefer to handle tasks that are difficult to them. Since challenging tasks are often linked with science disciplines, women are less commonly associated with these fields. Overall, some male participants suggest that their disproportionate representation in non-science disciplines stems not only from early differences in exposure and experience with domestic tasks but also from societal beliefs about women's aptitude for more difficult tasks (thus avoiding science disciplines). Men, in turn, uphold traditional gender stereotypes in their career choices to bolster their masculine image.

The reason I like sciences is because when I was in O'level, I didn't want to study accounting or other things. This [preference for science] is because I used to hear people saying that those combinations are for girls because they are simple. And then I said, 'Let me choose something difficult that can differentiate me from girls - which can be challenging for me as a man. That's why I decided to study sciences. (FGD with male MBBS students)
The association of girls with easier subjects was echoed in more discussions with male participants.
You will find that most girls choose courses that do not include sciences, as they favor easier things, like history-economics-geography (HEG), mathematics-economics-geography (MEG) combination, and others. But it does not mean that they cannot go on with science. It is just not their favorite ones. (FGD with male secondary students)

Concerns about girls avoiding sciences due to perceived difficulty or stress were also echoed in the FGDs with teacher groups and parent interviews:

I think that girls don't study science because they don't want to be tired. They say that a girl is weak; she doesn't want things that stress her. If it is true, why would she join things that stress her? (FGD with teachers)

Similarly, male participants discussed stereotypes about girls being emotionally vulnerable and avoiding professions like medicine due to their sensitive nature.

I also hear other people talking about emotions and thinking that they will not handle seeing blood. That they can have so many emotions, or always seeing people who are suffering can cause her depression because of their hearts. (FGD with male MBBS students)

Additionally, participants suggested that girls may choose careers based on expectations of an easier life supported by future husbands, further avoiding professions perceived as physically or emotionally demanding.

Their husbands will do this so that they do not have to let them do difficult things. So, they choose to make their life easier thinking that their future husbands will do those hard things for them. (FGD with secondary male students)

Theme 2: female students' self-perceptions about appropriate career choices within gender norms

Society's emphasis on domestic responsibility and roles for women appear to impact female students' interest in pursuing MBBS programs. Many female participants raised concerns about not meeting societal expectations, particularly regarding marriage. Participants indicated that the lengthy duration of medical school conflicts with perceived societal expectations or pressures to marry, which in turn deters females from pursuing an MBBS degree.

I see that the [girls'] preference for jobs mainly depends on society. It's also disappointing that girls, most of the time, prefer a job that does not take much time in studying and preparation because society expects them to marry at a youthful age, so they tend to study but also not take many years for learning. (FGD with female MBBS students)
We were brought up saying that for girls, it is better sometimes to stay at home, and I think that's why most girls are from business, because maybe they will be looking for jobs that they can be doing while they stay at home to take care of the kids. Because as she said when they go for piloting or go for doctor.... Those jobs require us to go out of the house daily. (FGD with female secondary students)

Alongside self-perceptions of living up to societal expectations, female participants also indicated a fear of not being able to get married after six years of medical school.

According to medicine, as we said before, it takes a long time. A girl thinks about the years she will spend in [medical school], and in the end, she would be like 27 years old. It could be hard for her to get married, even if she might be a doctor. She fears such things which would have an effect on her life. (FGD with female secondary students)
Some girls may be reluctant to study medicine because they think they are older, and they start thinking that they may fail to get husbands and so on, because they think that getting married at a younger age is more important. (FGD with female secondary students)

Theme 3: self-perceptions regarding girls' professional interests

Beyond those that relate to women's domestic role, societal expectations around women being emotionally sensitive, lazy, and avoiding emotionally, mentally, and physically challenging tasks are ingrained in women's own perceptions of themselves and career paths that they deem appropriate and pursue. Specifically, participants indicated that "female-appropriate" jobs, which don't include medicine, are preferred.

Girls prefer jobs that will not make them sweat and do not require much intelligence and vision. And

they really like jobs that bring fast profit... Besides, they [girls] like jobs that will not change their physical appearance, those jobs that will let them show their beauty. They don't want to go to repair cars and stain their clothes with oil. (FGD with female secondary students)

Another female participant indicated that females prefer easy jobs.

Women like the simplest jobs like sitting in offices and cleaning, and men like physical activities, like mining, and so on. (FGD with female secondary students)

Furthermore, participants indicated that men prefer more active jobs that require energy.

I think in our society, girls like easy jobs such as salesperson in shops, office jobs and other easy life jobs... (FGD with female secondary students).

When asked to elaborate on why women prefer particular jobs, one participant attributed this to laziness and the desire to have a stress-free life.

In my view, girls are lazy in their mind. They think MCB or PCM is very hard and lose confidence, and they join easy combinations which won't stress her, for they don't want to find X and Y. (FGD with female secondary students)

Some female students also reflected on how the community's perceptions of girls' capabilities affect female students' choices.

Girls do not join medical streams because they are usually told they are weak people. But on their side, they are able. But the problem is that they only like to perceive that they are suitable for easier jobs and don't like the hard work. For example, they may say they cannot work a night shift at the hospital because they need to sleep more. (FGD with female secondary students)

Teachers also voiced that some female students lack the confidence to be medical doctors because of their perceived challenges.

I have something to add on why they [girls] do not study medicine based on my experience. I think it is because they fear taking risks. Because when you join medicine, it is because you want to help people to recover from different illnesses. When you are in the hospital doing your job, you know there are two things: to help that person recover, or she/he may even die. They fear taking the risk. I have a typical example of a girl that I know. They gave her the choice of studying medicine, and then she changed to the other faculty, saying: 'What would happen if I failed to help a patient to recover?' (FGD with mixed-sex teachers).

Discussion

The findings of this study suggest that society plays a crucial role in creating and promoting gender-based expectations and stereotypes that heavily influence girls' self-perceptions. Consistent with gender schema theory (GST), participants from FGDs appear to learn cultural definitions of masculinity and femineity (gender schemas) at an early age, as parents assigned them different household chores based on their genders, presumably to prepare them for their societal roles (Bem [9]). The emphasis on domestic responsibilities assigned to girls seems to have been internalized by female participants in this study, who cited concerns about balancing marriage expectations with the demands of pursuing an MBBS program. The fear of not conforming to societal gender norms, such as marrying at a young age, is exacerbated by the lengthy duration of medical studies.

These fears highlight underlying competency biases and stereotypes about girls' capabilities in pursuing fields like medicine. Such biases contribute to a self-fulfilling prophecy where girls internalize stereotypes that confine their skills to domestic roles, doubting their own capabilities and thus opting for careers deemed more suitable or achievable within societal norms. This internalization process reflects findings in current literature suggesting that a key part of observing and learning socially appropriate gender-based behaviors is to internalize this knowledge and, eventually, act intrinsically in accordance with those beliefs (Lewis et al. [38]). The findings also resonate with previous research on gender schemas and career choices, which emphasizes how internalizing societal norms influence individual self-perception and career orientation (Leschziner and Brett [37]).

The concerns expressed by female participants regarding marriage also reflects GST's premise that self-perception is closely linked with gender schemas, inasmuch that one measures their own adequacy as a person based on how closely they conform to gendered schemas. Just as the female participants were deterred from an MBBS education due to concerns over their ability to conform to gender norms, the male participants also noted that they chose careers that aligned with, and would affirm, their identity as a man (e.g., a profession in the sciences). The strong link between self-perceptions/worth and gender schemas can explain how gender stereotypes influence decisions as personal and lifechanging as one's career choices. The fact that these gender-based stereotypes were echoed in female, male, and teacher FGDs

alike, as well as in the parents' interviews, support not only GST's assertions of societal influences on cognitive processes and behaviors but also Albert Bandura's Social Cognitive Theory (SCT). The SCT, which is one of the main theories used to explain gender differences in career choices, argues that career selection processes rely on individuals' internalized self-beliefs and their perceived self-efficacy (Mozahem [43]). According to Mozahem, Bandura's "SCT predicts that individuals will not consider occupations that they believe are beyond their abilities, no matter how attractive those occupations may be" (2022). Bandura (1997)[6] noted that self-efficacy is developed through four sources: (1) experiences with success and failure and how these affect their ability to keep trying (performance achievements), (2) observing modeled behaviors from individuals similar to oneself, thereby reinforcing or discouraging one's own attempts (vicarious learning), (3) verbal encouragement, while keeping in mind that negative messages have greater influence than the positive ones (social persuasion), and (4) interpreting stress reactions and emotional states positively, perceiving them as energizing rather than debilitating (emotional arousal).

Some male participants noted that jobs in hospitality and similar sectors were more appropriate career paths for girls, given their extensive experience in and exposure to assigned household chores, such as cleaning and cooking. This observation may merit consideration regarding the role of experiences with success and failure as one source informing one's self-efficacy. As girls are typically deprived of experiences that build skills outside of household chores, they may develop lower self-efficacies, and thus lower inclinations, towards disciplines that do not align with their familiar experiences. Furthermore, the scarcity of female role models in disciplines like the sciences and medicine hampers efforts to build self-efficacy among young women, given the low representation of women in these fields.

Environmental factors, including societal expectations around gender roles, are also crucial in forming an individual's self-efficacy by SCT *(*Bandura [4]; Zimmerman [53]). In addition to expectations regarding domestic responsibilities, female students were perceived as lazy, emotionally vulnerable, and weak, preferring 'easy' subjects and jobs. These notions were held by male students, teachers, parents of all genders, and female students, who indicated that girls and women prefer jobs that do not make them 'sweat' or that do not affect their appearance. The internalization of these notions was also another factor that appeared to lead female students to gravitate towards particular career choices. Specifically, this internalization process may have influenced perceived self-efficacy, in which female participants in this study are deterred from the sciences or programs such as MBBS due to not only perceived domestic responsibilities, such as marriage but also perceived deficiencies; the girls in the study associated 'easier' jobs with 'girly' or 'female-appropriate' and doubted their abilities to excel in science. Such links between gender stereotypes, internalization, and academics is congruent with studies that have been conducted in the U.S. and found that when girls are exposed to gender stereotypes about their competence in fields traditionally dominated by men, the girls' achievements, self-efficacies, and aspirations regarding the careers are undermined (Gunderson et al. [25]; Simpkins et al. [50]; Bleeker and Jacobs [13]; Hackett and Betz [11]).

As gender stereotypes are acquired from observing and learning, studies have shown that exposure to constant counter-stereotypic interventions, women in diverse contexts, can change these gender-based stereotypes and propel women in male-dominated fields (Lewis et al. [38]). Such interventions could build self-efficacies in sciences and mathematics among girls— the self-perceptions necessary to inspire engagement in the fields.

Conclusion

The study has highlighted the important role of societal expectations, stereotypes, and girls' perceptions in promoting or limiting girls' participation in MBBS degree programs in Rwanda. The study drew from the gender schema and social cognitive theory to indicate how societal expectations and stereotypes are promoted and maintained, affecting girls' career options. Communities' expectations of girls regarding their domestic responsibilities and roles, as well as biases and stereotypes about their ability to succeed in MBBS and other science fields, impact girls' career choices. It is important to raise community-level awareness about women's potential to participate in STEM fields, as that boosts or limits girls' engagement in MBBS. Encouraging women's participation in different levels, including the school, family, community structures, households, and individual girls, is also important to dismantle perceptions and norms that hinder girls' participation in science streams, including MBBS. The engagement of female role models is also recommended to dismantle negative perceptions about females' engagement in MBBS programs.

Abbreviations

AUCA Adventist University of Central Africa
FGD Focus group discussion
MBBS Bachelor of Medicine, Bachelor of Surgery
SCT Social cognitive theory
UGHE University of Global Health Equity
UR University of Rwanda

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Authors' contributions
TY and DU collected the data, which TY, KN, DU, AN and AY analyzed. All authors wrote the initial draft, revised it, and approved the final draft.

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Data availability
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate
This study has ethical approval from the University of Global Health Equity's Institutional Review Board (Protocol Reference #131). As required by UGHE's IRB, informed consent from all participants and assent from minors were obtained.

Consent for publication
Signed consent forms were obtained from all participants and/or their parents or legal guardians.

Competing interests
The authors declare no competing interests.

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