



Measuring effectiveness of chatbot to improve attitudes towards gender issues in underserved adolescent children in India

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 **HARVARD Kennedy School**
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Abstract

Background: India slipped 28 places to rank 140th among 156 countries in the World Economic Forum's Global Gender Gap Report 2021. Regressive gender norms, specially at the adolescent age, result in gender inequality and inequity. Changing attitudes towards gender issues has the potential to reduce gender inequality and inequity. More than 80 million underserved adolescent children in India have access to the internet and there is potential for a scalable technology solution to reduce gender inequality and inequity.

Objective: To measure the effectiveness of WeUnlearn's new technology solution - Wulu - to change attitudes regarding gender issues in underserved adolescents in urban poor areas of Delhi.

Solution: Wulu's chatbot architecture is AI driven and uses data analytics to deliver content based on priority issues for the adolescent. Extensive field visits were conducted to understand priority issues. Multiple pilots were designed and tested in the past 2 years. For this research project, content was delivered through automated messages via WhatsApp. The content consists of short videos everyday followed by a few questions to gain understanding of the content.

Method: A 2-week Randomized Control Trial (RCT) to test 2 modules of Wulu (gender stereotypes and bullying) was deployed. 1200 participants (700 treatment, 500 control) between 14-18 years of age in urban poor areas of Delhi were included as part of the study. Evaluation questionnaires inspired from GEMS study were deployed via Wulu itself.

Results: In a 14-day period, there was a 12.58% change in total scores in the treatment group. Overall, the change in attitude for girls was 14.79% and for boys was 9.42%, hence girls showed higher change than boys. The difference-in-difference between treatment and control were statistically significant in attitudes involving gender stereotypes on education, sports, profession, roles at home. There was also a positive shift in understanding and dealing with bullying and body shaming.

Conclusion: The intervention has potential as it was successful in changing attitudes for some priority issues affecting underserved adolescents.

Introduction

Gender Norms, Inequality and Inequity

Gender norms are defined as culturally accepted expectations and characteristics that men and women should possess and how they should behave (Yu et al., 2017). Rules governing gender roles, traits and power associated with masculinity and femininity are a part of gender norms (Kagesten et al, 2016). Rigid gender norms are a cause of gender inequality in many cultures including India. Not only does India suffer from have a severely skewed sex ratio (900 girls to 1000 boys) (NITI, 2015), the country slipped 28 places to rank 140th among 156 countries in the Global Gender Gap Report 2021 (WEF, 2021). These disparities are clearly evidenced in secondary education, employment, health, violence and safety. Only 32% of girls complete class 10 (Acharya & Shah, 2014). 52% of women report abuse of varying types in their lifetime (Nanda et al, 2014). Girls and women also disproportionately experience adverse health outcomes including malnutrition, maternal death, suicide and gender-based violence (WHO, 2009). Finally, there exists mass gender-based discrimination in employment in the labor force as well as the types of work women are engaged in (Razavi, 2012).

Inequitable norms inform notions of masculinity, power and relationships, directly shaping individual behavior, including the acceptability and use of violence (Hiese 2011, WHO 2009). YP Foundation conducted a survey of ~80 young men in Uttar Pradesh on prevalent masculine norms in the state and found that instead of being a positive reinforcement, the pervasiveness of contemporary masculine ideals across all spaces in the respondents' lives appeared to be an imposition on them and led to immense mental and emotional pressure. Furthermore, men can sometimes find the perceived lack of power frustrating and adopt behaviors that give them a sense of power over others. A vicious cycle operates between the internal (mental models of men) and interpersonal (societal/cultural masculinity norms) levels that reinforce each other, perpetuating regressive behaviors and violence (Barker, 2005).

To close the gender gap and overcome its harmful effects, it is important to focus on both gender inequality and inequity. UN Women (2013) recognizes gender equality as “the equal rights, responsibilities and opportunities of women and men and girls and boys.” Interventions designed to extend opportunities to women that are enjoyed by men do not necessarily result in empowering women as they fail to take into account societal and cultural factors that need to be corrected as well. Similarly, interventions designed for people from a high-income background are mostly ineffective work for low-income backgrounds. Hence, it is important to also focus on inequity to correct the historical wrongs that have prevented the more marginalized groups to otherwise operate on a level playing field. Interventions need to take into account the intersectionality of gender issues across class, caste, income, religion and other factors for them to be effective.

Gender Norms and Adolescence

While understanding the development of gender norms, it is important to focus on the adolescent years (defined as 10-19 years old). Adolescence marks a period of tremendous expansion in the ability to adapt to a variety of social, contextual and cultural influences that are inherent in the process of gender socialization (Zelazo, Craik & Booth, 2004). Gender attitudes and perception of gender norms constructed at this age have long-term outcomes. Hill and Lynch (1983) captured the importance of this age in the Gender Intensification Hypothesis. The hypothesis posits that beginning in adolescence, girls and boys face increased pressure to conform to culturally sanctioned gender roles. These pressures come from a variety of sources that convey messages about appropriate gender roles, such as parents, peers, educators, and the media. As adolescents experience these and other socializing influences, they become more stereotypical in their gender identities and gendered attitudes and behaviors (Hill and Lynch, 1983).

By adolescence, most youths realize that men occupy more powerful, dominant, and higher status positions than women (Bigler & Liben, 2007; Leaper & Brown, 2008). Young adolescents’ notions of sexuality and body image are especially impacted by the sexualized and idealized bodies portrayed in the media (Neetu A et al, 2017).

Unhealthy gender attitudes affect sexual and reproductive health, bullying and violent behaviors, school dropout rates and other issues. Bullying is prevalent in adolescence due to rigid expectations of conforming to gender norms by peers. Bullying is defined as repetitive aggressive behaviors with an intent to be harmful or hurtful including some form of power imbalance between the parties involved (Olweus, 1996). Bullying can take the form of direct verbal or physical aggression, relational aggression such as rumor spreading or gossiping, either online or offline (Wang, Iannotti & Nansel, 2009). Analysis shows a stronger correlation for boys to be bullies compared to girls (small to medium effect size) (Cook, Williams, Guerra, Kim and Sadek, 2010). Being bullied is associated with negative effects on self-efficacy, self-esteem, peer and parent relations later in life. Hence, gender related interventions to promote gender equity at this stage are extremely beneficial.

Consequences of unhealthy gender norms for girls include lack of education, child marriage, young age pregnancy, poor physical health, violence and various mental health problems including depression. Similarly, consequences for boys include higher risk of drug abuse, engaging in violent behaviors, increased risk of death from injuries and shorter life expectancy as compared to women (Blum et al, 2017). India has limited research on gender norms and gender equity even though high rates of gender-based discrimination and violence exists. However, it is hypothesized that working on adolescent's gender attitudes would result in improved short and long-term outcomes.

Interventions promoting healthy Gender norms

One effective example of interventions in India to reduce gender inequity is a study conducted by the International Center for Research on Women (ICRW), in partnership with the Committee of Resource Organizations for Literacy (CORO) and the Tata Institute for Social Sciences (TISS). They developed a school-based program - "Gender Equity Movement in Schools," or GEMS, for students in Grades VI and VII. Their research team developed a scale to measure student's attitude towards gender equality. GEMS study was able to bring about a positive shift in students' attitudes toward gender equity.

Analysis of existing interventions highlights two important factors that impeded long lasting impact - focus group of intervention (mostly girls) and nature of intervention (in-person). Interventions focusing only on girls inadvertently put the onus on girls to be agents of change. Boys too feel the effect of patriarchy, and it is imperative that both groups are educated so that they can empower each other to break the chain of patriarchy. In-person interventions are difficult to scale, especially in a covid-ravaged world. More than 80 million underserved adolescent children in India have access to the internet and there is potential for a scalable technology solution to reduce gender inequality and inequity.

Solution

WeUnlearn has a bottoms-up approach to deal with gender issues and we focus on individual attitude and behavior change. As per a study by UNICEF, change at individual level is more effective in the short term and more sustainable in the long term. While a number of policy interventions have had a significant impact on both gender norms and the socialization process, relatively few focus at the individual level (Whiteford, 2013). WeUnlearn introduces young people to the ways in which gender is constructed in society and presents alternative gender roles to the norm. The solutions are guided by the 3Rs -

1. **Reflect:** Create awareness about harmful gender norms, attitudes and behavior in our society. Academic research is converted into bite sized info packets for easy consumption. WeUnlearn team develops fun, interactive content to help adolescents deconstruct harmful norms and get acquainted with the psychology behind certain behaviors.
2. **Realign:** Equip individuals with necessary skills like negotiation, persuasion, communication and building self-esteem to better align with people with opposing views.
3. **Recreate:** Attitude and behavior change through application enabled by solutions

WeUnlearn's focus is solving for gender inequity and the target group is underserved adolescent children including those who belong to families with income falling in the range of INR 10K – 30K per month. For these adolescents, an innovative technology solution - Wulu - which is an interactive chatbot to reduce gender gap by building awareness on priority issues and inculcating relevant skills, has been designed. Extensive field visits for 1:1 interaction with these adolescents to understand priority issues were conducted. Keeping the duration of the intervention in mind, the

goal of this research was only to assess whether there was any attitude change in adolescents after being exposed to the curated content. It was also decided that the medium of delivery for this content will be WhatsApp since it is a widely used platform and it gives us the opportunity to directly deliver our content to our target audience. The intervention majorly focused on 1. Raising Awareness and 2. Skilling (Negotiation/Persuasion/Communication) as a way to bring attitudinal change.



Picture: WeUnlearn team conducting field visits to understand priority issues of adolescent children

Method

Objective

To measure the effectiveness of Wulu in changing gender attitudes in underserved adolescent children in urban poor areas of Delhi

Sample

WeUnlearn's team used social media to get connected with multiple organizations that worked with adolescents in our target group. More than 10 organizations reached out to us to collaborate on the research project. Freedom English Academy (FEA), an NGO providing vocational education to underserved adolescents with branches across Delhi, who were willing to let their students volunteer for the intervention, was finalized. Adolescents would come to FEA branches after their school hours to get trained on vocational education. At FEA, each branch is run by 4 facilitators and 1 branch manager. Each facilitator is assigned one batch of students divided among morning and evening slots.

The sample consisted of students at FEA Delhi, adolescents aged 14-19yrs both male and female, from underserved backgrounds, having access to smartphones and a WhatsApp account. The students could also read/speak/write either English or Hindi or both. Even though the sample was taken entirely from Delhi, they were spread all across 26 urban poor centers within Delhi. The participants were not given any incentive to be a part of the study. The content itself provided free of cost acted as an incentive.

A total of 1200 participants were recruited for the study, out of which 1000 started interacting with Wulu. This further reduced to 891 as some participants did not meet the age criteria. In the end, a total of 652 participants (342 female and 310 male) were retained as the sample size after 26.82% of attrition. The attrition occurred primarily due to the technical difficulties with the communication platform being used (Glific). Additionally, some participants dropped out of the study due to reasons such as loss of internet connectivity, inaccessibility to smartphones during multiple days of the intervention and academic examinations. There were also some dropouts due to the length of the questionnaire, as mentioned in the limitations section. This led to the end result of 368 adolescents in treatment, 284 adolescents in control groups.

Design

A mixed method approach was deemed fit for the purpose of this study. For the quantitative aspect, a Randomized Control Trial (RCT) was used, wherein around half the participants were assigned to the treatment group and the other half to the control group. A quantitative measure of the attitudinal change in the adolescents was obtained through baseline and endline surveys. The control group only answered the surveys, whereas the treatment group was exposed to the 2-week intervention along with the questionnaires.

The scores on these surveys were compared to note the difference in their gender attitude pre and post exposure to the program within the treatment group. The change in the ideal response between treatment and control groups was also compared. The alpha value was taken as 0.05.

This was followed by the qualitative aspect through a focused group discussion with a few students from the treatment group. The responses of the adolescents to a semi-structured interview done in person post the intervention were analyzed, where their attitudinal changes were explored in-depth. The quantitative and qualitative outcomes were then combined to arrive at a holistic conclusion about the effectiveness of the program.

Tools used

An evaluation questionnaire was designed by studying the GEMS model (Achyut et. al. 2016) and consulting with experts. The questionnaires were deployed via the Wulu chatbot itself. The questionnaire was divided into 2 sections - 1. Demographics 2. Attitude change. The demographic section included questions on age, gender, location, number of siblings, father and mother's education. The attitude change section aimed to measure changes in attitude in gender stereotypes operating at home, peer groups, professional setting as well as change in attitude on body shaming and bullying. Each question in the attitude change section had 4-5 options ranging from the most ideal response to the least ideal response. Many questions had options in the form of strongly disagree, disagree, agree, strongly agree. While evaluating, the difference between responses of control and treatment groups for the ideal response was considered. A total score by adding all the instances where a participant chose the best answer was calculated. In addition, a semi-structured interview schedule was also created for the qualitative focused group discussions.

Intervention

Wulu engages with adolescents through automated messages via WhatsApp. The content consisted of video as well as text delivered in either English or Hindi. The main topics covered under the present version of the intervention was Gender Stereotypes and Bullying. On Day 1 all the participants were sent an introductory video along with the pre-test. From days 2-14, the participants in the treatment group were sent 1 video per day which they had to watch and then answer 2 questions to indicate their learning from the video content. The control group did not receive any intervention during this period. On the 15th day the endline survey was then administered on both the groups.

Through the team's extensive field visits with adolescents through the years and interviews done with government school teachers across India, the most pressing issues faced by underserved adolescents in the country were identified. Robust research in behavioral and cognitive psychology was used to design content addressing these pressing issues.



Picture: Adolescents sharing their priority issues during field visits

Implementation

The chatbot was created on Glific, a Whatsapp based communication platform being developed by Project Tech4Dev initiative of Chintu Gudiya Foundation (2021). Tides is the SaaS product built on top of Glific. ColoredCow, being a part of the core development team of Glific, runs Tides to provide setup, implementation and feature customization services specific to individual NGOs needs. With their support, Wulu was set up. Using automated messaging and content delivery, the participants received text messages and videos every day during the intervention. Structured flows were created for each day's content, including the questionnaires and this was sent automatically on schedule.

With the help of a flowchart-based conversation flow software in Glific, the conversation for each day's content was mapped out. Wulu's questions and responses were set up for appropriate user response collection that was either free input or condition-based. A few flows branched out into different bot responses based on the student's reply to the previous question. The bot has alphanumeric based conditions that would check the responses if required, wait for responses and delay the bot's message when necessary.

Natural language inputs were allowed, both in Hindi and English. The questionnaires had conditions on the acceptable answers while the daily flows had free inputs. The conversation was structured for each day's content but the language was kept casual and adolescent-friendly.

Procedure

The teachers at FEA who engaged with students on the ground were included as facilitators of the study. They acted as the medium for the offline communication with the participants regarding effective interaction with Wulu with each facilitator roughly managing 10-20 participants under them. A total of 75 facilitators were randomly assigned into control and treatment groups. They received training from WeUnlearn and in turn guided the participants on accessing the chatbot for the period of the intervention. They also kept WeUnlearn informed of any technical issues or dropouts. It was conveyed that the facilitators are not supposed to help the participants in their responses to Wulu.

After training and assignment of participants into control and treatment groups, the facilitators were asked to communicate to the participants to start interacting with the chatbot, kicking off

Day 1 of the study. An onboarding video to the adolescents on how to use and interact with the bot was shared. A Whatsapp group was created with all the facilitators. Facilitators were requested to send a link to the participants to initiate conversation with the bot as they already had WhatsApp groups with the participants. The participants were informed that Wulu was a computer program and not a human responding to them and that they should not send personal images or voice notes. While the Glific platform helped WeUnlearn monitor the participants who were engaged, the facilitators catalyzed the process by following up with the adolescents. Data collected from Glific was collated in GCP BigQuery to aid easy analysis using simple SQL queries. Data was cleaned using a set of methods involving Python and Excel. Bulk cleaning of data and structuring was performed using Python (aided by Pandas) and this semi-cleaned data further reformatted using Excel functions before quantitative analysis.

Ethics

The partner organization, FEA, gave informed consent on behalf of its students. WeUnlearn's interaction was limited to the facilitators of FEA and there was no direct outreach to the participants. Moreover, the stored data was encrypted in the database and was analyzed anonymously by the researchers.

Results

Participant Demographics

The median age of child was 17 in both groups [Figure 1]. The percentage of girls to boys was 53% and 47% for treatment (n=368) and 52% and 48% in control (n=284) [Figure 2].

Figure 1: Age wise distribution of sample

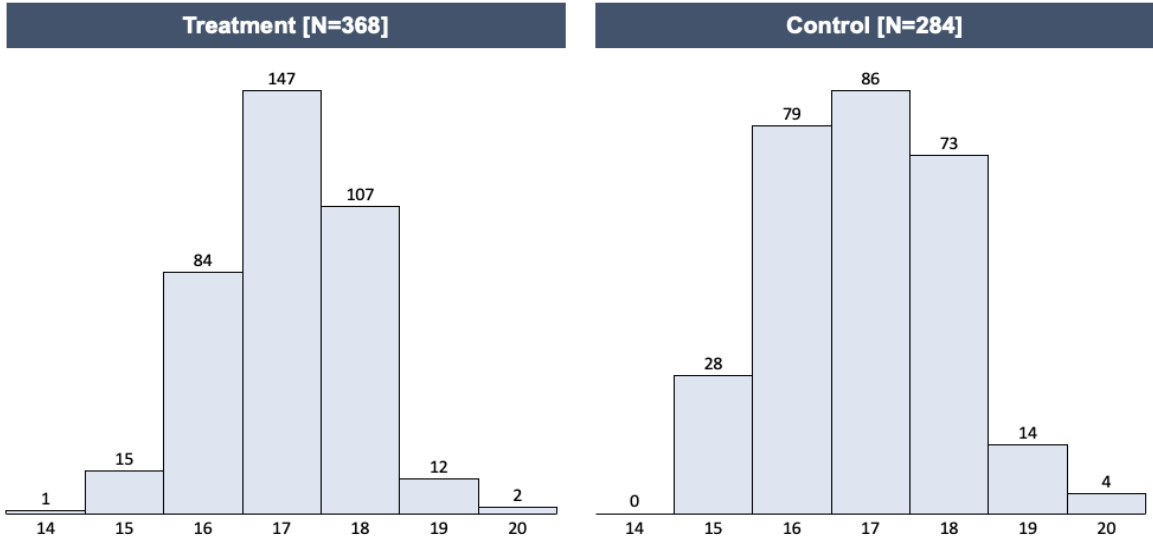
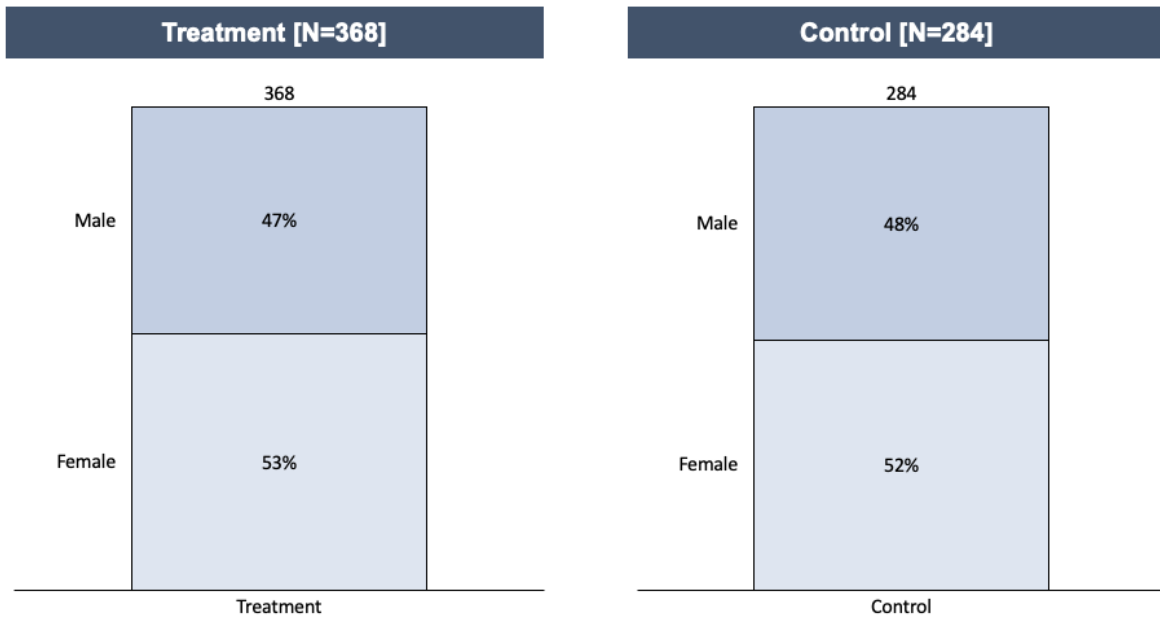


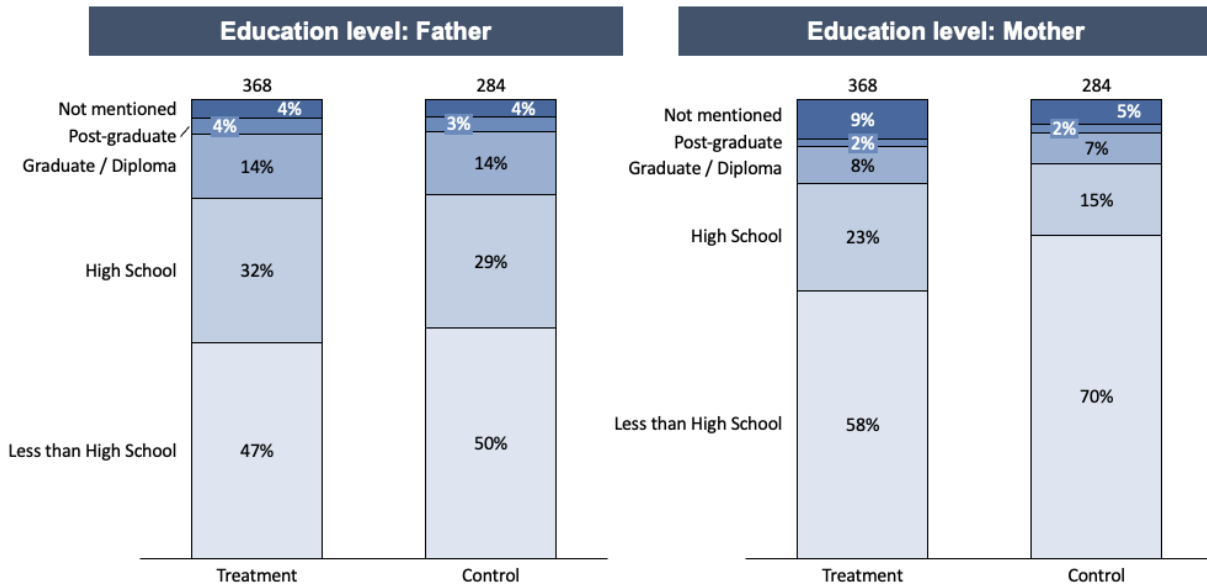
Figure 2: Sex wise distribution of sample



47% and 48% of the adolescents from treatment and control groups respectively had fathers with education level less than high school. 81% and 85% of the adolescents from the treatment and

control groups respectively had mothers with education less than graduate degree/diploma. However, control had 12% more mothers with education less than high school.

Figure 3: Sample distribution by education level of fathers and mothers



Attitude change

In a 14-day period, there was a 12.58% change in total scores in the treatment group. Overall, the change in attitude for girls was 14.79% and for boys was 9.42%, hence girls showed higher change than boys by 5.37% points [Chart 1].

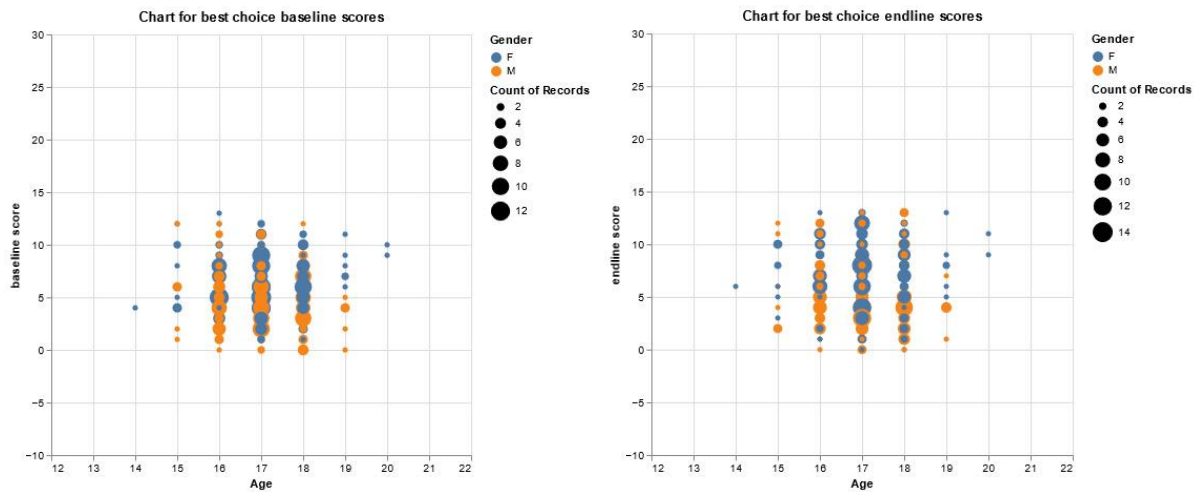


Chart 1: Charts showing distribution of total scores by age and gender

For the questions which measured gender stereotypes regarding academics, before the pilot 73% respondents felt that boys and girls had the same capabilities in subjects of Maths and Science, and after the pilot 82% felt that. The control group had a better result at baseline where 80% participants felt that boys and girls have the same capabilities and it dropped to 75% in the endline. The change is statistically significant as $p < 0.001$ [Figure 4]

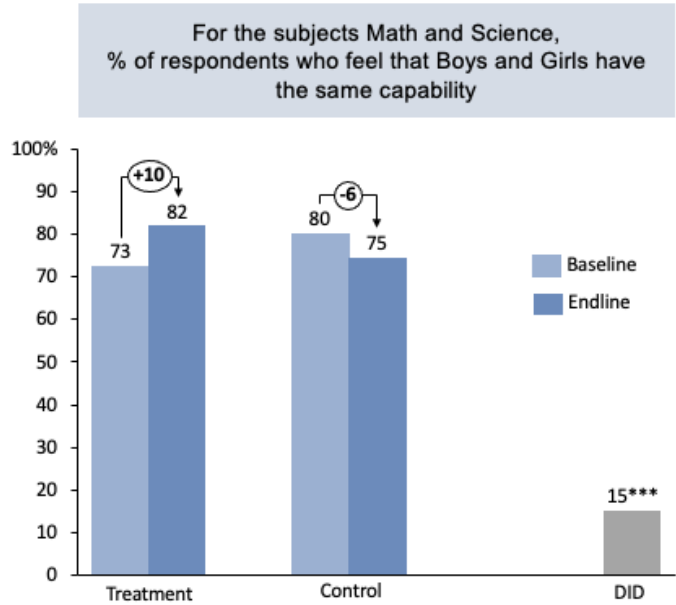


Figure 4: Attitude change for gender stereotypes in academics

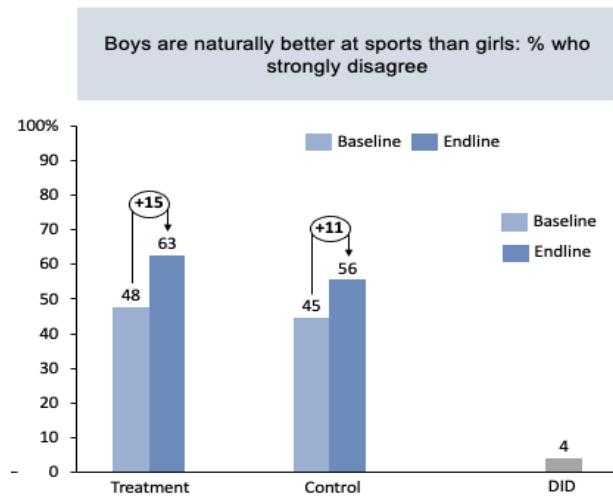


Figure 5: Attitude change in sports capabilities by gender

For questions regarding attitudes on physical abilities, and on whether boys are naturally better at sports than girls, the percentage who strongly disagreed in the treatment group changed from 48% to 63%. However, this change in the treatment group (+15) when compared with the control group (+11) was not found to be statistically significant as $p > 0.05$ [Figure 5]

For questions regarding gender stereotypes at home, 84% participants strongly disagreed with boys not sweeping/cooking at home, which increased to 89% in the endline. Similarly for the control group 79% participants strongly disagreed which increased slightly to 81% in the endline. While the difference-in-difference was higher for treatment, the change was not statistically significant as $p \text{ value} > 0.05$ [Figure 6].

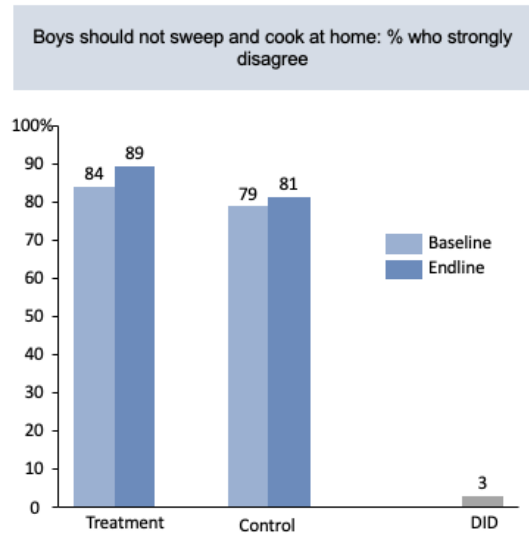


Figure 6: Attitude change for gender stereotypes at home

Regarding gender stereotypes on roles at home, 57% of participants strongly disagreed with the statement that women taking care of house and children is more important than their career at baseline, which increased to 60% at the endline for the treatment group. The control group had a higher change from 56% in baseline to 64% in endline who strongly disagreed with the above statement and this change was statistically significant as $p \text{ value} < 0.001$ [Figure 7].

For women, taking care of the house and children should be more important than her career: % who strongly disagree

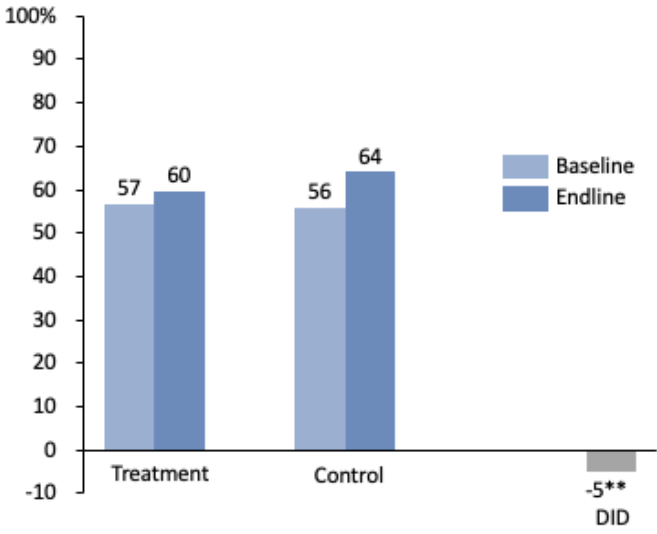


Figure 7: Gender stereotypes on roles at home - role of woman

Another question regarding gender stereotypes at home was on the role of man. 46% participants strongly disagreed that man is the head and provider of family at baseline which increased to 57% for the treatment group. The control group saw a change from 48% to 50% between baseline and endline. The Difference-in-difference between treatment and control was 8% points and statistically significant as $p < 0.001$ [Figure 8].

The traditional view that a man is the head of the family and responsible for providing economically for the family is still correct: % who strongly disagree

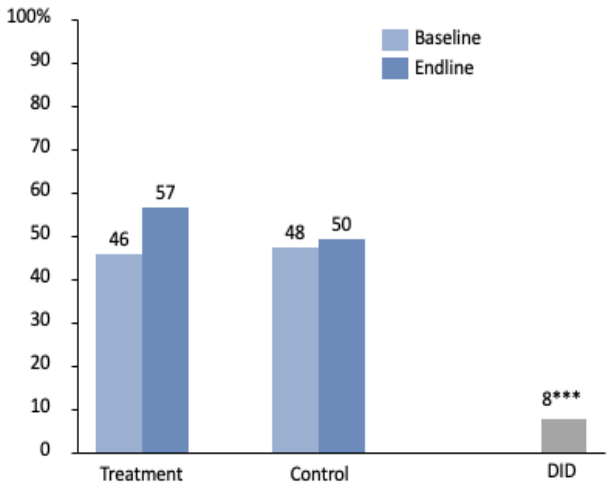


Figure 8: Gender stereotypes at home - role of man

Regarding questions on gender stereotypes by future potential, 74% participants strongly disagreed with the statement that money should not be spent on girl’s education at baseline which increased to 80% at the endline for the treatment group. In the control group, the percentage of participants who strongly disagreed increased from 76% to 81% from baseline to endline. The difference-in-difference was 1 percentage point and it was not statistically significant as $p \text{ value} > 0.05$ [Figure 9].

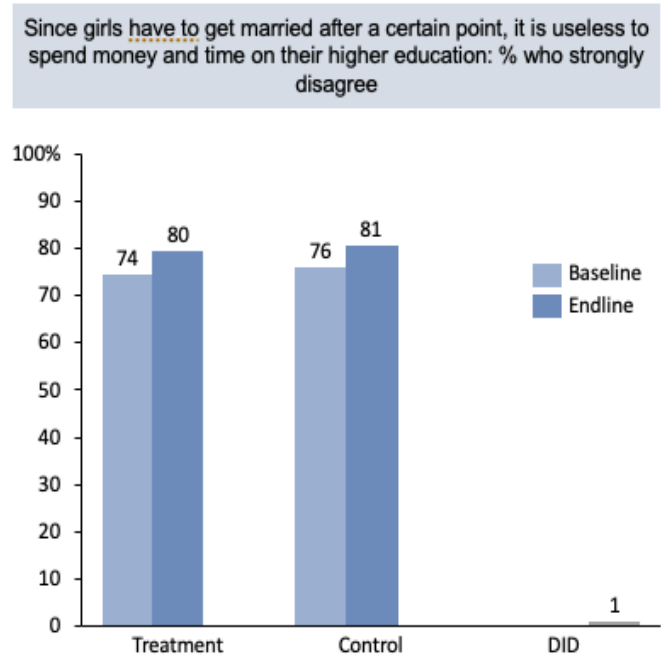


Figure 9: Gender stereotypes by future potential

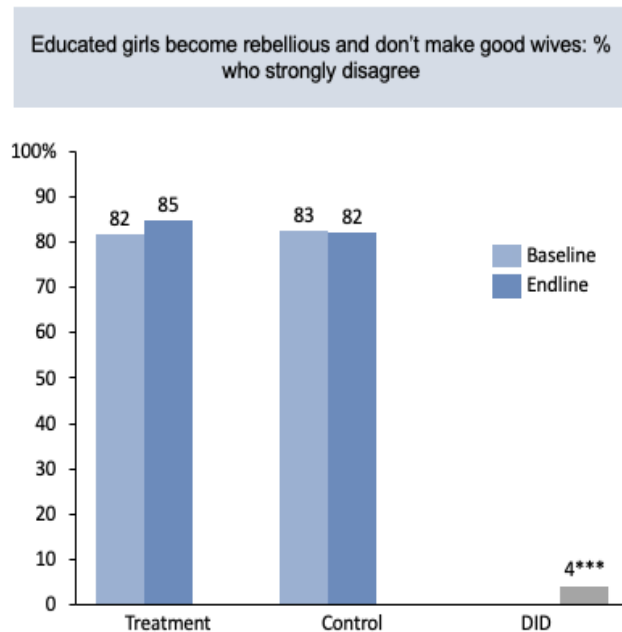


Figure 10: Gender stereotypes regarding girls’ education

Another question on gender stereotypes was on girls becoming rebellious and not making good wives after education. 82% participants in the treatment group strongly disagreed with the statement at baseline and it increased to 85% at endline. In the control group, 83% participants disagreed at baseline which decreased to 82% at endline. The difference-in-difference was 4 percentage points and it was statistically significant as $p < 0.001$ [Figure 10].

Another question asked to assess gender stereotypes was based on clothing. 75% of the participants in the treatment group strongly disagreed that it is strange when boys wear pink colored shirts at baseline. The percentage of participants who disagreed with the statement increased to 81% after the intervention. For the control group, the initial percentage of 73% of the participants who disagreed with the statement at baseline, increased to 77% at the endline. The difference-in-difference was 2 percentage points and it was not statistically significant as p value > 0.05 [Figure 11].

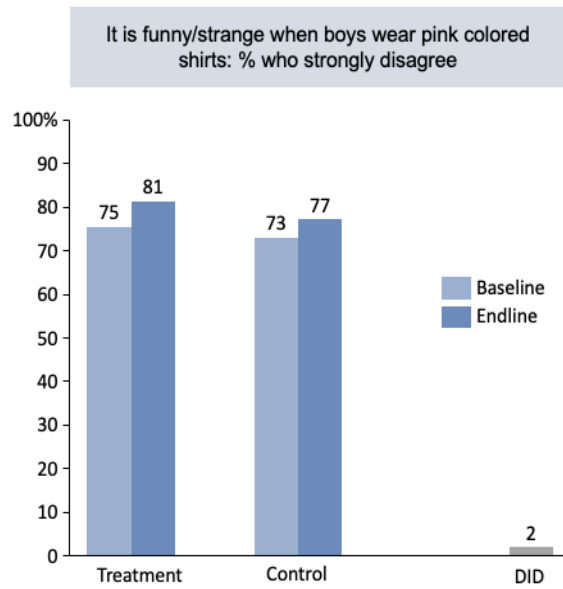


Figure 11: Gender stereotypes regarding clothing preferences

Another question on gender stereotypes was that short hair or “boy cut” doesn't suit girls . 83% participants in the treatment group strongly disagreed with the statement at baseline and it remained the same at endline. In the control group, 80% participants disagreed at baseline which increased to 82% at endline. The difference-in-difference was -3 percentage points and it was statistically significant as p value < 0.001 [Figure 12].

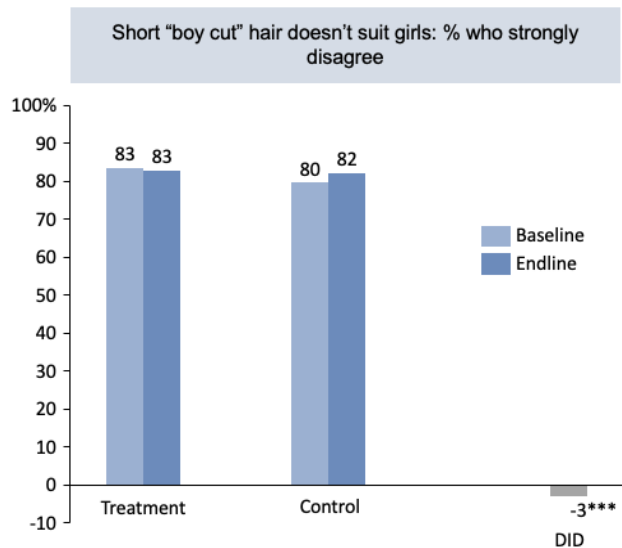


Figure 12: Gender stereotypes regarding hairstyle

On the topic of bullying, only 33% of the treatment group reported zero tolerance towards bullying behavior at baseline. This number increased to 35% at the endline. For the control group, 32% of the participants reported zero tolerance at baseline, however this number decreased to 27% at the endline. The difference-in-difference was 6 percentage points and it was statistically significant as $p \text{ value} < 0.001$ [Figure 13].

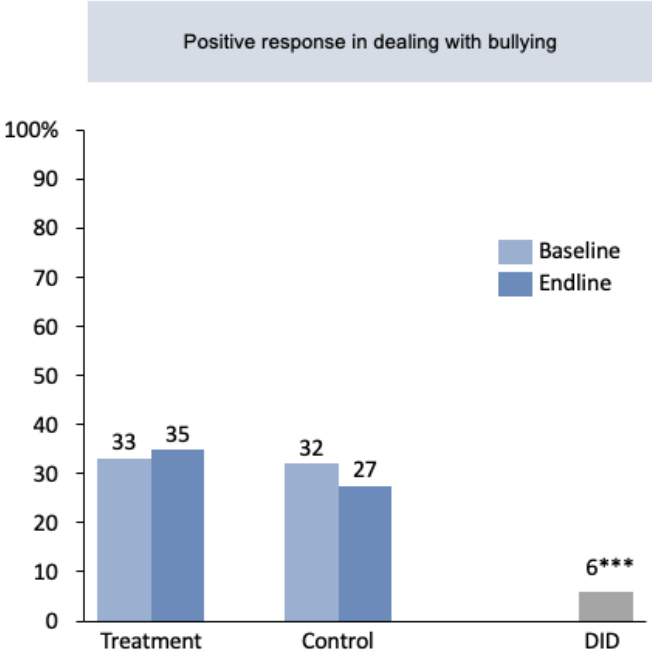


Figure 13: Response on how to deal with bullying

When asked about how the participants would deal with body shaming, 73% of the participants in the treatment group said under no circumstances is body shaming justified, at baseline, this number increased to 74% at the endline. For the control group, 78% gave the same response, this number decreased to 77% at the endline. The difference-in-difference was 6 percentage points and it was statistically significant as p value <0.001[Figure 14].

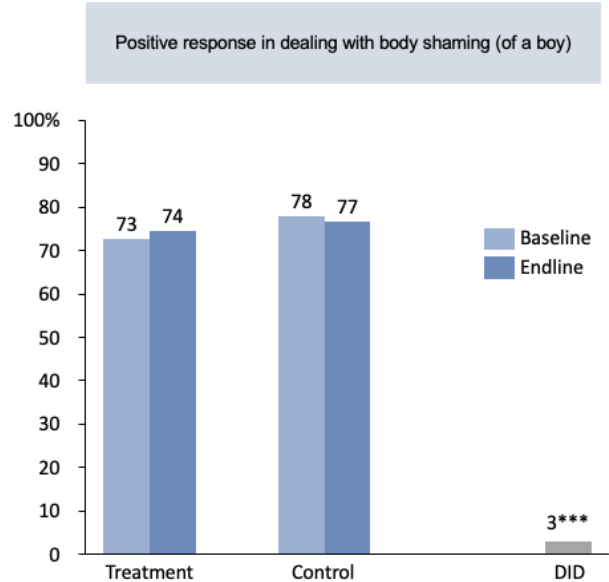


Figure 14: Response on how to deal with body shaming (of.a boy)

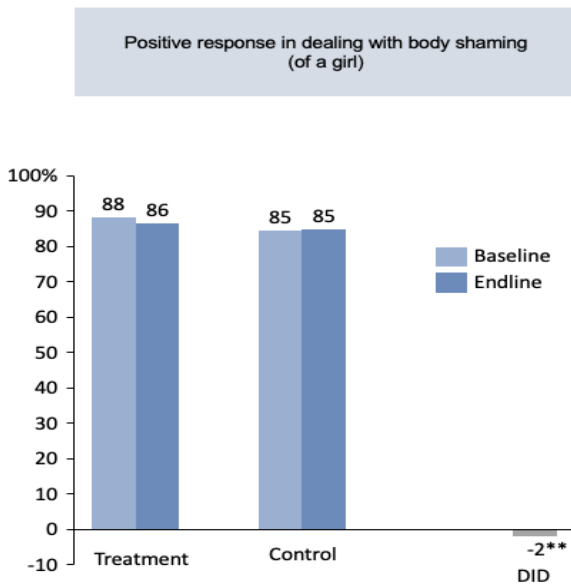


Figure 15: Response on how to deal with body shaming (of a girl)

When asked about how the participants would deal with body shaming of a girl, 88% of the participants in the treatment group said under no circumstances is body shaming justified, at baseline, this number decreased to 86% at the endline. For the control group, 85% gave the same response at the baseline and the endline. The difference-in-difference was -2 percentage points and it was statistically significant as p value < 0.001 [Figure 15].

About 90% of the adolescents had mothers with education till high school and less, and only 10% had mothers with education more than high school. Regarding fathers' education, around 82% adolescents had fathers with education till high school and less, and 18% had fathers with education more than high school [Figure 16].

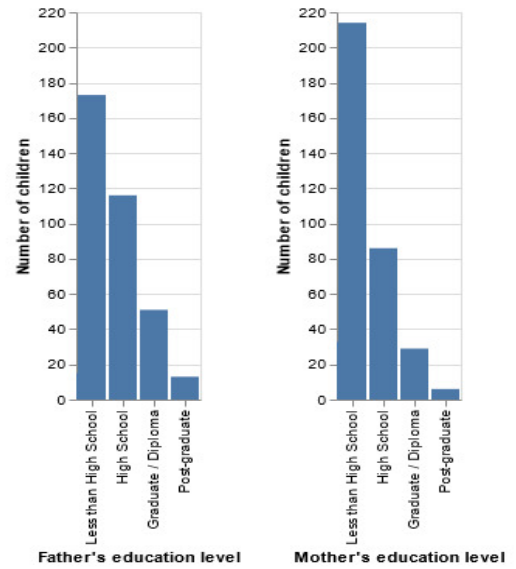


Figure 16: Distribution of sample by parents education level

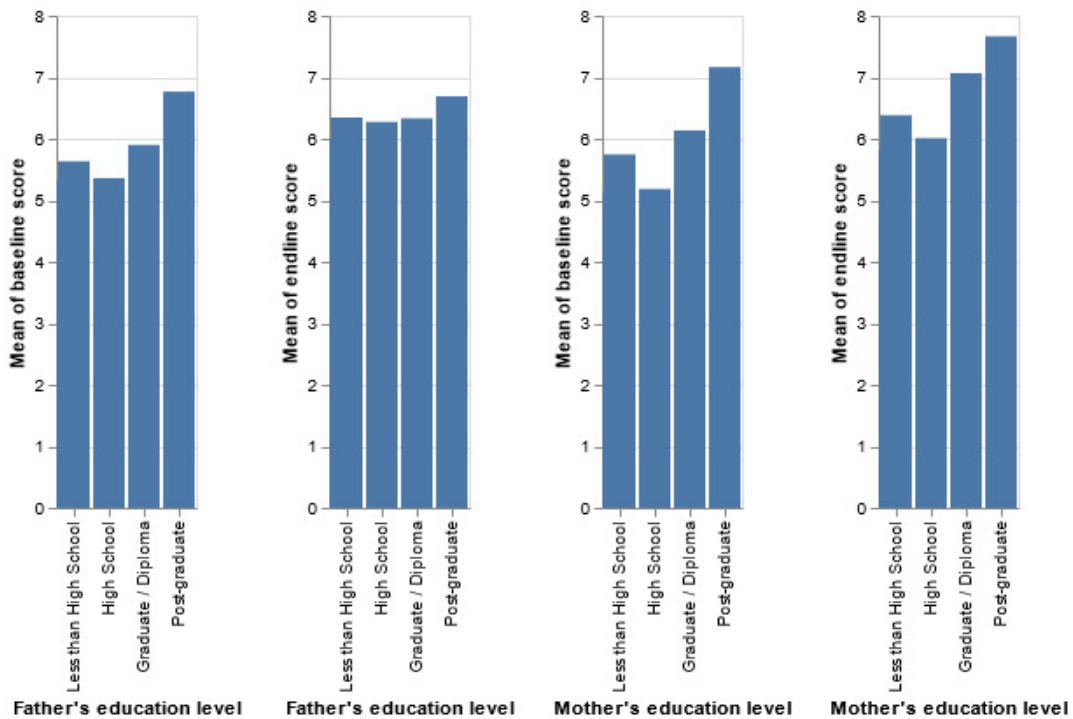


Figure 17: Distribution of scores by parents education level

Adolescents whose mothers have had education above high school showed a 85.71% change in their total scores between baseline and endline while adolescents whose mothers did not have beyond high school education showed 69% change. The difference was 16.71% point more for above high school educated mothers. Adolescents whose fathers have had education above high

school showed a 32.81% change in their total scores between baseline and endline while adolescents whose fathers did not have beyond high school education showed 79.24% change. The difference was 47.57% point more for below high school educated fathers.



Picture: Participants sharing their experience of using Wulu during research period

Discussion

Quantitative Analysis

In the current study the treatment and control groups were balanced with respect to male-female ratio of participants, age, and family education level. Within just 2 weeks, there was a positive shift in gender attitudes in the treatment group. Overall, the changes were significant in participants with educated mothers and in attitudes involving gender stereotypes on education, sports, profession, roles at home. There was also a positive shift in understanding and dealing with bullying and body shaming.

Demographic

In general more than half the participants across both groups had parents with education levels less than high school. Attitude change observed in adolescents varied with the education level of their mothers but not their fathers. A greater change was observed in adolescents whose mothers have had higher education (high school and above). The change in attitude was higher in girls than boys for all questions, especially on questions regarding male involvement at household level.

The strong correlation that completing secondary education shows with delaying age of marriage and pregnancy in girls (United Nations) suggests that education also leads to developing more gender equitable attitudes. Hence, it could be explained that educated mothers have more gender equitable attitudes and Intergenerational Transmission of gender attitudes (Moen et al, 1997) results in their daughters having more equitable attitudes as well.

Gender stereotypes on education

There was a positive shift in attitude regarding the importance of girl education and the stereotypes attached with educated women. Through modules in Wulu, adolescents were educated about gender stereotypes, especially in the academic setting. This change was observed irrespective of the gender of the participant.

Gender roles at home

While there was a significant positive change in the traditional view of a man being head of family, the attitudes regarding boys doing household chores or women moving beyond caregiving roles did not see much positive change.

Bullying and body shaming

There was a positive change regarding change in attitude to deal with bullying and body shaming. While the incremental change was highest in bullying, most adolescents across treatment and control had a positive attitude towards dealing with body shaming as well.

Gender stereotypes regarding appearance did not show much positive change. Most of the adolescents both in the treatment and control group believed that girls should not keep short hair. However, most adolescents thought that it was alright for boys to wear pink shirts. It would be interesting to investigate if this difference in acceptance depends on where the adolescent places a particular trait/behavior in the femininity masculinity spectrum.

Qualitative Analysis

Applying gender lens to problems

The participants in focus group discussions shared common challenges they face in their daily life. It was observed that even though the issues both girls and boys spoke about were a result of gender norms only girls recognized or presented it as a gender issue in the focused group discussions.

Girl's challenges were either in relation to boys - "teasing can be a good topic (to include in Wulu) because we see it everywhere, we can see a bunch of boys in the street or even out of school. They just stand to see some girls, and they comment or something like that", or boys were used as a comparison - "When girls wear shorts outside, they are judged and people comment on them, but boys aren't judged for wearing shorts. Which I think is the worst thing in our country, they just judge all the girls not the boys."

Boys shared problems under body image issues and peer pressure *"in teenage all the boys say we go to gym and take steroids and proteins and say it is physical fitness, but it's not. No one can explain physical fitness. This is like a craze, I go to gym and take my steroids and I'm fit but that's not a physical fitness"*. Even though they acknowledged the pressure on them to conform to the

accepted stereotypical ideal of being well-built, strong and muscular, they did not realize it was a result of gender role expectations.

Another challenge was boys being peer pressured into thinking alcohol and smoking is ‘cool’ and then becoming habituated to it *“I’ve seen that people go wrong way especially in our age. Because many friends of mine from my circle I’ve seen, that they were very nice, they were good at all the things like physical things. But now they caught one thing, once they fall in, now they are habitual of all this. Many people think that if they do that smoking they get a kind of ‘swag’, they say that if I can drink alcohol then I am very cool person”*.

Hence it was observed that boys did not see their problems in comparison or in relation with girls. When talking of peer pressure, they made no mention of how it might be easier for girls to navigate that particular aspect.

What participants liked best/their key takeaways

Most participants indicated that they liked the content on bullying the most. This is also supported by the greater positive shift in attitude under questions regarding bullying as observed in the quantitative data. When speaking about the content on bullying, participants stressed on how they finally learnt how to label it correctly *“helps to increase vocabulary...in my past I don’t have knowledge about bullying”* and learnt the extent of harm it could cause - *“So actually it is a very bad thing, can make everyone cry and can make a person to commit suicide”*. This sentiment was expressed by multiple participants.

Being able to see and understand immediate measurable changes drove home the seriousness of the topic and hence facilitated greater attitude change. Breaking down the content on gender stereotypes in the same manner and giving them clear takeaways might aid in better understanding of the topic. Boys asked WeUnlearn’s team to include topics on personality, communication skills, career guidance which are more immediate concerns for them, rather than topics on feeling financially pressured to support family which were more long term in comparison. It was also observed that boys were more likely to discuss feeling pressured about achieving a muscular body type, using alcohol and cigarettes to maintain social status. Using these examples and instances would be important to build the understanding that their problems too are a result of gender stereotypes.

Few girls mentioned that they could “*relate to the didis (elder sister)*” as the problems our content creators spoke about were commonly faced by adolescents but were hardly addressed- “*Thank you for making video on topics, that are so common and no one is talking about it, love this and make more videos*”, “*Wulu is providing us with the general knowledge question which is related to our daily routine and which is very important*”. When asked further on whether they ever talked about bullying before our intervention, and whether they thought it was important to talk about it, the participants displayed a level of awareness where they understood bullying but did not have the right terms to be able to label it correctly. Nor did they understand the nuances and the extent of harm it could cause before our pilot - “*So when I first learnt about it I was in very short age, I just know basic but now I know about what is bullying. In daily life also we use the same word.....but now we are aware, we will not do the same thing*”.

After watching the videos some participants realized that they were being bullied, whereas some admitted to realizing that they were being a bully. A boy said that he used to abuse his friends in his circle about their appearances but stopped after he learnt that it was bullying. He further suggested that “*nowadays people know what to do but don’t know how to implement it in their lives - so if there could be a topic that covers that*”. This was amplified by a lot of other participants and there was willingness to change for the better. They also sought ways to implement this knowledge gained in their lives. This data reinforced WeUnlearn’s theory of change model and the need to compliment attitude change with skills, tools, and actionable content to drive behavior change.

However, one of the participants after seeing the video realized that her brother was bullying her, and showed Wulu’s videos to him. She said he now “*knows in which way he was wrong*” but didn’t stop “*because if you are doing something to him, he will not stop, he will always bully you. Either you can teach a lot of lessons, or scold him, beat him, but he will not listen.*”

This illustrates that while attitude change might automatically follow behavior change for some adolescents, for others it might be a tough habit to break even when they know it’s harmful. There is a need to better understand the barriers to change to develop content directed towards behavior change.

An interesting observation was of participants admitting to using a different tactic to respond to bullies after watching the content videos. One boy shared his story of being used to either not engaging or ignoring people who bullied him earlier, however post the research study, he bombarded the bully with abundant information to leave them confused which resulted in the bully not bothering the boy. It points to the fact that different participants when engaging with people will use strategies which vary in amount and duration of effort. They might not want a long term or permanent change but find other ways to dissipate the problem.

A participant mentioned liking the use of movie dialogues and scenes to explain our content in the videos they were shown. Another point she found humorous was the use of an alien to explain the formation of gender stereotypes. The use of such examples makes the content more engaging for adolescents. Another participant liked the video of a boy who wanted to be a belly dancer and broke stereotypes to pursue what he wanted. A short video clip of only a few seconds in duration standing out in about an hour of content suggests that exposure to counter-stereotypical role-models is impactful. It is in line with research which suggests that this exposure also leads to reducing gender stereotypes (Frontiers, 2018).

Regarding positive role models, a participant shared that he initially thought bus drivers could only be men but after coming across 2 lady bus drivers his perception changed. He said- *“So I don't think we have any work in this world which is only for men or only for women”*, which is the message we wanted to give through our videos on gender stereotypes. Another boy acknowledged this intended takeaway when he said *“I learnt that don't differentiate between girls and boys, because it's an equal division between girls and boys, because girls also do same works as the capability of the boys”*.

Participants shared that Wulu's videos were short but filled with new knowledge. They mentioned losing interest when videos are *“too long”*. Hence, Wulu will continue to maintain its current video length of 5-10 mins for each content piece in the future.

The participants pointed out that the people who delivered content in the videos had good pronunciation and vocabulary. *“I first thought wulu was “ullu” (English: Owl) but learnt it's correct pronunciation - realized there is so much more to learn here”*. Such factors were not accounted for and perhaps good vocabulary helped build credibility. Moreover, as English is not

the first language for these adolescents, good vocabulary is perhaps an aspiration. Research by Hovland, Janis and Kelley (1953) found that communicators who were perceived to be likeable and credible - experts in the topics they were addressing - were more persuasive than those disliked or perceived to lack expertise.

An unexpected positive consequence of Wulu's content was when the participants shared the videos with others in their community unprompted. One of the girls mentioned that even though they had one device, both her brother and her watched the content and answered the questions that followed it. Participants willingly choosing to use it together makes it interesting to explore how we can leverage Wulu for collective learning sessions in places adolescents might not have access to a device to themselves. This resembles the principles of Hole in the Wall interventions in India that use minimally invasive education techniques. Their first experiment in 1999 demonstrated that children, coming from any background, can learn to use computers on their own without any formal training. Their findings show that if one child learns how to use a mouse and work the computer, other children watching him/her will also learn the same. Hole in the Wall intervention has since used this insight to help thousands of children across India. In our research we found a similar ripple effect of learning in participant's communities. Hence, there is indication of an even greater than anticipated reach for Wulu and increased usage possibilities.

One girl mentioned showing Wulu to her brother who bullied her and other participants mentioned recommending it to their cousins, siblings and friends. A boy who was a tuition teacher for other children in the age group 14-18 years shared that he saw Wulu helping his students understand topics like harassment, experiences of which they often did not share with their parents or older adults. An interesting phrase he used was "*they are just bullying themselves by their own*" which brings to light how often people are their own bullies. WeUnlearn would like to address this aspect of bullying in our further pilots.

WeUnlearn also recognized the need to create safe spaces and have appropriate mental health support for students to share experiences of gender-based bullying, harassment, molestation which adversely impacts their mental health at a critical age of development. In the future, WeUnlearn will work at the intersection of gender and mental health. By solving such gender-based problems - reducing gender stereotypes, making attitudes more gender equitable, inculcating skills and tools

to act on these attitudes, it will be possible to address the mental health problems they contribute towards.

The realization of having been bullied or having been a bully through Wulu might need a space where such issues can be addressed with professional support. In future, WeUnlearn will work towards prototypes that integrate mental health support and also empower its users to create such safe spaces for themselves in their community with their peers.

Participants' understanding of technology

One of the participants shared how they explained Wulu to their cousins. In order to build curiosity they recommended Wulu as *“an application that you use and you will get automatically reply from that, without...”*. This highlights what a technology solution means to the target population. Additionally, it indicates a simple way to explain Wulu to a community of underserved adolescents to whom these solutions are new and exciting.

Other participants showed similar limited understanding of the technical aspects of Wulu. They initially thought that since their class teacher was acting as a facilitator she was also the one behind a device and manually sending them messages. When their teacher clarified to them that it was not her and was *“all technical”* their perception of the bot changed but they were still confused about the details of how it worked. One of the girls said *“I just wonder how it is working, then I got to realize it is just a JAVA program and we are contacting through program”*.

Despite the confusion there was an excitement they showed at being exposed to something new- *“first we thought Wulu is person, then once we started we got to know that Wulu is a machine, we were very much excited that how a machine will reply us.”*

When asked further about whether the idea that a machine was reading their answers worried them, they showed no qualms and said *“no we just thought we are talking to a robot”* which indicates some level of comfort with the privacy it afforded them. They were mostly open and curious to interact with Wulu and enjoyed the experience despite some technical problems in the beginning.

Hence, perhaps technology only limits functionality in an underserved population but does not act as a barrier or hamper motivation.

Limitations

Questionnaire dropout

Baseline and endline questionnaires were administered through Wulu on day 1 and day 14 respectively of the research study. These questionnaires led to many dropouts. Receiving a list of long questions one after the other and which required cognitive effort to answer might have reduced their interest to continue. There is a need to either reduce the length of the questions, to space it out, or to prepare them mentally to engage for longer durations on the first and last day, in order to prevent dropout. Alternatively gamified methods of asking questions might help in keeping them engaged. Some participants dropped out just before the penultimate or last question. Knowing the maximum number of questions before they start might help them mentally prepare to answer all and not leave them anticipating for the questionnaire to end.

There was a suggestion to make the questions in the baseline and endline simpler. Since the questions were designed to measure gender attitudes, a lot of them were situation based and hence had multiple sentences to explain the context. It also required consistent cognitive effort on the participant's part. One way of taking their suggestion into consideration would be reducing the length of the questions so that they are easier for the participants to comprehend. Switching the order of the questions to include a mix of short and long questions might also reduce the effort for the user and hence make it seem simpler. It may also help reduce dropout rates significantly.

The feedback on the check-for-understanding questions that were asked after the content videos was the opposite. A few participants felt that some of those questions were simple enough for them to be able to answer correctly even if they hadn't watched the videos- *"Because they were very common questions and we are aware of things and we are seeing these things"*.

Social Desirability

There is also a need to check and solve for social desirability. When asked what they thought of answering the same questions on day 1 and day 14 one participant showed an understanding of the objective of the questionnaire- *"what I think is that it is showing us the improvement that in the first day and in the last day if we have the same ques, then how we understand the topics and how we can answer the questions"*. This desire to give answers which were in line with their perceived objective could have influenced the answers the participants gave.

It is also important to understand how the questions should be framed so that the students select answers based on their understanding rather than what should be the right answer. For example, on questions regarding dealing with body shaming, gender stereotypes regarding hairstyle, more than 80% of the participants already chose the best answer at baseline and hence there was little room for improvement and to measure actual impact of intervention.

Design

A limitation in design that needs to be addressed is giving the participants more space on the bot to elaborate their answers as they felt restricted in their expression - *“there were answers that were yes or no, but we need to write more, in paragraph”*. Children kept coming back to chat even after the day’s content was over and they wanted to establish a personal relationship with Wulu. However, Wulu is yet to evolve to be able to respond to friendly messages and build a trusting relationship. There is also a need to understand more about what changes are required so that the content is more appealing to boys to be able to change their attitudes.

No follow-up data

Not scheduling a follow up questionnaire meant that we could not observe whether the recorded attitude change was long-lasting. Further pilots could design for spaced out check-ins to observe how long the attitude change lasts when the participants are not exposed to any new content after the intervention.

Potential risk in half knowledge

Adolescents indicated behaviour change as a result of awareness. Considering that some participants shared a few videos with their peers, and that there were dropouts, it is important to make sure that the half-knowledge some adolescents are left with does not harm their relations with their family or peers. It is important that they act on their knowledge only in a safe environment and when they have the appropriate tools and skills to navigate the situations.

Learnings and Future Directions

Nuances of the Problem

A more nuanced understanding of existing problems addressed through Wulu was gained. A participant used the word teasing while describing instances of harassment- *“Teasing can be a good topic (to include in Wulu) because we can see it everywhere....can see a bunch of boys in street or even out of school. They just stand to see some girls, and they just comment or something like that, that’s what they want to do...and once we didn’t reply but same thing that they always repeated day by day”*. The participant did not know how to label the problem correctly which served as an impediment to identifying and expressing the seriousness of it. Hence the need to continue having content which equipped them with the vocabulary to label these experiences was reinforced by their statements.

The repetitiveness of the problematic behavior was also observed. Boys behaving in such ways in groups will be even harder to address because of peer pressure. The scenario described also resembles one commonly seen in Bollywood movies, hence diving deeper into the role of media and how it affects their gender stereotypes might give us better insights to help counter it.

Wulu also needs to include tools and steps to break the cyclical nature of bullying - *“ There is a problem that if you want to change, people bully you. And then if you are not bullying them.....they keep doing it. So you have to bully them to fight back, so it is a cycle.”*

Role of family

Strong ties to family members brought forward the role of family - *“he said about we need to change ourselves, we need to change ourselves but not become rude. Our family members feel bad if we are rude. We need to prepare ourselves, but don't make others feel like you are changing.....Because such type of things happen in our generation, where we all are busy in our life.....sometimes we come back and taking our mobile and chatting and our parents are sitting in front of us and say what are you doing. We need to talk with parents also, we need to take time with parents and family members. They feel we have completely changed, you come home and are in your mobile chatting you do not play with us talk with us.”*.

The statement quoted above also displays some dissonance in knowing change is important but having difficulty showing or accepting that change in front of their family. Guidance is needed in navigating these feelings in a healthy manner.

It is important to make sure the content and awareness through Wulu's interventions does not deteriorate adolescents' family relations. The flip side to consider would be whether despite an attitude change, adolescent would refrain from behavior change to avoid disrupting the status quo or causing conflict in their home environments.

Identity of Wulu

Adolescents tried to relate Wulu - a new word and entity - to previous knowledge or their first language. A participant when talking about Wulu assigned it a gender - *"I also think like that but Ma'am has told us it is technical. In starting I thought Wulu will tell us about only bullying, but HE told us about many things which I realized and which I do in practical also."*

It would be interesting to explore whether making assumptions about the identity of the bot guides or influences the way adolescents interact with it. Would it be better for to leave it up to the users to give the bot an identity based on what they like, or is it better to establish a fixed identity which ensures uniformity in understanding before they start interactions? Another question which arises here is that why did the participant assume the bot was a "he" despite all content videos featuring women who explained concepts. Could it be because they associate technology with males or was the use of "he" insignificant?

Work on mental health

Gender norms impact adolescent mental health in prominent ways. Hence, it is important that interventions that aim at transforming gender norms also focus on understanding the extent of and alleviating mental health toll on adolescents due to gender norms.

Conclusion

WeUnlearn's technology solution, Wulu, aims at reducing gender inequality and inequity by building awareness on priority issues and inculcating relevant skills in underserved adolescents in India. An RCT was implemented to test Wulu's curriculum on bullying and gender stereotypes with a sample of around 1200 children in urban poor areas in Delhi. Results show statistically significant changes in attitudes concerning gender stereotypes and bullying. Girls responded more to the content than boys. Children with mothers whose education was more than high school showed greater change than mothers with less than high school education. Attitudes regarding boys doing household chores or women moving beyond caregiving roles did not see much positive change.

Focused Group Discussions also reflected the effectiveness of content in changing attitudes towards priority issues. The research study helped WeUnlearn's team understand the nuances of the priority issues better to improve future prototypes of Wulu. It highlighted the role of family ties, the importance of the identity of chatbot for interaction, and the need to create a safe space and solve for gender-determined mental health issues as well.

Going forward there is a need to further build Wulu's curriculum to include more priority issues and methods to also impact behavior change. There is potential to build a longer intervention to evaluate whether change in attitude and behavior stick. It is important to carefully analyze the intended and unintended consequences and plan accordingly. Wulu has the potential to become a trusted friend of adolescent children in India. In the future, translation into multiple vernacular languages to help Wulu effectively scale up.

About Research Study and WeUnlearn

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WeUnlearn's team was engaged in designing and implementation the research study. Agastya Dev, Bhavya Jha, Diya Agarwal, Nivya Raghu, Meghna Chaudhury, Tanaya Dube are part of the WeUnlearn team involved in the research study.

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