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Artificial Intelligence (Ai) For Adolescent Health: A Case Study Of Bol Behen Whatsapp Chatbot

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ABSTRACT

Artificial intelligent (AI) chatbots used on social media applications for health communication have created an atmosphere where the advancement of society's future is dependent on technological developments. The United Nations is exploring the prospects of social media to advocate and accomplish the seventeen Sustainable Development Goals (SDGs). India, one of the mobile-first countries, where smartphones evoke popular media and raise awareness of healthcare issues, has inspired young Indians to find solutions for their daily struggles. The advent of inexpensive and easily available mobile-based social media applications like WhatsApp has become an important channel for health communication. Artificial intelligence-powered mobile chatbots possess the capacity to understand languages beyond pre-programmed instructions and generate responses using the existing information in the system. This allows users to proactively communicate their motives in their own words, speeding up interpersonal communication. The non-profit Girl Effect and WhatsApp designed the Bol Behen (Speak Sister) Chatbot to cater to Hinglish (Hindi and English) speaking young women about their general and sexual well-being. To explore the stages of user behaviour change during interactions with a chatbot, a thematic analysis was conducted based on user interviews and was further guided by an integrative transtheoretical model of change proposed by Prochaska and DiClemente (1983). These stages included the user's interaction communication process through technology design, user engagement, content, and interface design. The study also provided insights on the challenges related to AI chatbots, like data privacy and accountability, in light of its links to the theory of technological determinism.

Keywords*:* *Smartphone, AI Chatbot, Adolescent Health, Bol Behen, WhatsApp*

INTRODUCTION

The Sustainable Development Global 2030 Strategy for Health has laid out an action plan to improve adolescent health by addressing SDG 3 that ensures healthy lives and fosters wellbeing for everyone, regardless of age (UNICEF, 2016). Investment in adolescent health with the help of technological advancements like social media applications and artificial intelligence is essential to achieving the 17 SDGs, which are considered to be the plan of action in empowering youth and promoting sustainable development (United Nations, 2024). The emergence of Web 2.0 has led to an extensive use of interactive media content available on the web. The first stage was Web 1.0, which included static websites designed for user viewing and rarely updated. The Web 2.0 stage introduced social media and mobile devices that enabled interaction among users, remote access to the Internet, and device geographic location monitoring. Praful Bharadiya, (2023), argues that AI is a key technology of the digital era, which is creating opportunities for the advancement of Web 3.0 technologies through its ability to enhance intelligent communication. Web 3.0 is the subsequent phase in the evolution of the internet, characterized by decentralized frameworks and interconnected peers (Lupton, 2014). New media technologies, like smartphones, artificial intelligence, and social media applications, have digitized social relationships, knowledge creation, business execution, and governance. The research provides an insightful case study analysis of the Bol Behen (Speak Sister) chatbot, which was designed by the Girl Effect and WhatsApp to cater to Hinglish (Hindi and English)-speaking young women about their general and sexual well-being. Adolescence is the origin of many major disorders that can affect adulthood. Adolescents commonly face mental health issues, and other problems because of lack of knowledge. These health challenges include; teenage pregnancies, sexually transmitted infections (STIs), physical abuse, nutritional deficiencies and they often stem from not having adequate awareness (Sihag & Nagal, 2023). Therefore, it often becomes challenging to address such issues that require comprehensive sexual reproductive health related education to propagate health communication channels to promote healthy living and avoid long-term illnesses. In order to ensure the health of future generations, adolescent girls' reproductive health is essential. However, because of the stigma and shame that come from subsets of patriarchal mindsets, adolescents aren't able to access the correct information. In the times of big data, fake news, and information overload, it is too troublesome to receive the right advice and facts related to health. Today's digital world involves collecting massive amounts of data through social media. The digital world captures our actions and purchases in real time while surfing the web, participating

in online discussions, or using our smartphones. India, as one of the leading mobile-first countries, has successfully utilized mobile phones as a means to promote popular media and increase exposure to healthcare issues. This has effectively engaged young Indians in seeking solutions to their daily challenges. The advent of inexpensive and easily available mobile-based social media applications like WhatsApp has become an important channel for health communication (Maitra & Rowley, 2021). The study uses Technological Determinism as its theoretical framework. It builds on Veblen's (1921) basic idea and McLuhan's technological determinism through media to look at how AI chatbots can help adolescent girls change their behaviour when it comes to sexual and reproductive health (SRH) and an integrative model of behaviour change (Prochaska and DiClemente, 1983) to understand the progression of user behavioral transformation. The inclusion of technology in health communication symbolizes a new way of thinking. Social media platforms provide dynamic spaces for conversations and solidarity. Mobile apps and artificial intelligence provide individualized self-care tools. Digital platforms have the potential to create a global network for fostering online spaces for providing credible information regarding personal and sexual wellbeing.

RESEARCH QUESTIONS

1. How can adolescent health benefit from mobile-based AI chatbot technologies?
2. How application of AI chatbots lead to user behaviour change?
3. How does a chatbot interact with humans?
4. What are the hurdles a user may face while using an AI chatbot?

RESEARCH OBJECTIVES

1. To understand the pros of using AI chatbots for improving adolescent health
2. To assess the ability of an AI chatbot to change human behaviour using interpersonal communication
3. To comprehend the process and flow of an AI chatbot- human conversation
4. To describe the challenges of using AI chatbots?

Literature Review

Smartphone & Adolescent Health

India possesses an adolescent population that covers the country's major demographic makeup. Adolescent girls and boys alike lack basic SRH (Sexual Reproductive Health) education. However, according to Saha et al., 2022, this gap widens in case of adolescent girls are more susceptible to detrimental social conventions that affect girls' value and transfer them into the shackles of reproductive health risks due to gender-based norms because of limited access to media platforms, mainly in rural areas. Martino et al. (2016) states that adolescence is a time when people are transitioning from childhood to maturity. During this phase, significant biological, societal, cultural, and economic developments take place that prepare people for society. Studies also emphasize how essential it is to evaluate the key role of technology to enhance outreach and education efforts, especially through Social and Behaviour Change Communication (SBCC) strategies (Singh & Nayak, 2015; Srivastava, 2016; Johri et al., 2020). Such strategies can aid in bridging health communication gaps to deliver information according to the age of the target groups with content that engages and resonates with the mindset of youth. Today's generation is born with smartphones in their hands, as if they have become extensions of their fingers as argued by McLuhan (1964) about how media has evolved into a manifestation of human capability. The COVID-19 pandemic and online schools mandated the use of smartphones for school-going children, who previously only received phones for safety or recreational purposes (Rajendhiran et al., 2023). Mobile media offers stable communication capabilities, including mobility, accessibility, geographical location, and multimodality (Schrock, 2015). Mobile health technology, or mHealth, is the cost-effective use of mobile phones to facilitate public health practice. The term "eHealth" encompasses artificial intelligence, tele-health, telemedicine, mobile health, and other mobile technology-based treatments. Mobile health increases the effectiveness of work by providing precise information and lessening the need for manual documentation (Kandpal et al., 2022). For instance, the rise of mobile apps for mental health has revolutionized the way people care about their mental well-being. These apps provide tailored resources for self-examination and emotional support, including mental state monitoring and meditation instruction. Furthermore, some apps use artificial intelligence to provide targeted solutions. A study on the impact of digital interventions on adolescents' health revealed that they are frequent users of mobile social media, making them an ideal target for promoting health and physical activity via mobile phones. Intervention by a moderator in mobile health adds interaction and makes it a peer

activity (Aschbrenner et al., 2019). The aforementioned study suggests that mobile phones can encourage behavioral changes in adolescents through the use of a catalyst, which could be human or human-like, and in this case, a chatbot. Mobile health interventions are device-neutral and cross-platform. The device's extensive availability and compatibility with all web browsers, as well as access to the Internet and emerging technology like artificial intelligence, make it desirable to offer behaviour change towards health practices (Reddy et al., 2021).

Deciphering Core of "Artificial Intelligence"

John McCarthy was credited with originating the term "artificial intelligence," which refers to non-biological intelligence characterized by computing systems, data, and goals (Palomares et al., 2021). Machine intelligence, or artificial intelligence, can be understood as a device's capacity to perceive and comprehend its surroundings and respond appropriately to fulfill the tasks assigned to it. AI also encompasses situations where machines can mimic human minds in terms of knowledge acquisition and comprehension, thereby aiding in task resolution (Rong et al., 2020). AI has the potential to generate significant beneficial impacts on society. We employ machine learning to enhance services and streamline decision-making processes. AI technologies can interact through a diverse means, including human interactions and content creation. Voice assistants, such as Amazon's Alexa, provide responses to inquiries and commands made by humans. Bots mimic human conversations on social media, influencing the tone and content. These technologies function as communicators, a role traditionally limited to the communication discipline to establish a connection between humans and machines for a purpose (Guzman & Lewis, 2020).

Harnessing AI Chatbot's Potential for Social Impact

Vinuesa et al. (2020) states that an expanding number of industries are now being developed using artificial intelligence (AI). As an instance, it has been projected that AI would have an impact in various sectors, including climate change, equity and healthcare. Amidst several technological advancements, AI represents a relatively recent endeavour for humanity as a whole. It possesses the potential to address problems that might enhance efficiency, foster innovation, and enable the creation of equitable and ethical communities, guided by rules and sustainable development.

AI has the ability to rectify cybersecurity attacks, businesses have discovered numerous possibilities in areas like automatic trading choices, machine assisting automobiles, adaptive customer support, and smart virtual helpers (Truby, 2020). The COVID-19 pandemic also opened doors for the use of AI in healthcare using chatbots during lockdown by introducing apps like Practo to facilitate physical checkups and consultation with the doctor, keeping a track of COVID -19 cases and updating the statistics through apps like ArogyaSetu (Mahdavi et al., 2023). Chatbots are artificially intelligent agents that provide information and services with the help of natural language interfaces for users. In simple words, a chatbot is an AI program that chats with the users through varied forms that include text messages, voice notes or avatars. Chatbot is a term procured from the word, "*Chatterbot",* given by Michael Mauldin in 1997, defining them as virtual assistants that give responses to human cues in the form of natural language texts (Deryugina, 2010). Eliza, the maiden chatbot, was created by the AI Lab at MIT. In 1966, Professor Joseph Weizenbaum developed a program that functioned as a psychotherapist. The program asked open-ended questions and also provided responses. Chatbots rose to prominence with the advancements of the Internet and more preferably with the birth of the social media sites. In a study by Sandu & Gide (2019), the attainment of learning that is student-focused will be made easier by the incorporation of AI-chatbot in the field of education. Chatbots can help students interact effectively. Today, these are widely used in almost every field ranging from entertainment, healthcare, politics, advertising to the threats of swaying public opinions on social media (ZEMČÍK, 2019). Wang et al. (2022) carried out a study on SnehAI, an AI chatbot that is the first of its kind to communicate in Hinglish. The chatbot was specifically created to bring about social and behaviour shifts in India. The study revealed that the chatbot incorporated edutainment components and effectively utilized natural language processing to personalize chatbot responses, hence improving the user experience.

METHODOLOGY

Research Design

The study is qualitative in nature. Qualitative analysis enhances the credibility of research that deals with user's personal experiences and health information related matters by offering contextual and reflective real-life verbatims that are non-positivist (Ngenye & Kreps, 2020). A

case study approach was used to get insights into the process, flow, and characteristics of an AI chatbot based on a mobile app. The study revealed that the chatbot incorporated edutainment components and effectively utilized natural language processing to personalize chatbot responses and improve user experience. Qualitative content analysis was also used to evaluate text of the chat between the user and AI chatbot. In case study research, content analysis was considered to be a beneficial approach for examining data since it provides transparency and the ability to cope with the complexity of media content (Kohlbacher, 2006). Between July and September 2023, an amalgamation of semi-structured, offline and online interviews was carried out to gather input on the user experience of chatbots. Participants were instructed to interact with a chatbot, which provided information on sexual reproductive health and mental wellbeing. Eleven participants had been selected using purposive sampling. The inclusion criteria required that the participants be adolescents who owned a smartphone and had WhatsApp, and who willingly agreed to participate in the research. Along with that, consent of their parents was also taken as the participants are minors. Ethical considerations were duly followed as the girls involved were minor and subject matter involved in the study is sensitive in nature. The intention, goals, and objectives of the study were explicitly communicated to all research participants. Without their consent, no personal information about the research subjects or the important person in their life has been disclosed. Every research subject had the option of taking part or not, as well as the freedom to opt out at any moment. The data collection instruments, comprising an interview schedule, was devised by drawing upon the themes found through an extensive analysis of existing literature. The collected data was then transcribed and translated from Hindi to English before being analyzed using Clarke & Braun's (2017) thematic analysis method. Thematic Analysis gives clear and organized methods for deriving codes from data collected. These codes are concise elements of analysis that encapsulate relevant qualities for research inquiries. Two frameworks; including a model and a theory, namely Transtheoretical Model of Behaviour Change (Prochaska and DiClemente,1983) and McLuhan's Technological Determinism theory of Media (1964) respectively were used to analyse the workflow and content of the chatbot and its impact on society's development.

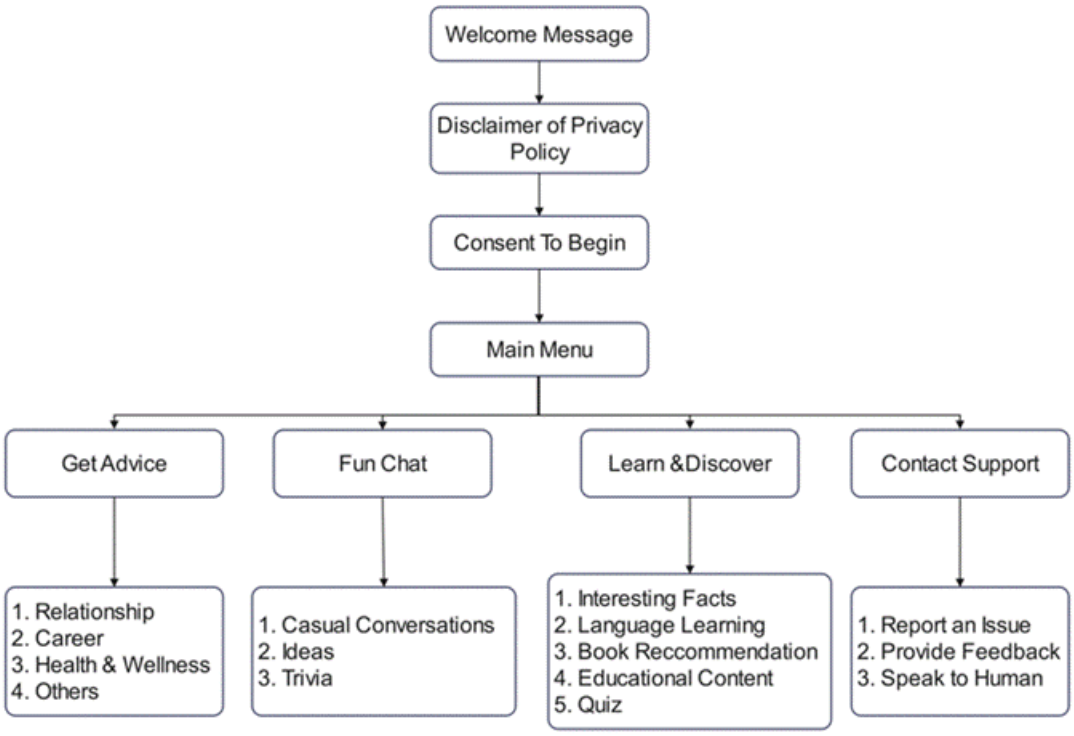
Bol Behen Chatbot

To meet the objectives, the study was centered on the Indian WhatsApp chatbot Bol Behen that has been designed by Girl Effect and WhatsApp, for their project Chhaajaa. The selection criteria

included; the chatbot should cater to the Indian Adolescents and young girls to find solutions to their personal and sexual wellbeing. A case study method was adopted because it investigates simultaneously occurring paradoxes within its organic setting with the understanding that it will make an impact (Kaarbo & Beasley, 1999). The research examined a specific case to better understand how the deployment of an AI chatbot might influence user behavior and also cater to SDGs. Further it was also understood how technology can shape society and facilitate progress towards these goals. Then a textual content analysis was conducted on the chats between the chatbot and user. The Bol Behen chatbot was initially introduced on Facebook Messenger in 2020. Subsequently, in 2022, a WhatsApp chatbot was developed to cater to Hindi-speaking teenage females with limited internet bandwidth access. The chatbot was conceptualized by Meta-owned WhatsApp and the non-profit organization GirlEffect. It is a 24x7 available Hinglish (a blend of Hindi and English language) speaking chatbot that caters to the Indian adolescent girls living in the Hindi speaking belt. Bol Behen enables girls to learn and comprehend content on contentious subjects like sexuality, intimate relationships, and reproductive wellness in a safe environment.

Figure 1

Flowchart of Bol Behen Chatbot Content (Personal Archive)



Users can initiate contact with bot by texting a simple greeting, "Hi," to the designated WhatsApp account or by joining the provided invite link. In order to engage in a conversation with Bol Behen, it is necessary for someone to be a user of the WhatsApp smartphone application.

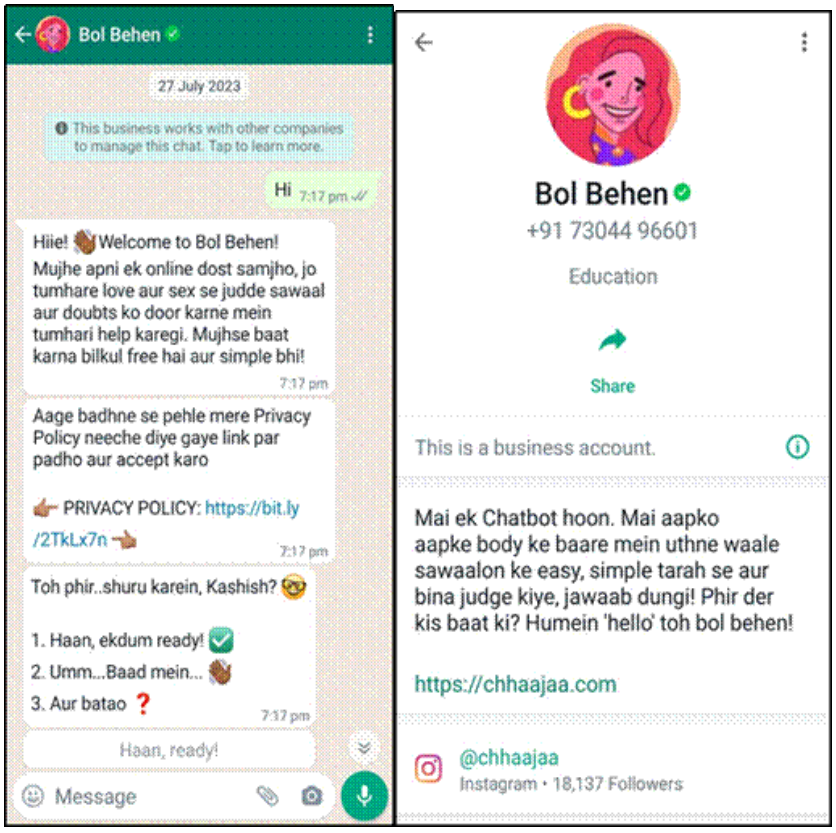
Image 1

Bol Behen Chatbot Graphical Representation

Image 1 is the graphical representation of the Bol Behen chatbot that acts as the user's best friend or a sister that can help them guide and answer questions related to their private life including relationships, contraceptives, periods and others. The red colour of the girl's hair depicts that she is young and cool and has answers to all the questions that the generation has to ask her. The bright coloured clothes also depict the youthfulness in the mascot.

Image 2

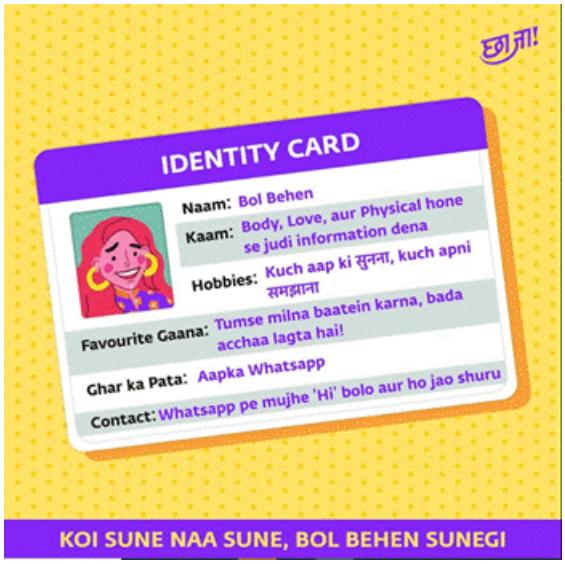
Bol Behen Chatbot User Interface on WhatsApp



The dialogue between a user and chatbot commences with a cordial welcome greeting. The chatbot introduces itself as an online friend that can help the girls answer questions related to their sex life, relationships and personal life. It also specifies the fact that she answers questions for free and that too in simple Hinglish texting language. The chatbot also mentions its privacy policies in the very beginning of the conversation and shares the link to accept the terms and conditions.

Image 3

About Bol Behen Chatbot (Courtesy: Bol Behen Facebook Page)



Subsequently, the consumers are presented with a range of choices and can participate using a diverse array of content showcased on the main menu. The information can be presented as hyperlinks and text, depending on the user's selections. Moreover, these interactions based on themes are classified into three distinct types (Image 4):

1. **Common Topics**

   This option lists out subjects that the chatbot can talk about. These options include:

   - Love and Relationships
   - Basics about Sex
   - Sex and Safety
   - Quizzes
   - Ask Your Own Question
   - Expert Advice

2. **Quiz Karein**: Lists out questions for fun related to the common topics listed above.

3. **Help Menu**: This option helps you navigate to the main menu options listed above.

Image 4

Theme wise interaction categories

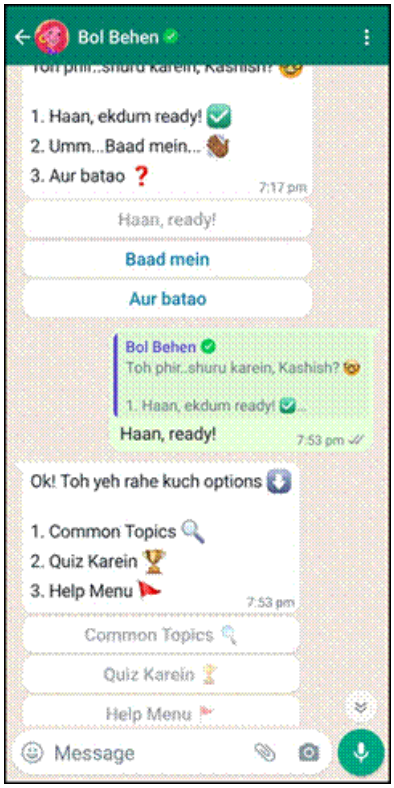


Image 5 explains the conversation structure or flow of the Bol Behen chatbot. The first step is to send a message, choose the given topic options, common questions related to the chosen topic will be listed out of which the user is supposed to choose one, then finally chatbot gives the answers.

Image 5

Conversation Flow of the Bol Behen Chatbot

(Courtesy: Bol Behen Facebook Page)

The Phenomenon of Behaviour Change and the Communication Process

A chatbot works by following a set of commands, which lets it talk to the user in a text-based discussion. The user types in a question, the chatbot encodes and sends back an answer, and then the user gives feedback, making it a two-way, interactive communication. The user stays interested because of the constant cycle of encoding, decoding, and feedback. The Social Behaviour Change Communication (SBCC) framework, especially the Socio-Ecological Model of Change, looks at how behaviour changes happen at several levels: first at the individual level, then at the interpersonal level, and eventually at the community level (Schiavo et al., 2022). A chatbot may start to change at the individual level and spread outward since it makes it easier for people to interact with each other. Other settings have looked into similar interactive methods. For instance, dance movement therapy (DMT) has been looked at as a non-verbal communication intervention that is engaging and can enhance the mental health outcomes of adolescent girls (Paul, Singh, & Kusuma, 2023), emerging technologies, such as AI chatbots, provide alternate opportunities for behaviour change communication in areas such as sexual and reproductive health. This study uses the Transtheoretical Model of Behaviour Change (Prochaska & DiClemente, 1983) to look more closely at how a chatbot may be used in sexual and reproductive health treatments. The model

describes a series of stages, from precontemplation to maintenance, which are explored in length in the paper's discussion.

Technological Determinism and its Impact on Society's Development

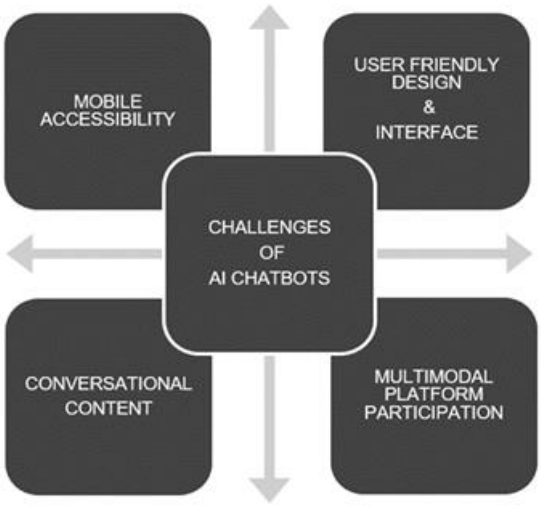
Technology has a significant influence on people by introducing technical advancements that change how humans interact, collaborate for various things within an environment (Vinuesa et al., 2020). This establishes a reciprocal connection between technology and society, where technology influences cultural norms. Technology on the other hand also shapes culture, but cultural factors determine what technologies are developed. Mobile phones, for example, have expanded media communication possibilities. People can communicate with others at any time and from anywhere. The emergence of AI technology has demystified the phenomenon of technological determinism (Veblen, 1921) that is based on the construct that future's growth is to be measured through technological advancements. McLuhan (1964) also argued that media technologies are "extension of human senses". The AI chatbots are an extension of human decision- making in healthcare facilities. These health and personal advisors extend the role of doctors, educators and healthcare professionals allowing instantaneous health advice at home. Héder (2021) states that AI technology is nearly free to reproduce and reuse by the virtue of making it and becomes an intergenerational tool. Thus, by keeping in track of the theory used, AI technology has the capacity to shape society and culture.

FINDINGS & ANALYSIS

On the basis of the results that were obtained from the effective screening of the content through the case study of Bol Behen chatbot and the content analysis of its chats with users and the user interviews to understand the potential of AI chatbot applications to improve adolescent health. The findings demonstrate that healthcare progress is dependent on the combined efforts of human expertise and AI. This harmony leverages AI's technical capabilities, and chatbot's humanistic answers as responses to the users. Following themes were obtained after collecting the data and coding them according to diverse themes:

Figure 2

Themes derived from Thematic Analysis



Mobile Accessibility

One of the major obstacles to socio-economic growth of developing countries like India is the digital divide, resulting in disparities in access to technology. However, AI chatbots like Bol Behen provide the adolescent girls in India an opportunity to rely on their smartphones to look for credible answers to their questions that are considered contentious in the society. According to Kamani et al. (2016) there are numerous social media platforms, with WhatsApp being the most widely used by the majority of Indians. WhatsApp being a cross-platform messenger is compatible with all smartphone devices whether low or high end. WhatsApp Messenger offers free communication via call, chats, statuses and the user has to just incur the cost of internet connection that too for minimal charges. One of the respondents said, "*It answers my questions at any hour, it is available for me 24X7. I also like using WhatsApp instead of other apps because it does not take much space in my phone unlike other apps*" (Semi-Structured Interview, 2023). Using WhatsApp is user friendly and offers an instantaneous way to communicate. The 24X7 availability of the chatbot helps to get answers anywhere and anytime.

User Friendly Design & Interface

One of the respondents said, "*It gives an instantaneous response and also answers using pictures, videos and gifs to explain certain concepts that I am ashamed of discussing with my mother*" (Semi-Structured Interview, 2023). Bol Behen chatbot uses friendly ways to initiate communication such as texts, emojis, lists, quiz, hyperlinks and drop-down menus to engage with the users. The content is branched into several categories and is available in nonlinear traversal. It emulates participation in conversations and provides instantaneous verbal responses. Thus, making the conversation more interactive. However, it was found out that the chatbot did not use all the benefits of the smartphone and WhatsApp as it does not have a voice note feature. The voice note feature can act as the boon for those who cannot read and write and make conversations more personalised. Effective chatbot interactions require both reliability and confidence in the bot. But, the chatbot has the ability to only respond in the form of numbers, alphabets and emojis. Users were able to navigate the content based on their preferences, which also employed machine learning to personalise responses. Communicative affordances like portability of a mobile phone and availability of an app like WhatsApp facilitates the use of such AI based chatbots. However, one feature that failed to work was response to the customised question. The chatbot only responds to the curated questions and has a selective approach towards customised questions asked by the users.

Conversational Content

The conversation tone of the chatbot bridges the gap between technology and the vulnerable youth away from the facts related to prejudiced information that is essential for their wellbeing. The chatbot puts across the essential stigmatized topics in such a way that it encourages the users to get comfortable. The taboos attached with sex, menstruation and other such topics make it difficult for the girls to decide what's best for them, however Bol Behen acts as their friend or elder sister and talks to them in a language that is very well understood by them. As mentioned by one of the respondents, "*Chatting with Bol Behen is like seeking advice from an elder sister whom I can trust with questions related to private life. I like how she explains complex topics with such an ease and without any stigma attached to it*" (Semi-Structured Interview, 2023). The answer to the question of whether it's ok to change your mind after giving consent for a physical relationship with your partner. The chatbot's response is relatable and colloquial in nature. The response also makes the user understand the definition of being in a sexual state with your partner or someone else. The

chatbot even asks for a clarification in the end by texting “okay?” to confirm whether the user understood the answer or not, making the conversation even more interpersonal in nature. The first step of behaviour change is initiating interpersonal communication by sharing your inner thoughts with someone or simply giving feedback. Effective chatbot communication enhances its reliability. Communication competencies include disclosure of oneself, empathy, ease of use, engagement, ability to express, assistance, rapidity, and influence over the environment (Lee & Chan, 2023).

Multimodal Platform Participation

Bol Behen chatbot initiates conversations on multiple platforms increasing its reach. The chatbot is available on WhatsApp and Facebook Messenger. It also has a designated Facebook and Instagram page to endorse its achievements and new activities to understand the reactions of the discourses on social media platforms. Multimodal Platforms increase the connectivity amongst the masses and encourage more young women to be a part of the community that is working for their own wellbeing. The chatbot also gives an option to be a part of the community page on Facebook called “Bak bak gang”, wherein one can discuss each other's queries within a community of young girls and experience a sense of belongingness. According to one of the respondents, “*I also follow Bol Behen instagram and facebook pages that keep posting tips on how to use the app wisely*” (Semi-Structured Interview, 2023). The proponents can reach various demographics by sharing personal anecdotes, experiences, educational stories, and other content on other various social media platforms. The multimodality of a mobile phone also encourages the inclusion of various content forms and social media platforms to integrate and allow the users to interact effectively. These interactive platforms break down conventional limitations, enabling folks to share their insights and seek backing without dreading judgement. Digital environments that facilitate a sense of community and shared knowledge catapults people to actively participate. Peer-led actions and community-generated material leads to incorporating inclusivity and encourages individuals to take care of their wellbeing.

Image 6

Bak Bak Gang Community Page on Facebook

Challenges of AI Chatbots

Chatbots have the ability to record, click actions and user-generated material to determine how users behave on the web. Though, Bol Behen chatbot lists down all the terms and conditions related to data privacy and cyber security before beginning the conversation, yet the user's data is shared for their product-based services as mentioned on the Chhaajaa's website. The website states that the user's data is shared with its partners as well. The boon observed in this case is accountability and transparency that the chatbot developers maintain about their user's data. Other critical elements that exist in the Bol Behen chatbot and need improvement are requirements of a smarter natural language processing bot that has the ability to answer to the customizable user-queries and can aid in targeted behavior change. As mentioned by one of the respondents, "*Bol Behen didn't answer back to the 'Khudka sawaal poocho' option. It said that it'll choose from the best questions and answers back on Friday*" (Semi-Structured Interview, 2023). Another critique of the chatbot includes requirement of voice-based conversations for illiterate users as according to a respondent, "*I want to chat with Bol Been using voice notes, and it's a simpler way to express my thoughts*." (Semi-Structured Interview, 2023)

Table 1

Coding Sheet of Content Analysis of the Bol Behen Chatbot

Codes	Sub-Themes	Themes
• Lack of Access to Fast speed internet • WhatsApp is the most used social media • WhatsApp requires low internet	• Digital Divide • Access to low end Smartphones • 24X7 medium • Portable Device	Mobile Accessibility
• Answers using pictures, videos and gif • Initiates communication through texts, emojis, lists, quiz, hyperlinks and drop-down menus to engage with the users.	• Easy to use • Multimedia Content • Non-Linear Conversation • Verbal Responses	User Friendly Design and Interface
• Hindi speaking girls • Access to stigmatized topics	• Hinglish Content • Customized Answers • Credible answers to stigmatized Topics	Conversational Content

• Bol Behen acts as their friend or elder sister		
• The chatbot is available on WhatsApp and Facebook Messenger. • Community page on Facebook called "Bak bak gang" • Sharing of personal stories and educational content	• Users on Multiple Platforms • Community Participation • Demographic Connect via Social Media • Peer-led actions	Multimodal Online Participation
• Ability to determine how users behave on the web • No answer to user created question • No use of all WhatsApp Features including Voice note	• Lack of Transparency • Lack of Data Privacy • Need of smarter natural language processing bot • Need of 2.0 version of Bol Behen	Challenges of AI chatbots

DISCUSSION

The findings from the study indicate that AI chatbots gave people timely health information and emotional support during the COVID-19 lockdowns. This means that chatbots might be useful in public health emergencies when people can't get to a doctor in person. The study also revealed how today's youth is dependent on these AI based tools for every answer. The taboos attached to the youth sexual reproductive health forces them to find credible answers on these chatbots that in return gives them suitable answers and also comfort. It is a technology that offers alternative ways of interpersonal communication to foster change. Chatbots are illustrations of views that aim to change behaviour (Pereira & Díaz, 2019). This behaviour change is observed in stages as mentioned in the Transtheoretical Model. In the first stage Pre-contemplation, the user is unaware about the existence of the chatbot and about its application to change behaviour. Contemplation is the second stage when the user gets to access the chatbot on WhatsApp and attain awareness about the benefits of using Bol Behen, however is still not committed to change as the user is still considering the fact that whether they should use the chatbot or not. The next stage is that of Preparation where the user has discovered the chatbot and has made up their minds to participate. In the case of Bol Behen, one decides to chat with a bot by texting “Hi” to discuss their queries related to sexual and personal wellbeing. The user has changed in a way that she is ready to share her personal life with a bot wherein the bot gives choices to the user to ask questions and the user makes a choice to ask questions that can enable behaviour change within them. At the Action stage chatbots are used to significantly alter behaviour. This stage includes guidance on sexual reproductive health, consent and others (Image 4). The behaviour change at this stage is induced through the conversational and colloquial tone of the Bol Behen bot that provides information and advice with emotions attached to its responses. In the next stage, the chatbot helps the user to avoid relapse from the occurring change. To maintain a conversation the Bol Behen chatbot keeps confirming with the user whether they understood the response by texting “okay?”, “Aur batao” (Tell me more). In cases where the user did not get a satisfactory response from the chatbot, then it gives the user a complete manual on how to communicate. This stage is known as Maintenance. In the last stage, Termination, the chatbot's job at the termination stage is to determine whether the behaviour has changed or if additional assistance is required. At this stage the Bol Behen chatbot

takes its user back to the main menu to ask to continue the cyclical conversation. Thus, from a perspective of behaviour change, chatbots have the ability to influence user engagement. Therefore, the final aim of a chatbot is to facilitate users in changing their behaviour rather than just fulfilling and ticking off the tasks assigned by the user (Pereira & Díaz, 2019). The study discovered that chatbots could potentially fill the void left by the absence of a first point of contact for information requests of users (Yadav et al., 2019). The study also found its point of contact with the McLuhan's theory of "Technological Determinism" (1964) that states that technology shapes the future of the society and artificial intelligence being a part of everyday human activity whether it's for sexual reproductive health, maintaining a calorie count, keeping a track of physical activity or menstrual cycle. Though the study makes essential contributions, it also has several shortcomings. The case study was not inclusive of any data from the application creator's perspective. This should be the immediate essential next step in terms of furthering the research. This may make the study even more credible and enhance the understanding of the various diasporic views of the applications of AI in health communication research. The user profile can further help in comprehending the behaviour change through a survey method. Further, through a theoretical perspective the gratification of users while interacting with the chatbot can also be studied with context to their dependency on technology to fulfill their social needs and explore their alternative social personalities. The shortcomings of the Bol Behen chatbot discussed in the paper can be further used as reference by the chatbot developers to further develop a 2.0 version of the same chatbot with better features. Bol Behen has a huge potential for growth through a variety of adolescent health education programmes, government school and colleges initiatives for women's health. The WhatsApp chatbot claims to cater to adolescent girls from the very beginning, however generating awareness regarding sexual reproductive health should not be limited to one gender. Men continue to be underrepresented in reproductive health. Previous research conducted in the areas of health communication and behaviour change have conventionally been segregated according to the gender; where family planning, contraceptives, HIV and AIDs initiatives were targeted for men and SRH only focused towards the women population. The ASHA programmes have primarily served only women (Jejeebhoy et al., 2020). Sexual reproductive health is usually concerned with heterosexual and cisgender women, and it frequently fails to address the needs of transgender women. An inclusive response is required to give access to build a comprehensive approach to LGBTQI+ communities as well as adolescence is also a period in which young adults

get to explore the real essence of their sexuality. Maintaining a clear view between inventiveness and sound ethics is essential for maximising the benefits of digital technology in health communication without jeopardising individual well-being or autonomy. Chatbots must constantly improve their communication skills to gain credibility and increase confidence among users, contentment, and acceptance. To address these challenges, media professionals, technicians, and policy makers must work together and prioritise accountability, diversity, and user-focused design.

CONCLUSION

In conclusion, bringing together technology into sexual reproductive health awareness is a profound journey with significant future implications. The combination of new media and social change has helped raise awareness, reduce stigma, and provide support for young adolescents seeking credible answers. The Bol Behen chatbot gave users an intimate, judgment-free, and secure setting where they could discuss otherwise sensitive subjects, get reliable information, and get individualised advice. It also provided an opportunity for girls in Hindi speaking belts with low end smartphones and unstable internet connections to effectively engage in discussing and learning relatable conversational and a friendly tone of text message. The excessive use of smartphones amongst the youth have created new potential for offering focused, affordable public health education interventions. With their simplicity of use, chatbots make it possible to communicate with groups of people who have little prior digital expertise and cannot afford the mainstream mass media. Bol Behen chatbot strongly supports the scope and impact of AI technologies for the betterment of society. The future of AI and health communication involves personalised media strategies using artificial intelligence, AR & VR experiences, and participatory community-based interventions. Gamifying health interventions is a novel approach being explored in the field. Adding game-like elements to digital platforms can boost user participation, drive, and advancement of skills. Gaming can also be considered as a form of Edutainment (Yvonne Oshevwe Okoro et al., 2024). Encouraging users to engage and share on chatbots leads to significant conversations over social media applications like WhatsApp that are cheap and easily available. These innovations have catapulted in improving the availability, participation, and impact of sexual reproductive health globally. Nevertheless, this foreseeable future comes without obstacles and concerns regarding ethics. AI has become part of the human lives and even humans cannot keep themselves detached from these benefits despite the existing challenges of data privacy, cyber

security and accountability. The study thus, facilitates AI chatbots aid in dialogue flow optimization and personalise the user experience, bringing us one step closer to achieving UN sustainable development goals to improve adolescent health.

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