1. Understanding the discourse of health communication framework and significance of Social Communication in the Current Context

Our Bodies, Ourselves is a feminist movement that started in 1969 with the objective of encouraging women to talk about their own body, rather than listening to experts(History & Legacy - Our Bodies Ourselves Today, n.d.). The movement focused on personal experiences that provide valuable information for understanding one's own body and other topics. This type of learning allowed women to be better prepared to identify institutions for their health needs. Consequently, women had an increased ability to make proactive choices about pregnancy, and it was recognized that information about one's body is perhaps the most essential type of education. These radical thoughts and ideas have persisted for generations. However, discussions on these topics are confined to groups of feminist women with radical ideas and are not commonly considered a topic of discussion amongst most women. Moreover, discussions around such topics are encouraged only when the women have reached a certain age, which is mostly when the females have surpassed their formative learning years.

The inclusion of adolescent reproductive and sexual health in the WHO's Sustainable Development Goals (Child and Adolescent Health: Fact Sheet on Sustainable Development Goals (SDGs): Health Targets, n.d.) acknowledges the fact that there is a need for discussions around reproductive health and well-being from an early age. It also highlights the fact that although the topic's importance has been recognized since the 1960s, awareness about the topic remains low in the mainstream. Thus, information is not transferred generationally for women. The socio-cultural and demographic restrictions on women's education remain the same in large parts of the world. Globally, adolescent girls possess variable and often little information regarding reproductive health and well-being, which is concurrent with cultural stigma and taboos regarding such topics (Chandra-Mouli et al., 2017). Reproductive health and its consequences on women's health are not well understood despite a significant research on menstruation and sexual health (Facing the Facts: The Case for Comprehensive Sexuality Education | Global Education Monitoring Report, n.d.).Poor outcomes related to adolescent reproductive health and well-being include, unsafe abortions resulting in maternal mortality, adolescent pregnancy, and reproductive tract infection.

Several governmental, for-profit, and non-profit organisations are extensively working to design health communication interventions that focus on awareness, adherence monitoring, and reminders for immediate action. Their approach towards health communication is structured, with focus on modulating health-promoting method. Over the years the face of Health Communication has evolved from static uni directional print messages to dynamic two way interaction. However it has still not been able to surpass the linearity of message transformation. While advanced data-driven technology has enabled choice autonomy amongst consumers expanding the acceptance, and adaptability of health communication programs, targeting a high outreach to a diverse and large population. consumers with their new role as prosumers find it challenging to assimilate different from of information due to information overload. Due to this reason implications of health promotion practices are constantly being questioned. While there are instances where individuals have benefited from these, have acknowledged and accepted such interventions. Evidences of long term sustainable behavior change at a significant population level is minimal. Factors affecting the efficacy of such interventions varies across situations. while some of these practices are voluntarily undertaken by individuals who are interested in improving their health and fitness; in other cases, individuals are employed by agencies to conduct health interventions among specific target groups.(Lupton, 2015; Reddy et al., 2020) In such circumstances, individuals who have benefitted from these have continued, however, individuals leading have shifted to self-reliance have discontinued with such interventions. .

Literature review and results of the data suggest that the evidences of self-management and self-responsibility are contributing factors of any health promotion strategy. This contends the thought that suggest individuals or social groups as ignorant, lacking self-control, of having the capacity to take appropriate responsibility for their health. This shift in outlook is changing the discourse of health care towards taking agency of selfcare. (Chapin et al., 2016).

1.1 Shortcoming in the current health communication framework

Several agencies have developed health communication frameworks that provide systematic approaches for integrating and navigating health interventions. These frameworks include:

• The strategic communications framework for effective communications proposed by WHO: This approach presents a set of guiding principles applicable to health interventions. The intended audience for this framework includes individuals, professionals, and decision-makers who are responsible for making health decisions. While the framework's structured format facilitates programme integration; it lacks insights into communication content and its potential impact on individual behaviour (WHO Strategic Communications Framework for Effective Communications | 2017.).

• Field Guide to Designing a Health Communication Strategy by Johns Hopkins Bloomberg School of Public Health: This resource adopts a collaborative and participatory approach to health communication that emphasises the convergence of the receiver and sender. The 300-page document serves as a practical guide for those involved in designing, implementing, or supporting strategic communication efforts. Each section of the guide is further divided into steps, offering valuable resources such as worksheets, tips, checklists, self-assessment questions, important notes, and case studies. While it excels in detailing stakeholder roles, including those responsible for communication design, the field guide primarily focuses on designing strategies for building and implementing interventions rather than specifying intervention content (Hopkins Bloomberg, 2003).

• The Periodic Table of Healthcare by Owen Health: This framework aids agencies engaged in health communication to craft strategies that encompass the customer experience, brand planning, and multi-channel marketing. It offers a customisable design approach adaptable to the specific requirements of an agency or client. Despite its comparatively recent publication in 2018, The Periodic Table of Healthcare has since been used extensively. The Periodic Table of Healthcare is built in a way that any firm or organisation can customise to design strategy that caters to the organisational needs.

While the health communication frameworks discussed above cater to different facets of health communication and are widely used from a management and systems perspective, they do not adequately address the psychological variables that influence individual behaviour. Rather than delving into the intricacies and underlying factors contributing to behavioural change, they often define health behaviour change in methodologically prescribed terms and processes. Specifically, the WHO framework describes stakeholder roles and responsibilities, the Johns Hopkins framework focuses on the overall implementation intervention plan, and the Periodical Table of Healthcare Communication foregrounds the customisability of branding strategies for different audiences and clients. As a result, the 'what' and 'why' of communication design are not sufficiently explored, leading to a lack of depth for addressing the underlying psychological variables that influence interventions and contribute to behavioural change (The Periodic Table of Healthcare Communications 2018). The next section of the chapter explores some of these issues.

1.2 Underlying Factors Affecting the Efficacy of Health Communication

Designing health communication for multicultural and diverse populations poses challenges. Factors such as language, technology, and infrastructure have been acknowledged by organisations and agencies as having a substantial impact on the overall efficacy of interventions. However, underlying factors, including socio-demographic, cultural, and psychological dimensions, exert a stronger influence on the efficacy of healthcare programs. These factors present greater challenges as they often resist quantification, leading to their implications going unnoticed. Perceptions of health risks vary considerably across individuals. The risk perception attitude framework (Rimal et al., 2009; Turner et al., 2006) classifies people into four categories:

- Group 1: Characterized by high risk perceptions and weak efficacy beliefs, resulting in a perceived lack of control over one's actions and an indifferent attitude toward protective behaviours.
- Group 2: Characterized by high risk perceptions and strong efficacy beliefs, leading to responsive attitudes and extensive engagement in self-protective behaviours.
- Group 3: Characterized by low risk perceptions and strong efficacy beliefs, resulting in limited engagement in self-protective behaviours.

- Group 4: Characterized by high risk perceptions and weak efficacy beliefs, leading to avoidance attitudes.

This individuality makes health communication a challenging endeavour as the strategies in them defined work on common patterns identified for a segment of people rather than dealing with individual traits. Also the focus and impact is on immediate action, which does not confirm sustainable health behaviour change for long-term implications.

This individual variability presents challenges in health communication, as strategies often address common patterns identified within specific populations or groups rather than individual traits. Additionally, the focus on immediate action often falls short of ensuring sustainable, long-term health behaviour change.

2 The Existing Gap in the Understanding of Reproductive Health and Wellbeing

2.1.1 Lacunae Revealed Through the Qualitative and Quantitative Data

A mixed-method approach was used in this research to understand information seeking and knowledge building amongst female adolescent, while identifying influential variables. Further identifying the variables that influence the above factors. A qualitative study (Chapter 4) and quantitative survey (Chapter 5) were conducted to delve into these aspects.

The quantitative findings revealed a significant deficit in knowledge concerning reproductive health and wellbeing across women of all age groups. To illustrate, when asked to rate their knowledge of reproductive health and wellbeing, 53.2% of the participants admitted knowing nothing about the topic. Notably, older respondents (those above the age of 60), who comprised 6.3% of the quantitative sample, indicated having gained knowledge primarily through self-experience. Their knowledge encompassed topics such as PCOS, the ovaries and uterus, and common problems related to reproductive health and conception. Conversely, participants below the age of 45 did not exhibit knowledge that reflected their access to various information sources. Interestingly, those under the age of 30 demonstrated an awareness of the influence of mental health on reproductive health and wellbeing, indicating a willingness to consider mental health as a contributing factor.

The qualitative data unearthed several underlying factors that contributed to the identified knowledge gaps. These factors included experiential learning, influence of socio-demographic settings, and information exposure. Most significantly, the qualitative findings indicated that the knowledge obtained and educational gaps during adolescence hampered the understanding of reproductive health and wellbeing.

The data were aligned with the health belief model, which identifies the demographic and psychological variables that are contributing factors to health behaviour change. According to this model, a lack of health consciousness and behaviours stems from a perceived absence of susceptibility and severity as well as casual attitudes arising from an individual's demographic and psychological traits. All of these variables prevent individuals from understanding the severity of the consequences of risk situations. Moreover, the research findings exhibited a notable affinity with Bronfenbenner's (1979) ecological systems framework. Taken together, the above-mentioned findings indicate that female respondents were generally unaware of the future implications of their reproductive health and wellbeing, unless they encountered actual heath issues.

In summary, the research findings indicated a widespread lack of a conceptual understanding of reproductive health and wellbeing across all age groups. The responses highlighted a crucial disconnect between individuals' perceived knowledge and their actual knowledge. The qualitative and quantitative data both showed that experiential learning, whether from personal experiences or the shared experiences of close associates and peers, played a more significant role in shaping risk perception than did formal knowledge.

This emphasisess the need for targeted interventions tailored to adolescents. Such interventions should encourage adolescents to contemplate about their future health and life choices and proactively adopt measures towards self-reliance. Additionally, these interventions ought to be meticulously designed for adolescents, given that adolescence is a transitional period and a critical phase for formative learning.

Adolescents must bear the responsibility of their decision-making through changes in their attitudes and beliefs. Risk perception varies across different age groups, and individuals' approaches are shaped by their attitudes and perceived notions. For example, a 33-year-old respondent refrained from discussing certain topics even with her friends because of social norms.

Such differences are also culturally influenced, as exemplified by a 42-year-old respondent living in an urban setting who, during her menstrual cycle, had to use separate utensils and was not allowed to enter the kitchen by her traditional mother-in-law.

Thus, it is essential to recognise that the discourse on behavioural interventions frequently use a top-down, paternalistic approach focusing on information provision rather than the promotion of mindfulness towards one's health and well-being.

2.1.2 The Imperative for Adolescent Reproductive Health and Wellbeing

The study of adolescent sexual behaviour has long been a focus of healthcare interventions, with considerable emphasis on topics such as menstrual practices, health, hygiene, and sexual behaviour. Nonetheless, the broader aspects of reproductive health and general wellbeing are often overlooked. This is especially salient given that the global distribution of adolescents has changed significantly, with approximately 1.3 billion female adolescents constituting 16% of the world's population (Adolescents Statistics - UNICEF DATA,2022.). In India, which is currently estimated to be the world's most populous country, the adolescent population comprises over a quarter of the total population, and one in every 10 Indian is a female adolescent (INVESTING IN ADOLESCENT GIRLS IN INDIA A CRITICAL NEED, 2011.)

Adolescence and young adulthood mark a critical period of change with regards to health problems and determinants in later life. Research has shown that the health habits formed during adolescence, such as during one's teenage and college years, may suppress the effect of disease risk after the age of 45 and determine an individual's risk of developing chronic diseases and cause of mortality (Bundy et al., 2018). Despite considerable research on sexual practices and menstruation, our understanding of reproductive health and its implications for women's bodies continues to be rudimentary. The discourse on sexual health often does not include a positive and respectful approach, and ignoring or minimising the importance of sexual pleasure, consent, and relationships is arguably the norm. Promoting greater engagement among adolescents with their health can enhance healthcare utilisation and the effectiveness and sustainability of sexual and reproductive health interventions and rights for adolescents (Sebastian et al., 2014).

Female adolescents today experience significant shifts in their career options, perspectives, and lifestyles, offering the opportunity to fulfil their aspirations and voice their choices. However, these changes have unique health implications. The interplay between the biological clock and the career clock presents complex issues. The biological clock is a prevalent framework for determining reproductive time in the context of late childbearing and age-related infertility. Many women are delaying childbirth, with a growing percentage having their first child at the age of 35 or later (Cooke et al., 2010; Lavender et al., 2015; Wyndham et al., 2012). This postponement poses reproductive health challenges, as it clashes with the limited fertility window determined by female biology. Philosophers such as Foucault (2003) have even discussed 'biopolitics' as a modern technology of power that seeks to control societal norms and the biological processes of the human species.

Adolescence is an ideal period for educating individuals about health and cultivating healthy habits and lifestyles that can endure throughout their lives. Positive health behaviours adopted during adolescence can reduce an individual's risk of developing chronic diseases in adulthood (Taylor, 2018.).

This accumulated evidence stressed the urgent need for an intervention model that educates adolescents about their wellbeing in a manner that enables them to contemplate the long-term consequences of their health choices.

3 Formulation of the Social Communication Model for Adolescent Reproductive Health and Wellbeing

3.1.1 Benefits of the Proposed Framework

The proposed social communication model is designed as an onion framework that integrates psychological theories and concepts in a gamified format. Gamification is widely recognised as an effective approach for developing health interventions. In addition to increasing the interactivity of and engagement with content, it offers a methodology that can incorporate psychological theories and concepts for constructing behaviour change mechanisms. The proposed social communication model strives to heighten individuals' awareness of their health choices

through information seeking, knowledge building, self-maintenance, and self-goals. The integration of reflexive and participatory consciousness with the stages of change, nudge, and risk perception adds further depth to model. Participatory consciousness involves a profound sense of vitality and connection with the world, where individuals primarily engage with the world through intuition, emotion, sensory experience, and the immediate present, and reality is perceived as vibrant, organic, and imbued with a spiritual essence. In contrast, reflexive consciousness involves the capacity to comprehend both ourselves and the world through mental images and abstract ideas. Over time, there has been a noticeable shift from reflexive to participatory consciousness. The subsequent loss of meaning may result in a 'detached' consciousness that impairs empathy, causing individuals to perceive everything in an objective and mechanistic manner (Richard Tarnas: "The Passion of the Western Mind", 1993).

Understanding consciousness and its different aspects is pivotal in the context of contemporary health communication. With increasing reliance on artificial intelligence for monitoring, supervision, and decision making, humans may be approaching a cyborg-like existence. This shift is driven by the perceived unreliability and scientificness of extant practices, leading to a lack of understanding of simple and logical phenomena that is further exacerbated by the external cultural influences and norms.

The transtheoretical model (TTM) complements this framework by offering strategies for public health interventions that address individuals at different stages of the decision-making process. By assessing an individual's current stage of stage, the TTM facilitates effective interventions that are tailored to the target population's level of motivation and knowledge and account for lapses in decision making; this allows individuals to move through the stages of change (from precontemplation, contemplation, preparation, action, and to maintenance, which is the ideal stage for health behaviour change; DiClemente & Prochaska, 1998).

Nudges are rooted in behavioural economic and psychological research on human behaviour and cognition (Lin et al., 2017), and offer potential improvements for patient outcomes and healthcare delivery in healthcare settings (Patel et al., 2018). The model proposed in this study includes both hard and soft nudges to support self-monitoring and self-management; hard nudges come into play only in the case of major breakdowns and lapses that may necessitate a re-initiation

of the intervention. Importantly, both types of nudges serve as a mechanism for negative reinforcement rather than punishment.

In health decision making, individuals must weigh the consequences and benefits of their actions, which often involve pleasurable behaviours such as eating and smoking that may contribute to poor health and disease. The motivation to refrain from engaging in such pleasurable behaviours or inconvenient preventive behaviours partially hinges on beliefs about the likelihood of personal health consequences (Rogers, 2010). Thus, the willingness to be healthy becomes the driving force for behaviour change.

The proposed model aims to promote wellbeing by not only informing and raising awareness but also devising a self-development mechanism grounded in informed choices. Given that discussions on reproductive health and wellbeing remain stigmatised in several parts of the world, interventions based on the model proposed in this study have the potential to allow female adolescent to take ownership of their health and well-being. The proposed model could be used to construct self-directed, technological interventions for female adolescent girls with an emphasis on choice autonomy.

3.2 Integration of the Framework With the Toolkit

To validate the applicability of the framework, a toolkit for social communication was developed. The primary objective of developing this toolkit was to explore sensitive topics related to reproductive health and wellbeing in an innovate manner. The toolkit was developed through a series of experience based co-design workshops conducted among young adults. The workshops allowed the participants to gain insights from the experiences of women at various life stages (i.e. the respondents of the qualitative study), enabling them to envision a path towards wellbeing for themselves and adolescents.

3.2.1 Designing Culturally Relevant Communication.

The workshops were designed to integrate the perspectives of three generations of women. Qualitative data analysis enabled the workshop participants to explore the cultural influences and practices referenced by the interview respondents. Throughout the sessions, the participants

acknowledged the persistence of myths, misconceptions, and misinformation. However, a glimmer of positive change emerged as open dialogues on reproductive health topics gained traction. This newfound awareness inspired the participants to proactively disseminate the information they once lacked, ultimately empowering future generations.

3.2.2 Relevance of Scientific Perspectives in Cultural Traditions.

Amidst the various traditions reported by the respondents, scientific rationales were found to underpin certain age-old practices. While older generations were familiar with these rationales, younger respondents often followed these customs out of familial obligation. For example, the practice of consuming warm herbal drinks during menstruation or specific foods to comfort adolescents. The respondents expressed the need to perpetuate these practices in a more informed manner.

3.3 Addressing Generational Information Gaps.

Generations have passed with enduring misconceptions and misinformation, particularly regarding female physiology. Only a few respondents and participants possessed comprehensive knowledge of their own bodies, revealing a significant knowledge gap. Recognising this gap, the participants felt a profound responsibility to equip future generations with greater awareness and the capacity to take ownership of their physical well-being.

3.4 Establishing Adolescent-Centric Communication..

Effective communication necessitates relevance and contextuality, as concepts that are not immediately relevant often struggle to gain traction. This challenge extends to conveying future health risks to any demographic. Renfree et al. (2016) noted the difficulty in communicating such risks effectively. In such scenarios, constructive fear can serve as a catalyst for motivating health behaviour change in unforeseen circumstances (Maddux & Rogers, 1983). Additionally, sharing lived experiences that shed light on future implications can inspire individuals to become self-reliant and self-aware to the best of their abilities (Bruine de Bruin & Bennett, 2020).

3.5 Empowering Agency in Reproductive Time

The concepts of tracking and calculating feature prominently in the strategies women employ to manage their biological clocks. This expectation of agency over reproductive time involves both planning and future anticipation. Researchers such as Martin (2010) and Myers (2014) have highlighted the ways contemporary reproductive time is influenced by the expectation of predicting and preparing for the future. Among the respondents, this practice of self-awareness acted as a technology of power that regulated individual behaviours, echoing Foucault's concept of concept of biopolitics (2003).

3.6 Expert Consensus on the Framework and Applicability

In the assessment of the framework's theoretical underpinnings and its sequential flow, experts found unanimity. However, they raised concerns regarding the applicability of the framework in real-life scenarios. It was suggested that the framework's efficacy should be tested in real-life situations, specifically to determine if users of the toolkit were able to understand the relevance of reflective journaling and whether it leads to sustainable behaviour change.

The experts endorsed the relevance of the framework's components and the rationale for having individuals navigate through the entire process. There was consensus about the use of archetypes for customising messages as per individual personality types, as well as the use of psychological concepts to promote healthy behaviour. Nonetheless, some concerns were raised about the components, leading to several suggestions and opinions regarding the information delivery mechanism.

According to their recommendations, if a mechanism for the source of information is being developed, it should cater to those aged 10 and above, enabling discussions about reproductive health to commence comfortably as they enter puberty. The involvement and training of parents were also highlighted as essential elements. Female adolescents typically seek information about sensitive topics from trusted sources; however, due to socio-cultural norms, discussing reproductive health and wellbeing continues to be uncomfortable in many parts of the world. Consequently, female adolescents turn to external sources such as peers or the Internet, leading to incomplete information and misinformation.

All the experts concurred that in the early stages of puberty, use of the toolkit should be facilitated and supervised. They recommended that the toolkit be implemented as a school activity or by a non-governmental organisation, which would offer female adolescents a safe and collaborative environment to learn about topics related to reproductive health and wellbeing. Finally, the experts approved of the concepts as a medium for social communication that would enable adolescents to explore their reproductive health and well-being.

4 Finality of the Conceptual Framework

The model proposed in this study is designed to guide adolescents through the various changes in their reproductive health and well-being, fostering self-reliance. The conceptual framework introduced in Chapter 1 elucidates the behaviour change process, highlighting the variables that lead to the change. According to the model, individuals progress through a trajectory that begins with information seeking and leads to knowledge, maintenance, and the establishment of self-goals.

Information seeking is defined as the acquisition of information necessary to complete specific goals. The model also describes a series of behaviours encompassing information needs, information source selection, evaluation, and information utilisation. During the knowledge acquisition process, humans engage in different forms of knowledge building activities. This constructivist approach entails a communal inquiry into specific subjects, leading to deeper understanding through interactive questioning, dialogue, and ongoing refinement of ideas.

Knowledge building is a type of deliberate, conscious effort to produce knowledge based on exposure to various information sources. An individual’s information seeking is influenced by both positive and negative factors. These underlying variables are shaped by the socio-demographic context, including environmental factors and exposure to the sources of knowledge and information. Positive influence are likelier to have a favourable impact on an individual’s life, whereas negative influence can hinder information seeking and knowledge building. How an individual deals with these influences is contingent on their attentional attitudes. The interaction between influences and attitudes directs individuals towards information seeking, followed by knowledge building.

Given the uniqueness of each individual, the interactions between these variables would vary from person to person. Therefore, for any social communication medium to be effective holistically, it must motivated and empower individuals to become self-driven, ensuring the sustainability and maintenance of behaviour change for the rest of their life. The proposed framework, based on empirical research, integrates the stages of change model, risk perception, and nudge to cultivate participatory and reflective consciousness. Such a reflective approach can inculcate self-reliance. When implemented as a toolkit, it presents strong evidence of a positive impacting self-reliance. Nevertheless, further research is necessary to rigorously evalute the toolkit's efficacy in promoting sustainable behaviour change.

5 Major Findings

5.1 Phase 1: Assessment of the Current Understanding of Reproductive Health and Wellbeing Amongst Women at Different Stages of Life

Phase 1A: Qualitative Study

- The understanding and interpretation of the terms 'healthy' and 'sexual and reproductive health' evolve with age and self-experience. A conceptual understanding of reproductive and sexual health is often acquired through experience and personal exchanges, such as conversations with peers
- Women's understanding of their bodies and various reproductive issues is significantly shaped by their lived experiences. These experiences are diverse and unique; while certain events such as menstruation, conception, reproductive health issues, and menopause are common among women, the personal implications and lived experiences surrounding these events differ markedly
- Discourse around menstruation is only a few decades old, and women today are far more aware than in the past; topics such as menopause and other reproductive health issues remain less openly discussed.
- There is strong evidence for the influence of sociodemographic settings that impact getting information regarding reproductive health. Information seeking depended on

an individual's keenness towards wellbeing, which was affected by the sociodemographic environment.

- School plays a pivotal role in foundational learning and initial exposure towards menstruation. However, the learning mode is more instructional and does not provide conceptual clarity in most scenarios.
- Women depend on male partners for information related to sex and contraceptives.
- As the discussion around reproductive health is still a taboo, it restricts intergenerational knowledge transfer.
- Metaphors are commonly used as a mode for informing adolescents regarding reproductive health while maintain discreetness. Nevertheless, the accuracy of the knowledge imparted is incomplete, leading to misconceptions.
- Misconceptions formed at an early age due to lack of clear communication hinder overall understanding for a long time. Women are unable to speculate about their health implications.

Phase 1B: Quantitative Study

- Understanding of reproductive health had higher accurate response rates among women above the age of 61 years. The question about the function of the ovaries had a higher correct response rate among those aged 31–45 years.
- Participants aged 61 years and above had significantly higher scores for the questions about white discharge and the removal of the uterus and ovaries. On questions related to the identification of symptoms of PCOS, participants aged 46–60 years scored significantly higher than the other age groups.
- Participants aged 61 years or above had higher scores than the other age groups for the questions on estrogen, arthritis, and common problems with reproductive health and conceiving, and significantly higher scores for the question regarding common problems with reproductive health and conception.

- With regard to mental health problem and awareness respondents aged 21–30 scored higher, although the scores were not significantly higher.
- Of the 696 participants in the sample, only 4.7% said they ‘have a thorough understanding of reproductive health and wellbeing’, most belonging to the age group of 21–30 years. However, their scores for evaluate the understanding was less. This was indicative that although the young adults aged 21-30 felt they have better understanding, the scores did not validate it. Further, 52.3% of the participants said they ‘know nothing about the topic’, of whom 57.7% were aged 46–60 years, however they had scored higher in the questions leading to understanding.
- As a whole irrespective of age, most participant started learning about reproductive health and well being 12 yr onward, where understanding was limited to menstruation hygiene in the early years. The understanding of the complexities related to reproductive health came much later. .
- The participants’ information sources included formal education (including sex-education classes in school and promotional events by agencies dealing with sanitary products), discussions with friends and peers, family, doctors, media (including books, the Internet, and social media), and self-experience.
- There were no significant differences among the age groups regarding the age of learning and information source. However, the mean scores of the age groups suggested that participants aged 36–45 years had a stronger perception of self-knowledge, and those aged 46–60 years had the weakest perception of self-knowledge.

5.2 Learnings:

There was a gap in the overall understanding and knowledge regarding reproductive health and wellbeing amongst women of all age groups. The qualitative data revealed significant evidence of sociodemographic influences that affect information seeking at an early age. The aspects that

emerged as influencers for information seeking included sociocultural practices, perceived notions, the influence of parents and partners, and navigating cultural differences. The quantitative data highlighted that the participants' perception of their knowledge was not related to their actual knowledge; individuals develop conceptual knowledge with age and experience. Women older than 61 years were the most knowledgeable about their reproductive health and wellbeing; however, their primary source of information was self-experience. Women aged 21–30 and 31–45 years had accessed information through multiple sources, but their knowledge was not reflected in their responses to the questions. The effects of learning through role models and the use of metaphors emerged prominently from the data, which had a substantial impact on learning and recall. This underscores the need to design interventions for adolescents that help them prepare better for their future health outcomes. These concepts were applied in the design of the toolkit. Awareness and consciousness towards one's wellbeing were the prominent factors that led to sustainable behaviour change.

5.3 Phase 2: Developing a Gamified Social Communication Model and Toolkit

Phase 2A: Building Social Communication Model Using EBCD

- The results of the qualitative and quantitative data align with the components of the health belief model proposed by Rosenstock, (2004), according to which a lack of health behaviour stems from a lack of perceived susceptibility and perceived severity.
- The findings suggested an evident lack of risk perception, in most cases, with no conscious attempt to inform oneself about reproductive health and wellbeing.
- The areas of intervention need to include the prediction of risk perception, motivation through nudges to take through the various stages of changes in behaviour
- There is a need to incorporating self-reflective practices to question the prevalent norms and notions, leading to the building of a reflexive consciousness.
- Using metaphor in a gamified can be used as a medium of communicate and speculate the future of health

Information giving mechanism need to be designed in a way that would facilitating intervention

that can be customised as per age appropriateness, relevance, and attitude towards information seeking.

Phase 2B: Validation by Expert

- Overall, the experts found the concept interesting but expressed some concerns about the framework's applicability in real-life scenarios. Suggestions were made for rigorous testing in real-life scenario to validate its efficacy.
- The experts approved on the relevance of the toolkit components in context of reproductive health and well being. The purpose of having individuals navigate through the entire toolkit in a democratic manner, with choice autonomy was acknowledged. They consented to the use of archetypes to customise messages as per individual personality types.
- Incorporating the understanding of consciousness with the elements of psychology was accredited as a concept to be explored, and recommendations of testing and validation was proposed.
    - There were concerns about using risk or constructive fear as modes of behaviour change, suggestions were made to use more positive and contemporary approaches.
    - To ensure engagement with the toolkit for a longitudinal period, needs more tangible incentives than only psychological motivations to keep the adolescent involved. As impact of information related to reproductive health may become emotionally and psychologically disruptive and tedious.
    - The categorisation of the information must be based on the stages of mental and physiological changes that female adolescents undergo. While the identified age range spans four years, the maturity and temperament of a 12-year-old would be different from that of a 15-year-old. And agency changes beyond 16. Hence the age range for information giving should be from 10-19, having an age-appropriate information-giving system.
    - The involvement and training of the parents play an essential role to have discussions around reproductive health and well being. Female adolescents seek information about sensitive topics from people they can trust. However, the socio-cultural norms restricts

the discussions around reproductive health and wellbeing comfortably in most parts of the world , forcing them to seek information from external sources, such as their peers or the Internet. There needs to be mechanisms to build a circle of trust to get reliable and authentic information so that adolescents may not find themselves ‘lost’ again

The toolkit should also build a mechanism to empower women about their rights through information seeking and knowledge building. To break through the power dynamics that persists in the families.

5.4 Implications of the Research

The study has significant implications for developing social communication interventions for adolescents to make them aware of their reproductive health and wellbeing. The social communication framework could contribute to designing interventions for social change. The toolkit based on the framework could facilitate creating awareness at a metacognitive level. The implications can be categorised as:

Theoretical Implications

- The proposed framework integrates models of psychology with principles of participatory/reflexive consciousness. This can be used to understand the core dynamics of human behaviour, identifying indicators that lead to self-reliance.
- The framework can be used to build gamified interventions to bring about social change. The proposed model would be able to help promote wellbeing by not only informing and creating awareness but also devising a self-development mechanism based on informed choices. The framework could be used to build self-directed technology innovations, giving more autonomy of choice.

- The proposed framework can help promote wellbeing by informing, creating awareness, and devising a self-development mechanism based on informed choices. The framework could be used to build self-directed technological interventions, giving adolescent girls autonomy.

Practical Implications

The beneficiaries who could take advantage of the toolkit would be

- Adolescents
    - Discussions around reproductive health and wellbeing are still considered a stigma in several parts of the world. Interventions based on the framework could empower adolescent girls to take ownership of their health and wellbeing.
    - The proposed social communication framework would lead an individual from self-awareness to the achievement of self-goals through the information-knowledge-maintenance process. This would be accomplished by speculating about health through risk perception, leading an individual from pre-contemplation to contemplation mode, where the individual receives a hard nudge with risk perception
    - The toolkit can be used as a self-reflective guide that could work at a metacognitive level throughout a woman's lifespan, as it would facilitate access to information discreetly in a scientific manner.
- Stakeholder (Schools, Agencies working with adolescent health, Policy Planner)
    - The toolkit and the framework can used by the schools and agencies working with adolescents, to curate content based on the location of the audience
    - The options of customising messages and interactive elements to generate knowledge could create a constructive and safe learning space for females from diverse sociodemographic backgrounds.
    - The gamified way of giving instructions would facilitate dealing with sensitive topics, this could help policy makers to design interventions dealing with women empowerment.

  - The framework derived from the findings will be used to develop a gamified toolkit for adolescent psychoeducation schools, and to individuals as a self-owned kit for promoting self-reflection and self-reliance.

- Parents and peer group
  - Discussions around reproductive health and well being are considered taboo in most families in India. This open-ended toolkit could become an enabling tool that could function as a conversation builder.
  - This can create a discreet and safe space where a female adolescent can learn about her body and self securely. Use of the toolkit could be moderated until the female adolescent is under parental supervision; after adulthood, users can take ownership of the toolkit.
  - It can work as a tool for peer-to-peer collaborative learning, encouraging and motivating each other to take care of themselves.

5.5 Limitations of the Research

- While the study focused on creating an awareness mechanism for adolescents, it was not tested with adolescents. Hence, the validity of the social communication model has to be tested among adolescents from different demographic settings.
- Due to the constraints imposed by COVID-19, the fieldwork for this research could not be conducted, and the sample was limited to netizens (i.e. individuals with Internet access). The toolkit needs further validation among adolescents residing in rural settings in India.
- The applicability of the toolkit could not be confirmed with adolescents and requires thorough testing and validation.

5.6 Recommendations for Future Work

- Future work will include developing a toolkit, evaluating and validating it with experts and adolescents,
- Working in collaboration with NGOs and schools to deploy the toolkit.
- The toolkit concept is based on self-reflection and uses archetypes, interactive board games, conversational cards, and metaphors in a gamified manner. Although the toolkit's components have been identified, further work is needed to flesh out the functionality of each component in detail.
- The flow of information and age appropriateness of content need to be validated by experts in the field of adolescent health. Further, the efficacy of journaling and self-reflection habits must be determined and validated using rigorous testing methods.
- The toolkit is currently in the form of a rapid paper prototype that can be adapted to a digital interface, which would lead to better functionality for some of the features, such as building the metaphor.
- Furthermore, the tool must be validated by conducting long-term user testing in collaboration with NGOs working with adolescents and schools.
- Currently, female adolescents constitute the target population. Future studies could be conducted among male adolescents