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Understanding the role of Fogg behavior model in enhancing green consumption practices

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Abstract

The studies on behaviour change often follow various models, theories, approaches, strategies and framework to develop interventions aimed at altering behaviour in a best possible way. Many researchers have used 'Fogg Behavior Model' to persuade the target behaviour. In this context, the intervention-based study using 'Fogg behavior model' (FBM) and three components of behaviour change i.e. ability, motivation, and prompt/trigger was conducted in Ludhiana district of Punjab, India, aimed to enhance overall green consumption practices (GCP) among 300 students from six government schools. The results of the study revealed that both the experimental schools showed a significant improvement in GCP post intervention, in urban experimental group and in rural experimental group. These findings underscore the effectiveness of intervention based on 'Fogg Behavior Model' in altering the behaviour linked to green consumption practices.

Keywords: Intervention, theories, approaches, framework, Fogg behavior model, motivation, ability, prompt/ trigger, behaviour, practices

1. Introduction

Environmental degradation is one of the major challenges we are facing in present era which is majorly driven by unethical human activities which is leading to extreme weather events like droughts, flash floods, desert encroachment, depletion of ozone layer, torrential rainfall, recurring heat waves, cyclones, hurricanes, etc. Over the past few decades, global warming has become a significant concern contributing to ongoing climate change.

It is important for the individuals to preserve and protect the environment through the development of new forms of skills, behaviour, and attitude (Sadi, 2019) [19] Addressing these environmental challenges requires a shift in individual as well as in collective behaviour towards sustainable practices. Sustainable practices interchangeably used as green consumption practices (GCP) as defined by Cherrier *et al*. (2007) [4] green consumption refers to the practice of consuming goods and services that are environmentally friendly and sustainable. It involves making environmentally responsible choices, which is majorly purchasing, using, and disposing of products. However, fostering such behaviours often requires some interventions, strategies, approaches, frameworks and when targeted to a specific behaviour can influence it by acting as an external force. Intervention is an intentional activity, program, or approach intended to solve a problem. According to Lesaffre and Verbeke, (2005) [14] interventions are designed to enhance the well-being or to improve the present circumstances of an individual or a group. Evaluating the intervention involves comparing the outcomes of the two groups at the end. Szapocznik *et al*. (2010) [22] conceptualized intervention as a series of actions undertaken by an intervenor aimed at influencing and changing the behaviour of specific individual or groups. Intervention in research studies refers to specific actions, treatments, programs or strategies intentionally introduced by researchers to bring about change or test their effects on a target population (Anonymous, 2024) [2]. Intervention engages experimental groups via various activities such as trainings, delivering lectures, campaigns, demonstrations, showing videos and sending them information in the form of a text message, videos, pictures, and counselling, or anything else that could be included in an interventional study to change the behaviour. Sharma *et al*. (2018) [20] used campaign, street play and incentives to alter the behaviour. Whereas, White *et al*. (2019) [25] developed a framework with acronym SHIFT which stands for social influence, habit formation, individual self, feelings and cognition and tangibility to modify a behaviour. Moreover, interventions based on social media marketing was identified to develop positive intention for green consumption behaviour (Wagdi *et al*. 2022) [23]. Dam and Trijp, (2016) [5] identified

interventions as both extrinsic and intrinsic factor for behaviour change.

To access the effectiveness of an intervention there is always a control group that does not get any kind of intervention and at the end, the outcome is compared between controlled and experimental groups in terms of behavioural change. According to Jackson (2005) [10] human behaviour are strongly influenced by social and institutional contexts. Our actions and choices are often shaped by the behaviour of those around us. Behavioural change is simply a transformation or modification in existing human behaviour. Interventions to change behaviour have enormous potential to alter current patterns. As human behaviour is believed to be altered when confronted with different strategies. Change might not come easily but researchers/ psychologists have proposed number of theories, approaches, strategies and models to explain how change occurs. Some of them are health belief model, social cognitive learning theory, social marketing approach, trans theoretical or stages of change model, theory of reasoned action, theory of planned behavior, 4 E's Model of behaviour change. These are being used by extensionists, therapists, physicians, and teachers to study behaviour change.

Hence, the present investigation is an attempt in this direction using one of the behaviour change model i.e. Fogg Behavior Model. In 2009 [7], B.J. Fogg published the Fogg Behavior Model (FBM), a model for analysing behaviour change. The Fogg Behavior Model is a theory developed by Dr. BJ Fogg, a behavioural scientist at Stanford University. Fogg suggests that three elements i.e. Motivation, Ability and a Prompt/trigger are needed for behaviour change. **"**Motivation" includes three drives, namely 'sensation', 'anticipation' and 'belonging'. 'Sensation' is a dimension that has two sides: pleasure and pain. People are motivated to seek pleasure and avoid pain. 'Anticipation' is a second core motivator having two sides: hope and fear. 'Belonging' is a third core motivator and a social dimension that has two sides: social acceptance and social rejection. People are motivated to do things that provides them social acceptance. Second element "Ability" includes promoting those target behaviours for which the users have high ability. BJ Fogg list dimensions that are characterized with high ability or simplicity for performing a behaviour i.e. money, time, physiological effort, brain cycle/ thought process and social deviance. Thirdly "Prompt/trigger" are reminders that may be direct or indirect about the performance of a behaviour. It is the starting gun to fire and they'll get going. There are three types of prompt 'spark', 'facilitator' and 'signal'. (Anonymous, 2019; B J Fog, 2009) [1, 7]. According to the Fogg Behavior Model, behaviour change occurs when motivation, ability, and prompt/triggers all converge at the same time. For example, a person may be motivated to start running, have the ability to start with a short jog, and be triggered by a running buddy inviting them for a jog. Although studies have been conducted using Fogg Behavior Model to address behaviour change however, none of them have targeted to enhance the green consumption practices among school students. Therefore, the objectives of current study aimed to develop interventions targetting green consumption practices based on Fogg Behavior Model and to assess the effectiveness of GCP intervention in bringing behaviour change.

2. Theoretical background

2.1 Behaviour change through intervention

There are several interventions and strategies that can be employed to enhance behaviour and promote the adoption of green practices. These interventions can be targeted at individuals, organizations, or communities. Different interventions may be more effective for different individuals and contexts. Tailoring interventions to specific audiences and considering their unique needs and barriers can enhance the likelihood of behaviour change and the adoption of green practices. Mostly interventions and strategies are taken by theories and model to initiate the behaviour change. Hossieni *et al*. (2015) [9] examined the effectiveness of an educational intervention, based on the Theory of Reasoned Action (TRA) to increase breakfast consumption among school children in Bandar Abbas, Iran and found that application of TRA significantly increased scores of behaviour of breakfast consumption. The findings support application of the TRA in improving the intention and behaviour of breakfast consumption. Another study by Defra (2008) [6], outlined the 4 'E's model of behaviour changes to assist the UK government to develop strategies that enabled more sustainable living in homes and communities. The emphasis was on interventions that would enable and engage, enabling by tackling external barriers (such as information, facilities and infrastructure - applied to all segments) and engaging through communications, community action, targeting individual opinion leaders. Exemplifying the things to individual and encouraged individual driven by a motivation to avoid wastage. Study suggested that different combinations of these tools i.e. enable, encourage, exemplify and engage, should be applied to different population segments that varied according to environmental awareness and commitment, such as 'deep greens' versus those who were honestly unengaged in green behaviour. Another study done by Kigaru *et al*. (2015) [11], highlighted that the impact of nutrition and lifestyle interventions was observed higher in urban participants as compared to rural one. Urban participants were likely to reduce junk food consumption and adopted healthier eating habits to not consume junk food post intervention.

Micael and Hooper (2016) [16] stated that participants used different strategies to influence others like nagging, positive reinforcement etc. These strategies influenced other participants to practice greener behaviour to some extent. Lai and Cheng (2016) [12] investigated green purchase behaviour of undergraduate student in Hong Kong and revealed that undergraduate students were unwilling to pay for green products. Study suggested that in order to enhance green purchasing, appropriate marketing strategies could be used particularly, the aspect of eco-labelling and eco-friendly ways of communication should be focused in order to enhance consumer's knowledge. Packaging and advertising should be attractive to convince undergraduate to purchase green products. Dam and Trijp (2016) [5] identified various interventions that can act as both extrinsic and intrinsic factor for behaviour change. These interventions were information based such as awareness campaigns, labelling as well as financial incentives like discount and subsidies on green products.

In this direction another study by Sharma *et al*. (2018) [20] entitled 'social marketing approach to bring change in water use behaviour of rural people of Punjab, India' adopted different intervention to change the water usage behaviour among individuals. Interventions included awareness campaign such as rallies and street plays was conducted. Knowledge regarding water saving technologies was imparted through skill training. To encourage the adoption, small water saving devices on a trial basis was distributed. The social marketing approach proved to bring about change in the water use behaviour of rural people and impacted their knowledge and adoption level.

Another study done by White *et al*. (2019) [25] developed a framework with acronym SHIFT stands for social influence, habit formation, individual self, feelings and cognition and tangibility. Social influence consisted of social norms, social identities and social desirability could help in shift the consumers towards sustainable consumption. Habit formation as an intervention that break repetition, such as break and penalties could interrupt bad habits. Actions that encourage repetition, such as making sustainable actions easy and utilizing triggers, incentives, and feedback, could lead a positive habit. Individual self-consisted of self-concept, self-interest, self-consistency, self-efficacy, and individual differences. Feelings and cognition worked upon negative emotions, positive emotions, information, learning, knowledge about green product, eco-labels and last Tangibility consisting temporal focus, communicate local and proximal impacts, concrete communication, encouraging desires for intangibles could all together work as a strong strategy to change the behaviour of consumers towards sustainable consumption.

Miller (2019) [17] used various adaptive intervention to change the behaviour of individual. Adaptive intervention consisted of Just-in-time adaptive interventions (JITAIs) used continuously collected data (e.g., via sensors, accelerometer, mobile application, or questionnaire) and Sequential multiple assignment randomized trials (SMART) where another stage treatment was provided. Another intervention used by Miller was named stepped-down approach required fewer resources and lowered burden for participants who were meeting treatment goals. Lastly, the multiphase optimization strategy (MOST) used an adaptive engineering-based approach to create the best intervention possible while working within realistic and specified resource limitations during intervention development and implementation. Miller revealed that among all JITAIs were successful in reducing sedentary behaviour by increasing their physical activity as the patients were being continuously triggered.

2.2 Fogg Behavior Model

There are only few studies that utilized Fogg Behavior Model (FBM) to influence a behaviour. The model posited that human behaviour is a result of interaction between three core elements

i.e. motivation, ability and prompt/trigger. Some studies have demonstrated its effectiveness in designing interventions that address the underlying factors that drive human behaviour.

In this line Moraveji *et al*. (2012) [18] conducted a study entitled 'the role of commitment devices and self-shaping in persuasive technology' and the results showed that self - shaping and commitment devices were not conceptualized evenly, describing these by Fogg Behavior Model, these descriptions could had helped designers identify exactly how they want to invoke behaviour change in the lives of their users. The study further found that only six per cent of the user generated designs were made to self-shape motivation. Guimareas *et al*. (2018) [8] aimed to contribute by offering an approach that bridges the gap between theory and practice in applications requiring the FBM. The approach enabled the behavioural model to be applied with greater certainty, thereby enhancing efficiency in the evaluation and implementation process of persuasive technology. Another study conducted by Adnan *et al*. (2012) [3] merged the human personality with Fogg behavior grid, they expounded strong association between personality type of student and their study habits/behaviour, they further said persuasion could be done more easily and effectively in order to achieve target behaviour if their personality types were considered in account.

Leila *et al*. (2023) [13] used Fogg Behavior Model to gain a deeper understanding of the different perceptions of HIV testing across all age groups. Results revealed that younger men (21-30 years) were more accepting of HIV testing, free testing act as key motivator despite financial barriers. However, across all ages, men were motivated to get treatment if they found HIV positive. In case of triggers for testing, younger and older men (41+) preferred to hear directly from health professionals however younger men used social media, tv adds and middle men (31-40 years) identified tv and radio as a effective trigger to follow a testing.

Another study based on FBM conducted by Lin (2024) [15] found that generation had strong motivation and purchasing power along with plenty of reminders. Among all, sugar-free beverages remained popular after an initial purchase because of good taste and health benefits. Social media, videos provided constant reminder encouraged them to purchase more. All together motivation, purchasing power and frequent triggers made a sugar free product a key choice among generation z.

Another study done by Wang *et al*. (2024) [24] elucidated that hybrid approach based on Fogg Behavior Model significantly improved the appropriate rate of weight gain during pregnancy and improves neonatal results. The results showed that the experimental group gained less or appropriate weight during pregnancy along with lower rate of gestational diabetes and hypertension as compared to the control group. Results further revealed that neonatal weight and incidence of macrosomia were found lower in the intervention group.

3. Materials and Methods

The present study was conducted in the Ludhiana District of Punjab. A list of government schools was procured from the District Education Office, Ludhiana. From the list of schools, three schools were selected from urban zones and three from rural blocks, thus a total six government schools

were selected randomly. From the six selected government schools, fifty students from each school (standard IX to XII) were selected randomly. In urban zones, from three selected schools, two schools were considered as an experimental group which comprised 100 students, and one school was considered as a control school which consisted of 50 students. Similarly, from rural blocks, two schools were considered as experimental groups comprised of 100 students, and one school was considered as the control school which consisted of 50 students. Thus, a sample of 150 students from urban schools and 150 students from rural government schools were selected. Hence, the sample comprised of 300 students in all. Survey method was used to collect data through personal interview method with the help of a prepared interview schedule. The responses of respondents were obtained on a five-point continuum Likert scale i.e. Very frequently (5), Usually (4), Occasionally (3), Rarely (2), and Never (1). Further, intervention was designed based on 'Fogg Behavior Model' which consisted three components to change the behaviour i.e. ability, motivation and prompt/trigger. Interventions included lecture-cum discissions, motivation videos, storytelling, demonstrations related to green practices, quiz competitions and best out of waste competition. Along with that WhatsApp group was created to continuously trigger the students regarding green practices. Intervention was provided only in four experimental schools. After the gap of four months post data was collected from all the six groups. Data was analyzed with the help of statistical methods such as mean score and paired 't' test and independent 't' test, analyzed using SPSS tool.

Table 1: Selection of respondents for experimental and control group

Group	Urban	Rural
Control group	Government Senior Secondary School, Sunet, Ludhiana, Punjab, India	Government Senior Secondary School, Mansooran, Ludhiana, Punjab, India
Experimental group	Government High School, Barewal Ludhiana, Punjab, India	Government Senior Secondary School, Rampur Ludhiana, Punjab, India
Experimental group	Government Senior Secondary School, PAU, Gobind Nagar, Ludhiana, Punjab, India	Government Senior Secondary School, Jandiali, Ludhiana, Punjab, India

4. Results and Discussion

4.1 Development of intervention

Based on three components of Fogg Behavior Model i.e. Motivation, Ability and Prompt/ trigger interventions was developed in order to enhance the green consumption practices among the respondents.

Table 2 Intervention development based on Fogg Behavior Model (Figure 1)

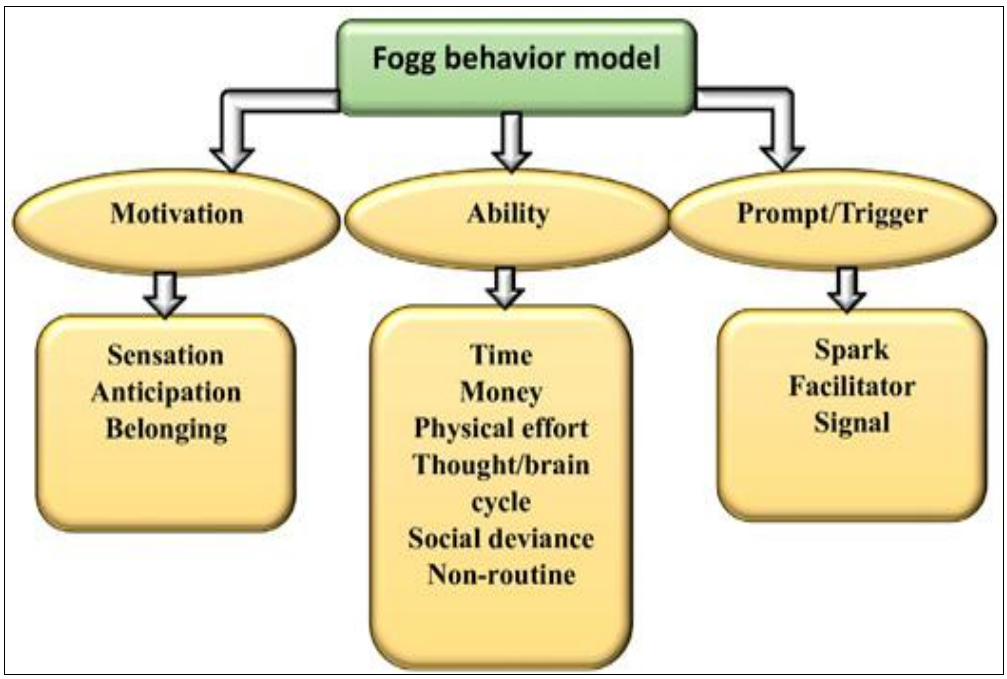

Fig 1: Fogg Behavior Model

Table 2: displays the development of intervention based on Fogg Behavior Model for each component i.e. motivation, ability and prompt/trigger

Component	Strategy	Source
Motivation	Lecture on 'green consumption'	Literature
	Lecture on 'let's contribute to environment'	Literature
	Motivational introductory video on 'environmental challenges'	https://youtu.be/4NU2Iq8HTPY?si=VQ_6CGEie52QyiCp
	Motivational video on 'pollution by 2030'	https://youtu.be/z_eknOqTrWM?si=sdYyvm1Y3Prsy58S
	Story telling video on 'cleanliness'	https://youtu.be/lUAfH23k1PA?si=MLe5achvKxL7qnJZ
	Motivational Punjabi poem video on 'saving earth'	https://youtu.be/PksBSYd_c7Q?si=XyXb4ObaGTNii8a5
	Motivational video on 'bulk packaging'	https://youtu.be/9Yd1aHr44ss?si=HVYHUAb979gaJPnC
	Storytelling video on 'importance of tree and water'	https://youtu.be/qk1697UCG7U?si=l9fspy3ioASDdmkl
	Projective techniques on 'environmental issues'	Literature
	Motivational video on 'water scarcity'	https://youtube.com/shorts/JnJhFcP5iNM?si=JNuiVNNzxFsQXQjB
	Storytelling video on 'water saving'	https://youtu.be/el1y5YFJuQ4?si=NwcmRVuoEPfcpnWD
	Storytelling video on 'food wastage'	https://youtu.be/3xmT-F46kWU?si=hCCCrtfKBmXzdftJ
	Motivational video on 'eco bricks focusing reuse and reduce of plastic'	https://youtu.be/lNgAW4VRcKo?si=N8ZU-KmM4h7CTlbG
	Motivational video on 'use of cloth napkin instead tissue paper'	https://youtu.be/oocVnWdRewY?si=T0TEGElpsdI1tGTl
	Motivational video on 'responsible consumption'	https://youtu.be/fXJmwW3xay4?si=VdouLJ5unrOpo6uA
	Motivational video on 'threat of using and throwing disposable mask'	https://youtu.be/dzO13VR14jo?si=Te8v8nsRMA_d6D_Y
Ability	Lecture on 'grow organic'	Literature
	Demonstration video on 'kitchen gardening'	https://youtu.be/PlDILbVXanE?si=hNa2tDa3gfB8cx_r
	Demonstration video on 'mulching process'	https://youtu.be/j4HKv7Ikogw?si=1TVF5epQHQNJaXjk
	Demonstration video on 'best out of waste'	https://youtu.be/2JkXgATQx7Q?si=YuvIiNfFdqhf89yE
	Demonstration video on 'making pots by using waste mask'	https://youtu.be/3khrXBv4_wM?si=Hy8yyOXHsYf0s2jo
	Do it yourself activity on 'organic Holi colour making'	https://youtu.be/pR2RsLGfn1w?si=n5vvcSAbpBCtdwb
	Do it yourself activity on 'hanger making'	https://youtu.be/QoCu6ZuleaU?si=sao2BCmxcFY4lqyc
	Do it yourself activity on 'organic shampoo making'	https://youtu.be/RIzFYjdC76s?si=CEqsMhNFeMNCgRhn
	Do it yourself activity on 'makeover of old table'	https://youtu.be/LdN6M1ThT9U?si=AXemLDTPNtnei7hq
	Do it yourself activity on 'making play material'	https://youtu.be/nLOXu3fZObw?si=ZPD9xQMH1RHgMg4G
	Do it yourself activity on 'reusing plastic bottle'	https://youtu.be/0ZLEJ8QXDrA?si=q5TEtjqcrWNZUny8
	Do it yourself activity on 'reusing waste CDs'	https://youtube.com/shorts/9bW-8U3tiRM?si=mptcNiY5V4ETO2-G
Prompt/trigger	Quiz competition based on initial interventions	Initial intervention
	Competition	-
	Prize /reward	-

For the 'motivation' phase, two lectures were developed which consisted of introduction to green consumption and ways to contribute in environment by following the green practices. Motivation part, further consisted of eight motivational videos, four storytelling videos, one projective technique method and one motivational Punjabi poem. All the videos were downloaded through YouTube.

The purpose of this part was on raising awareness, which is an important step to motivate others to adopt any behaviour. The content aimed to inspire individuals to follow green practices by connecting to real-life scenarios.

For the 'ability' phase intervention, one lecture was developed using PowerPoint presentation on the topic 'grow organic and ways to become organic at low price i.e. kitchen gardening. Further, method demonstration was designed to equip participants with the skills needed to implement green practices in their day-to-day life. Four demonstration videos related to best out of waste and seven do-it-yourself were downloaded from YouTube to show and share with the students via WhatsApp groups as home assignments to enhance their capability to be responsible and contribute towards environmental sustainability.

In the 'prompt/trigger' phase, questions for quiz competition was designed based on developed lectures and videos. 'Best out of waste competition' was planned to instil creating skills among the students. Reward and price distribution was planned for the participants and for the winners. Further, WhatsApp media was selected for continuously triggering the behaviour of participants to follow green practices. It was planned to share videos and picture timely to keep them in touch and to foster their behaviour.

Consistent digital engagement served as a prompt to maintain momentum to continue the practices.

All the components of intervention focused on enhancing green seeking credibility, green prosumption practices, green procurement practices and green whispering practices among the participants.

4.2 Validation of intervention

Validity refers to the extent to which an instrument measures what it is intended to measure. In the current study validity test was conducted to check whether the components of interventions were accurate and fulfilling the criteria of relevance, accuracy, clarity and completeness. For the current study content validity was used to measure whether intervention covers the entire range of the concept it is intended to provide information.

Each component of the Fogg Behavior Model i.e. motivation, ability and prompt/trigger was judged on a 4-point continuum for relevancy, accuracy, clarity, and completeness. The results are presented in table 3

Table 3: Content validity of intervention by experts n =20

Parameters	Component of Fogg Behavior Model		
	Motivation	Ability	Prompt/trigger
Relevancy	3.5	3.75	3.6
Accuracy	3.3	3.7	3.35
Clarity	3.1	3.65	3.35
Completeness	3.05	3.6	3.15
Total	3.24	3.68	3.36

(Mean range 1-4)

The table depicts the content validity of the GCP intervention based of three components of Fogg Behavior Model i.e. motivation, ability and prompt/trigger.

For motivation, the experts rated the intervention with an average of 3.24, with individual parameter ratings with scores 3.50 for relevancy, 3.30 for accuracy, 3.10 for clarity and 3.05 for completeness. This suggests that the intervention was considered 'good'.

For ability, the expert rated intervention with an average of 3.68. The individual parameter ratings scores were 3.75 for relevancy, 3.70 for accuracy, 3.65 for clarity and 3.60 for completeness. suggesting that the intervention was considered 'very good'

For the prompt/trigger component, the intervention received an overall mean score of 3.36, with individual parameter ratings with scores 3.60 for relevancy, 3.35 for accuracy, 3.35 for clarity and 3.15 for completeness. The scores signify that it was rated 'good' by experts.

The table depicts that the 'ability' intervention received highest overall rating by the experts followed by 'prompt/trigger' and 'motivation' in that order overall intervention was found suitable and well designed to enhance the participants ability to perform green consumption practices.

4.3 Delivery of intervention

4.3.1 Pre-intervention stage

The pre-intervention stage involved systematic steps to establish connections, build rapport and performing pre-data collection across controlled and experimental groups of both urban and rural area. It also involves creation of WhatsApp group for experimental groups.

Table 4: Description of activities planned at pre-intervention stage in experimental and controlled group

Days	Activities	Mode of interaction
Day 1	Linkage with schools	Telephonic conversation and e-mail
Day 2	Permission for data collection and intervention	Personal visit
Day 3	Rapport building	Personal visit
Day 4	Pre-data collection and WhatsApp group formation	Personal visit

At first, the efforts were focused on establishing linkage with all six schools and procuring the necessary permissions for data collection with both controlled and experimental schools. This was achieved through telephonic conversation, email correspondence followed by personal visits to ensure clear communication and formal approval. After that, rapport was established through personal visit in each of the schools. Rapport building was done to establish trust and familiarity with the selected participants laying the foundation for effective collaborations.

Finally, preliminary data was collected from all the 300 students covering each of the experimental and controlled schools using structured interview schedule through personal visit. Later on, four separate WhatsApp groups were created for four experimental school participants for streamlined communication and interactions with them during intervention stage.

4.3.2 Intervention stage

As discussed earlier, the intervention was developed under three components of Fogg Behavior Model i.e. motivation, ability and prompt/trigger. Developed intervention was delivered to all the experimental groups to enhance the green consumption practices.

4.3.2.1 Intervention under motivation component

In first step, intervention was targeted on creating awareness regarding environmental issues, highlighting reasons behind these issues and motivating the participants to follow a sustainable practice to tackle these issues. Table 5 presents a detailed description of GCP interventions provided around the motivation component of Fogg Behavior Model. In each experimental school, intervention activities were initiated with the selected students, two days after pre data collection.

Table 5: Intervention given to experimental groups under component 'motivation'

Days	Activities	Mode of interaction	Time duration (minutes)	Method
Day 1	Lecture on 'green consumption'	Personal visit	40:00	PowerPoint presentation
	Motivational introductory video on 'environmental challenges'	Personal visit	04:22	Video using overhead projector
	Motivational video on 'pollution by 2030'	Personal visit	03:15	Video using overhead projector
	Story telling video on 'cleanliness'	Personal visit	02:00	Video using overhead projector
	Motivational Punjabi poem video on 'saving earth'	Personal visit	01:50	Video using overhead projector
Day 2	Lecture on 'Let's contribute to environment'	Personal visit	30:00	PowerPoint presentation
	Motivational video on 'bulk packaging'	Personal visit	02:30	Video using overhead projector
	Storytelling video on 'importance of tree and water'	Personal visit	10:40	Video using overhead projector
	Projective techniques on 'environmental issues'	Personal visit	15:00	Using overhead projector
Day 3	Motivational video on 'water scarcity'	Social media	00:57	WhatsApp
	Storytelling video on 'water saving'	Social media	05:00	WhatsApp
	Storytelling video on 'food wastage'	Social media	08:06	WhatsApp
Day 4	Motivational video on 'eco bricks focusing reuse and reduce of plastic'	Social media	02:26	WhatsApp
	Motivational video on 'use of cloth napkin instead tissue paper'	Social media	03:00	WhatsApp
Day 5	Motivational video on 'responsible consumption'	Social media	01:22	WhatsApp
	Motivational video on 'threat of using and throwing disposable mask'	Social media	03:00	WhatsApp

Day 1 activities

On the first day, lecture-cum-discussion session was organized by using developed PowerPoint presentation. The lecture focused on green consumption, unsustainable consumption practices and about leading environmental issues as a result of unsustainable consumption. The lecture further emphasized plastic as a major problem, highlighting its effect on natural resources, animal health and human health. It also covered different types of plastics, and students were told where one should use or should not use them, followed by showing various plastic samples. Finally, the session provided information about difference between biodegradable and non-biodegradable products. The lecture was completed approximately in forty minutes.

On the same day, two motivational videos, a story telling video and a motivational Punjabi poem were shown using audio-visual aids. The first motivational video served as an introductory video highlighting unsustainable human consumption practice which is contributing to environmental degradation and suggesting green practices to mitigate these issues. The second motivational video acted as a warning, and creating awareness about the harmful consequences of neglecting green practices. The video predicted a future scenario in 2030 where individuals would need to wear masks all the time, due to no available clean air, will relying on oxygen kits to breathe and will struggle to step outside.

The story telling video on cleanliness, portrayed a school student who took an initiative to clean his classroom by missing an assembly session, and was later appreciated by the teacher for his thoughtful act. The moral of the story was to motivate the students to keep our surroundings clean. The motivational Punjabi poem featured rhyming lines that criticized humans for their unsustainable practices and continuously degrading the mother 'Earth'. The lyrics of the poem were provided to the students and they sang the poem along. The poem urged people to stop such unethical practices and protect the nature from further harm. All the above activities were carried out in all the four schools with experimental groups.

Day 2 activities

After the gap of three days, the intervention resumed with further activities. On this day, a lecture-cum-discussion session was conducted using a developed PowerPoint presentation on the topic entitled 'Lets contribute to our environment'. The session covered the 3 R's of sustainability, 'reduce', 'recycle' and 'reuse' and practical ways to implement these at individual level. Lecture further introduced eco-labelling, its significance and identification of different eco-labels on electronic items, food products, garments etc. At the end, the lecture briefly explained how to become green and contribute to environment sustainability by following various green practices related to energy saving, water saving, food, waste management, festivals, plastic use and other miscellaneous activities.

On the same day, a motivational video, a storytelling video and projective techniques related to environmental issues were shown. The motivational video addressed the issue of plastic waste and proposed solutions such as buying products in bulk with single packaging instead of individually packed items in order to reduce waste. It also highlighted the importance of tearing wrapper of chocolate, chips or biscuits in a way that prevents smaller part from detaching to a bigger part, as smaller plastic is not recyclable and often harm animals by getting stuck in their guts.

The story telling video consisted of two parts, first part highlighted the importance of trees and harmful consequences of cutting trees. The other part emphasized on significance of water in our lives and reinforcing the message that 'water is life'. The moral of the story was to stop cutting trees and wasting water. The projective techniques involved displaying pictures regarding environmental issues caused by unsustainable human practices and students were asked to analyze the pictures and to identify the underlining message behind them. This technique fostered critical thinking and awareness about environment challenges.

Day 3 activities

After a gap of one day, the third day intervention was carried out simultaneously across all the schools through online mode. There were one motivational video and two storytelling videos that were shared with the participants via WhatsApp. The motivational video was in the form of news report, narrating the tragic story of a boy's death caused by unavailability of water during summers. It emphasized the importance of water and urged viewers to avoid its misuse. The first storytelling video depicted a village facing severe water shortages, and the moral was to discourage the water wastage and adopt efficient ways to save the water. Another storytelling video was about food wastage and its negative long-term effect. It conveyed a powerful message about the importance of avoiding food wastage to ensure sustainability.

Day 4 activities

After the gap of one day, activities of fourth day were carried out by sending two motivational videos and one storytelling videos via WhatsApp media across all the schools. The first motivational video focused on the concept of reusing waste and demonstrated the proper disposable method to create eco-bricks, highlighting a creative way to manage plastic waste. The second motivational video was about the environmental impact of using too much tissue paper, explaining its production involves cutting of trees. It encouraged the use of cloth napkin as an eco-friendly alternative.

Day 5 activities

After a one-day gap, two more motivational videos were shared via WhatsApp media with all the subjects in all the schools. The first video was regarding contrast behaviour of two students, one was engaged in green practices while other was engaged in unsustainable practices, emphasizing the importance of environment friendly behaviour and emphasizing responsible consumption. The second motivational video highlighted the threat of using disposable mask to humans, animals and environment. It promoted to use cloth mask instead of disposable mask in order to reduce waste.

4.3.2.2 Intervention under ability component

In the second step, intervention was delivered to enhanced ability of a participants to follow a sustainable green practice and make them feel how effortlessly these practices can be integrated into daily life. Table 6 showcase the activities prepared under the component 'ability'.

Table 6: Intervention given to experimental groups under component 'ability'

Days	Activities	Mode of interaction	Time duration (minutes)	Method
Day 6	Lecture on 'grow organic'	Personal visit	30:00	PowerPoint presentation and video
	Demonstration video on 'kitchen gardening'	Personal visit	04:41	Video using overhead projector
	Demonstration video on 'mulching process'	Personal visit	02:24	Video using overhead projector
Day 7	Demonstrations on 'best out of waste'	Personal visit	25:00	Demonstration method
	Demonstration video on 'best out of waste'	Personal visit	12:13	Video using overhead projector
	Demonstration video on 'making pots by using waste mask'	Personal visit	06:14	Video using overhead projector
Day 8	Do it yourself activity on 'organic holi color making'	Social media	05:10	WhatsApp
	Do it yourself activity on 'hanger making'	Social media	02:19	WhatsApp
Day 9	Do it yourself activity on 'organic shampoo making'	Social media	04:30	WhatsApp
	Do it yourself activity on 'makeover of old table'	Social media	12:00	WhatsApp
Day 10	Do it yourself activity on 'making play material'	Social media	12:00	WhatsApp
	Do it yourself activity on 'reusing plastic bottle'	Social media	05:00	WhatsApp
	Do it yourself activity on 'reusing waste CDs'	Social media	00:58	WhatsApp

Day 6 activities

After a gap of two days, the sixth day intervention activities were conducted which consisted of lecture followed by discussion, two demonstration videos through personal visit. The session began with a lecture on grow organic food which was delivered through PowerPoint presentation. It covered difference between organic and inorganic food, ways to identify organic products, and a practical solution to the high-cost organic food i.e. establishing kitchen gardens at home or school. Lecture further provided detailed information about kitchen gardening, focusing on seasonal vegetable that can be grown in small spaces. Following the lecture, students watched a demonstration video on step-by-step process of setting up a kitchen garden using grow bags and old plastic buckets.

Another demonstration video was on mulching process, which showcased the benefits of mulching process and demonstrating simple technique of organic mulching in kitchen gardens by using old leaves and grass. These activities were carried out simultaneously in all the four experimental schools.

Day 7 activities

After a gap of two days, seventh day activities were carried out through personal visit. Seventh day activities consisted of a method demonstration and two demonstration videos. The method demonstration was focused on creating useful items from waste material, such as rakhi making, envelop making and paper bag making from old used papers. As students were also provided materials to prepare articles, this provided a hands-on-experience to the students, encouraging their creativity. Following the demonstration, two demonstration videos were shown to the students on similar activities like Rakhi making using waste materials and another video demonstrated how to reuse the disposable mask to make flower pots, promoting the innovative reuse of waste.

Day 8 activities

Three days later, the next set of activities were carried out. Do it yourself (DIY) videos were shared via WhatsApp in WhatsApp groups with all the subjects of all the four schools, demonstrating how to make organic Holi colour from home available ingredients and hanger making using scrap material. These videos aimed to encouraged creativity, sustainability and adoption of eco-friendly practices.

Day 9 activities

After a gap of three days, two do it yourself videos (DIY), one on making organic shampoo and other on decorating old furniture to reuse it were shared via WhatsApp. These videos aimed to empower participants to make their own products to promote green practices.

Day 10 activities

After a gap of three days, three do it yourself videos (DIY) were shared in WhatsApp group simultaneously with all subjects of all four schools. The first video demonstrated how to make a ludo board at home using minimum available material. The second video consisted of reusing the old plastic bottle to create new items, while the third video focused on transforming old CDs into decorative item. So, all the activities under 'ability' included activities to capacitate them for behaving eco- friendly and to make them realize how easy thing are.

4.3.2.3 Intervention under Prompt/ trigger component

In the third step, intervention was delivered to prompt participants to take specific actions and continue the eco-friendly behaviour. Prompt/ triggers were used to reinforce the habits and sustained participation by keeping the students actively involved. Table 7 showcase the detail of activities performed under 'prompt/trigger' component.

Table 7: Intervention given to experimental groups under component 'prompt/trigger'

Days	Activities	Mode of interaction	Time duration (minutes)	Method
Day 11	Best out of waste competition	Personal visit	45:00	Competition and price distribution
Day 12	Quiz competition	Personal visit	45:00	Competition and price distribution
Day 13	Project work	Social media	30:00	WhatsApp

Day 11 activities
After a gap of six days, next activity was carried out through personal visit. Best out of waste competition was organized with the assistance of school teachers. Students participated in the activity, were appreciated and rewarded for their efforts and top three positions were rewarded by prizes, encouraging continued enthusiasm for sustainable practices.

Day 12 activities
After a gap of five days, quiz competition was organized based on delivered lectures and videos on green consumption. The students were divided into five groups, ten students in each group. All the participates were appreciated and rewarded for their efforts. Special prizes were awarded to the group that secured first and second position.

Day 13 activities
By messaging in WhatsApp group home project was assigned to the students, encouraging them to perform any form of green practices. They were asked to post their activities in the WhatsApp group, serving as prompt and stimulus for other fellow students.

All the above mentioned GCP interventions were provided to motivate them to integrate green consumption practices into their daily routines. It also emphasized the ease and feasibility adopting a practice, ensuring the participants to feel confident in their ability to make green choices with minimal efforts. Additionally, the timely reminders and prompt were used to encourage participants to consistently follow green practices and to foster behavioural change.

4.4 Change in green consumption practices
The results of green consumption practices in table 7 reveal a significant improvement in both urban and rural experimental groups after intervention. In urban group the mean score improved from 2.34 to 3.20 which raised by 0.86, with t value 42.383 significant at one per cent level, indicating a strong positive shift in green consumption practices. In rural group, the mean score has increased from 2.33 to 2.90 reflecting the rise by 0.57, with t= 23.211, with one per cent level of significance, signifying positive change but to a lesser extent compared to the urban group. Overall urban group showed a greater change ($\bar{x}$ =3.20) compared to the rural group ($\bar{x}$ = 2.90).

Table 8: Comparison in overall green consumption practices of urban and rural respondents before and after intervention n=300

Groups	Urban control (n=50)	Urban experimental (n=100)	't'value	Rural control (n=50)	Rural experimental (n=100)	't'value
	Mean±SD	Mean±SD		Mean±SD	Mean±SD	
Before	2.37±0.16	2.34±0.18	1.752	2.32±0.11	2.33±0.13	0.736
After	2.38±0.16	3.20±0.15	30.914**	2.33±0.11	2.90±0.23	17.051**
Paired 't' value	1.769	42.383**		1.999	23.211**	

* p <0.05 but >0.01 ** p <0.01, (Mean range: 1-5)

On the other hand, control groups show non-significant changes in either group without intervention. While comparing control and experimental group at pre-test stage non-significant difference were observed in both the groups, (t=1.752) in urban and (t=0.736) in rural. In the post-test stage, data indicate significant differences in both urban groups, (t=30.914, p <0.01) and in rural group with (t= 17.051, p <0.01).
The overall findings underscore the effectiveness of structured interventions in enhancing green consumption practices using Fogg Behavior Model to ensure behaviour change as shown in figure 2. Hence, framework of Fogg Behavior Model was successful in changing the behaviour amongst school students. The findings are aligned with the results of studies conducted by Guimareas *et al*., 2018 [8]; Sutanto *et al*., 2021 [21]; Lin, 2024 [15]; Wang *et al*., 2024 [24]; Leila *et al*., 2023 [13] who developed interventions and approaches based on Fogg Behavior Model to change the behaviour of participants and found the model successful in persuading others to form a habit and change a behaviour.

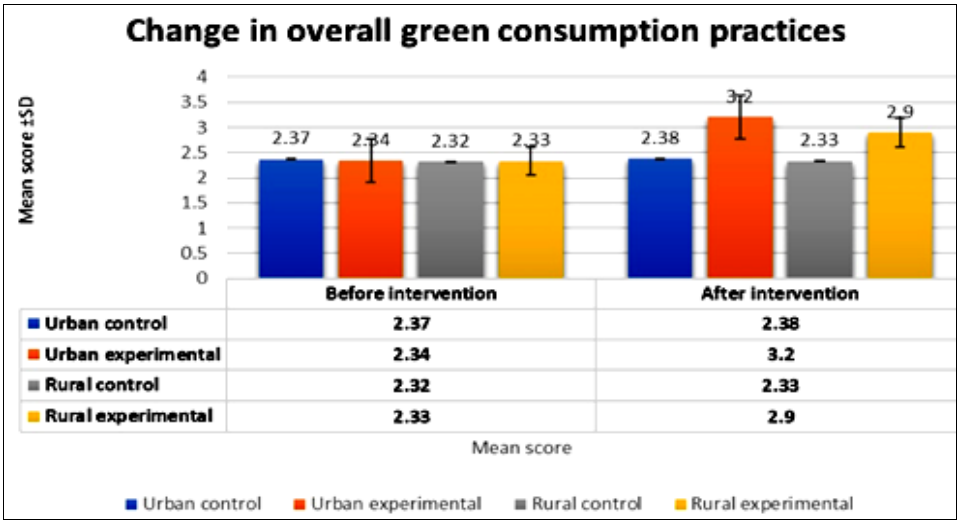

Fig 2: Change in overall green consumption practices after intervention

5. Conclusion

The study aimed to develop the intervention based on 'Fogg Behavior Model' (FBM) consists of three core elements i.e. motivation, ability and prompt/trigger. Intervention focused to enhance overall green consumption practices among school students. The results demonstrated a significant improvement among both urban and rural experimental group students in terms of improvement in their overall green consumption practices. Hence, the study found the significance of Fogg Behavior Model for behavioural change with respect to green consumption practices. An intensive program to promote eco-friendly behaviour based on Fogg Behavior Model can be planned and implemented across schools at state and National levels. Fogg Behavior Model framework can be used in other behavioral change research studies across various segments of society.

Declaration

All authors declare that they have no conflicts of interest.

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Chat-GPT has been used to rephrase the sentence and change the bibliography style of references.

Consent

Verbal consent was obtained from each of the school administration and all the subjects involved in the study to conduct research.

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