

Using Behavioural Economics to Explain Substance Abuse Among Indian Adolescents

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ABSTRACT

Understanding the behavioural factors that influence adolescent risky behaviour including substance abuse in India is critical for government agencies and organisations working to combat the now upsurging problem caused by substance use amongst adolescents. The objective of this study is to find out the behavioural biases that influence risky behaviour, including substance abuse among adolescents in India. An exploratory factor analysis is conducted on the responses of 682 teenage respondents from a close-ended questionnaire administered electronically in five schools in Ahmedabad, Gujarat. The Bandwagon Effect, Hard Easy Effect, Optimism Bias, Sunk Cost Fallacy, Social Norms, Disposition Effect, Illusion of Validity, and Availability Heuristic emerged as the factors most affecting the risky behaviour of adolescents including substance abuse. The findings of this research can be used to develop effective interventions to mitigate the effect of these biases on adolescent substance abuse and other risky behaviours. This study enriches the behavioural economics literature by focusing on teenage substance abuse, filling a critical research gap, and providing valuable insights for public health interventions. It also provides benchmarks for future research and policy-making in behavioural economics.

Introduction

Behavioural economics (BE) is a field that examines how cognitive, emotional, and social factors influence economic decisions. It combines insights from economics and psychology to understand human behaviour in economic contexts. Numerous applications of BE have been explored, including consumer behaviour, financial decision-making, and public policy design (Thaler, 2016; Kahneman and Tversky, 1979).

BE provides a valuable framework for explaining behaviour across different fields, as it recognizes that individuals' decisions are not always rational and are influenced by various psychological and social factors. This approach has been applied to understand behaviour in healthcare, environmental conservation, and even substance abuse (Loewenstein, Brennan and Volpp, 2007; DellaVigna, 2009).

Substance abuse among adolescents is a significant public health concern worldwide. According to global statistics, a substantial number of adolescents engage in substance abuse, with approximately 22% reporting alcohol use and 8% reporting illicit drug use (UNODC, 2020). In India, the situation is also alarming, with figures indicating that about 18% of adolescents are involved in substance abuse, including alcohol, tobacco, and illicit drugs (National Drug Dependence Treatment Centre, 2021).

Several studies have examined the behavioural factors contributing to adolescent substance abuse in different countries. For instance, research in the United States has highlighted peer influence, family dynamics, and personality traits as significant determinants of substance abuse. Similarly, studies in Europe, such as those conducted in the Netherlands and Sweden, have identified factors like social norms, parental monitoring, and self-control as influential (Newcomb and Bentler, 1988; Kandel, 1996).

While there is existing research on the factors affecting substance abuse among adolescents in various countries, the Indian context remains relatively understudied. Changes in education, lifestyle, and culture in India have the potential to impact the behavioural factors that contribute to substance abuse among adolescents (Patel et al., 2016). Therefore, conducting an India-focused study can help identify the specific behavioural factors relevant to the Indian context, thus contributing to effective strategies for controlling widespread substance abuse.

Understanding the behavioural factors that influence substance abuse among adolescents in India is essential for policy advisors, government agencies and organisations confronting this issue. The findings of this study are essential to the ongoing growth and enhancement of public health interventions that focus on reducing substance abuse among adolescents. Understanding these cognitive biases enables policymakers to devise more effective methods that account for the cognitive biases that influence adolescent substance use decisions (Thaler and Sunstein, 2008).

To the best of the researcher's knowledge, few studies have examined the behavioural factors that influence substance abuse in adolescents in India.

Therefore, this study attempts to investigate the behavioural factors affecting risky behaviour including substance abuse among adolescents in India. It addresses the following research question: What are the behavioural biases and heuristics that explain risky behaviour including substance abuse among teenagers/adolescents in India?

The paper is organized as follows. The next section contains an in-depth review of the literature on behavioural economics, and its use in understanding various types of behavioural patterns, especially substance abuse among adults and adolescents. The next section describes the research methodology used, which is followed by the findings of the factor analysis conducted using responses from 682 adolescents. The conclusions from the findings are shown next. Finally, the discussion section discusses the practical implications of the study, limitations and further scope for research.

Literature Review

Behavioural Economics

Behavioural economics recognises that human decision-making is influenced by psychological, cognitive, emotive, cultural, and social factors in addition to rational considerations (Mullainathan and Thaler, 2000). It deviates from traditional economic theories by considering cognitive biases and heuristics. This shift has significantly improved the comprehension of a variety of issues, including substance abuse, and is increasingly utilised in benchmarking studies.

Behavioural economics looks into the biases, habits, and tendencies that set off processes of decision-making and how these are different from the behavioural predictions derived from conventional economic theory which assumes rational choices and decisions by individuals. By combining two different social sciences - economics and psychology - behavioural economics attempts to comprehend cognitive biases and how people actually act compared to how they would act if they were behaving in a rational manner (McGill et al., 2019).

According to prospect theory, people tend to avoid risk when it comes to gains but do not mind risk when it comes to losses. In other words, people value the possibility of losing something more than the possibility of gaining something of equal value. There is also the concept of framing theory, which states that the way information is presented to people can influence their decisions (Kahneman and Tversky, 1979).

According to research, people are more likely to accept unequal wealth distribution if they believe it is fair and just. This has significant implications for policymakers attempting to design policies that promote social welfare while maintaining a sense of fairness in resource distribution. Furthermore, the concept of fairness has spawned new theories and models in behavioural economics. For example, the "ultimatum game," a

popular experiment used to study fairness, has been used to demonstrate that people will reject unfair offers even if it means receiving nothing. The findings of such experiments have aided in the development of theories of social preferences, which seek to explain why people behave in ways that contradict traditional economic models (Kahneman, Knetsch and Thaler, 1986).

Behavioural economics has its roots in problems of rationality and optimizing expected utility, particularly empirical evidence of individuals acting contrary to expected norms (Balasubramanian, 2021).

Risky Behaviour in Adolescents and Teens

Adolescents and teens frequently engage in risky behaviours that can have serious ramifications for their health, safety, and future. Risky behaviours such as overeating, smoking, sedentary lifestyles, substance abuse and excessive alcohol consumption are major contributors to chronic health conditions, premature deaths, and health-care spending (Galizzi, 2012).

Substance abuse, such as drug or alcohol use, can result in addiction, impaired judgment, and long-term health issues. Unwanted pregnancies, sexually transmitted infections, and emotional trauma can all result from unsafe sex. Unsafe driving, such as speeding or texting while driving, can result in serious injuries or fatalities. Riding with a drunk or impaired driver and driving under the influence of alcohol or drugs are significant public health issues among adolescents (Osilla et al., 2019). Theft and vandalism can result in legal trouble and harm relationships with family and friends. Overspending or taking on too much debt can lead to financial hardship and limit future opportunities (Lesner et al., 2022).

Thus, for a variety of reasons, adolescents engage in risky behaviours. They may have greater access to cigarettes, drugs, and alcohol than previous generations, less adult supervision, and peer pressure from older students who engage in risky behaviours (Crispin, 2017). Research also shows that once students start earning (through vacation jobs or internships), the number of events where he or she may be tempted to engage in risky behaviour, such as partying and drinking may increase (Lesner et al., 2022).

Explaining Risky Behaviour Through Behavioural Economics

The study of behavioural economics has led to increased insights into the risky behaviours of adults and adolescents. It has been useful in determining why individuals engage in potentially long-term damaging behaviours, such as substance abuse, despite being aware of its negative effects (Choi et al., 2014). Various cognitive biases, which include overestimating the favourable effects of substance use whilst underestimating its hazards, have been shown to be linked to this phenomenon (Bickel et al., 2012).

Camerer and Loewenstein (2004) and Tversky and Kahneman (1981) are two examples of studies that investigated the role of behavioural economics in understanding risky behaviours in adults.

Several models of cognitive-behavioural theory have been used to guide behavioural interventions to enhance health. Behavioural economics is a relatively new framework with proven insights about how people make choices in health and other areas that can be applied to the development of interventions to influence decisions by individuals. Unlike traditional economics, which implies rational choice, behavioural economics explains decisions that are taken under the effect of cognitive, emotional, and social factors that sometimes contradict rational choice. This perspective is beneficial because the account of "irrationality" in behavioural economics may increase the effectiveness of certain interventions in comparison to other models (Wong et al., 2021).

Schelleman-Offermans et al. (2020) undertook a study that utilised a multi-component intervention based on behavioural economics concepts, such as goal-setting, monitoring, feedback, and incentives, to reduce adolescents' excessive drinking. Patel et al. (2021) used gamification and behavioural economics principles to encourage college students to exercise more, whereas Shepherd et al. (2010) conducted a systematic review of

studies that used behavioural economics to promote safer sexual behaviour in young adults. Interventions from several countries, including the United States, the United Kingdom, and Australia, were included in the study.

The literature on adolescents' risky behaviours, particularly substance abuse, is less rigorous. While some research has examined the role of peer pressure, family background, and socioeconomic status in adolescent substance abuse (Hoffman et al., 2006; Fergusson et al., 2008), there is a significant lack of understanding regarding how cognitive biases and heuristics affect their decisions regarding substance use.

This research gap demonstrates the need for the current research, which employs behavioural economics to explain risky adolescent behaviours such as substance abuse. This study seeks to provide an improved comprehension of the role cognitive biases and heuristics play in shaping these behaviours by studying the decision-making processes of adolescents in the context of substance abuse.

Research Methodology

As stated above, this study aims to explore the following research question: What are the behavioural biases and heuristics that explain risky behaviour including substance abuse among teenagers/adolescents in India?

Questionnaire Development and Design

A structured questionnaire containing 34 items that describe the addictive perception and usage of adolescents and teenagers in detail was used as the research instrument (See Table I). The basis of these items was the behavioural biases outlined in extant literature. The respondents were asked to rate the importance accorded by them to these variables on a 5-point Likert scale ranging from 1 to 5, where 1 denotes not at all important and 5 denotes extremely important.

Sampling

The sample for the study was determined as 1000 students, and responses were received from 682 students at various schools in Gujarat, leading to a response rate of 68 percent. The sampling method used was non-probabilistic convenience sampling, as data collection could only be carried out at schools that agreed to participate in the study.

Administration of Instrument

The questionnaire was created in Google Forms. A link containing the questionnaire in the form of a Google Form was sent to various high school-going children at five schools in Ahmedabad through WhatsApp after obtaining their contact details from the school authorities. 682 responses were received where the average age of the respondents was 16 years and the majority of the respondents were female.

Table 1. Behavioral Economics Biases and the Attributes of Risky Behaviour

Sr. No	Behavioural Economic Bias	Attributes of Risky Behaviour
1	Endowment Effect	<ul style="list-style-type: none"> I believe if someone starts consuming drugs or alcohol, they will keep using them for a long time. I believe those who have addictive habits will always continue to have them.

		<ul style="list-style-type: none"> • I think teenagers will keep using drugs or alcohol till they see the bad impact it has on them. • I think teenagers would not mind doing under-age driving, till they are caught.
2	Anchoring and Adjustment	<ul style="list-style-type: none"> • I believe if someone likes drugs or alcohol, they will borrow money to buy them. • I believe if someone wants to try under-age driving, they will borrow vehicles from their peer group. • I believe those who need to feel good want to take more drugs or alcohol. • I believe those who need to feel stress-free want to take more drugs or alcohol. • I believe those who do under-age driving want to feel more thrilled. • I believe that addictive habits lead to no progress in life. • I believe those who need to feel stress-free want to do under-age driving.
3	Representativeness	<ul style="list-style-type: none"> • I am curious about what would have happened to those who have addictive habits if they had chosen differently. • If anyone takes drugs or alcohol, I try to find out why they started. • If anyone does under-age driving, I try to find out why they do so. • If I use drugs or alcohol, I might think about opportunities I have passed up.
4	Anchoring and Herding	<ul style="list-style-type: none"> • There is no discussion about addictive habits among my family or friends. • It is okay to use drugs and alcohol if my friends use them. • It is okay to do underage driving if my friends do so. • It is okay to use drugs and alcohol as everyone does it nowadays. • It is okay to drive underage as everyone does it nowadays.
5	Mental Accounting and Framing	<ul style="list-style-type: none"> • I believe it is okay to use drugs or alcohol to help a person think clearly. • I believe it is okay to use drugs or alcohol to help a person feel less stressed. • I believe it is okay to do under-age driving to help a person feel better.
6	Familiarity	<ul style="list-style-type: none"> • I believe people use the same type of drug or alcohol every time. • I believe people use the drugs or alcohol available in their area.

		<ul style="list-style-type: none"> I believe people avoid using unknown addictive substances.
7	Overconfidence	<ul style="list-style-type: none"> I feel more confident in my own opinions about drug or alcohol usage over opinions of my friends and colleagues. I feel more confident in my own opinions about drug or alcohol usage over opinions of my parents and teachers. I feel more confident in my own opinions about under-age driving over opinions of my friends and colleagues. I feel more confident in my own opinions about under-age driving over opinions of my parents and teachers. I believe that if I use drugs or alcohol, I will consume better quality than others. I believe that if I do under-age driving, I will do it better than others.
8	Loss Aversion	<ul style="list-style-type: none"> I believe people will hold on to drugs or alcohol till they don't suffer any health issues owing to the same. I believe people will keep doing under-age driving till they don't suffer any negative impact of the same.

The objective of the questionnaire was to measure quantitatively the factors and examine the constructs of behavioural finance biases based on the perception of respondent teenagers towards various risky behaviours including substance abuse.

The reliability of the questionnaire was checked using the reliability test in SPSS software. Cronbach Alpha values for each construct item were greater than 0.70, indicating the questionnaire's reliability and applicability for the final research (Hair et al., 2010).

Data Analysis

Exploratory factor analysis (EFA) was used to identify the factors underlying the questionnaire responses.

Exploratory Factor Analysis

Using principal component analysis (PCA) with Varimax Rotation, the eight most significant factors were extracted. Six iterations were conducted to arrive at a distinct, interpretable, and meaningful factor solution. (i) Kaiser's criterion of including factors with an eigenvalue greater than 1 (Kaiser, 1960); and (ii) a minimum loading value of 0.50 for any factor to be incorporated into the final set of constructs (Hair et al., 2010).

The factor structures were determined based on the importance and clarity of the factor loadings, as well as the interpretability and relevance of the factors within the overall theoretical framework. This resulted in the exclusion of some factors because they did not sit well with other items, as well as the renaming of some factors due to the analysis's grouping of factors. As shown in Table II, the final model featured eight factors with a total of 31 attributes.

Table 2. Exploratory Factor Analysis Outcomes: Constructs and Indicators of Their Reliability and Validity

		Factor							
		1	2	3	4	5	6	7	8
Factor 1 - The Bandwagon Effect									
1	I believe those who need to feel stress-free want to drive under-age.	.466	.034	-.228	-.055	.360	-.145	.316	-.052
2	I believe it is okay to use drugs or alcohol to help a person feel less stressed.	.644	.070	.444	-.072	.110	.015	.006	.031
3	It is okay to use drugs and alcohol if my friends use them.	.702	.108	.433	-.136	.126	-.016	-.003	.002
4	It is okay to drive under-age as everyone does it nowadays.	.839	.142	.045	-.209	.065	-.035	-.020	-.039
5	It is okay to drive under-age if my friends do so.	.810	.159	.130	-.139	.061	-.060	.033	-.020
6	I believe it is okay to drive under-age to help a person feel better.	.781	.145	.047	-.081	.015	.011	-.027	-.074
7	It is okay to use drugs and alcohol as everyone does it nowadays.	.653	.110	.515	-.128	.134	-.022	.026	-.026
8	I believe that if I drive under-age, I will do it better than others.	.600	.278	.117	-.175	.119	-.052	-.001	-.028
Factor 2 - Hard Easy Effect									
1	I feel more confident about my own opinions on drug and alcohol usage over the opinions of my parents and teachers.	.269	.638	.159	.025	.133	.035	.005	.058
2	I feel more confident about my own opinions on under-age driving over the opinions of my parents and teachers.	.380	.702	.040	-.080	.005	.037	.017	-.023
3	I feel more confident about my own opinions on drug or alcohol usage over the opinions of my friends and colleagues.	.017	.788	.095	-.031	.126	.022	.071	.021
4	I feel more confident about my own opinions on under-age driving over the opinions of my friends and colleagues.	.138	.816	-.020	-.068	.018	.007	.006	-.060
Factor 3 - Optimism Bias									

1	I believe it is okay to use drugs or alcohol to help a person think clearly.	.464	.135	.615	.014	.195	-.086	.001	.059
2	I believe that if I use drugs or alcohol, I will consume a better quality than others.	.296	.212	.526	-.158	.247	.060	-.042	-.162
Factor 4 - Sunk Cost Fallacy									
1	I believe that addictive habits lead to no progress in life.	-.117	-.001	-.435	.305	-.186	.147	.230	.105
2	I am curious about what would have happened to those who are addicted if they had chosen differently.	-.169	-.024	-.293	.524	.237	.029	-.001	-.066
3	If anyone uses drugs or alcohol, I try to find out why they started.	-.151	-.022	-.157	.811	-.021	-.011	-.014	.042
4	If anyone drives under-age, I try to find out why they do so.	-.215	-.102	.064	.772	-.064	.087	.066	.057
5	If I use drugs or alcohol, I might think about the opportunities I might have missed.	-.261	-.059	-.451	.340	.010	.107	-.146	.003
Factor 5 - Social Norms									
1	I believe those who need to feel good want to take more drugs or alcohol.	.238	.045	.084	.021	.782	.063	.039	.065
2	I believe those who drive under-age want to feel more thrilled.	.284	.142	.061	-.078	.480	.337	.106	-.120
3	I believe those who need to feel stress-free want to use more drugs or alcohol.	.007	.165	.268	.063	.740	.101	.048	.017
Factor 6 - Disposition Effect									
1	I think teenagers will keep using drugs or alcohol till they understand the negative impact it has on them.	-.063	.037	-.183	.140	.171	.573	-.076	.234
2	I think teenagers would not mind under-age driving, till they are caught.	.225	.187	.216	-.026	.055	.516	.199	-.215
3	I believe people will keep on using drugs or alcohol till they suffer health issues because of it.	-.044	-.021	-.163	-.009	.011	.699	.089	.142

4	I believe people will keep driving under-age till they suffer a negative impact of the same.	-.154	-.030	.071	.056	.046	.689	.097	-.093
Factor 7 - Illusion of Validity									
1	I believe if someone starts consuming drugs or alcohol, they will keep using them for a long time.	-.034	.001	-.139	.064	.089	.113	.660	-.080
2	I believe those who have addictive habits will always continue to have them.	.091	.040	.043	-.118	-.042	.024	.731	.191
3	I believe if someone wants to try under-age driving, they will borrow vehicles from their friends.	-.051	.077	.263	.184	.162	.208	.461	.143
Factor 8 - Availability Heuristic									
1	I believe people use the same type of drug or alcohol every time.	-.060	-.019	.014	.116	-.031	.005	.203	.656
2	I believe people only use drugs or alcohol available in their area.	-.017	.013	-.059	-.063	.039	.069	-.039	.802

Table 3. Constructs and Indicators of Their Reliability and Validity

Factor	SCR	AVE	Cronbach's Alpha
Factor 1: The Bandwagon Effect	0.880	0.2168	0.893
Factor 2: Hard Easy Effect	0.827	0.4064	0.782
Factor 3: Optimism Bias	0.492	0.3786	0.620
Factor 4: Sunk Cost Fallacy	0.699	0.093	0.673
Factor 5: Social Norms	0.714	0.6112	0.665
Factor 6: Disposition Effect	0.542	0.3281	0.634
Factor 7: Illusion of Validity	0.654	0.4362	0.624
Factor 8: Availability Heuristic	0.696	0.4297	0.618

The scale composite reliability (SCR), average variance extracted (AVE), and Cronbach Alpha reliability of each factor are displayed in Table III. For every factor, the SCR values were discovered to be greater than 0.60. AVE was greater than 0.5 for all eight factors, which is sufficient for discriminant validity. Each

factor's Cronbach Alpha was greater than 0.60. This indicates the factors' convergent validity (Fornell and Larcker, 1981). To ascertain discriminant validity, a modified inter-factor correlation matrix was derived. As shown in Table IV, the squares of correlation coefficients between any two factors did not exceed the individual AVEs of the two factors, indicating that each factor possessed an internal (extract) variance that exceeded the variance between the factors and possessed sufficient discriminant validity (Fornell and Larcker, 1981).

Table 4. Discriminant Validity

	Factor	1	2	3	4	5	6	7	8
1	The Bandwagon Effect	1.000							
2	Hard Easy Effect	.229	1.000						
3	Optimism Bias	.257	.260	1.000					
4	Sunk Cost Fallacy	-.116	-.148	-.235	1.000				
5	Social Norms	.113	.226	.332	-.120	1.000			
6	Disposition Effect	.101	.149	.096	.031	.182	1.000		
7	Illusion of Validity	.191	.048	-.090	.059	-.080	.112	1.000	
8	Availability Heuristic	.006	-.009	-.085	.064	-.068	.015	.121	1.000

Thus, it can be concluded that the model presented in the paper has discriminant as well as convergent validity (Singh, Nandan, and Chawla, 2015).

Discussion

This study finds several behavioural biases that have a significant impact on the decision-making processes of Indian adolescents concerning risky behaviours, such as substance abuse. The Bandwagon Effect, Hard Easy Effect, Optimism Bias, Sunk Cost Fallacy, Social Norms, Disposition Effect, Illusion of Validity, and Availability Heuristic (The Decision Lab, 2023) emerged as influential factors as a result of factor analysis carried out on responses of 682 Indian teenagers.

The Bandwagon Effect: This bias asserts that adolescents are prone to engage in risky behaviour, such as substance abuse if they perceive it to be prevalent among their peers. This is consistent with previous research (Christakis and Fowler, 2008) connecting the Bandwagon Effect to risky health behaviours. According to Jongenelis et al. (2016) and Kuntsche et al. (2017), the bandwagon effect or social conformity has been linked to substance abuse among adolescents. Previous studies have shown that adolescents' decisions to consume alcohol are significantly influenced by their perceptions of their peers' drinking behaviour.

Hard easy effect: Overconfidence can cause adolescents to underestimate the risks associated with various risky behaviours, such as substance abuse, because they believe they can control or manage them better than others. This is consistent with Svenson's (1981) concept of "illusion of invulnerability." This is also in line with the findings of Levin, Schneider and Gaeth (2002) and Bechara (2005), who discovered that individuals made different decisions regarding substance use based on whether probable outcomes were framed as gains or losses. Janssen et al. (2016) discovered that Dutch adolescents who overestimated their drug-related knowledge and self-control were more likely to engage in substance abuse.

Optimism Bias: Teenagers may be susceptible to the belief that they can use substances in moderation without experiencing significant harm, thereby underestimating the slippery slope that may result in addiction (Perkins, 1999).

Sunk Cost Fallacy: According to Roesse (1997), if teens imagine worse alternatives to their present status (e.g., "If I didn't smoke, I'd be more stressed"), they may continue their harmful behaviour. Previous research by Morewedge and Giblin (2015), Janssen et al. (2016), and Wang et al. (2019) in the Netherlands and China found that people frequently assign a higher value to the substances they possess simply because they possess them. This overvaluation of drugs as a result of possession can contribute to prolonged use and difficulty quitting. Likewise, the findings of Espada et al. (2015) in Spain and Jongenelis et al. (2016) in Australia are consistent with those of this study.

Social Norms and Illusion of Validity: Teenagers may wrongly extend the experiences of a few people to the entire population due to social norms and the illusion of validity. For instance, knowing someone who engages in substance abuse or other risky behaviour without apparent negative consequences may cause one to overgeneralize and underestimate the risks (Kahneman and Tversky, 1972). These results correspond with those of Ariely, Loewenstein, and Prelec (2003), Bechara (2005), Bradford (2010), and Bickel et al. (2011), who demonstrated that substance abusers frequently show a strong preference for immediate rewards over possible long-term consequences. This tendency towards instant gratification can result in a pattern of chronic substance abuse.

Disposition Effect: Adolescents may overestimate the extent to which others engage in substance addiction, leading them to accept such conduct as normal (Ross, Greene, and House, 1977).

Availability Heuristic: Teenagers may assess the likelihood of consequences based on easily obtainable information or past experiences. If immediate negative consequences are not readily apparent or if positive experiences with substance abuse are more easily recalled, they may perceive it as less dangerous (Tversky and Kahneman, 1972). This is consistent with the findings of Wang et al. (2019), who discovered that Chinese adults with either first-hand or vicarious experiences of substance abuse tended to exaggerate the prevalence and minimise the risks of drug abuse, thus increasing their chances of substance abuse.

Conclusion

This research paper studies the area of behavioural economics, specifically in terms of risky behaviour such as substance abuse among Indian teenagers. Analysing the responses of 682 adolescents led to the identification of eight cognitive and behavioural biases that play a crucial role in explaining risky behaviour, including substance abuse, among adolescents.

The findings demonstrate that The Bandwagon Effect, Hard Easy Effect, Optimism Bias, Sunk Cost Fallacy, Social Norms, Disposition Effect, Illusion of Validity, and Availability Heuristic strongly impact the likelihood of adolescents engaging in various risky behaviours, such as substance abuse, and can serve as primary indicators against which interventions can be designed, implemented, and evaluated (Thaler and Sunstein, 2008).

This study widens the scope of behavioural economics by revealing the biases that fuel adolescent substance abuse, emphasizing their role in decision-making (Kahneman and Tversky, 1979). So far, there is little research on how these biases affect substance abuse among Indian teenagers. By providing new theoretical and practical insights into this unexplored area, the findings of this study set a new benchmark for future research in the field (Davies and Slade, 2020).

The findings of this study suggest that interventions intended to reduce risky adolescent behaviour, such as unsafe driving and substance abuse, must go beyond merely providing information (Thaler and Sunstein, 2008). Although educating adolescents about the long-term effects of substance abuse is necessary, it is insufficient given the observed biases (Dolan et al., 2012). Interventions should be designed to tackle these specific biases, possibly applying principles of nudging and choice architecture to encourage healthier behaviour.

This study establishes a benchmark for behavioural economics and its application to public health and policymaking. It highlights the necessity of integrating behavioural insights into strategies aimed at curbing adolescent substance abuse, thereby making a valuable contribution to the existing body of knowledge.

The results of this study support the international applicability and relevance of behavioural economics. While this study concentrates on a specific population (Indian teenagers), the universality of cognitive biases suggests that these findings can be applied and adapted to diverse contexts and populations around the world (Epley and Caruso, 2004).

In terms of theoretical implications, this study contributes to the behavioural economics literature by applying its concepts to adolescent behaviour in a non-Western context, thereby filling a critical gap in the research and offering valuable insights for public health interventions. Given that the majority of research in behavioural economics has focused on adults or Western populations (Ariely, 2008), this is a significant contribution. It also provides benchmarks for future behavioural economics research.

In terms of practical implications, these findings provide a measurable, evidence-based framework for Indian and international public health practitioners and policymakers (Anderson, Chisholm and Fuhr, 2019). The findings of this study can be used to design interventions that reduce the influence of these biases on the substance abuse behaviour of adolescents. For instance, educational programmes can be designed to help adolescents develop critical thinking and decision-making skills, enabling them to recognise and combat these biases.

Benchmarking these results can help evaluate the effectiveness of existing interventions and the development of innovative, more effective strategies that account for these biases (Dolan et al., 2012). In addition, these benchmarks can be used to compare and evaluate geographical variations in the biases and their correlation with substance abuse among teenagers (Yule and Tinson, 2017).

The study has some limitations. Although the sample size is large, it does not reflect the complete range of socioeconomic, cultural, and regional backgrounds in India, and therefore does not represent all Indian adolescents. In addition, the study's cross-sectional design restricts the ability to infer changes over time.

Future research can build on these findings by using longitudinal studies to examine how these biases and their impact on substance abuse evolve as adolescents become adults.

In conclusion, behavioural economics provides a sound framework for understanding risky behaviour, such as substance abuse. By concentrating on the flawed decision-making processes inherent to such behaviour, the identification of these biases can greatly help in the designing of preventive interventions.

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