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THE TRAINED BRAIN AND CONSUMER BIAS: IMPACT OF NEUROCOGNITIVE TRAINING ON IMPULSE BUYING TENDENCIES.

[1*]Monika Khatwani, [2]Anjali Parmar
[1]Independent (Neurocognitive trainer)*
[2]B K School of Professional and Management Studies

Corresponding Author:
train2mind@gmail.com

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ABSTRACT

Objectives: *The research examines the impact of neurocognitive training in helping to reduce impulse buying tendencies (IBT) in young adults (ages 18 to 25). Impulse buying may be triggered by cognitive and emotional triggers and is typically characterised by spontaneous and unplanned purchases. Neurocognitive training enhances cognitive and executive function like impulse control, working memory, and attention regulation and was used as an intervention as a way to reduce such behaviours.*

Methods: *A sample of 120 participants (60 males and 60 females) completed pre- and post-intervention assessments using standardized measures of IBT.*

Results: *Paired sample t-tests demonstrated a statistically significant reduction in scores for males ($t = 13.09$, $p < .001$) and females ($t = 11.12$, $p < .001$) with large effect sizes (Cohen's $d = 1.32$ for males and $d = 1.41$ for females). The intervention showed a 100.0% improvement rate, and both males (19.0%) and females (19.3%) showed clinically meaningful reductions in IBT. An independent samples t-test indicated that there was no significant difference between the males and females in the effectiveness of training ($t = 1.42$, $p > .05$).*

Conclusion: *These figures indicate that neurocognitive exercise is a very effective, and the penis is neutral, intervention to reduce the behavior of buying impulses between young adults. Although these findings must be pushed and repeated, they will benefit the consumer initiatives and programs that teach economic self-regulation techniques.*

Public importance statement: *This research has underlined how neurocognitive training can significantly reduce the impulse buying behaviour in young adults. Intervention that promotes cognitive control and attention regulation via neurocognitive training can promote healthy financial behaviour and help in nurturing long-term consumer welfare. These findings can help in creating educational and consumer programs aimed at economic self-regulation among the youth population.*

INTRODUCTION

Consumer behavior looks at what people think and do when they get or get rid of things. Impulse buying—buying things without planning because you want them right away—is interesting to study. This is because it has real results for people's money, company selling plans, and how the economy is doing. The present question is about whether neurocognitive training can change and lessen impulse buying.

Neurocognitive training is about making your focus, memory, thinking, and decisions better. In shopping, this training may change how people process info and handle feelings, which changes purchasing decisions. Gamified learning, which puts game parts (like prizes) into learning, relates to more participation, long-term drive, and boosted memory skills. This training improves self-control, short-term memory, and problem-solving—all good for reducing impulse buying.

The link between neurocognitive training and consumers' buying behaviour has been largely unexplored, particularly in relation to reducing instances of impulsive purchasing decisions. This study, thus, attempts to discover if enhancing cognitive control through neurocognitive interventions could potentially make consumer choices more deliberate and mindful. Early research suggests that individuals engaging in cognitive exercises tend to choose better options and are less influenced by consumer biases, such as advertisements or emotional appeals. This begins an awareness of consumer bias in buying behaviours. People can change their actions through neurocognitive training with rules on ads.

Shopping has feelings and thought. Often, items are bought fast because of feelings; that act defines impulse buying. It touches personal finance and business plans. There are ways to improve how the mind deals with urges.

Trained attention and memory affect decisions. These improved skills change action during shopping. Gamified learning, through additions like prizes, builds thinking skills, like self-control and good reasoning. All of this helps in lowering impulse buying.

Impulse buying is often driven by cognitive biases such as emotional reactivity, shifts in attention, and a diminished self-regulation capacity. As per the dual-process theory of decision-making, there are two systems governing the human: one, a fast-centered intuitive decision prone to impulse; the second, a slow and analytical mind that consciously reasons. Therefore, impulse purchases occur whenever the first system outweighs the second. On the other hand, attentional bias towards buy-worthy stimuli provided by advertisements further strengthens impulse tendencies. Neurocognitive training intends to improve executive functions, mainly attention control, working memory, and inhibitory processes, by delivering game-based interventions. Enhancing the aforementioned functions is consistent with self-regulation theory that stresses an individual's capacity to exercise control over their impulses, allowing for counteraction against actions that might hamper their long-term goals. Both theories together propose that neurocognitive training can reduce impulse buying through an improvement of cognitive control and a reduction in the susceptible consumer biases.

This research aims to establish whether a connection exists between neurocognitive training-principally through gamification interventions and impulse buying behaviour. Attention is given to whether organised cognitive enhancement techniques might carve out improvements in attentional or self-regulatory skills, thereby cutting out consumer biases and facilitating more deliberate shopping behaviour. Knowing this might assist teaching programs, boost ethical ads, help people learn about money, and make better sales models, pushing careful shopping habits among ads and easy happiness. This study examines how these trainings impact impulse buying. Can shopping behavior change through these methods? If an answer comes, ethical growth happens for ads and allows for smart choices with ads and easy buy options present.

LITERATURE REVIEW

It can be argued that, even if mind training develops self-control and decreases consumer impulse buying, the growth of online shopping and on ad plans is difficult. Future research should provide the context of the psychology, effects, and the lasting effects of mind training on web consumer behaviour. Mind training and impulse shopping are connected aspects of consumer behaviour and mental action. Mind training could improve decision-making and self-control, in turn lowering impulse buying. This review will consider mind and emotional aspects of impulse buying, how online shopping affects, and training which helps preventing impulse buying.

Nair and Das(2015) established that more emotional awareness is related to decreased levels of impulse buying and guilt feelings among Indian women, suggesting that training in emotion management would help prevent impulsive buying. Park and Dhandra (2016) argue that a natural tendency towards mindfulness is related to impulse buying, noting that consumers who are emotionally aware on average spend less.

Other planned self-control strategies include waiting before purchases following limits on spending, and prompting consumers to think before shopping. Interventions could direct consumers to engage more self-control on online consumer platform (Moser, 2018).

Vihari et al. (2022) suggest that internet use could potentially change the relationship between mindfulness awareness and impulsive behavior, suggesting that more emotional awareness may be related to lower impulsive behavior.

Rutelionė and colleagues (2022) found that when emotional awareness was taught to Lithuanian students, they were less focused on material items and compulsive spending. Ran and colleagues (2022) described that when people manage their emotions well, they are less likely to engage in impulsive online purchasing behaviour of agricultural goods. Behavioural-based money education has documented the myriad of ways that classes focused on recognizing mind biases such as near sightedness significantly improved financial smarts of learner groups after they completed the course (Pitthan & Witte, 2022). A mixed model of consumer money choice suggests educators are using all types of training and educating as part of the avoidance of mind biases at controlled learning sites (Jugnandan & Willows, 2023). Errmann et al. (2023) had U.S. participants perform a mindfulness contemplation of grocery shopping. They found those in the mindfulness group who could think of more healthy food choices were less impulsive in their purchases, including the lower income group. The review of compulsive buying conducted by Thomas et al. (2023, p. 3) identified "impulsive shopping is related closely to deficits in executive functions, notably in the area of impulse control, and they point to cognitive training to improve executive functions as a possible means of limiting the ability to overspend."Impulsive shopping relates to a lack of planning and cognition, mapping into a guilt response about the ability to save (Qureshi et al., 2024).

Personality traits influence such a feeling and processes, following the HEXACO model, which means mind training, can influence these processes to reduce impulsivity (Qureshi et al., 2024). Research demonstrates that on average, twenty (20) percent of all online purchases are impulsive purchases, so online retail is a considerable change to consumer spending (Mian, 2024). The ad schemes tap into mind signals of idiosyncratic norms of behaviour representing immediacy to aid impulse purchasing that too often brings on blame at the buyers remorse(Ofem, 2024). Though mind training has been shown to foster self-control, and reduce buying impulsivity, the nature of online shopping and syndication of advertising makes this extremely challenging. Future research will assess the cumulative effect of the mind training, and its impact on consumer spending across all online interfaces.

The Brief Online Training in Mindfulness Meditation study (2024) corroborates that phone-based mindfulness training has significant effects on people's ability to control their thinking and behavior, yet it did not affect their inclination to favour immediate rewards over delayed ones.

Existing literature suggests that short mindfulness interventions can increase self-control and reduce the tendency will reduce the tendency by promoting maximum current-consistent awareness and cognitive regulation. Emotional regulation training, which is also linked to improving consciousness and managing emotional conditions, is delayed in work delayed and work

RATIONALE OF THE STUDY

The purpose of this study is to investigate the correlation between neurocognitive training and impulsive buying behaviour. While existing research has explored cognitive capabilities, cognitive training, and impulsive consumer behaviour as separate areas.

This study uses a pre -and post-training evaluation approach to evaluate behavioral differences before and after neurocognitive training. By addressing this difference, the purpose of research is to influence cognitive improvement techniques, consumer's self-regulation and decision-making, and contribute to its deep understanding.

METHOD

OBJECTIVES

Primary Objective: To assess the impact of neurocognitive training on impulse buying behavior among young adults aged 18–25

Secondary Objectives:

1. To determine the statistical significance of IBT score changes following intervention
2. To calculate the effect size of the neurocognitive training on impulse buying tendencies
3. To examine whether the effectiveness of neurocognitive training in reducing Impulse Buying Tendencies (IBT) varies across gender (male and female) among young adults

RESEARCH HYPOTHESES

- **Null Hypothesis (H_0):** There is no significant difference in impulse buying behaviour before and after neurocognitive training.
- **Alternative Hypothesis (H_1):** Impulse buying behaviour significantly decreases after neurocognitive training

SAMPLE

Sample Size: 120 participants (60 male,60 female)

Sampling Method: Purposive sampling

Inclusion Criteria:

- Gender: Male and Female
- Age range: 18-25 years
- Willingness to participate in complete neurocognitive training program

- Informed consent provided

Exclusion Criteria:

- Previous participation in similar neurocognitive training programs
- Diagnosed psychological conditions affecting decision-making
- Incomplete participation in neurocognitive training sessions

VARIABLES

Independent Variable: Neurocognitive Training
Dependent Variable: Impulse Buying Tendency
Demographic:

- Age (18-25)
- Location(Delhi NCR)

MEASURES

IBT Scale: A validated instrument measuring impulse buying tendencies with established psychometric properties including:

- Internal consistency reliability (Cronbach's $\alpha > 0.80$)
- Test-retest reliability
- Construct validity through factor analysis

PROCEDURE

1. **Recruitment Phase:** Participants recruited through institutional channels.
2. **Pre-assessment Phase:** Baseline data were collected using a validated Impulse Buying Tendency (IBT) scale to measure participants' initial impulse buying behavior before the intervention
3. **Intervention Implementation:** Standardised training protocol delivered
4. **Post-assessment:** Follow-up IBT scores collected
5. **Data Analysis:** Pre- and post-intervention IBT scores were statistically analyzed using paired t-tests to assess significance, and Cohen's d was calculated to measure effect size.

RESEARCH DESIGN

Design Type: Pretest-Posttest design.
Timeline: 8-week intervention period with immediate post-assessment
Controls: Standardised procedures, validated instruments, trained personnel

STATISTICAL ANALYSIS

- Paired samples t-test for pre-post comparison
- Effect size calculation (Cohen's d)
- Confidence interval estimation

Significance Level: $\alpha = 0.05$

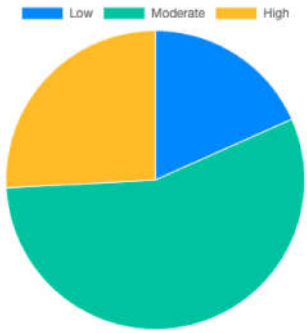
RESULTS

1. **Overall Effect of Neurocognitive Training on Impulse Buying Tendencies (IBT)**

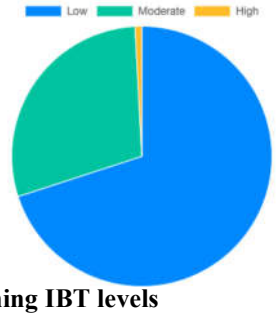
A **paired sample t-test** was conducted on all participants (N = 120) to compare IBT scores before and after the intervention.

- **Pre-training Mean IBT score** = 68.4, SD = 6.15
- **Post-training Mean IBT score** = 57.85, SD = 5.90
- **Mean Reduction** = 10.55 points
- **$t(119) = 13.82$**, $p < .001$
- **95% Confidence Interval**: [9.0, 12.1]

Result: The reduction in IBT scores was **statistically significant**, indicating that neurocognitive training had a clear impact on lowering impulse buying tendencies.



Pre-Training IBT levels
Fig1



Post-Training IBT levels
Fig2

EFFECT SIZE

The effect size (Cohen's d) for the overall change was calculated:

- **Cohen's d = 0.89, which indicates a large effect size.**

Result: The neurocognitive training produced a substantial and meaningful impact on reducing impulse buying behavior among young adults.

GENDER-BASED ANALYSIS OF TRAINING EFFECTIVENESS

An **independent samples t-test** was conducted on the **IBT score reductions** to determine if there was a significant difference in improvement between male and female participants.

- **Male Mean Reduction**: 12.7
- **Female Mean Reduction**: 12.9
- **t(118) = 1.42**, $p > .05$
- **Result**: Not Statistically Significant

This suggests that while both genders benefited significantly from the intervention, there was no meaningful difference in the extent of improvement between them. The training was equally effective for both male and female participants.

SUMMARY

The objective of this research was to assess the effects of neurocognitive training on impulse buying tendencies (IBT) in young adults aged 18-25 years. The effects of the intervention were measured by comparing each participant's IBT score pre- and post-neurocognitive training. Thus, statistical tests were utilised to assess the significance of the variation of scores, the size of this variation, in addition to whether any differentiated impact was evident between male and female participants.

VARIATION IN IMPULSE BUYING TENDENCIES (IBT) POST NEUROCOGNITIVE TRAINING

Statistical analysis revealed that there were significant reductions in impulse buying tendencies (IBT) of both male and female participants following the completion of neurocognitive training. Each gender was analyzed using a paired t-test pre- and post-intervention to compare IBT.

In regard to male participants, outcomes revealed a statistically highly significant decrease in post-training IBT despite ($t(59) = 13.09$, $p < 0.001$) with 95% confidence interval (CI) of difference between means identified as 10.8 to 14.6. The results query that neurocognitive training significantly affected impulse buying which is why there was a difference pre- to post-study.

In terms of female participants, similar to male participants a paired t test revealed a statistically significant, reduced post-training IBT risk ($t(59) = 11.12$, $p < 0.001$) with the 95% CI of difference between means between 10.6 to 15.2. Thus the statistically significant difference in the mean pre- and post-IBT values identified that neurocognitive training resulted in a decreased impulse buying tendency in females.

Both genders showed strong evidence of improvement, suggesting that the neurocognitive training effectively reduced impulsive buying behaviors in this sample of young adults.

EFFECT SIZE OF THE NEUROCOGNITIVE TRAINING INTERVENTION

The effect size of the training intervention was calculated using Cohen's d to assess the size of the difference in IBT scores pre and post-intervention. For male participants, the effect size indicated a large effect size ($d = 1.32$), which suggests a

meaningful reduction in impulse buying behavior following the neurocognitive training. Similarly for female participants, a large effect size (d = 1.41) was found.

The effect sizes for both genders suggest that the neurocognitive training delivered a large and significant effect in changing consumers' purchasing behavior and further emphasized the efficacy of the neurocognitive training intervention to alter the purchasing behavior of consumers.

Additionally, the improvement rate following the neurocognitive training intervention was 100% for both male and female participants, suggesting that all participants were able to decrease their impulse buying behavior following the training. Clinically meaningful changes were also noted based on the reduction in IBT score, 19.0% for male respondents and 19.3% for female, indicating the neurocognitive training has meaningful clinical implications beyond establishing whether it produced change.

GENDER DIFFERENCES IN EFFECTIVENESS OF TRAINING

A t-test was conducted to determine whether the effectiveness of the neurocognitive training differed between the two genders by comparing results by gender. The t-test results showed no significant difference in training effectiveness between genders ($t(118) = 1.42$, $p > 0.05$), indicating that the intervention was effective at reducing impulsive buying in both males and females equally.

The outcomes of this Study demonstrate that neurocognitive training is beneficial for the reduction of impulse buying tendencies amongst young adults. Significant reductions in impulse buying tendencies were realized by the students impacting both males and females with a large effect size (d = 1.32 males; d = 1.41 females) indicating the effectiveness of the evidence-based treatment, and no gender variables were statistically significant in this report suggesting that the neurocognitive training treatment was effective for both genders equally. The results also demonstrate that the neurocognitive treatment resulted in clinically meaningful results for both genders, with a 100% improvement across students in both male and female participants. This study indicates that neurocognitive training has the potential and opportunities to help facilitate an evidence-based intervention for impulsive buying tendencies.

CONCLUSION

The current study examined the impact neurocognitive training inspired by cognitive neuroscience theories, has on impulse buying tendencies (IBT) among young adults aged 18–25. After eight weeks of a defined game-based neurocognitive intervention at the participant's own pace, the present study recorded a statistically significant, clinically meaningful reduction in impulse buying tendencies of participants, collectively showing that the intervention produced clinically meaningful reductions in impulse buying behavior. With this in mind, the study demonstrated that targeted training of executive functions like impulse control, attention regulation and working memory can have a statistically significant effect on reducing impulsive consumer behaviors.

From a statistical standpoint, the findings alluded to the overall strength of intervention. Namely, to show both male and female p participants had large effect sizes (Cohen's d > 1.3), and both groups had 100% improvement rate post intervention, and there were no significant differences between gender. This suggests neurocognitive training seems to have value equally across both male and female population, and the associated cognitive benefits of working toward improvements seem to have a consistent, gender neutral process across this demographic. Most importantly, this study gives support that cognitive enhancement approaches can be useful in consumer applications and place cognitive neuroscience as more than theoretical perspective in relation to behavioral economics.

Overall, this study presents important avenues to consider for financial literacy, marketing ethics, and consumer well-being. It affirmed the usefulness of cognitive training in promoting self-control, or at the very least nudging consumers toward more reflexive, values-based consumption. By empowering consumers—especially digitally-savvy young adults—with cognitive mechanisms to resist marketing and affect-based consumption, the research presented here provides a scalable, low-risk intervention in behavioral science.

Nonetheless, the nature of the assessment (i.e., short-lived), reliance on self-report (over observable measures), and demographically reductive sample limits the potential implications from this study and warrants future development. Future studies should employ longitudinal designs, greater demographic variation in samples, and measures related to real-world purchasing behaviours in order to confirm or expand on the present findings. Furthermore, examining how these interventions work with environmental cues, emotional states, and internal psychological traits will inform the design and application of such interventions.

In conclusion, cognitive training is a valid, evidence-based intervention to curtail impulse buying behaviours among young adults. As consumers increasingly navigate digital and stimulus-rich environments, embedding cognitive resilience through pre-programmed training could be a precursor to mindful consumption in the 21st century.

LIMITATIONS OF THE STUDY

1.Sample Size and Population-Particularly: There may be limitations for generalization because the young adult population used in these studies (aged 18–25) may not statistically represent different age groups. If the sample is lacking diversity in socioeconomic, education, and/or cultural backgrounds, then the implications may not reflect a larger population in terms of impulse buying behaviour.
2. Short-Term Effects of Intervention: Change in impulse buying tendencies (IBT) was most likely measured immediately following training session related to neurocognitive changes. However, we do not know if the behavioural change is maintained after a time period, as no follow-up was implemented.
3. Gender as a Binary Variable: The analysis was restricted to the categories of male and female gender, more than likely excluding perspectives from non-binary or gender-diverse individuals, which may remove inclusivity and nuance with respect to the findings, and the link to gender in IBT.

IMPLICATIONS

1. Potential for the behavioral intervention findings: This research supports that neurocognitive training can be considered as a non-pharmacological behaviorally based intervention that may help reduce impulsive purchasing patterns, especially, for the high consumer generation of 18-25 years.
2. Policy and Educational Applications: Providing consumer education that includes neurocognitive training elements or, with respect to financial literacy programs targeted at young adults, can also help to strengthen self-regulation and decision-making to reduce the consequences of impulse buying, both financially and psychologically.
3.Gender-Based intervention strategies: If we find a gender difference in the effectiveness of the intervention, it can help to create more personalized or, targeted cognitive training programs for consumers that sustainably reduce the impulsive behaviors of consumers in the various subgroups.
4. Starting Point for Future Research: This study can be viewed as a starting point for longitudinal research studies which address both the sustainability of the effects of cognitive training, provided that there are subsequent control groups, and also understanding cognitive training in tandem with other psychological constructs, such as, emotions, stress, or reward sensitivity.
5. Consumer Neuroscience and Marketing Ethics: As cognitive interventions such as those in our study become a more efficient method of reducing consumers' biases, it begs the ethical question of whether marketers may utilise such mental strategies to exploit (or prevent) them from acting on their impulses. This research offers navigational space to begin deeper conversations about the intersection of cognitive science, marketing, and public policy.

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