‘ANALYSIS OF INFLUENCE OF NEUROTRANSMITTERS ON NET PROMOTOR SCORE BASED ON CONSUMER DECISION MAKING’

Mrs. Vinitha Vincent (Assistant Professor),Mr. Vikrant Thokchom
Ms. Shunmugi V,Mr. Yash.D.Chaudhari
Xavier Institute of Management and Entrepreneurship

ABSTRACT
Advancements in neuromarketing have deepened our understanding of the human decision-making process, particularly how emotions, driven by neurotransmitters, influence consumer behavior. This paper explores the relationship between neurotransmitter levels and brand recommendation, measured through the Net Promoter Score (NPS). We focus on six key emotions-excitement, pride, belonging, anxiety, fear, and regret-associated with neurotransmitters like dopamine, serotonin, oxytocin, cortisol, and adrenaline. By analyzing how emotional stimuli influence NPS, we hypothesize that manipulating neurotransmitter levels through emotional triggers can enhance consumer recommendations. The survey was conducted with 120 Zudio customers. Our research reveals a positive correlation between emotional triggers and NPS ratings, suggesting that deeper physiological responses, rather than superficial emotional appeals, play a critical role in shaping consumer behavior. These findings emphasize the potential of neurotransmitter-focused marketing strategies, indicating a shift away from surface-level emotional marketing to more biologically grounded approaches for optimizing customer engagement and brand loyalty.
Keywords: Neurotransmitters, Emotions, NPS, Customer, Neuromarketing, Strategies

Introduction

Advancement in modern science and technology has increased the initiation of understanding how human thinking works, how it reacts to external stimuli, and what goes on inside our neurons. Neuromarketing comes after this. Companies look into this for unlocking the key to what really goes into the minds of customers such that they can tap into what really goes for them and give them exactly what they need. Steve Job said, "People don't know what they want, until you show it to them". This would allow us to understand customer's wants from what they buy, and also, by understanding how their hormones work, we're even trying to predict what they would do and buy. This is how neuromarketing has gathered steam. Now, it isn't that easy. It can't be just up there and said "this is what the customers want" because a series of triggers and chained chemical reactions make up this desire. With that, we have opened a new gate of understanding and unlocking marketing research through a different landscape-the realization that our decisions and behaviours depend on internal hormones.

In the past, there have been a number of different research studies focusing on neuromarketing which ended up focusing on a number of different conclusions. What this paper is seeking to investigate is how people as endorsers of the companies are affected by neurotransmitters. Wang et al., (2022) in their study point out that the neurotransmitters which are playing an important role in consumers' decision-making process are reflected in our emotions. Emotions are what we, as human beings, have as response to some things that happen to us or to other people. Based on emotions-apart from the myriads of factors affecting our actions-emotions can be negative or positive and in turn, we react to circumstances within our environments and those around us. The feeling in marketing the product has related to the understanding of the target customers emotions and has formed an integral part of brand as well as other marketing campaigns. That is how we attract clients. Despite the fact that emotions are central to the subject of art, we believe that actions alone cannot provide enough insight into emotion. Amusingly, we have to comprehend their motivations. This may assist to achieve optimal efficiency in marketing campaigns and will lead us into unprecedented commercial futures.

In this paper, we have considered 6 types of emotions. These are: excitement, pride, belonging, anxiety, fear, and regret. And, we are also only considering 6 types of causes for each and they are Like Dopamine, Serotonin, Oxytocin, Cortisol, Adrenaline and Cortisol again. The cause of the mentioned feelings is not only these hormones. These neurotransmitters are also majorly associated with the emotions mentioned above that go on in a consumer's body.

Table 1: Neurotransmitters and hormones considered for the research

S. No.	Neurotransmitters	Types of Consumer Emotions
1	Dopamine	Excitement
2	Serotonin	Pride
3	Oxytocin	Belonging
4	Cortisol	Anxiety
5	Adrenaline	Fear
6	Cortisol	Regret

Dopamine and Excitement

Expectation comes with excitement and delight. This emotion is connected with burning passion for something. However, it would be valuable to understand what this particular feeling

is paired with and that is dopamine. As Wise and Jordan (2021) suggest, pathological gamblers exhibit higher levels of dopamine than those who do not gamble. This suggests that high levels of dopamine in humans are strong indications of excitement. Here, it is important to point out an interesting role that a system invented for a person to make a certain type of effort in order to ultimately earn a corresponding reward play.

Serotonin and Pride

Humans live together because they are social beings and they need cooperation to thrive. When living together, we have our pride. It can be because of something we have, our social status, the work we do, and the money we earn. This gives dignity to a person to move on in life. The point is pride is an emotion. But this emotion is caused by a neurotransmitter called Serotonin which is a key modulator of social status, influencing behaviors that help maintain an individual's position in a social hierarchy high Serotonin Levels are often linked to dominant or high-status behaviors, fostering confidence and assertiveness without unnecessary aggression while low Serotonin Levels is associated with submissive behaviors or difficulties in maintaining status, often coupled with increased stress or anxiety(Edwards & Kravitz, 1997)

Oxytocin and Belonging

Belonging is defined as that which relates to a yearning for connection with others, the need for positive regard, and the desire for interpersonal connection as proposed by Rogers in the year 1951. Sense of belonging is included in Maslow's hierarchy of human needs. It is one of the basic feelings for evolution and survival for a societal community. We need to give love and receive love. This makes us feel belong to one another. Known to the world as the "bonding hormone," oxytocin serves as the strongest bonding hormone, strengthening the ties of social bonding and enhances feelings of trust and empathy through its release due to various forms of social behaviours, like touch, eye contact, and positive communication, to create emotional bonding and collective cohesion, and this biochemical mechanism supports not only the well-being of an individual but also the collective's feeling of belonging, which means oxytocin is very important in the formation of significant bonds and their maintenance (Allen, 2019)

Cortisol and Anxiety

Anxiety is a natural emotional response to stress, characterized by feelings of worry, nervousness, or unease about uncertain outcomes or potential threats. But the cause of these emotions is always associated with Cortisol. Higher levels of cortisol are a hormone released during stress, but it is strongly linked to anxiety, and a study suggests that when its levels are elevated, there is an increased chance to feel anxious; however, cortisol does not seem to have this effect on depression, and its management could be an essential way to reduce anxiety while other treatments may be required for addressing depression(Chan & Wu, 2024)Cortisol and Regret

Regret is a deeply human experience that can shape the way we perceive our past and influence the choices we make in the present. It often arises from missed opportunities, unfulfilled dreams, or decisions we wish we could change. Whether it's the career path we didn’t take,

relationships we let go of, or moments we failed to cherish, regret reminds us of life's fleeting nature and the importance of living with intention.

Cortisol, often known as the stress hormone, may not only reflect emotional states but actively influence them, as research suggests that elevated cortisol levels, particularly during early morning peaks, may intensify feelings of regret, creating a feedback loop where biological stress amplifies negative emotional responses, which highlights how physiological changes in cortisol secretion can exacerbate emotional experiences and make it more challenging for individuals to manage and resolve their regrets effectively (Wrosch et al., 2007)

Adrenaline and Fear (Flight-Fight)

Adrenaline or epinephrine: Creates the fight or flight conditions for a situation (Brown et al., 1979). It makes humans hurry due to the "fight or flight" response to threats since this has been our best option to avoid being consumed or to pursue objects to get them. The nature of this response in ourselves has been fundamental in developing our species. The adrenaline hormone controls this state of heightened readiness and activity. Understanding this primal response will provide valuable insights for creating effective marketing strategies

Net Promoter Score

Net Promoter Score (NPS) is how much a people would recommend certain product, service, brand, company, etc. to people around them. Customers rate their likelihood on a scale from 0 to 10 and are categorized into three groups: Promoters, who have scores between 9 and 10, are loyal customers who will likely recommend the product and drive growth through positive word-of-mouth; Passives, who have scores between 7 and 8, are satisfied but not enthusiastic and may switch to competitors; and Detractors, who have scores between 0 and 6, are dissatisfied customers that may harm the brand through negative feedback. NPS is linked to how much a consumer is satisfied with the value they are getting. In this research paper, we would like to examine the relationship between NPS and neurotransmitters. We directly move our target to neurotransmitters from emotion because, as said before, emotions are reflections of the hormones inside our body (Wang et al., 2022).

Hypothesis

H1: There is a significant positive relationship between the manipulation of emotional situations designed to heighten neurotransmitter levels and the likelihood of respondents recommending the brand (NPS).

H0: There is no significant relationship between the manipulation of emotional situations designed to heighten neurotransmitter levels and the likelihood of respondents recommending the brand (NPS). The emotional stimuli do not affect the respondents' NPS ratings.

Objectives

- To explore the relationship between neurotransmitters and emotion triggers/emotions in influencing consumer behavior in buying apparel products.
- To evaluate the influence of neurotransmitters on consumers while giving NPS ratings for apparel.

Literature Review

Dopamine, according to wise & Jordan, 2021 is a neurotransmitter that will propel addiction because it promotes dopamine via burst firing in the reward circuits of the brain to be able to create patterns so impossible to resist substances. For their part, Edwards & Kravitz (1997) suggest the role that serotonin plays in regulating aggression as well as social dominance on how we should go through social hierarchies. As we dig deeper, Linnet et al, (2010) reveal the dopamine link towards pathological gambling where increased dopaminergic release is thought to foster vicious cycles. Moving out of these individual chemicals Wang et al. (2008) paint a broader view, showing how emotions are precipitated by the complex play of dopamine, serotonin and norepinephrine across different brain regions. Another layer to this story is the one that Wrosch et al. (2009) make, where they reveal that intense regret in older adults sets off stress hormones like cortisol, which contributes to the degradation of health. However, Chan & Wu (2024) reveal further insight into how cortisol not only contributes to anxiety and depression but also stands at the center of mental health struggles in a larger sense. From these stories, we understand that neurotransmitters have such an influence on our lives. Everything, from addiction to emotional regulation and mental well-being, is guided by these tiny molecules.

Research Gap

Numerous studies have explored neuromarketing to understand consumer decision-making regarding products and services. However, limited research has focused on the influence of emotions on neurotransmitters. It is important to recognize that emotions do not arise spontaneously but are driven by neurotransmitters in the human body. Research has also examined how neurotransmitters and hormones impact NPS ratings. By delving into the root causes rather than addressing surface-level observations, this approach could pave the way for innovative marketing strategies in the future.

Methodology

Research Design

This study employs a survey-based research design, where data is collected through a structured questionnaire. The sample consists of 120 respondents, and the survey is administered via Google Forms. To prevent respondent fatigue, the survey is designed to take approximately 15 minutes to complete. The purpose of the questionnaire is to examine how

certain situational stimuli impact neurotransmitter levels and, consequently, customer behavior, specifically about the Net Promoter Score (NPS).

Independent Variable (IV)

The independent variable in this study consists of seven situational questions designed to evoke emotional responses, potentially heightening neurotransmitter levels. These situations are related to shopping experiences with the Zudio apparel brand and aim to simulate various stimuli that may trigger heightened emotional reactions. The situational questions are as follows:

1. **Q1H:** "Zudio sends you a message: 'You are 50 points away from unlocking a ₹500 voucher. Complete your purchase today to claim your reward!' How excited are you to shop immediately to earn the reward?"
2. **Q2H:** "You receive a limited-edition, personalized item with your name embroidered from Zudio. How likely are you to feel a sense of exclusivity and shop more frequently?"
3. **Q3H:** "You attend a social gathering, and multiple people compliment your outfit, saying it looks trendy and unique. How does this influence your likelihood of purchasing similar styles from Zudio in the future?"
4. **Q4H**: "You attend a Zudio event where you meet other fashion enthusiasts and form new connections. How likely are you to continue shopping at Zudio to maintain these social connections?"
5. **Q5H:** "After posting a positive review, you receive a personalized message from Zudio thanking you and offering a loyalty coupon. How likely are you to feel a stronger emotional connection with the brand?"
6. **Q6H:** "You see other shoppers rushing to grab the last available pieces of the limited-edition item. How likely are you to act quickly and purchase the item immediately?"
7. **Q7H:** "You couldn't buy the jacket, and later you see a friend wearing it and receiving compliments. How much regret do you feel for not purchasing it?"

Each of these situational questions is designed to assess the respondent's emotional response to various marketing stimuli that could trigger neurotransmitter release, thereby influencing consumer behavior.

Dependent Variable (DV)

The dependent variable (DV) in this study is the **Heightened Neurotransmitter NPS (HNPS).** This is measured through a Net Promoter Score (NPS) question asked after the situational questions. Respondents are asked:

"How likely are you to recommend Zudio to a friend or colleague based on your experience?"

The NPS score, which ranges from 0 to 10, is used to assess customer loyalty and satisfaction, with the assumption that heightened emotional responses due to the IV will influence the respondent's likelihood to recommend the brand.

Survey Instrument

The survey contains situational questions designed to provoke emotional reactions, followed by an NPS question to measure the respondents' overall satisfaction and loyalty. The questionnaire uses multiple-choice questions (MCQs) to assess the emotional responses to each situation.

Data Collection

The survey was distributed to a sample of 120 respondents via Google Forms. The respondents were selected to reflect a diverse demographic profile, ensuring a broad range of emotional responses to the situational stimuli. The survey is designed to be completed in 15 minutes, to avoid fatigue and ensure accurate responses.

Data Analysis Method

Data analysis is conducted using **Excel** and **SPSS**. Descriptive statistics are used to summarize the respondents' answers, while **multilinear regression analysis** is performed in SPSS to evaluate the relationship between the independent variables (situational questions) and the dependent variable (HNPS). The regression analysis is particularly useful given that multiple IVs are involved in influencing the DV. We also used Google form to conduct the survey.

By analyzing the relationship between the emotional reactions (IVs) and the NPS scores (DV), the study seeks to determine whether heightened neurotransmitter levels, induced by specific marketing stimuli, affect customer loyalty and recommendation behavior.

Results

Table 2: Table showing the frequency of responses based on situations

Question No.	Responses	Frequency	Percent	Valid Percent	umulative Perce
Q1H	1	4	3.3	3.3	3.3
Q1H	2	14	11.7	11.7	15
Q1H	3	39	32.5	32.5	47.5
Q1H	4	63	52.5	52.5	100
Q2H	1	13	10.8	10.8	10.8
Q2H	2	17	14.2	14.2	25
Q2H	3	42	35	35	60
Q2H	4	48	40	40	100
Q3H	1	14	11.7	11.7	11.7

Q3H	2	14	11.7	11.7	23.3
Q3H	3	30	25	25	48.3
Q3H	4	62	51.7	51.7	100
Q4H	1	14	11.7	11.7	11.7
Q4H	2	17	14.2	14.2	25.8
Q4H	3	45	37.5	37.5	63.3
Q4H	4	44	36.7	36.7	100
Q5H	1	12	10	10	10
Q5H	2	10	8.3	8.3	18.3
Q5H	3	33	27.5	27.5	45.8
Q5H	4	65	54.2	54.2	100
Q6H	1	4	3.3	3.3	3.3
Q6H	2	15	12.5	12.5	15.8
Q6H	3	40	33.3	33.3	49.2
Q6H	4	61	50.8	50.8	100
Q7H	1	6	5	5	5
Q7H	2	15	12.5	12.5	17.5
Q7H	3	50	41.7	41.7	59.2
Q7H	4	49	40.8	40.8	100

Table 2 presents the frequency distribution of respondents' answers across various situational questions designed to assess how different emotions (excitement, pride, belonging, anxiety, fear, and regret) influence consumer behavior. For each question (Q1H to Q7H), the responses are categorized into four levels, representing varying degrees of emotional reaction. The highest frequency is consistently observed for response option 4, across all questions. This indicates that the majority of respondents are highly motivated or excited by the situations presented, such as receiving rewards, personalized items, social validation, and limited-edition offers, which heighten their emotional engagement with the Zudio brand. The prevalence of response 4 as the mode for each question suggests that when neurotransmitters are triggered, consumers exhibit stronger positive reactions, such as willingness to pay and actively

participate in marketing campaigns. These heightened emotional responses can be linked to a greater likelihood of recommending the brand, indicating that increased emotional arousal can positively influence customer loyalty and engagement.

Multilinear Regression Analysis

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.985[a]	.971	.969	.27900	2.222

a. Predictors: (Constant), Q6H, Q7H, Q4H, Q3H, Q5H, Q2H, Q1H

b. Dependent Variable: HNPS

Table 4: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	290.073	7	41.439	532.350	.000[b]
	Residual	8.718	112	.078		
	Total	298.792	119			

a. Dependent Variable: HNPS

b. Predictors: (Constant), Q6H, Q7H, Q4H, Q3H, Q5H, Q2H, Q1H

Table 5: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-7.205	.237		-30.341	.000		
	Q1H	.603	.033	.310	18.055	.000	.884	1.131
	Q2H	.597	.027	.373	22.151	.000	.918	1.089
	Q3H	.652	.025	.428	26.013	.000	.963	1.038
	Q4H	.628	.026	.393	23.757	.000	.952	1.050
	Q5H	.643	.027	.399	24.170	.000	.957	1.045

Q7H	.644	.032	.342	20.225	.000	.913	1.095
Q6H	.677	.033	.350	20.671	.000	.908	1.101

a. Dependent Variable: HNPS

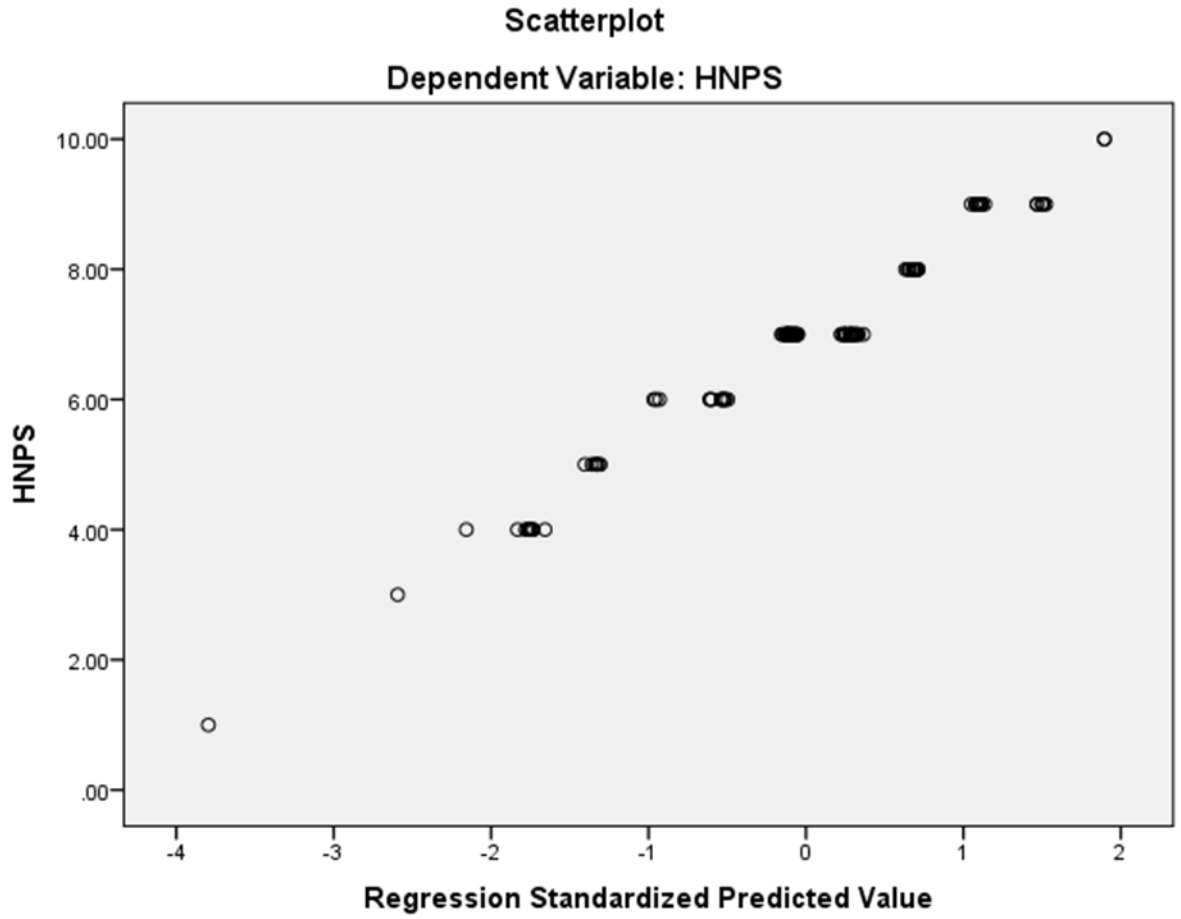

Figure 1: The graph shows the relation between IV and DV

From the scatterplot above, where the x-axis represents the "Regression Standardized Predicted Value" (which corresponds to the manipulated situations from my questionnaire), and the y-axis represents the dependent variable (HNPS or Heightened Neurotransmitter NPS), I can make the following interpretations:

Strength and Validity of the Regression Model

The regression model yielded a high R-squared value of 0.971, indicating that over 97% of the variation in HNPS is explained by the independent variables representing different emotional triggers (Q1H to Q7H). This robust model suggests that the designed emotional manipulations

significantly influence NPS outcomes. Furthermore, the Adjusted R-squared value of 0.969 supports the model's reliability by accounting for the number of predictors, while the low standard error of the estimate (0.279) confirms the model's precision.

The significance of the model is underscored by an F-statistic of 532.350 and a p-value of 0.000, highlighting that the independent variables collectively have a statistically significant effect on the dependent variable (HNPS). These results strongly validate the hypothesis that neurotransmitter-driven emotional situations are key determinants of customer advocacy.

Contribution of Individual Emotional Triggers

The coefficient table provided critical insights into the contribution of each predictor variable:

- **Q3H (linked to feelings of exclusivity):** Standardized beta coefficient of 0.428, indicating a strong influence on HNPS.
- **Q6H (related to social validation):** Standardized beta coefficient of 0.350, emphasizing its significant role.
- Other emotional triggers, including Q1H, Q2H, Q4H, Q5H, and Q7H, also exhibited statistically significant positive effects on HNPS ($p < 0.001$), with standardized beta values ranging from 0.310 to 0.373.

These findings highlight that emotional triggers associated with exclusivity, social validation, and pride are the most effective in enhancing NPS, suggesting that neurotransmitter activity (e.g., dopamine and serotonin release) plays a critical role in shaping consumer decision-making.

Positive Linear Relationship: The scatterplot clearly exhibits a positive linear trend. The actual HNPS values tend to increase as the predicted value increases, with the predicted value being affected by the situations I created to stimulate different emotional responses. This indicates that the emotional scenarios depicted in the survey, like getting a personalized product from Zudio or attending a social event where people appreciated their attire, results in an NPS rating corresponding to the increased scenario. This is consistent with my hypothesis that manipulating neurotransmitters to induce certain emotions can impact customer behavior as measured by their propensity to recommend the brand.

Clustering and Consistency: Most of the data points are clustered, with a gradual upward slope, indicating that the majority of the respondents' reactions align with the expected pattern. This suggests that for most respondents, the emotional situations I created (such as feelings of exclusivity or social validation) were effective in raising their neurotransmitter levels, and their responses to the NPS question reflected this heightened emotional state.

Outliers and Variability: There are a few outliers where the predicted values do not perfectly align with the observed HNPS ratings. For example, a few data points fall outside the main cluster on both the lower and higher ends of the graph. This variability could indicate that for some respondents, the emotional situations didn't have as strong an impact, or they may have

interpreted the situations differently. These outliers might require further investigation, as they could point to other factors influencing how emotions are processed or how neurotransmitters are released in those particular cases.

Discussion

The results from the scatterplot and the regression analysis suggest a significant relationship between the emotional situations manipulated through the questionnaire and the resulting changes in the Heightened Neurotransmitter NPS (HNPS). As observed, there is a positive linear correlation between the predicted values (based on the emotional situations) and the actual NPS ratings, with most respondents showing a consistent increase in their likelihood to recommend the brand when emotionally triggered. This finding supports the hypothesis that manipulating neurotransmitter levels through emotional stimuli can influence consumer behavior more profoundly than merely appealing to surface-level emotions. By inducing specific feelings, such as pride, excitement, and belonging, the respondents' responses to the NPS question were more favorable, suggesting that their attitudes towards the brand were influenced by deeper, biological emotional responses rather than just superficial emotional appeals.

Additionally, the presence of a few outliers in the data prompts an important consideration for marketers. These outliers represent individuals whose responses deviated from the expected pattern, indicating that not all respondents process emotional stimuli in the same way. This variance can be attributed to individual differences, such as personality traits, past experiences, or even biological differences in how neurotransmitters are released. While most respondents showed a strong correlation between heightened emotional responses and positive NPS ratings, these outliers indicate that a more personalized approach may be necessary to account for differing consumer profiles. Further research could explore these individual variations to better understand how emotional manipulation might work across different consumer segments, thus refining the strategy of using neurotransmitter-focused marketing.

Conclusion

In conclusion, this research supports the notion that neurotransmitters play a key role in shaping consumer attitudes and behavior, especially when designed marketing strategies are created toward developing brand loyalty and influencing likelihood of customer recommendation. Emotional situations, designed with high levels of neurotransmitter activity, have been linked positively to the respondents' NPS scores, establishing how deeper emotional engagement, and not just more obvious appeals, is an imperative feature. The findings indicate that, instead of basic emotional marketing, brands ought to shift towards targeting those underlying biological mechanisms that power consumer decision making. From merely scraping through the usual emotional appeals to designing their marketing campaigns and engaging as well as activating some specific neurotransmitters for sustained consumer loyalty and an excellent customer experience, brands ought to switch gears. By tapping into the science of manipulating neurotransmitters, marketers can unshackle themselves from mediocrity and find newer, more

effective ways in which to connect with consumer instincts, thereby engaging that consumer at a higher rate and creating stronger brand advocates.

Reference

Allen. (2019). Making Sense of Belonging, InPsych 2019 | Vol 41| Issue 3

Brown, H. F., Difrancesco, D., & Noble, S. J. (1979). How does adrenaline accelerate the heart? Nature, 280(5719), 235–236. https://doi.org/10.1038/280235a0

Chan, I. I., & Wu, A. M. S. (2024). Assessing the Role of Cortisol in Anxiety, Major Depression, and Neuroticism: A Mendelian Randomization Study Using SERPINA6/SERPINA1 Variants. Biological Psychiatry Global Open Science, 4(3), 100294. https://doi.org/10.1016/j.bpsgos.2024.100294

Edwards, D. H., & Kravitz, E. A. (1997). Serotonin, social status and aggression. Current Opinion in Neurobiology, 7(6), 812–819. https://doi.org/10.1016/S0959-4388(97)80140-7

Rogers, C. R. (1951). Perceptual reorganization in client-centered therapy. In Perception: An approach to personality (pp. 307–327). Ronald Press Company. https://doi.org/10.1037/11505-011

Wang, F., Yang, J., Pan, F., Ho, R. C., & Huang, J. H. (2022). Editorial: Neurotransmitters and Emotions, Volume II. Frontiers in Psychology, 13, 920702. https://doi.org/10.3389/fpsyg.2022.920702

Wise, R. A., & Jordan, C. J. (2021). Dopamine, behavior, and addiction. Journal of Biomedical Science, 28, 83. https://doi.org/10.1186/s12929-021-00779-7

Wrosch, C., Bauer, I., Miller, G. E., & Lupien, S. (2007). Regret intensity, diurnal cortisol secretion, and physical health in older individuals: Evidence for directional effects and protective factors. Psychology and Aging, 22(2), 319–330. https://doi.org/10.1037/0882-7974.22.2.319