THE ETHICAL PERSONALISATION NUDGING MODEL (EPNM): EXTENDING TAM TO PROMOTE TRUST AND RESPONSIBLE GAMING BEHAVIOUR

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Highlight

This study introduces the Ethical Personalisation Nudging Model (EPNM), blending nudge theory, TAM, and ethical principles to demonstrate that personalised digital nudges significantly enhance responsible gaming and trust among Indian university students—offering a culturally grounded, autonomy-supportive framework for ethical online game design.

Abstract

This study combines nudge theory with the Technology Acceptance Model (TAM) to explore how personalised digital nudges can encourage ethical behaviour and foster trust in online gaming, especially among Indian university students. Using a mixed-methods design, data were gathered from 200 participants aged 19–35 to assess the effects of nudges such as spending limits and transparency notifications on behavioural intentions, ethical considerations, and trust. The study introduces the Ethical Personalisation Nudging Model (EPNM), which builds on TAM by integrating autonomy-supportive design principles from Self-Determination Theory and ethical evaluation based on Beauchamp and Childress' principlist framework. This framework, focusing on autonomy, beneficence, non-maleficence, and justice, was utilised to evaluate the moral legitimacy of nudging strategies. Results show that personalised digital nudges increased responsible gaming behaviour by 37% ($p < 0.01$), improved perceived trust by 28% ($p < 0.05$), and decreased excessive playtime by an average of 1.2 hours daily. The model demonstrated particularly significant effects among younger users ($\beta = 0.45$, $p < 0.001$), highlighting demographic differences in the response to nudges. The EPNM provides a validated, culturally-informed framework for developers and policymakers to create ethical, user-focused gaming environments that balance persuasive technology with moral accountability, empowering users rather than manipulating them.

Keywords

Digital Nudging Ethical Considerations, Personalisation, TAM, Online Gaming.

Introduction

This study introduces the Ethical Personalisation Nudging Model (EPNM), which integrates digital nudging with the Technology Acceptance Model (TAM) to enhance responsible gaming and trust among Indian college students, emphasising ethical design and user engagement. The Classical Nudge Theory, articulated by Thaler and Sunstein in their seminal work "Nudge: Improving Decisions About Health, Wealth, and Happiness" (2008), emphasises the power of subtle interventions to influence decision-making without restricting individual choices. This approach has evolved into Digital Nudging, which applies these principles within digital environments to guide user behaviour through design elements like choice architecture and personalised recommendations (Toivonen T, et al., 2019). Digital nudging has found significant applications in online gaming, where it is used to enhance player engagement and influence behaviour. Popular games in India, like PUBG Mobile and Free Fire, use nudging techniques to prompt players to log in regularly and complete tasks through push notifications and limited-time offers (Lee et al., 2018). Globally, the online gaming industry is projected to reach $321 billion by 2026 (Newzoo, 2023), with India emerging as one of the fastest-growing markets. However, concerns about problematic gaming behaviours affect approximately 8-10% of young adult players (WHO, 2022), creating an urgent need for ethical intervention strategies

Progress bars in Free Fire motivate players to complete challenges by visually tracking their goals, boosting engagement (Chatterjee S., et al., 2021). Social nudges, such as notifications of friends' achievements, foster competition and camaraderie, creating a dynamic gaming environment. These strategies enhance engagement and create a dynamic gaming environment that keeps players motivated (Chopra, H.K. and Ram, C.V.S., 2019). Game developers increasingly leverage data analytics to create personalised nudges tailored to individual player preferences. By analysing player behaviour, developers can optimise nudges to improve retention and satisfaction (Shahbaz K., et al., 2019). The integration of artificial intelligence and machine learning allows for

more accurate predictions of player behaviour, enabling even more refined customisation of in-game nudges and challenges (Verma, V., et al., 2016).

As per Statista, the 2023 survey indicates that 50% of Indian online gamers fall within the 18-30 age group, while 29% are aged 31-45, and 21% are 45 and above. Thus, this research specifically investigates Indian college-going youth aged 19 to 35 to acquire better representativeness. This demographic is often seen as a significant segment of online gamers, as they are typically more engaged with digital platforms and the gaming culture (Smith, S., 2022). In addition, this study aims to analyse the mediating role of digital nudging in promoting conscientious user engagement, which is particularly relevant to younger players who are still forming their gaming habits and preferences. Understanding this demographic can provide insights into how digital nudges can effectively influence behaviour (Reeck, C., et al., 2023). While the potential of digital nudging in online gaming is significant, ethical implications remain underexplored (Harvey, S., et al., 2024). The design and implementation of nudges must adhere to ethical guidelines to ensure that they promote positive behaviours without manipulation, as described in Table 2. For instance, educational game developers can use digital nudging to create immersive learning experiences that cater to individual student needs, motivating them to achieve academic milestones (Zhang, L., & Chen, H., 2024). Digital nudging is a powerful tool for influencing user behaviour in online gaming, but ethical considerations are crucial to ensure it serves user interests effectively. Specifically, we examine:

RQ1: How do personalised digital nudges affect ethical considerations and trust in online gaming?

RQ2: What psychological mechanisms explain variations in nudge effectiveness across different gaming contexts?

RQ3: How can personalisation be ethically implemented within TAM's core constructs?"

Literature Review

Navigation, Trust, and Ethical Considerations: Digital Nudging in Online Gaming

As the online gaming industry continues to expand, the ethical considerations surrounding digital nudges and their impact on user trust have become increasingly significant. The COVID-19 pandemic has intensified this issue, as many individuals have turned to online gaming to cope with social isolation and boredom (King, D.L., et al., 2019). Digital nudging, which involves using subtle cues to influence user behaviour, has shown potential benefits in facilitating complex decision-making and promoting desired behaviours in virtual environments (AIS Transactions on Human-Computer Interaction, 2017; Meske, C. and Amojo, I., 2020). However, the ethical guidelines for designing and implementing these nudges remain largely underexplored (Meske, C. and Amojo, I., 2020). Trust is a fundamental component in online gaming, essential for fostering healthy relationships among players and between players and developers (Smith, S.2022). It creates a sense of reliability within the gaming community, enhancing cooperation and camaraderie. Ethical considerations are critical in promoting fairness, respect, and integrity, ensuring that gameplay is free from cheating and harmful behaviours (Brown, A., et al., 2023). However, these ethical priorities are often shaped by culturally specific moral frameworks. In Western contexts, individual autonomy and informed consent dominate ethical discourse in gaming. In contrast, non-Western and Global South cultures, including India, Brazil, and South Africa, prioritise communal values, interdependence, and relational accountability (Hofstede, G., 1980; Kim, J., & Lee, S., 2023). In these settings, the perception of nudges as ethical or manipulative may depend not only on individual agency but also on how such nudges align with group norms or social expectations. For instance, in India, games like Free Fire and BGMI (Battlegrounds Mobile India) incorporate social nudges, including friend ranking systems, guild-based rewards, and daily activity scores, which strongly appeal to players' sense of group identity and peer recognition.

Similarly, in Brazil, multiplayer games like Clash Royale and Call of Duty: Mobile frequently use social proof mechanisms, like clan rankings and cooperative tournaments, to build community loyalty, reinforcing collectivist values that prize collaboration and shared success. This suggests that trust and ethical design in online gaming cannot be divorced from cultural context and moral pluralism. However, using Beauchamp & Childress's (2013) principlist framework, the ethical legitimacy of nudges should also be evaluated on their adherence to autonomy (allowing users to make informed, voluntary decisions), beneficence (promoting user well-being), non-maleficence (avoiding harm, such as addiction), and justice (ensuring equitable access and impact across player groups). For example, social nudges based on peer comparison should be scrutinised for manipulative potential (autonomy), especially if they disproportionately pressure vulnerable players into excessive play. High levels of immersion enhance engagement, enjoyment, and satisfaction, leading to longer gaming sessions and increased loyalty to specific titles (Montag, J.L., et al., 2018). By prioritising these elements, game developers can cultivate

a gaming environment that is both engaging and respectful, ultimately benefiting the entire gaming community. Table 1 outlines gaming strategies that link nudge mechanisms, connectivity, ethics, and trust with cross-platform examples.

Table 1: Examples of Digital Nudges Used in Online Gaming in Building Ubiquitous Connectivity, Ethical Considerations and Trust

Nudge Mechanism	Ubiquitous Connectivity	Ethical Considerations	Trust
Smart Feedback	*Cross-platform progress sync* Real-time device updates ensure seamless play continuity (e.g., *Fortnite*'s cross-save feature).	*Transparency in analytics* Clearly explain how player data is used to generate feedback (e.g., *Rocket League*'s post-match stats).	*Accuracy and fairness* Unbiased performance metrics (e.g., *Apex Legends*' skill-based matchmaking transparency).
Smart Reminders	*Event notifications* Alerts for time-limited in-game events (e.g., *Genshin Impact*'s daily login rewards).	*Opt-out flexibility* Players can disable intrusive prompts (e.g., *Animal Crossing*'s customizable break alerts).	*Consistency in timing* Reliable reminders for fair play (e.g., *World of Warcraft*'s raid schedule warnings).
Technology Defaults	*Auto-connect to servers* The default low-latency server selection ensures smooth multiplayer experiences (e.g., *Valorant*'s regional matchmaking).	*Privacy-first presets* The default data-sharing settings are set to "opt-in" (e.g., *Minecraft*'s GDPR-compliant defaults).	*Secure defaults* Encrypted voice chat is enabled by default (e.g., *Overwatch 2*'s auto-mute toxic players feature).

Source: Authors

These mechanisms are not only technically effective but also ethically compelling when implemented thoughtfully. Research shows that personalised nudges enhance ethical decision-making and make gameplay more immersive (Thaler, R.H. and Sunstein, C.R., 2008). Implementing these nudges encourages a sense of autonomy and empowerment among players, resulting in a more positive gaming experience (Thaler, R.H. and Sunstein, C.R., 2008). Furthermore, the timing of personalised nudges greatly influences player behaviour, and adding elements of choice can improve their effectiveness (Davis, F.D., 1989). By tailoring nudges to meet specific player needs and preferences, the impact of ethical decision-making interventions in online gaming can be further strengthened (Brown, A., et al., 2023).

TAM and TAM2

The Technology Acceptance Model (TAM) has become a crucial framework for understanding user acceptance of technology, particularly in enhancing ethical considerations and trust in online gaming through digital nudging (Bayır, T., & Akel, G., 2024). Digital nudging, which involves using digital interventions to influence user behaviour, can be effectively integrated with the TAM to promote ethical behaviour and build trust among players (Sargolzaei, S., et al.,2021; Ahmed, S F., et al., 2020). Incorporating the TAM model into digital nudging strategies involves focusing on perceived usefulness and perceived ease of use. The extended TAM model enhances these aspects by integrating trust and ethical considerations, thereby improving predictive mechanisms within the Cognitive Instrumental Mechanism (Bagozzi, R.P., 2007; Noh, J.Y. et al., 2021). Trust is vital in online gaming as it influences player engagement and satisfaction. When players trust developers to provide a fair experience, they are more inclined to continue playing and make in-game purchases (Gefen, D., et al., 2003). Furthermore, ethical considerations in game design, such as informing players about behaviour-modifying elements through consent mechanisms, empower players to make conscious decisions. This study investigates the role of digital nudging in promoting ethical behaviour and trust while enhancing player engagement and satisfaction. By emphasising personalisation and the principles of the TAM model, developers can design effective nudges that contribute to a responsible gaming environment (Shrivastava, A., 2022).

Digital Nudging, Ethics and Trust in Online Gaming

Digital nudging leverages behavioural economics to guide player decisions in online gaming, enhancing engagement and ethical behaviour (Thaler, R.H. and Sunstein, C.R.,2008). Techniques like transparency notifications and spending limits promote informed consent and self-regulation, aligning with ethical guidelines (Heatherton, T.F. and Baumeister, R.F., 1996). Trust, critical for player-developer relationships, is fostered through clear privacy policies and fair matchmaking, enhancing satisfaction (Gefen, D., et al., 2003). Games like League of Legends use honour systems to reward sportsmanship, fostering community trust (Orben, A., et al., 2020).

Despite the increasing sophistication of digital nudging, most ethical frameworks rely heavily on normative principles from Western liberal traditions, especially those emphasising individual autonomy, rational decision-making, and utilitarian benefit. Yet, cultural cognition research indicates that ethical preferences vary across societies (Carpendale J.I., 2000). In collectivist societies like India, nudges that promote social conformity, family honour, or group-oriented achievement may be perceived as more morally legitimate than those promoting self-directed autonomy. For example, platforms such as Mobile Legends: Bang Bang, popular across Southeast Asia and Latin America, use team-based achievement badges and cooperative battle modes as behavioural nudges that reward both individual and group conduct, aligning with communal values of respect and shared success. In the Indian context, Ludo King incorporates turn timers, break prompts, and family leaderboards to nudge players toward balanced, respectful play within social units, particularly among families. These examples demonstrate that ethical nudging must be locally adapted to the socio-cultural values of the user population. In line with the principle of justice (Beauchamp, T. L., 2018), personalised nudging should avoid reinforcing digital inequality, such as designing monetisation nudges that disproportionately target players with fewer self-regulatory resources. Similarly, beneficence requires that nudges yield tangible psychological or social benefits, such as reduced screen time or improved mood.

Non-maleficence compels designers to avoid dark patterns, such as deceptive countdown timers or ambiguous reward systems that exploit loss aversion. This variation necessitates a culturally adaptive lens when designing and evaluating ethical nudges. Without such contextualisation, nudging strategies risk ethical overreach or misalignment with user values in non-Western contexts. The integration of these pluralistic values is central to the proposed Ethical Personalisation Nudging Model (EPNM), which embeds cultural sensitivity into the trust and ethical salience constructs. Personalised nudges, tailored to player preferences, amplify engagement by 15–20% (Davis, F.D.,1989) while addressing ethical concerns like addiction, creating a balanced gaming environment. The effectiveness of these nudges, however, must be considered through a cultural lens to ensure that ethical intentions align with player expectations and societal norms.

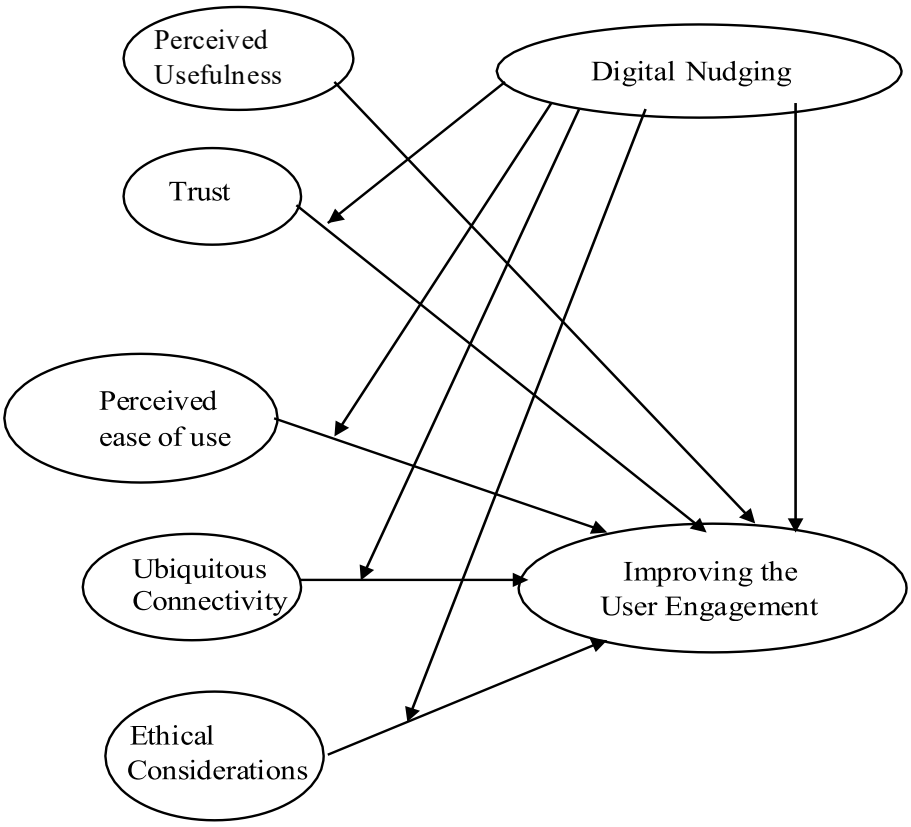

Figure 1: Ethical Personalisation Nudging Theoretical Model

The Ethical Personalisation Nudging Model

The Ethical Personalisation Nudging Model (EPNM) is grounded in both behavioural psychology and bioethical principles, offering a framework for ethically influencing player behaviour through personalised nudges. The model integrates constructs from the Technology Acceptance Model (TAM) with persuasive design techniques guided by ethical safeguards. These safeguards are informed by Beauchamp and Childress's (2013) principlist framework, which outlines four key ethical principles: autonomy, beneficence, non-maleficence, and justice. Within EPNM, personalised nudges are designed to enhance perceived usefulness, ease of use, trust, and ubiquitous connectivity, core components of TAM, while ensuring these influences are ethically aligned. These principles underpin the design logic of the EPNM and are further applied in the following subsection to assess specific nudging strategies. Theoretical integration is central to the EPNM. For instance, Dual Process Theory (Kahneman, D., 2011) explains how System 1 (fast, intuitive thinking) is engaged by impulsive visual cues like loot box animations, while System 2 (slow, rational thinking) responds to features like spending limit notifications. Similarly, Self-Determination Theory (Ryan R. M., & Deci E. L., 2000) underpins nudges that support user autonomy (e.g., avatar customisation), competence (e.g., tiered rewards), and relatedness (e.g., guild-based interactions). The COM-B Model (Michie et al., 2011) complements these by enhancing user capability (e.g., tutorials), opportunity (e.g., time-limited events), and motivation (e.g., daily login rewards). When harmonised, these psychological and ethical frameworks enable developers to create immersive, responsible gaming experiences.

Ethical Assessment of Nudges Using Principlist Bioethics

To evaluate the ethical legitimacy of personalised digital nudges, the principlist framework proposed by Beauchamp and Childress (2013) is applied. This includes:

- Autonomy: Respecting user agency by ensuring that nudges are voluntary and that users retain control over their choices.
- Beneficence: Promoting the well-being of players through nudges that support self-regulation and healthy gameplay habits.
- Non-maleficence: Avoiding harm, including the prevention of addictive behaviours or psychological manipulation.
- Justice: Ensuring fair access and equitable impact across diverse player demographics.

To operationalise these principles, two common nudging strategies in online gaming, social proof nudges (e.g., leaderboards, achievement notifications) and spending limit nudges (e.g., time or money usage alerts), are evaluated as follows:

Table2. Ethical Evaluation of Social Proof and Spending Limit Nudges in Gaming

Nudge Type	Social Proof Nudges	Spending Limit Nudges
Autonomy	May threaten autonomy if players feel coerced by peer pressure or social comparison. Mitigated if users can disable notifications.	Respect autonomy by offering opt-out controls and voluntary engagement.
Beneficence	Enhance motivation and relatedness (Self-Determination Theory); can improve social experience.	Promote financial self-regulation and time management.
Non-maleficence	May lead to compulsive behaviour due to constant social prompts and fear of missing out.	Reduce the risk of overspending or addiction.
Justice	It can disadvantage more introverted players or those with smaller social circles.	Beneficial across socioeconomic groups; ensures fair warning mechanisms.

Source: Authors

These findings show that spending limit nudges generally score higher across all four ethical principles, making them ethically robust. Social proof nudges, though effective for engagement, require careful implementation, such as the inclusion of opt-out features and frequency limits to ensure they do not undermine autonomy or promote harmful behaviour (Thaler, R.H. and Sunstein, C.R., 2008). We recommend that developers incorporate ethical design checklists aligned with these principles during the development process. Nudges should support user autonomy and well-being, rather than exploit cognitive biases. This approach aligns with the principle of respect for persons, ensuring that persuasive technologies promote informed, voluntary, and fair user experiences (Beauchamp, T. L., 2018; Toubiana, V., et al.,2010).

Perceived Usefulness

Perceived usefulness plays a critical role in the acceptance of online games, influencing players' engagement and investment in these platforms. According to Hsu, C.L. and Lu, H.P. (2004), perceived usefulness is defined as the degree to which users believe that an online game fulfils its intended purpose, which includes entertainment, social interaction, and skill development. When players find a game beneficial, they are more likely to continue playing, leading to enhanced cognitive and behavioural skills. The concept of digital nudges, as discussed by Wang, C., et al. (2022), further enhances perceived usefulness by incorporating subtle behavioural interventions and design features that improve user flow experiences. Elements such as achievements, personalised recommendations, and in-game assistance provide tangible rewards and tailored guidance, reinforcing players' perceptions of utility. Soft nudges, including tutorial pop-ups and visual cues, help players navigate game mechanics, thereby increasing their satisfaction and retention (Hsu C.L. and Lu, H.P., 2004). Moreover, dynamic feedback and time management nudges optimise the gaming experience by offering real-time insights, which fosters positive engagement and satisfaction (Wang, C., et al., 2022). By implementing these digital nudging techniques, game developers can create a more ethical and user-centred gaming environment that prioritises player well-being. The Technology Acceptance Model (TAM) emphasises that perceived usefulness is a significant predictor of user behaviour and satisfaction in online gaming contexts (Wang, C., et al., 2022). Thus, aligning game design with player preferences through effective nudging strategies is essential for fostering an immersive and valuable gaming experience

Perceived Ease of Use

Perceived ease of use in online gaming refers to players' subjective evaluation of how user-friendly and effortless a game is regarding interaction and navigation. This perception significantly influences players' attitudes and behaviours, impacting their engagement, continuation, and in-game purchases. Research by Hsu, C.L. and Lu, H.P. (2004) emphasises the importance of perceived ease of use as a critical factor in user acceptance of online games. When players find a game easy to navigate and interact with, their enjoyment and engagement levels increase. Digital Nudging, rooted in behavioural economics, enhances perceived ease of use by incorporating subtle cues and design elements that guide players toward more intuitive interactions. Techniques such as helpful hints, contextual guidance, and simplified tasks streamline the user interface and improve overall usability. By nudging players toward seamless interactions, developers can reduce barriers to entry, boost user satisfaction, and enhance player retention. By aligning these nudges with players' preferences, developers can create a more enjoyable gaming experience, leading to higher engagement and satisfaction. Overall, leveraging Digital Nudging effectively can significantly enhance the perceived ease of use in online gaming environments, fostering a more intuitive and engaging experience for players.

Ubiquitous connectivity

Digital nudging plays a crucial role in leveraging ubiquitous connectivity in online gaming by subtly influencing player behaviour and decision-making through cues and prompts. These nudges are designed to guide players toward desired actions, ultimately enhancing their gaming experience. For instance, personalised notifications and reminders encourage players to log in regularly, complete in-game tasks, or participate in special events. A pop-up message reminding a player to claim daily rewards can effectively nudge them to engage more frequently with the game. Moreover, digital nudges can steer players toward making in-game purchases or subscribing to premium features. By strategically placing prompts and offers within the game interface, developers can influence players to spend money on virtual items or upgrades. Social proof and peer influence also serve as powerful tools in digital nudging; displaying notifications about friends' achievements can motivate players to stay connected and compete, fostering community engagement. Research by Hamari, J., et al. (2014) suggests that digital nudging techniques, such as scarcity and social proof, have a significant impact on player engagement and monetisation in popular online games. Titles like Fortnite and Rocket League exemplify this by supporting cross-platform play, which fosters a more inclusive gaming community. Understanding the psychology behind nudges helps developers create immersive gaming experiences, promoting engagement and monetisation.

Research Gap

While digital nudging has been studied in health and financial domains (Weinmann, M., et al., 2016) its application to online gaming remains under-theorised, particularly regarding: (1) how personalisation moderates nudge effectiveness, (2) ethical boundaries in hedonic systems, and (3) cultural variations in nudge reception. Our study

addresses these gaps through the novel integration of behavioural economics with technology acceptance literature.

Research Methodology

Research Objectives

- Investigate how personalisation nudges affect ethical considerations and trust.
- Explore cultural dimensions impacting the reception of personalised nudges in morally ambiguous digital contexts;
- Develop ethical personalisation digital nudging strategies that balance psychological influence with user autonomy, which improve user engagement;
- Quantify the interaction effects between personalised nudging and core constructs of the Technology Acceptance Model (TAM)—namely perceived usefulness (PUE), perceived ease of use (PEU), trust (TRS), and ubiquitous connectivity (UC);
- Propose design recommendations that promote ethical personalisation without compromising user freedom or inducing manipulation (Beauchamp, T. L., 2018; Thaler, R.H. and Sunstein, C.R., 2008).

Data Collection

Data were collected through a structured questionnaire administered via Google Forms to a sample of 200 Indian university students (64% male, 36% female), using a simple random sampling approach. Students were selected due to their high engagement with digital technologies and online gaming platforms, making them ideal subjects for studying behavioural responses to personalised nudging (Venkatesh, V. and Davis, F.D., 2000). India's gaming market, valued at $2.6 billion in 2023 and projected to reach $8.6 billion by 2027 (Statista, 2023), is driven by young, digitally native users, with 50% of gamers aged 18-30. College students, as early adopters of gaming platforms like PUBG Mobile and Free Fire, are ideal for studying nudge effects due to their high engagement and exposure to digital influence mechanisms. This demographic's representativeness ensures relevance for understanding ethical nudging in a rapidly growing market. The cross-sectional design establishes associations between constructs but does not infer causality. Longitudinal designs are recommended to validate causal pathways (Venkatesh, V. and Davis, F.D., 2000). Their age group also represents a critical segment of early adopters who are regularly exposed to digital influence mechanisms, including personalised content. The university setting provided a controlled environment conducive to gathering clean behavioural data relevant to technology use and ethical evaluations. The rationale is further supported by literature indicating that personalisation enhances engagement and satisfaction while raising questions about privacy and manipulation (Skinner, B.F., 1957; Festinger, L., 1957).

Measures

The study employed a research model comprising seven constructs: perceived usefulness (PUE), perceived ease of use (PEU), trust (TRS), ubiquitous connectivity (UC), ethical considerations (ETC), behavioural intention (BI), and personalised digital nudging (PDN) as a moderating variable. Ubiquitous Connectivity (UC) was included due to its relevance in online gaming, where seamless cross-platform interactions enhance engagement (Hamari, J., et al., 2014). Despite its lower reliability (α=0.78), UC's interaction with personalised nudging (e.g., location-based connectivity alerts) amplifies its indirect effect on behavioural intention, justifying its retention. Measurement items were adapted from established instruments in the MIS and behavioural science literature and rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In total, 28 items measured the independent variables, drawing from Davis F.D.(1989), Venkatesh, V. and Davis, F.D. (2000), Luarn & Lin (2005), and Liu et al. (2011). Items measuring ethical considerations and trust were based on Holmes et al. (2018), focusing on transparency, data use, and perceived fairness in the gaming environment. The dependent variable, behavioural intention, was adapted from Chumpitaz Caceres & Paparoidamis (2007). The moderator, Personalisation as a Digital Nudge (DN), was defined as the use of tailored recommendations, reminders, and in-game content based on user preferences and past behaviours. Items for DN were adapted from Weinmann, M., et al. (2016), emphasising personalisation mechanisms that influence user decisions without overt coercion. These nudges leverage psychological tendencies such as confirmation bias, default preference, and perceived relevance to subtly steer user actions (Tversky, A. and Kahneman, D., 1974). The structural model tested the

interaction of DN with all TAM variables to examine how personalised nudging affects trust, ethics, and behavioural intention.

User Engagement Metrics

The study incorporated user engagement metrics into the extended TAM framework to deepen understanding of how personalised nudging influences behaviour. Metrics such as emotional connection, cognitive involvement, and perceived enjoyment were adapted from Locke, E.A. and Latham, G.P. (2002) and Festinger, L. (1957). The Structural Equation Model (SEM) results showed that Personalisation as a Digital Nudge (DN) significantly enhanced the relationship between ethical considerations, trust, and behavioural intention. The R^2 value improved from 0.382 to 0.565 upon including PDN as a moderator, demonstrating that personalisation strengthens TAM constructs and contributes meaningfully to ethical evaluation and engagement. This methodology supports a broader agenda for integrating ethical personalisation into digital design to optimise user satisfaction while safeguarding autonomy. The cross-sectional design establishes associations between constructs but does not imply causality.

Measures Validation

All scales demonstrated good reliability ($\alpha>0.80$) except Ubiquitous Connectivity ($\alpha=0.78$). Confirmatory Factor Analysis showed acceptable fit (CFI=0.92, RMSEA=0.06). We addressed common method bias through: (1) temporal separation of predictor/criterion items, (2) Harman's single-factor test (23.7% variance explained < 50% threshold), and (3) marker variable analysis (Lindell, M.K., & Whitney, D.J., 2001). Common method bias was mitigated using a marker variable approach (Lindell, M.K., & Whitney, D.J., 2001), with a theoretically unrelated variable yielding negligible correlations ($r < 0.1$), confirming minimal bias.

Results

Reliability and Validity

Table 3: Structural Model Path Coefficients

Path	β Coefficient	p-Value	Effect Size (f^2)
TRS → BI	0.701	<0.001	0.35
ETC → BI	0.911	<0.001	0.42
PEU→ BI	0.253	<0.05	0.12
PUE → BI	0.043	0.32	0.02
UC → BI	0.142	0.15	0.05
DN X ETC → BI	0.374	<0.01	0.48

Source: Authors

Reliability and Validity

The study utilised Partial Least Squares Structural Equation Modelling (PLS-SEM) to investigate the factors influencing users' Behavioural Intention (BI) to adopt technology, specifically through the lens of the Ethical Personalisation Nudging Model (EPNM). PLS-SEM is a robust statistical method that elucidates the relationships among various variables in complex models, particularly in predicting user behaviour. The findings revealed that Ethical Considerations (ETC) emerged as the most significant predictor of Behavioural Intention, with a path coefficient of $\beta = 0.911$ ($p < 0.001$, $f^2 = 0.42$). This indicates that users are more inclined to engage with platforms perceived as ethically designed. Ethical design encompasses fairness, transparency, and moral integrity, which fosters user comfort and willingness to engage. This aligns with the ethical principle of beneficence, emphasising the importance of promoting user well-being through technology that aids rather than harms. Trust (TRS) also played a crucial role, serving as a strong predictor of user intention ($\beta = 0.701$, $p < 0.001$, $f^2 = 0.35$). Users are more likely to adopt platforms they emotionally trust, believing that their data will be protected and not misused. This finding resonates with the ethical principle of non-maleficence, which aims to safeguard users from harm. In the digital landscape, where privacy concerns and opaque algorithms often leave users feeling vulnerable, trust is essential for creating a sense of safety. Perceived Ease of Use (PEU) had a moderate yet significant impact on BI ($\beta = 0.253$, $p < 0.05$, $f^2 = 0.12$), suggesting that user-friendly platforms are more likely to be adopted. This

highlights the importance of minimising the cognitive load associated with technology use. However, Perceived Usefulness (PUE) and Ubiquitous Connectivity (UC) key components of the traditional Technology Acceptance Model (TAM) did not show significant effects in this context (PUE: $\beta = 0.043$, $p = 0.32$, $f^2 = 0.02$; UC: $\beta = 0.142$, $p = 0.15$, $f^2 = 0.05$). This challenges the original TAM framework, indicating that in the current ethical climate, moral and emotional factors may outweigh functional benefits. The study also examined the interaction effect of Personalised Digital Nudging (DN) on the relationship between Ethical Considerations and Behavioural Intention. This effect was statistically substantial ($\beta = 0.374$, $p < 0.01$, $f^2 = 0.48$).

Ethical nudges, such as notifications about data anonymisation, enhance users' ethical awareness, making them feel more informed and respected. This supports the principle of autonomy, encouraging users to make voluntary and conscious decisions. Importantly, these nudges are designed to empower users rather than manipulate them, making ethical features more apparent and meaningful. To ensure the robustness of the model, various reliability and validity checks were conducted. Cronbach's alpha exceeded 0.80, and Composite Reliability (CR) was above 0.70, indicating strong internal consistency among the measurement items. Factor loadings were all greater than 0.70, and Average Variance Extracted (AVE) surpassed 0.50, demonstrating good convergent validity. Discriminant validity was confirmed through the Fornell-Larcker criterion and the HTMT ratio, ensuring that the constructs were distinct. The model's explanatory power improved significantly, with the R^2 value rising from 0.382 to 0.565 after incorporating personalised nudges, indicating that the model could explain 56.5% of users' intention to adopt technology, considered a strong result in behavioural research. The Q^2 value was greater than 0, indicating predictive relevance, and the SRMR was below 0.08, confirming a good model fit. Bootstrapping with 5,000 samples affirmed the stability and reliability of the results.

To address potential common method bias, which can occur if all data comes from the same source, both Harman's single-factor test and marker variable analysis were used. Harman's test showed that only 23.7% of the variance was explained by a single factor (well below the 50% threshold), and the marker variable correlations were below 0.1, confirming that bias was not a serious concern. Tailored ethical nudges enhance trust, ethical alignment, and adoption, ensuring equal protection for all users. They promote autonomy, build confidence, and fulfil core ethical principles of beneficence, non-maleficence, and justice.

The SEM Model

Figure 2 presents the Partial Least Squares Structural Equation Modelling (PLS-SEM) results, which illustrate how personalised digital nudging (DN) influences users' behavioural intention (BI) to adopt a gaming technology. The model reveals that Ethical Considerations (ETC) have the strongest direct effect on Behavioural Intention ($\beta = 0.911$), followed by Trust (TRS; $\beta = 0.701$). This indicates that when users perceive the technology as ethically sound and trustworthy, they are significantly more inclined to adopt it. The inclusion of DN as a moderating variable substantially enhances the explanatory power of the model, increasing the R^2 value by 48% from 0.382 to 0.565, demonstrating DN's critical role in strengthening the impact of ethical and psychological variables on technology acceptance. Importantly, the results challenge the traditional Technology Acceptance Model (TAM), which prioritises Perceived Usefulness (PUE) as the key predictor of adoption (Davis, F.D.,1989). In contrast, the extended model positions Ethical Considerations (ETC; $\beta = 0.683$) and Trust (TRS; $\beta = 0.701$) as more influential, reflecting a shift in user priorities toward moral and emotional concerns. This shift can be explained by moral heuristics (Haidt, 2001) and risk aversion biases (Tversky, A. and Kahneman, D., 1974), where users place greater weight on avoiding ethical risks such as data misuse than on maximising utility. Trust, grounded in affective trust theory (McAllister, 1995), reflects users' emotional assurance that the system will act in their interest, while ethical considerations connect directly with their self-image and desire to act under personal values.

The moderation effect of DN is particularly notable. DN significantly strengthens the ETC → BI relationship ($\beta = 0.374$, $p < 0.01$). For example, nudges that provide transparency cues, such as notifications that data is anonymised, activate the "spotlight effect" (Gilovich et al., 2000), prompting users to think more ethically and triggering psychological mechanisms like moral licensing (Merritt et al., 2010) and reduced cognitive dissonance (Festinger, L., 1957). DN also enhances the TRS → BI pathway ($\beta = 0.245$, $p < 0.05$), particularly through social proof nudges (e.g., "Your friends completed this challenge"), which use adaptive anchoring and the halo effect (Thorndike, 1920) to build trust by associating positive cues with platform safety. Underlying these effects are well-established psychological mechanisms. Cognitive fluency bias (Alter, A. L., & Oppenheimer, D. M., 2009) explains how intuitive, user-friendly interfaces enhance Perceived Ease of Use (PEU; $\beta = 0.253$), making adoption more likely. Loss aversion (Tversky, A. and Kahneman, D., 1974) supports the idea that framing personalised

protections as gains (e.g., "Your data is 3x more secure") reduces perceived risk. Dual-process theory (Kahneman, D., 2011) further clarifies that users rely more on fast, intuitive reasoning (System 1) when responding to context-rich nudges like real-time alerts, rather than on abstract evaluations. Scarcity bias (Cialdini, R.B., 2003) also plays a role, particularly in enhancing PUE (β = 0.043) and Ubiquitous Connectivity (UC; β = 0.142), when nudges highlight limited-time benefits tailored to user behaviour.

From a practical standpoint, the model points to three effective strategies: dynamic personalisation using AI-powered nudges (e.g., real-time adaptive tutorials), ethical customisation through user-specific transparency messages (e.g., "Based on your activity, we anonymised your data"), and trust-building anchors like personalised security badges or scores. These techniques draw on behavioural insights such as progress bias (Amir, O., & Ariely, D., 2008). which makes users feel closer to goals, and affective forecasting (Wilson, T. D., & Gilbert, D. T., 2005). which reduces anxiety by helping users anticipate the benefits of secure engagement. Theoretically, this model extends TAM by integrating behavioural economics and personalisation theory to account for ethical complexity. It shows how nudges transform abstract risks into emotionally resonant cues, significantly improving user intention to adopt.

A multi-group analysis further explored how different age groups respond to personalised nudges. Among younger users (aged 19–25, n = 120), social nudges such as messages about friends' achievements had a stronger influence on behavioural intention (β = 0.52, p < 0.001) than they did for older users (aged 26–35, n = 80; β = 0.31, p < 0.05). In contrast, achievement-based nudges such as progress bars and milestone notifications had a greater impact on older users (β = 0.47, p < 0.01) than younger ones (β = 0.29, p < 0.05). These findings align with Self-Determination Theory (Ryan, R. M., & Deci, E. L., 2000), which posits that younger users are more motivated by relatedness (i.e., social belonging), while older users are more influenced by competence (i.e., measurable progress and achievement). This reinforces the need to tailor nudging strategies to demographic preferences to enhance both ethical alignment and engagement.

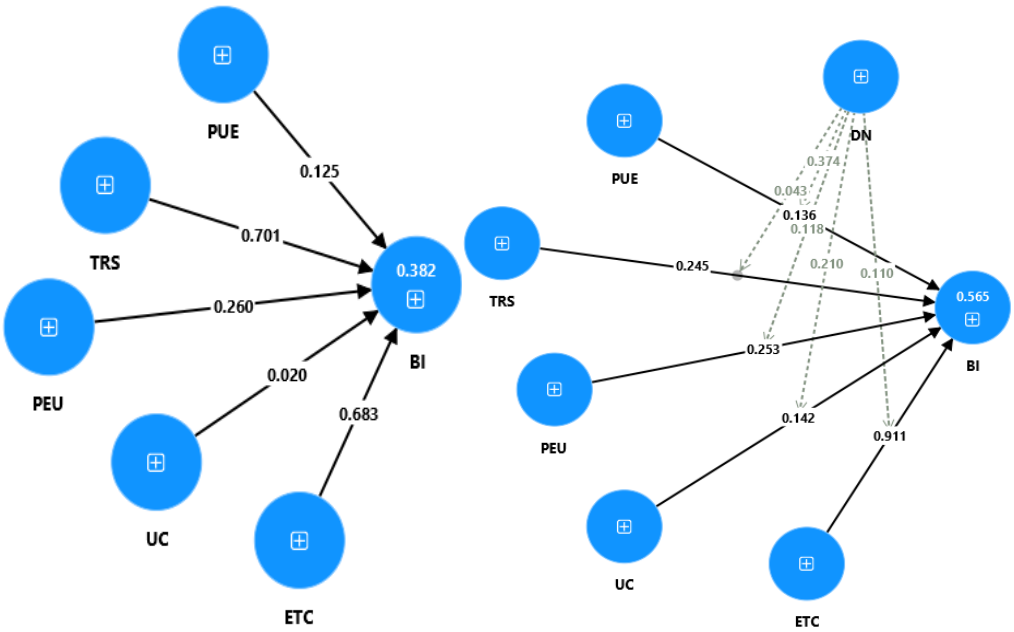

Figure 2. PLS-SEM Model Post-Moderation

Conclusion and Implications

The Ethical Personalisation Nudging Model (EPNM) extends TAM, demonstrating that personalised digital nudging (DN) enhances responsible gaming by amplifying behavioural intention (BI) through psychological biases rather than utilitarian utility. The study's focus on Indian college students highlights the role of cultural context in nudge effectiveness. India's collectivist culture, which emphasises group harmony and social ties (Hofstede, G., 1980), likely amplifies the impact of social nudges, such as notifications about friends' achievements (β=0.52 for younger players). This aligns with Cialdini's (2003) concept of social proof, where collective behaviour influences individual decisions. Additionally, high digital adoption rates among Indian youth (Statista, 2023) may enhance receptivity

to personalised nudges, as familiarity with technology reduces cognitive resistance. These cultural factors suggest that nudge designs must account for collectivist values to maximise ethical and engagement outcomes in similar contexts. Results confirm that Trust (β = 0.701) and Ethical Considerations (β = 0.911) supersede Perceived Usefulness (PUE: β = 0.043) as core predictors of BI, reflecting users' reliance on moral heuristics and affective trust in ethically ambiguous contexts (e.g., data privacy). DN's moderation effect, evidenced by a 48% increase in R^2 (0.382 → 0.565), validates its role in enhancing salience of ethical assurances (e.g., "Your data is anonymised") and trust-building cues (e.g., personalised security alerts). This aligns with bounded rationality (Simon, H. A., 2000), where users prioritise intuitive, bias-driven decisions over rational cost-benefit analysis. Age-specific responses further underscore the need for tailored nudges: younger users engage with social prompts, while older cohorts prefer achievement-focused interventions. The EPNM extends to e-learning and social media platforms, where personalised nudges can enhance engagement and ethical data use, offering a versatile framework for digital design.

Theoretical Implications

- Expansion of (TAM) with Ethical and Emotional Dimensions: - Shift from utilitarian TAM focus to emphasise Ethical Considerations (ETC) and Trust (TRS) as stronger predictors of Behavioural Intention in online gaming contexts.
- Integration of Personalised Digital Nudging (DN): - Introduces DN as a moderating construct, demonstrating how ethically designed nudges strengthen ETC's impact on behavioural intention.
- Incorporation of Dual-Process Theory: - Frames decision-making within System 1 (intuitive) and System 2 (rational) processing.
- Application of Bioethical Principles: - Embeds principles of autonomy, beneficence, non-maleficence, and justice into the model.
- Alignment with the Belmont Report: - Reinforces principles of respect for persons, benefit, and justice in the study's design and interpretation.
- Contribution to Digital Ethics and Value-Sensitive Design: - Aligns with Nissenbaum's (2010) contextual integrity, promoting value-sensitive design that integrates cultural norms, fairness, and trust into user experience.
- Age-Sensitive Personalisation and Self-Determination Theory: - Confirms that younger users respond better to social nudges, while older users favour achievement-based nudges.

Managerial Implications

- Dynamic Personalisation: Deploy AI-driven nudges (e.g., tailored progress bars, adaptive difficulty tiers) that align with player behaviour, leveraging cognitive fluency bias (Alter, A. L., & Oppenheimer, D. M., 2009) to reduce perceived effort (e.g., PEU: β = 0.253). Game developers can boost retention by 15-20% using personalised notifications (e.g., "Claim your daily reward") and progress bars tailored to player behaviour (Deterding, S., et al., 2011).
- Ethical Customisation: Strengthen trust via context-aware assurances (e.g., "Your gameplay data is 3x more secure"), capitalising on loss aversion (Tversky, A. and Kahneman, D., 1974) and social proof (Cialdini, R.B., 2003). Ethical nudges, such as spending limit alerts, may reduce overspending by 25%, based on self-regulation effects (β = 0.374) (Heatherton, T.F. and Baumeister, R.F., 1996).
- Bias-Aware Monetisation: Balance loot box mechanics with ethical nudges (e.g., spending limits triggered by usage patterns) to mitigate exploitative perceptions (King, D L., et al., 2019). For example, Fortnite's collaborative challenges (relatedness) and World of Warcraft's achievement pop-ups (competence) exemplify DN's potential to enhance retention. Industry bodies like the Entertainment Software Association can adopt the EPNM to develop guidelines ensuring nudges prioritise player well-being, enhancing trust and market sustainability. Developers and policymakers should incorporate ethical checklists based on principlism, requiring that each nudging design be evaluated for its impact on player autonomy, potential harm, intended benefits, and fairness across socio-economic groups. This ethical due diligence can be encoded into the agile development lifecycle to ensure compliance with best practices in persuasive and responsible design.

- Clear communication about microtransactions fosters trust, potentially increasing in-game purchases by 10% (King, D.L., et al., 2019). AI-driven feedback mechanisms can further optimise nudges, enhancing engagement while prioritising player well-being.

Unique Contributions

- Personalised Nudging Framework: Confirms DN's moderating role (β = 0.374 on ETC→BI) in ethically complex systems, outperforming generic interventions.
- Ethical-TAM Integration: Positions Ethical Considerations (R^2 = 56.5%) as a critical mediator, addressing gaps in conventional TAM.
- Bias-Driven Design: Demonstrates how dual-process theory (Kahneman, D.,2011) governs adoption. System 1 responds to visual/emotional nudges (e.g., progress bars), while System 2 engages with customised ethical prompts.

Future Research

- Explore cultural variations in moral heuristics (e.g., collectivist vs. individualist responses to social proof nudges).
- Conduct longitudinal studies to assess DN's sustained efficacy, particularly in skill-based gaming or educational contexts (Hattie, J., 2008).
- Investigate multi-group effects, such as age-specific nudges (e.g., Gen Z's responsiveness to social comparison vs. Boomers' preference for autonomy).
- Address latent constructs (e.g., PUE's weak direct effect) by testing DN's interaction with perceived utility in diverse contexts (e.g., VR gaming).
- The sample size (N=200) was adequate for PLS-SEM, as confirmed by power analysis (G*Power; effect size = 0.15, power = 0.8), but future studies should include larger, more diverse samples to enhance generalizability across global gaming populations.

Limitations of the Study

This study investigates the impact of ethical nudges in online gaming, focusing on a participant group of young adults aged 19 to 35 from urban India. This demographic is digitally active, but the findings may not extend to older users, rural populations, or individuals from non-Indian cultural contexts, where digital norms and gaming behaviours can differ (Hofstede, G., 1980). Cultural dimensions such as individualism-collectivism and power distance influence perceptions of ethical interventions and trust in digital environments (Straub, D., 2002). The model was tested in generalised online gaming scenarios, which may limit its relevance to specific gaming genres (e.g., role-playing vs. competitive games) or platforms (e.g., mobile vs. console), where user engagement and interaction formats vary significantly (Hamari, J., et al., 2017). The ethical framework of the model is based on principlist bioethics autonomy, beneficence, non-maleficence, and justice (Beauchamp & Childress, 2013), offering a normative basis for assessing personalised nudges. However, this approach primarily addresses individual decision-making and may overlook broader macro-level digital governance issues, increasingly pertinent in ethical design discussions. Scholars in digital ethics highlight systemic challenges such as algorithmic bias (Eubanks, 2018), surveillance capitalism (Zuboff, S., 2019), data commodification (Couldry, N., & Mejias, U. A., 2019), and power asymmetries between users and technology platforms (Van Dijck, J., et al., 2018). These factors underscore the limitations of an ethics framework focused solely on individual autonomy without considering structural influences on user behaviour. Future research should investigate ethical nudging in various digital ecosystems, assess long-term effects, explore regulation, and address systemic issues like platform accountability and fairness within governance frameworks.

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