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Influencing players to download new games: role of in-game pop-up advertisements

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The utilization of pop-up advertisements in promoting online games has become increasingly prominent, particularly within freemium gaming models, where advertising serves as a critical revenue and acquisition mechanism. Despite their widespread adoption, limited empirical research has examined how specific advertisement attributes shape advertising value and subsequent player download intentions, especially in emerging digital economies. This study investigates the influence of four key pop-up advertisement attributes; informativeness, creativity, personalization, and credibility, on perceived advertising value and its effect on game download intention in the context of freemium games. Undergraduate game players who belong to the age category of 18–25 years, representing Generation Z were determined as the study sample. Randomly selected participants were asked to engage in a game-playing experience and respond to a structured survey afterward. A total of 386 responses were collected for the analysis and 12 individuals were interviewed after the analysis intending to validate the results. The results revealed that the considered ad characteristics; informativeness, creativity, personalization, and credibility have a significant impact on advertising value and the perceived advertising value significantly influences the player's game download intentions. Subsequent qualitative interviews conducted with individual gamers validated the analyzed results. The qualitative findings corroborated the quantitative results, offering deeper insights into how gamers interpret and respond to in-game pop-up advertisements. This study contributes to the online gaming and digital advertising literature by empirically validating a model of advertising value in freemium gaming contexts. Practically, the findings provide actionable insights for marketers and game developers seeking to optimize pop-up advertisement design to enhance player engagement and increase game installations. Conducted within the Sri Lankan context, the study addresses a notable research gap in emerging digital markets and offers implications applicable to similar underexplored regions.

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Introduction

Online gaming has become one of the most popular segments in the entertainment industry for internet users of varied age groups (Abbasi, Rehman, et al. 2021; Chaney et al. 2018; Abbasi, Shah, et al. 2021; Roettl & Terlutter, 2018). With the internet becoming a fundamental part of the routine lives of people (Vashisht, 2017; Hou et al. 2022; Bhatiasavi et al. 2023) and with the ever-increasing usage of smartphones, mobile gaming has become an easily approachable entertaining platform. Thus, mobile gaming applications are one of the social networking platforms, where people spend quite a lot of time (Hussain et al. 2022). Therefore, online gaming has now become a widely used internet application and the count of users around the globe is more than 2.7 billion (Clement, 2023b). In the year 2022, gaming applications were the most popular application category available in both the Apple App Store and Google Play Store, making up a share of 12.68 percent and 13.8 percent, respectively of all applications available worldwide (Clement, 2023a). The global mobile gaming industry is expected to grow at a compound annual growth rate (CAGR) of 15.5% from 2023 to 2032, reaching over USD 775.69 billion (Research, 2023). Therefore, successfully utilizing In-game Advertising (IGA) for promotions within online gaming should be considered of utmost importance to gain a competitive advantage in the industry.

The incorporation of IGA into existing digital games is a practice that has been used in online advertising for some time (Clement, 2023a; Global Games Market, 2022). Online games can be classified as premium games and freemium games, with the latter referring to a model where the core service is free, but revenue is generated through the sales of additional products and premium services (Cai et al. 2022) and these games are available for users to download for free and play (Hussain et al. 2022). As per a recent analysis and a reveal of the top 300 applications in the Apple App Store, the majority of downloadable apps are games employing the free-to-play model (Brockmann et al. 2015). In the current gaming market, game developers are continuously offering freemium games that are allowed to be installed and engaged at zero cost for gamers, which leads to rising competition among game creators.

In the evolving digital gaming market, pop-up advertisements combined with the freemium game model have become the predominant monetization strategies particularly within mobile platform. However, pop-up advertisements distinctly different from traditional online or console gaming environments. Mobile games, characterized by their easy accessibility and widespread adoption, rely heavily on advertisements as a primary revenue source (Riedel & Mulcahy, 2025; Hussain et al. 2025). Console and online games often depend on upfront purchases or subscription models whereas in game pop-up ads are strategically placed during gameplay transitions to maximize user engagement and monetization effectiveness (Salehudin & Alpert, 2024; Gong et al. 2024). Pop-up advertisements within freemium mobile games aligns the research with contemporary industry practices and user behavior, especially in emerging markets like Sri Lanka (Makki et al. 2025; Ma & He, 2025). The prominence of advertisements in mobile gaming not only shapes player interactions and attitudes but also emphasizes the necessity to understand how ad characteristics such as informativeness, creativity, personalization, and credibility affect advertising value and consequent player intentions to download new games (Fayyaz et al. 2025; Crespo-Martínez, Bueno, & Gallego, 2025).

While playing and interacting with online video gaming sites, users are experiencing pop-up advertisements very frequently, mostly when switching between levels in a game. Pop-up advertisements can be defined as video advertisements that play automatically and that can be tailored based on the players' prior

clickstream (Hsieh et al. 2021) and they are frequently used in mobile gaming due to their immediacy and ability to drive quick responses (Hofacker et al. 2016). Incorporating pop-up advertisements is an effective marketing strategy for developers of video games because pop-up adverts can persuade players to download and play the game being promoted. The higher click-through rate of pop-up advertisements implies that they can easily grab the attention of viewers. Marketers and advertisers are utilizing in-game pop-up advertisements to advertise new games since it is a significant revenue stream for game creators (Mehrtens et al. 2018). Identifying the right patterns and trends along with customization and personalization processes will be beneficial for marketers to acquire the optimized use of pop-up advertisements.

Since application developers need to monetize the fundamental app-development costs incurred and also the utilizing costs for maintenance, advertisements within applications, have become one of the key pillars in generating profit and it has become the most popular monetization method in this context (Mattke et al. 2021). The majority of advertisers are using this strategy because of the direct influence of advertisements on the user to appear right in their eyes (Hanbazazh & Reeve, 2021). When more clicks are generated on in-app advertisements, it will generate more revenue (AppsFlyer, 2019). Constant exposure to the same pop-up ads can grab consumers' attention, especially if there is a major impact from the advertising value, which can have a considerable impact on players' thinking (Abbasi, Shah, et al. 2021).

In addition to pop-up advertisements, a variety of other advertising formats are commonly integrated into digital games. Video ads are often integrated more seamlessly into gameplay, offering immersive content and sometimes incentivized rewards (Hamari & Lehdonvirta, 2010). Banner ads, while less intrusive, typically have lower engagement rates (Calder et al. 2009). The effectiveness of these formats can vary by genre and target audience. For example, casual and hyper-casual games often employ pop-ups for rapid conversion, whereas strategy and role-playing games (RPG) may benefit from the storytelling capacity of video ads. Demographic factors also play a role; younger users tend to engage more with interactive and video-based content (Dehghani et al. 2016), while older users are more likely to respond negatively to interruptions like pop-ups.

Although pop-up advertisements are one of the universally despised online marketing methods by gamers, hundreds of dollars have been invested in pop-up advertisements by marketers worldwide (Abbasi et al. 2022). So, marketers should be highly attentive to the value of these advertisements, which will increase the rate of effectiveness. It was observed that most marketers are not capable enough of effectively utilizing pop-up advertisements to achieve their profitable objectives (Hsieh et al. 2021). Marketers should have a thorough understanding of the suitable marketing strategies that can be used in pop-up advertisements to motivate the viewers to purchase and use the promoted products or services. Just as products, new games can also be made popular among the gaming community successfully through pop-up advertisements, and game developers are spending a huge amount of money to promote newly developed games through IGA. Thus, finding ways to make pop-up advertising more effective while reducing irritation has become the main concern of advertisers.

Past research studies have been conducted on the impact of different attributes of pop-up advertisements and most of those have focused on adverts promoting different products or services by considering product related factors such as brand attitude, ad-congruence, purchase intention (Hanbazazh & Reeve, 2021;

AppsFlyer, 2019; Roettl & Terlutter, 2018). There is a considerable research gap regarding the use of advertisements displayed in existing online games to promote new games among players and specially. Also, only limited amounts of past studies have been conducted considering how various attributes of advertising resulting the relationship with gamers' feelings of influence and the intention to download new games. Focusing on the past literature, majority of the previous studies conducted in similar contexts have mainly focused on the global online gaming market and In-game advertising rather than pop-up advertisements and a niche number of studies are covered in the Sri Lankan gaming market.

According to Statista (2024), Sri Lanka's download games market generated revenues of approximately US\$30.77 million in 2024. According to 6Wresearch (2023), Sri Lanka's online gaming market is projected to grow at a compound annual growth rate (CAGR) of 8.3% from 2025 to 2031. This growth is driven by factors such as increasing internet penetration, the availability of affordable smartphones, and a rising interest in gaming among younger generations. Additionally, the mobile gaming segment is expected to witness significant growth in Sri Lanka, supported by widespread smartphone adoption and low-cost data plans. To the best of the authors' knowledge, a research study which considers the players intention to install an advertised game promoted by pop-up advertisements in freemium gaming environment has not been performed in the past and even in other countries, a very few articles have been conducted investigating the intention to install new games considering different variables. Research studies related to online gaming and its repercussions are very scarce in Sri Lankan context. While the study is situated within the Sri Lankan context, its relevance extends beyond national boundaries for several reasons. First, Sri Lanka represents a broader category of emerging digital markets characterized by rapid smartphone adoption, growing internet accessibility, and an expanding youth population engaged in mobile gaming. Insights from this context can inform similar economies across South and Southeast Asia and other developing regions. Second, the behavioral patterns associated with game installation through in-app advertising are not confined to a single geography, making the findings applicable to global game developers and marketers seeking to optimize user acquisition strategies. By focusing on an under-researched context, this study contributes to the diversification of gaming literature, which remains heavily skewed toward Western or highly developed. Hence, a study that investigates the impact of specific ad characteristics of pop-up advertisements in freemium games on players intention to download new games seems important and beneficial, especially to marketers and in-game advertisers.

In response to this gap, from the current study, the impact of ad characteristics of pop-up adverts in freemium games are investigated, which can have a positive or a negative effect on the download intention of a player through the advertising value. Given the continuous improvement in the video game industry, such research studies are considered highly valuable in comprehending the effectiveness of advertising in video games and improving the value of advertisements. First, the current study provides valuable insights and ideas about the current market trends, and game preferences of the young players and those ideas can be utilized by game developers and marketers to improve the quality of their service and attract and retain more players with games. Secondly, this study helps the marketers to identify the ways to improve the value of a pop-up advertisement, focusing on some basic characteristics of the advertisements and how those could be enhanced and upgraded to create more valued and appealing advertisements. Thirdly, since the online gaming industry has become one of the rapidly growing industries

worldwide, Sri Lanka can utilize strategies to improve the gaming market and increase revenue generation locally and globally

Research questions. To better direct this study, it is crucial to clearly identify the specific questions that the research aims to address. Hence, below research questions have been derived, which have grounded in the gaps identified in the existing literature.

- What is the significance of the informativeness of a pop-up advertisement on the advertising value?
- What is the significance of the creativity of a pop-up advertisement on the advertising value?
- What is the significance of the personalization of a pop-up advertisement on the advertising value?
- What is the significance of the credibility of a pop-up advertisement on the advertising value?
- What is the significance of the advertising value of a pop-up advertisement on players' intention to download new games?

The layout of this paper is organized as follows. The Overview of the Present Literature critically reviews prior studies relevant to the research context and is structured around the key constructs of the study. The Methods section outlines the research design and data collection procedures and is divided into three subsections corresponding to the mixed-methods approach: the real-time gameplay session, the post-play survey, and the semi-structured interviews. The Results section presents the findings derived from statistical analyses conducted using SPSS and Smart PLS. This is followed by the Discussion, which interprets the findings in light of the research objectives and existing literature, and also incorporates the study's theoretical and practical implications. Finally, the paper concludes by outlining the study's limitations and offering directions for future research.

Overview of the literature

Ducoffe's advertising value model. Ducoffe's advertising value model, proposed in 1995, identifies a distinct conceptual model about the value of an advertisement that consumers perceive (Ducoffe, 1995). In this model, an appraisal of the corresponding value or usefulness of advertising to users is defined as the advertising value (Ducoffe, 1995). The model was developed by analyzing the informational and entertaining value of pop-up advertisements as well as the irritable factor based on the user's desire to download the ad-supported game. Past researchers have extended Ducoffe's model by adding attributes such as ad-credibility to the initial conceptual framework (Online Games—Sri Lanka, 2023; Vashisht, 2017). Rather than focusing on modifications to advertising cognition processes, Ducoffe (1995) highlighted the process of assessing the effects of advertising itself, which analyses the degree of influence of advertising attitudes. As per numerous past research, advertising value is the primary determinant of the attitude towards advertising (Lee et al. 2017a; Abbasi, Rehman, et al. 2021; Vashisht & Chauhan, 2017; Hair et al. 2014; Henseler et al. 2009). Ducoffe's advertising value model was deliberated for the development of the framework of the current study. Ducoffe, (1995) and Ducoffe & Curlo (2000) have collectively defined advertising value as a kind of prediction about the comparative value of the advertisement. Improving advertising value will affect the growth of high click through rate for the related products or services. In-game advertisements always gain a considerable amount of visibility of the relevant product or service (Abbasi, Rehman, et al. 2021), and the advertising value of adverts depends on the factors identified. Prior research confirms that mediators play a significant role in

sustaining behavioral outcomes (Wijesinghe et al. 2025). This study presents a novel conceptual model by utilizing Ducoffe's advertising value model to test the associations between the selected constructs and the advertising value, and also to assess how the advertising value can impact on players' download intentions regarding advertised games.

Theory of planned behavior (TPB). In 1980, the Theory of Reasoned Action also referred to as the Theory of Planned Behavior (TPB) was developed to forecast an individual's intention to engage in a specific pattern of behavior at a certain time and place (Ajzen, 2012). The key component of this paradigm is the behavioral intentions which are determined by the attitude toward the likelihood that the activity will result in the expected outcome. TPB defines the intention as the degree to which a person evaluates the behavior of interest favorably or unfavorably and it requires thinking about the consequences of executing the behavior (Shafinah et al. 2013). The behavioral intention is defined as the motivational elements that influence a certain conduct, with the stronger the intention to perform the behavior, the more likely it will be performed (Shafinah et al. 2013). Identifying how the intentions of gamers can be affected by pop-up advertisements can provide valuable insights for advertisers to improve the value of advertisements, by concerning on various characteristics of adverts. By incorporating those findings, advertisers and the marketers can provide a better advertising experience for viewers and influence their intentions to gain more successful outcomes.

Literature review of the model constructs. The capacity to deliver useful information could be an important factor in improving the value of advertisements. The idea of informativeness can be described as the capability of an advertisement to provide viewers with information (Nik-Najib et al. 2016). Every single advertisement, regardless of what they are marketing or promoting, is displayed targeting a specific group of individuals. Ad-informativeness has been identified as a key driver that encourages the target audience to digest related information and helps them grasp features. As people are different from one another, the preferences of every single individual also differ. As a result, there are numerous factors to take into account when developing an advertisement that is appealing to many individuals in a target audience. According to Ducoffe (1995), advertising information refers to how valuable and appropriate communication in an advertisement is perceived by the consumer, as well as how well the advertisement explains the terms of the offers and the benefits connected to it, and the perceived level of customer interest in the advertisement. Hence, it is important to make an advertisement in an informative manner to always attract potential buyers toward the brand, product, or service. The ability of advertisements to provide actionable information may be a major factor that influences users to interact with the game. According to Deraz (2019), an advertisement's informativeness is related to its capability to provide highly significant information given its context as considered by its target viewers. A good advertisement should inform the relevant message to the target group of people in the best possible way and properly notify viewers of all the key points within a very short period. The information presented in the advertisement should be relevant, and up to date on the relevant areas (Brackett, L & Carr, B, 2001; Ducoffe & Curlo, 2000; Hussein & Abd Wahid, 2018). Eisend & Küster, (2011) have asserted that a wealth of information will increase the viewers' decision-making abilities. Educational advertising games have been created to encourage some beneficial social habits and moral values, especially among the young

generation, for the benefit of societal development (Vashisht & Chauhan, 2017). When considering the rapid growth of free-to-play gaming applications, game developers have constantly demonstrated a passion for adding novel ways to their marketing tactics (Hamari et al. 2017). As a result, the information-seeking component acts as a positive measurement in aligning users' perspectives regarding online advertisements. When advertisements are perceived as informative and relevant, they enhance the overall ad value for players. This perceived value, in turn, increases the likelihood that players will process the information effectively and feel encouraged to download the advertised games.

H₁: Informativeness of a pop-up advertisement has a significant impact on the advertising value.

The creativity of an advertisement is known to have a positive impact on factors such as product congruence and purchase intentions (Rosengren et al. 2020). The advertisement should contain the capability of capturing the interest of the viewer while giving out the exact idea regarding the advert to the viewers. Creative advertisements display something exciting and novel, but the key details might not be directly visible to the users and therefore, the way an advertisement is pitched should be varied accordingly, considering the targeted group of audience. Audio and video aesthetics can be identified as the main contributors to creativity and past research studies have been conducted to investigate how consumers who intend to install the promoted video game are influenced by the auditory and visual styles of the advertisements. Aesthetics can provide appealing pop-up advertisements that improve user experience. Audio aesthetics include the sounds of the advertisement, such as music or tones, in contrast to visible aesthetics, which comprise the mix and interaction of advertising colors and themes (Phan et al. 2016). To improve users' exposure and attitude toward advertisements, audio features in advertising media can be used (Bergel et al. 2019). Jylhä & Hamari, (2021) has identified that user experience and visual aesthetics are growing interconnected progressively. When an advertisement is more creative, it becomes more memorable, and the player may pay more attention to the advertisement. Engaging a variety of attention-seeking tools and techniques such as large visible sizes, vivid colors, and sharp animations plays an important role in making a good first impression on players (Shaouf et al. 2016). Moreover, advertisements should be conscientiously designed to be interactive, appealing, and stimulating (Duffett, 2015). In past studies, it can be identified that both visual and audio aesthetics have a noteworthy effect on the creativity of an advertisement which will eventually grab the attention of the viewers. Since creativity is a foremost attribute that plays a key role in the value of the advertisement, when the advert becomes more creative and appealing, the player's intention to download a new game will enhance as the advertising value also improves.

H₂: The creativity of a pop-up advertisement has a significant impact on the advertising value.

Personalization is described as the customization choices and preferences offered to customers to satisfy their needs. Numerous studies have shown that consumers prefer tailored, pertinent commercials and have noted them as attractive and eye-catching, so personalization of pop-up advertisements is crucial (Chang et al. 2018; Jeon et al. 2016). Players' choice of games can differ based on their gender, behaviors, qualities, and viewpoints, and past studies done on the online game stream can also influence the player's behaviors in choosing the game. Marketers may implement a direct and strong relationship with players by actively utilizing tailored personalization strategies by assisting in the development and improvement of connections between marketers and players (Nik-Najib et al. 2016). In online gaming, personalization is commonly used to adapt game mechanics

which are suitable for game players, or in a gaming approach, to customize interaction methods according to particular players (Tondello et al. 2018). Evaluation of the gaming passions of the players delivers major improvements that can be applied to the games that cater to multiple demographic regions. These insightful data can be utilized to develop more customized games for a better user experience (Nacke et al. 2014). Personalized advertising may affect negatively on user-centered factors, primarily in terms of privacy issues (Hamari et al. 2017; Phan et al. 2016; Bergel et al. 2019). Privacy issues are the main adverse concerns related to personalization since most players highly value their personal information and data. Acquiring insights into the player's psychological attributes and sensitivity can be used to develop highly customized tactics for persuasion and boost the influence of targeted advertisements (Moon et al. 2017). To cater to players with a broad range of gaming desires, current digital games have included novel game mechanics and are continuously arranged into numerous stages (Nacke et al. 2014). A good exploration of the gaming desires of the players in a broader context provides a significant value for the advancement of games that serve various players from different demographic areas. (Nacke et al. 2014). The uncovered details may be used to design games with more customized experiences, boosting the perceived values of adverts and as a result elevating the download intentions of players.

H₃: Personalization of a pop-up advertisement has a significant impact on the advertising value.

According to previous studies, credibility can be identified as one of the most essential predictors of consumers' attitudes and behaviors toward advertising (Shaouf et al. 2016; Duffett, 2015). In general, credibility refers to the belief in the honesty and truthfulness of the information that is related to a particular problem or an aspect. Therefore, advertising credibility can be understood as the extent to which the viewers believe in the truthfulness and reliability of an advertising message (Kim & Han, 2014). A large body of research indicates reliability as a crucial component of advertising credibility (Mumuni et al. 2020), which reduces discerned ad-related risk and raises ad-concerned value (Bilisbekov et al. 2021). Further, a study conducted by (Xu, 2006) has identified advertising credibility as one of the key drivers of advertising value, because it has been identified that if the viewers find the details provided in an advertising message believable and acceptable, it creates a way to have a positive image of the advertised brand, where the users feel undoubted about their decisions (Wang & Genç, 2019). But if the viewers prefer the advertisement as unbelievable or fake, they tend to ignore that content, which will eventually impact the success rate of the whole promotional campaign. In addition, credibility has been identified as one of the fundamental factors that positively impact consumers' intention toward in-game advertising, which affects the ad-clicking rate (Wang & Sun, 2010). In the same way, a study conducted to investigate the factors that develop a positive perspective regarding advertising has found that credibility is one of the major roles in generating positive attitudes among the players towards advertising. But, according to the findings of Greer, (2007) the credibility of the advertisement can be depended on both its content as well as the platform and the firm-related factors. Therefore, discovering the effect of credibility on advertising value in the context of IGA, which may impact the players' intention to download advertised games through in-game pop-up advertisements, can provide a notable value to the current body of literature regarding IGA.

H₄: The credibility of a pop-up advertisement has a significant impact on the advertising value.

According to Ducoffe (1995), the value of an advertisement can be identified as an unpredictable evaluation of the worth or

convenience of advertising efforts to the users. In general, advertising value measures the efficacy of the advertisement by evaluating if they are capable of meeting consumer needs and wants (Liu & Jang, 2009). Further, when considering from the marketing perspective, perceived advertising value can be identified as one of the key drivers to enhance the customer satisfaction and maintain their continuous interactions with the brands. When it comes to the value of the advertisements in mobile games, those advertisements usually provide a sense of experience to the players compared to other types of advertisements, and these in-game advertisements are exceptional because of their strong connection to entertainment, which directly increases the acceptance rate of the gamers (Ghirvu, 2012). The application and satisfaction theory additionally discusses the value of advertising as well as how commercials having an acceptable advertising value give significant details, promotions, or satisfy a need (Dix et al. 2012). There are numerous characteristics of an advertisement that can contribute either positively or negatively to the advertising value. Therefore, advertisement developers and marketers need to pay attention to each of these factors thoroughly to improve the advertising value of their promotional efforts to gain better outcomes. According to the findings of Ducoffe (1995), advertisement entertainment, informativeness, and irritation are the key factors affecting advertising value. Later, Brackett, L & Carr, B. (2001) extended Ducoffe's model by incorporating ad credibility into the considered framework by confirming that credibility also influences the values of the advertisements. Further, Xu, (2006) added personalization to this framework by concluding that informativeness, irritation, credibility, and personalization as the key drivers of the value of advertisements. Furthermore, Hussain et al. (2022) confirmed these findings by incorporating a few other ad-related characteristics, such as creativity, while confirming that the perceived advertising value positively influences the players' intention to install a video game that is advertised through an in-game pop-up advertisement. Therefore, the current study focuses on assessing how the above-mentioned characteristics of a pop-up advertisement influence the value of the advertisements as well as how that value can affect the new game download intentions of the players.

H₅: The advertising value of a pop-up advertisement has a significant impact on players' intention to download new games.

Informativeness is the term used to describe the combination of fun and information offered by an advertisement in the context of digital advertising. According to Ducoffe (1995), one of the main factors influencing the value of advertising is informativeness, or the degree to which an advertisement offers relevant and meaningful information. Successful pop-up advertisements provide visitors with actionable content that explains the features, advantages, and special offers of products (Nik-Najib et al. 2016; Deraz, 2019). On the other hand, entertainment describes how pleasant or emotionally captivating the advertising experience is. More positive attitudes are typically produced by ads that are entertaining, engaging, or visually appealing (Vashisht & Chauhan, 2017). According to research, informativeness makes consumers more emotionally and cognitively involved, which enhances the possibility that they would take action, such as downloading a game. The dual function of informativeness thus plays a critical role in shaping both advertising value and behavioral intention. The direct and indirect effects of informativeness on gamers' intentions to download games are investigated in this study.

Customizing ads for specific people according to their demographics, preferences, or habits is known as personalization. Viewers respond more favorably to highly customized advertisements, which boost relevance and decrease ad fatigue (Lee et al.

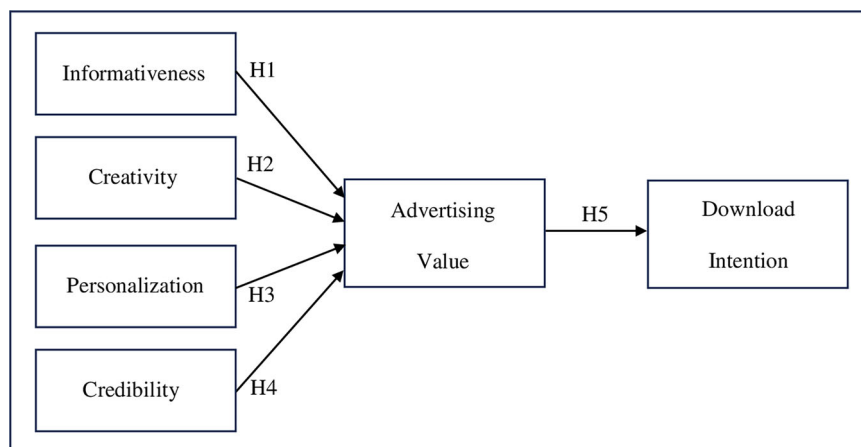


Fig. 1 Conceptual Framework.

2017b; Abbasi, Rehman, et al. 2021). By making the contents appear more relatable and helpful, personalization increases the advertising value. More significantly, new research indicates that personalization might influence behavioral intentions directly, discarding the conventional attitudinal mediators. For instance, even if a player has a neutral opinion toward advertisements generally, they might download a customized game ad that corresponds to their gaming preferences.

TPB states that one of the main factors influencing intention is attitude toward the behavior, in this case, downloading a mobile game (Ajzen, 2012). A positive attitude is frequently influenced by prior experiences, perceptions regarding the quality of the advertisement, and the emotional or mental responses to the advertisement's content. Ad features (such as informativeness and customization) and behavioral intention are connected by attitude. Users who have favorable opinions of in-game or mobile advertisements are more likely to take action, according to earlier research (Shafinah et al. 2013; Tian et al. 2023). This study uses this theoretical framework to assess how players' perceptions of pop-up advertisements influence the connection between download intention and advertising value. Additionally, it investigates if customization and infotainment could have a direct impact on download intention.

As outlined in the previous body of literature people's behavioral intentions can be identified as the primary indicator of their behavior (Kim & Han, 2014; Mumuni et al. 2020). Therefore, it can be further identified that the consumers' behavioral intentions can be considered as the key drivers of their actual behaviors (Kim & McMillan, 2008). As a consequence, it can be deduced that an individual's desire to download a new game has an apparent relationship with their actual download of that game. When considering the past literature, the term download intention has been assessed by many researchers. According to Chinomona, (2013), the user-perceived trust/security of the contents is a significant precondition to users' game-related download intention. Further, Pappas et al. (2019) have determined that the main factors influencing consumers' decision to download a game are the pricing, perceived value, content quality, and playability of mobile games. Moreover, Chin et al. (2018) recognized that user-discerned trust/ security as a significant predictor of users' game-concerned downloading desires. Therefore, it can be identified that in the context of online games, known value, quality of the content, player emotions, and various other relevant characteristics are major predictors of users' intention to download or use mobile applications and online games (Hsiao & Chen, 2016). Therefore, since those kinds of factors are crucial in increasing the new game

download intentions of the players, it is important to study and evaluate their impacts on players' intention to download mobile games and how they might direct to enhance their intention towards installing mobile games, which are advertised through in-game pop-up advertisements.

In this study, the proposed framework (Fig. 1) was developed by including significant characteristics of pop-up advertisements which can be utilized to enhance the advertising value and investigate their influence on users' desire to download new games displayed in the adverts.

Methods

This study employed a mixed-methods design consisting of three interconnected stages: a real-time freemium game-playing experience, a structured post-play survey, and a series of semi-structured interviews. This approach was selected to enhance both the validity and richness of the findings (Creswell, J. and Clark, V. 2017), enabling a comprehensive understanding of how pop-up advertisements in freemium games influence players' download intentions.

Participant selection and sampling procedure. Following previous studies (Liu & Jang, 2009; Hanbazazh & Reeve, 2021; Dix et al. 2012), data collection was conducted at a large university in Sri Lanka. A simple random sampling method was used to select participants from among undergraduate students aged 18 to 25, aligning with Generation Z, the primary demographic focus of this research. As highlighted in prior literature (Ghirvu, 2012; Vashisht & Chauhan, 2017) individuals within this age group are among the most active in the gaming community, with approximately 70% of gamers aged 18 or older. Generation Z, defined as those born between 1995 and 2010 (Dimock, 2019), is widely recognized for its digital fluency and high exposure to online gaming and digital advertising (Anderson et al. 2018; Turner & Turner, 2018) making them a relevant population for this study.

To implement the random sampling process, a set of commonly used locations within the university, such as lecture halls, corridors, cafeterias, study areas, and other public student spaces were first randomly selected. These areas were chosen to ensure broad exposure to the general undergraduate population across different academic and social settings. At each selected location, students who were seated or present at specific spots were then approached and invited to participate in the study. This two-step approach, random selection of physical spaces followed by systematic participant approach, helped ensure fairness in

participant recruitment and minimized sampling bias. All individuals were informed of the research purpose, and their voluntary consent was obtained prior to beginning the gameplay and survey phases.

Freemium game-playing experience. Participants engaged with a pre-selected freemium mobile game, *Temple Run*, for a few minutes. This game was chosen due to its widespread popularity across age groups and its frequent use of in-game pop-up advertisements, particularly during character transitions or post-game phases (Ghirvu, 2012; Vashisht & Chauhan, 2017). This real-time interaction aimed to simulate an authentic gaming environment, allowing participants to form impressions of pop-up advertisements based on actual exposure, thus improving the ecological validity of their subsequent responses.

Structured post-play survey. Immediately following the gameplay session, participants completed a structured questionnaire designed to assess their perceptions, preferences, and behavioral intentions in relation to the pop-up advertisements encountered. The survey included 19 items developed based on prior advertising and gaming research. Key frameworks that informed the item construction include Ducoffe' (1995) model of advertising value, and its subsequent extensions by Brackett, L & Carr, B, (2001) and Xu (2006) focusing on constructs such as informativeness, credibility, personalization, creativity, and perceived value.

Responses were recorded on a 5-point Likert scale ranging from "strongly agree" to "do not agree." In addition to perceptual items, the survey collected demographic information, including age, gender, gaming frequency, and genre preferences. A total of 430 responses were collected during this phase. However, not all responses were suitable for analysis. An in-depth data cleaning procedure was conducted to identify and eliminate incomplete, inconsistent, or irrelevant entries. This process involved screening for missing values, response patterns indicating inattention, and any data that did not meet the predefined quality criteria. Following this rigorous cleaning process, 386 valid responses were retained for analysis. Data were analyzed using SPSS and Smart PLS, which enabled evaluation of model fit, factor loadings, and the strength of relationships between key constructs. Detailed results are presented in the subsequent section.

Semi-structured interviews. Following quantitative analysis, a total of 12 semi-structured interviews were conducted to qualitatively validate and contextualize the findings. Interviewees were recruited through snowball sampling, with participants matched demographically to the survey sample. Consent was obtained prior to each interview. These interviews aimed to probe deeper into participants' attitudes toward pop-up advertisements, uncover motivational drivers behind download intentions, and identify perceptions that may not have been captured in the survey. This qualitative phase followed guidelines for methodological triangulation (Turner, D. 2010), thereby increasing the interpretive strength and credibility of the research findings. Interviews were analyzed thematically to identify patterns consistent with or divergent from the quantitative data, offering a nuanced understanding of how ad characteristics influence gamer behavior. By combining real-time exposure, quantitative analysis, and qualitative exploration, this study presents a holistic view of pop-up ad effectiveness in mobile gaming environments.

Results

A total of 430 responses were collected during this phase. However, not all responses were suitable for analysis. An in-depth data

Table 1 Demographic data analysis.

Measure	Item	Count	Column N %
Age	18-21	78	20.20%
	22-25	308	79.80%
Gender	Female	174	45.08%
	Male	212	54.92%
Do you play games?	Yes	386	100.00%
Game playing frequency	Everyday	72	18.70%
	Few times a month	122	31.60%
	Few times a week	141	36.50%
	Once a week	51	13.20%
Pop-up ad preference	No	350	90.67%
	Yes	36	9.33%
Pop-up ad displaying frequency	Never	14	3.60%
	Often	175	45.30%
	Rarely	26	6.70%
	Sometimes	171	44.30%

Survey data, 2023.

cleaning procedure was conducted to identify and eliminate incomplete, inconsistent, or irrelevant entries. This process involved screening for missing values, response patterns indicating inattention, and any data that did not meet the predefined quality criteria. Following this rigorous cleaning process, 386 valid responses were retained for analysis. These responses formed the final dataset used for the subsequent statistical procedures. The demographic data Table 1 indicates that the majority of respondents, 79.8% are between the ages of 22 and 25. To determine the precise percentage of respondents who play online games typically as a leisure time activity, it was only considered responses with 'Yes' to the question, 'Do you play online games?' in the survey. Rest was excluded from the analysis to increase the accuracy of the results. According to the demographic analysis, the largest proportion of the respondents are playing games a few times a week.

After analyzing the demographic data, Smart PLS was used to analyze the collected quantitative data. The model's convergent validity was assessed considering the outer loadings and the Average Variance Extracted (AVE) values. The outer loadings for each construct were above 0.65, which can be accepted compared to the threshold value (Kim & McMillan, 2008; Teng et al. 2014). The AVE for each construct, which measures the related variance of constructs and measurement errors, must be at least 0.5 (Ningning & Wenguang, 2023), explaining at least 50% of the measured variance (Kim & Han, 2014). According to Table 2, all the AVE values are above 0.5 and therefore acceptable. All the Cronbach Alpha (CA) values and the Composite Reliability (CR) values which demonstrate the internal consistency of measures are above 0.7 (Henseler et al. 2009), except for the CA values of personalization and credibility, which are also above 0.65 and can be deemed acceptable. Altogether the CA, CR, and AVE values along with the outer loadings prove the reliability and the validity of the constructs and measurement indicators.

Confirmatory factor analysis. The Table 2 presents the standardized factor loadings of observed variables on their respective latent constructs, serving as key evidence in evaluating the measurement model through Confirmatory Factor Analysis (CFA) within a PLS-SEM framework. In CFA, standardized loadings above 0.70 are typically considered strong indicators of construct validity, while values above 0.50 are acceptable, especially in the context of theory development or exploratory research (Hair et al.

2017; Modeling et al. 2015). The CFA results suggest that the measurement model is performing well overall. Constructs such as CRT exhibit particularly strong indicator reliability, with CRT1 loading at 0.906 and CRT2 close to the recommended benchmark. Similarly, CRD shows consistent and acceptable factor loadings (CRD1 = 0.792, CRD2 = 0.725), supporting convergent validity. The PER construct is also supported by well-loading indicators, particularly PER3 (0.766). Constructs such as ADV and INF demonstrate satisfactory indicator contributions, with ADV1 (0.651) and INF3 (0.686) falling within acceptable ranges. Notably, INF1 reflects a high loading (0.838) and further reinforces the robustness of the INF factor. While a few indicators are slightly below the ideal threshold, they still provide valuable measurement coverage and contribute meaningfully to construct representation, a common and acceptable feature in CFA conducted within PLS-SEM (Hair et al. 2014).

Measurement model assessment. The assessment of the measurement model evaluates the validity and reliability of the variables and their indicators. Reliability was assessed using Cronbach's alpha and composite reliability, while convergent

validity was examined through outer loadings and average variance extracted (AVE). The discriminant validity was determined using Fornell–Larcker criterion to verify that the constructs are not related to one another.

Table 3 results indicate that all constructs have very strong reliability as both Cronbach's alpha values and composite reliability values were above the recommended threshold 0.70 (Hair et al., 2018; Henseler et al., 2015). The outer loadings of the individual items of measurement construct validity as each items demonstrates significant loadings above the recommended threshold 0.5. Moreover, the AVE values also meet the recommended threshold 0.50 which confirms that a substantial portion of the variance in the indicators are explained by their respective constructs.

Discriminant validity was tested and interpreted in Table 4 using the Fornell–Larcker criterion, which suggest that a hypothetical variable shares more variance with its assigned indicators than with any other hypothetical variable. In statistical terms, the AVE of each latent variable should be greater than the latent variable's highest squared correlation values with any other latent variable (Henseler et al. 2009), proving the discriminant validity of the dataset of this study.

Table 2 Confirmatory Factor Analysis.						
	ADV	CRD	CRT	DIT	INF	PER
ADV1	0.651					
ADV3	0.548					
CRD1		0.792				
CRD2		0.725				
CRT1			0.906			
CRT2			0.674			
DIT1				0.494		
DIT2				0.555		
INF2					0.522	
INF3					0.686	
INF4					0.517	
PER1						0.573
PER2						0.645
PER3						0.766
INF1					0.838	

Structural model assessment. To assess the results obtained in the structural model, path coefficients, t-statistics, and *p*-values

Table 4 Discriminant validity.						
	ADV	CRT	CRD	DIT	INT	PER
Advertising Value (ADV)	0.791					
Creativity (CRT)	0.601	0.897				
Credibility (CRD)	0.732	0.433	0.787			
Download Intention (DIT)	0.729	0.430	0.755	0.732		
Informativeness (INF)	0.757	0.582	0.669	0.653	0.748	
Personalization (PER)	0.555	0.456	0.484	0.473	0.493	0.789
Authors' demonstrations.						

Table 3 Measurement model assessment.					
Construct	Items	Outer Loading	Composite Reliability	Cronbach's Alpha	AVE
Informativeness	INF1	0.852	0.834	0.735	0.560
	INF2	0.668			
	INF3	0.789			
	INF4	0.667			
Creativity	CRT1	0.880	0.892	0.758	0.804
	CRT2	0.913			
Personalization	PER1	0.732	0.832	0.698	0.623
	PER2	0.786			
	PER3	0.846			
Credibility	CRD1	0.870	0.828	0.688	0.619
	CRD2	0.811			
	CRD3	0.665			
Advertising Value	ADV1	0.820	0.833	0.701	0.625
	ADV2	0.758			
	ADV3	0.793			
Download Intention	DIT1	0.747	0.821	0.716	0.536
	DIT2	0.807			
	DIT3	0.666			
	DIT4	0.701			
Survey data, 2023.					

Table 5 Structural model assessment.

	Path	Path Coefficient(O)	Sample mean (M)	Standard deviation (STDEV)	T-statistics (O/STDEV)	P-values
H1	INF→ ADV	0.347	0.347	0.051	6.853	0.000
H2	CRT → ADV	0.187	0.186	0.041	4.544	0.000
H3	CRD → ADV	0.358	0.358	0.045	7.904	0.000
H4	PER → ADV	0.125	0.127	0.035	3.545	0.000
H5	ADV → DIT	0.729	0.731	0.026	28.014	0.000

Authors' demonstrations.

Table 6 Model Fit Indices.

	Saturated model	Estimated model
SRMR	0.084	0.090
d_ULS	1.329	1.553
d_G	0.499	0.551
Chi-square	1088.016	1160.262
NFI	0.672	0.650

were used, which were derived by performing a bootstrapping with 5000 samples under a path analysis (Rezaei et al. 2018). By observing the *p*-values in Table 5, it can be concluded that all relationships between the constructs are significant, and considering the path coefficients of the original sample, significant positive relationships exist between dependent and independent variables. In Table 4, INF, CRT, CRD, PER, ADV, and DIT indicate informativeness, creativity, credibility, personalization, advertising value, and the download intention, respectively.

Since this study collected data from a single source, Common method bias (CMB) was tested to using Harman's single-factor test (Hussain et al. 2022). The output explained that the maximum value of variance determined by any single construct was 37.5%, which is remaining below the acceptable threshold of 0.50, therefore, it can be concluded that the CMB is not an issue for the current study.

The model fit indices presented above Table 6 provide further evidence for evaluating the overall model fit in the context of Confirmatory Factor Analysis (CFA) using the PLS-SEM approach. Although traditional CFA conducted via covariance-based SEM offers a broader range of fit indices, PLS-SEM increasingly supports global model fit measures to assess the quality of both the measurement and structural models (Modeling et al. 2015; Hair et al. 2017). The Standardized Root Mean Square Residual (SRMR) is one of the most widely accepted fit indices in PLS-SEM. In the saturated model, the SRMR is 0.084, and in the estimated model, it is 0.090. These values are marginally above the commonly accepted threshold of 0.08 (Hu & Bentler, 1999), yet still within an acceptable range in exploratory research, suggesting a reasonable approximation of model fit. The *d*_ULS and *d*_G values, which assess the discrepancy between empirical and model-implied correlation matrices, are not evaluated against strict cutoffs but should generally be as low as possible, and the relatively small values (*d*_ULS = 1.553, *d*_G = 0.551 in the estimated model) support the plausibility of the model (Schuberth et al. 2018). The Chi-square statistics (1160.262 in the estimated model) are included for completeness but are less informative in large samples, as they tend to be sensitive to sample size and often yield significant results even when fit is acceptable (Hair et al. 2017). The Normed Fit Index (NFI) values of 0.672 and 0.650 are slightly below the traditional cutoff of 0.90 (Bentler and Bonnet, 1987), but such thresholds are less rigid in PLS-based CFA, particularly in early-stage model development or with complex models. Overall, the

reported fit indices suggest that the model demonstrates an acceptable level of fit for a PLS-SEM-based CFA, especially in an exploratory or theory building context.

Results from the interviews. As mentioned in the methods section of this paper, interviews with 12 gamers were conducted to collect qualitative data to validate the results attained through the analysis of the collected quantitative data. This approach was utilized since past literature presents both similar and different outcomes when compared to the current study. Responses obtained from gamers were helpful in identifying the causes for the acquired results for the considered constructs. Respondents' details are provided in Table 7 below;

Out of the 12 interviewees, 5 individuals mentioned that the pop-up advertisements can provide valuable insights through the content of ads, generalizing that ~40% of gamers consider advertisements as informative. Several other individuals mentioned that the information provided in the ads can be misleading and inaccurate some of the times. On the contrary, one of the respondents mentioned,

"I have downloaded many games as I have felt the advert has provided me useful information about new games." (R2)

Similar responses were provided by 4 other gamers. Therefore, we can say that the value obtained through the analysis regarding the relationship of Informativeness and Advertising value could be justified with the above response. Informativeness is a moderately impactable factor, so it has gained a value of 0.347.

Considering the value obtained to demonstrate the relationship between the dependent variable and the credibility, it can be concluded that the credibility and the advertising value have a significant positive relationship. Below expressed is a response provided by an interviewee, validating the path coefficient obtained, explaining the association between the credibility and the dependent variable.

"Most of the time, I think that I can believe the information provided by the ads. Even though I believe that the information provided by the ad is credible, I have ignored downloading that advertised game when I do not have an interest towards the advertised game and I do not download it." (R12)

Some of the players interviewed do not trust pop-up adverts completely because they have been misled after installing new games shown in advertisements. The installed games are not up to the expectations of players, acquired from ads. One interviewee responded,

"I don't trust much the information provided by the ad about the new games. I mainly consider stuff like the developer of the game; if I can trust the developers, I easily trust the new game. The security of the games and privacy issues have influenced me not to download the games." (R6)

Another important point highlighted by a respondent was, "Now there are enough sources such as YouTube and gaming channels where quality games are recommended by game reviewers. So, players trust those sources more than ads." (R3)

Table 7 Respondent profile for structured interviews.

Respondent ID	Age (years)	Game playing history (online gaming)	Frequency of game play (online gaming)	Preferred genre
R1	22	7 years	Weekly	Shooting
R2	25	9 years	Daily	Racing
R3	25	12 years	Few times a week	Shooting
R4	22	7 years	Weekly	Action
R5	23	6 years	Few times a week	Action
R6	23	11 years	Daily	Racing
R7	22	7 years	Few times a week	Cooking
R8	25	9 years	Weekly	Action
R9	23	8 years	Weekly	Dressup
R10	21	10 years	Daily	Racing
R11	21	9 years	Daily	Shooting
R12	24	9 years	Few times a week	Sports

Authors' demonstrations.

This can be considered an important statement by advertisers and marketers to upgrade their strategies and actions.

According to the analysis, creativity was also identified as a significant factor in determining the advertising value.

One respondent mentioned,

"I think advertisements have the capability of grabbing the players' attention. This is because, mostly ads are displayed between two levels of a game or else when the player fails a level. In both these options, a pop-up ad will be displayed before the continuation of the game. So, the advertisement can grab the attention of players, because players are in a hurry to skip the ad." (R3)

Despite the above response, creativity has a weak positive effect on the value of an advertisement, accounting for a 0.187 of coefficient value.

Personalized ads have been a common trend in pop-up ads for a long time, and with today's digital advancements and with the use of artificial intelligence, personalizing is becoming a normalized process. However, it can be argued whether personalized gaming ads are enjoyed by players.

"I don't think that personalization has a very big impact on my preferences because I have already played similar kinds of games before. Most of the time I think that the personalized adverts do not match what I like. So, it doesn't have much impact on me." (R6)

According to the above response, which was similar to a set of other responses, it can be observed that players do not get much influenced by personalized ads, which might be a reason for the low path coefficient value resulting from the analysis. Another reason for the weak relationship can be determined by another common response provided by more than 6 participants.

"Usually, I am not that satisfied with the recommendations provided by the ads because they are not aligned with my interests. Getting recommendations from friends is preferable for me because my friends know my preferences well and they recommend the games that suites me." (R7)

In contrast, one of the participants provided an opposed response from others.

"Sometimes when friends suggest games, that might not match my tastes and preferences. But I have downloaded a lot of games through ads which I have enjoyed. Therefore, I would rather consider ad suggestions than recommendations of friends." (R2)

The relationship between the advertising value and the download intention, which is the independent variable has a significant positive coefficient value, with a significant t-statistics value of 28.014 indicating a strong positive relationship. Validating this result, many participants provided positive

responses mentioning that they have been influenced by pop-up advertisements to install new games.

"Yes, I have been influenced to download games through pop-up advertisements and I have downloaded a lot of games in that way. I used to play a pool game earlier and during that game, while I was watching ads to obtain rewards, I came across a racing game called, and that is a game that I still enjoy playing", outlines that players can be directed towards games of different genres." (R2)

This highlights the importance of focusing on advertising value, which can strongly impact players and suggests that the increased value of advertisements can remarkably impact players' intentions to download new games displayed in adverts. Since all the relationships are statistically significant, all developed hypothesis indicates significant associations between selected constructs.

Discussion

The main goal of this study is to understand the impact of several identified ad-related characteristics, which are informativeness, creativity, personalization, credibility, and advertising value of pop-up advertisements in freemium games, on players' intention to download new games. From the four selected attributes of advertisements, informativeness and credibility characteristics have a relatively high impact on the advertising value, with marginally strong positive relationships. Creativity and personalization attributes have comparably lower path coefficients, stipulating marginally weak positive relationships. According to the best of the authors' knowledge, a study with a game-playing experiential model followed by a structured survey, where the findings are confirmed through interviews, has not been performed in Sri Lanka. With the available resources, successfully conducting a game-playing experience and confirming the findings through interviews was a strenuous procedure.

Very few past studies have investigated the relationships between the above-mentioned ad-related characteristics on download intention, and Hussain et al. (2022) revealed that the informativeness of a pop-up advertisement does not significantly influence the advertising value of pop-up advertisements. Abbasi, Rehman, et al. (2021) determined that informativeness has a significant, but a negative relationship towards advertising value. In contrast, Abbasi et al. (2022) have concluded that informativeness of an advert has a significant and positive influence on the advertising value, which was further validated by the current study. This finding was validated by the responses of several gamers mentioning that they have been influenced to download

advertised games if they feel the information provided through the adverts are useful.

Furthermore, when considering the impact of the creativity factor of pop-up advertisements on the value of the adverts, the current study reveals that there is a moderate positive and a significant impact on the advertising value from creativity. According to Modig & Rosengren (2014), it has been identified that there is a significant positive impact between advertising value and creativity, proving that when an advertisement appears creatively, it will eventually enhance the value of the advertisements. On the other hand, the study Hussain et al. (2022) has not considered the creativity factor of the adverts directly, instead they have considered the impact of video and audio aesthetics on advertising value separately and concluded that audio aesthetics has a positive significant impact while video aesthetics do not significantly influence the advertising value. Without considering the creativity factor, a similar attribute can be taken into consideration as entertainment, which was included in the advertising value model by Ducoffe. Abbasi, Rehman, et al. (2021) have focused on the entertainment attribute, with indicators measuring similar occurrences and have concluded that a significant positive relationship exists with the advertising value.

In addition, Hussain et al. (2022) has further revealed that the credibility and the personalization factors of pop-up advertisements have a moderately strong, significant and positive influence on the value of an advertisement, which further confirms the findings of the current study. Also, Abbasi, Rehman, et al. (2021) have presented similar outcomes with credibility and personalization attributes having significant positive relationships with the advertising value, adding further confirmation for the findings of the current study.

Notably, according to the analyzed results, advertising value has the highest positive impact on players' download intention. In the same way Hussain et al. (2022) also confirmed that the highest significant impact on the download intention is from the advertising value of the advertised new games. Further, these findings provide perspectives on how these factors interact in the environment of pop-up advertisements. Moreover, the findings of this study have paved the way to many possible and innovative ways that game creators or developers can utilize to develop their advertising and marketing strategies to achieve their promotional objectives. Providing attention to the advertising value will help to enhance the intentions of players to download a new game while playing online games by studying about supremacy of the ad-related factors that have been identified through the study. Game marketers can utilize the insight gained from the study to develop effective and useful marketing and advertising campaigns for the promotions of freemium games among generation Z population. Marketers can leverage the knowledge grasped by this study, which has exemplified the remarkable impact on the download intention and behaviors of the players to develop their marketing strategies according to the most suitable methods and enhance their attempts to achieve higher targets.

The findings of current study highlight the role of advertising in digital gaming markets by confirming that in-game pop-up advertisements are not simply supplementary but integral to mobile game monetization. Aligning with prior work (Hussain et al. 2025; Fayyaz et al. 2025), this study's results highlight how advertising design elements strongly affect advertising value and downloads intentions. Moreover, this study emphasizes on mobile gaming rather than console or traditional environments acknowledges the structural and behavioral differences underscored in recent literature. Recognizing mobile gaming's distinctive monetization dynamics strengthens the relevance and applicability of our findings, providing actionable insights for marketers and game developers operating in mobile-centric

gaming ecosystems. Specifically, while console gamers often view interruptions as intrusive, mobile gamers, particularly in generation Z, perceive advertising as an acceptable trade-off for free access and in-game rewards (Ma & He, 2025). Moreover, studies have shown that generation Z gamers respond more positively to personalized, immersive, and reward-driven advertising formats, which aligns with our findings on the importance of informativeness and creativity in enhancing ad acceptance (Crespo-Martínez et al. 2025; Welden et al. 2025). By contextualizing the results within these industry-specific dynamics, current study demonstrates that mobile gaming advertisements not only drive monetization but also shape player attitudes, engagement, and future intentions.

Moreover, while the current study primarily examined the short-term download intentions triggered by advertising value, it is important to consider the potential long-term behavioral impacts of these advertisements. Advertising value does not only influence immediate actions, such as downloads, but can also contribute to sustained brand engagement, in-game loyalty, and future purchasing behavior. According to Dix et al. (2012), perceived advertising value can enhance brand attitudes and long-term consumer-brand relationships. Similarly, Kim & Han (2014) found that perceived ad value plays a mediating role in forming user loyalty in mobile applications, indicating its influence beyond immediate reactions. When players perceive pop-up advertisements as informative, credible, creative, and personalized, this can foster ongoing positive associations with both the advertised game and the platform on which it appears. Wang & Sun, (2010) also argue that perceived value and credibility of online ads significantly affect users' long-term engagement and attitude toward mobile advertising. These findings suggest that advertising value serves not only as a short-term driver of behavior but also as a key determinant of continued engagement, game loyalty, and retention over time. Additionally, Tsang et al. (2004) emphasize that users are more likely to accept and respond positively to mobile ads over time when they perceive them to be valuable and personalized. Therefore, future research could explore how these perceptions evolve and influence players' ongoing behaviors, including retention, advocacy, and in-app purchases. This insight opens new avenues for developing sustainable and player-centered advertising strategies within freemium gaming environments that go beyond short-term outcomes.

Theoretical implications. The current study covers the vast area of significant theoretical implications in the existing literature related to online freemium games and the players' intentions to download advertised new games. Significantly, the study demonstrates the prevalent nature of pop-up advertisements as a key type of advertising in freemium game platforms, which emphasizes their significant influence or motivation on players' desire to install new games. The study utilizes Ducoffe's value advertising model (Ducoffe, 1995), which has been extended by Brackett, L & Carr, B, (2001) by adding credibility and, Xu, (2006) by incorporating personalization to the model, by exploring the key consumer-perceived drivers of pop-up advertisements in freemium games (Nacke et al. 2014; Bertagnolli, 2011). The current study validates those findings by further incorporating advertising creativity and confirming their significant impact on advertising value. In addition, the study investigates the crucial factors of pop-up advertisement value and its impact on players' intention to install the advertised new games. As previous studies have not been much focused on this study area, this study provides a greater contribution to the freemium game-related marketing literature.

Furthermore, this study advances the theoretical understanding of how the advertising value model functions as a predictive and explanatory framework for player behavior in response to in-game advertisements. According to Ducoffe, (1995) model, the perceived value of an advertisement is a composite outcome of key dimensions such as informativeness, entertainment, and irritation, later extended to include credibility (Brackett, L & Carr, B, 2001) and personalization (Xu, 2006). In this study, creativity is also introduced as an influential factor. These dimensions collectively shape players' cognitive and affective evaluations of advertisements, which in turn guide behavioral intentions such as game downloads. The mechanism operates through a value-perception-response sequence, where the user perceives high informational or emotional value in an ad, forming positive attitudes and leading to action. This is especially relevant in digital contexts where attention spans are short and perceived value must be immediate and clear. The validated model thus offers a robust theoretical lens through which marketers and researchers can predict not only short-term behaviors like downloads but also longer-term engagements. Additionally, while this study applies the model within freemium mobile gaming, the advertising value framework has high potential for cross-domain applicability. For instance, it can be extended to other digital platforms such as streaming services, social media environments, and e-commerce apps, where ad relevance, personalization, and perceived credibility critically shape user behavior. This reinforces the model's theoretical versatility and opens pathways for future research in other interactive media environments where user engagement is driven by similar perceptual mechanisms.

Furthermore, the findings of the current study can also be interpreted through the lens of the Theory of Planned Behavior (TPB) proposed by (Ajzen, 2012), which explains that an individual's behavioral intention is influenced by their attitude, subjective norms, and perceived behavioral control. In the context of this study, the attitude toward the pop-up advertisements formed through exposure to ad-related characteristics such as informativeness, creativity, personalization, and credibility contributes to shaping the advertising value, which in turn influences the intention to download the game. This conceptual alignment suggests that the advertising value construct serves as a mechanism through which TPB's component of attitude is expressed in digital advertising scenarios. While subjective norms and perceived behavioral control were not the focus of this study, the strong effect of perceived value on intention aligns with TPB's foundational structure, supporting its applicability in digital and gamified marketing environments. This cross-theoretical perspective provides a more comprehensive understanding of players' decision-making and reinforces the potential for combining consumer psychology frameworks with advertising theories to predict behavioral outcomes.

The current study covers the vast area of significant theoretical implications in the existing literature related to online freemium games and the players' intentions to download advertised new games. Significantly the study demonstrates the prevalent nature of pop-up advertisements as a key type of advertising in freemium game platforms, which emphasizes their significant influence or motivation on players' desire to install new games. The study utilizes Ducoffe's value advertising model (Ducoffe, 1995), which has been extended by Brackett, L & Carr, B, (2001), by adding credibility and, Xu, (2006) by incorporating personalization to the model, by exploring the key consumer-perceived drivers of pop-up advertisements in freemium games (Nacke et al. 2014; Bertagnolli, 2011). The current study validates those findings by further incorporating advertising creativity and confirming their significant impact on advertising value. In addition, the study investigates the crucial factors of pop-up advertisement value and

its impact on players' intention to install the advertised new games. As previous studies have not been much focused on this study area, this study provides a greater contribution to the freemium game-related marketing literature.

Practical implications. The outcome of the study has practical ramifications for both game developers and marketers to identify the most effective user experience methods. Stakeholders who are associated with the freemium game industry could generate higher engagement and success rates by harmonizing the advertising tactics aligned with the player preferences. The results of the investigation demonstrate that the pop-up advertisements that have a higher advertising value have a considerable propensity to influence the players to download new games. Further, the current study provides useful insights that can be used to motivate and inspire future studies on the realm of freemium games and pop-up advertisements area, providing more sophisticated knowledge on various ad features on players' behaviors and actions.

The results of the study could potentially be used by game creators to enhance the user experience and optimize their freemium game-promoting strategies. Game developers will have the full potential to identify how to develop the entire user experience by analyzing the influence of the informativeness, creativity, personalization, and credibility factors, and the advertising value of the pop-up advertisements. This leads to the possibility of players downloading the new games recommended through pop-up adverts. Game Marketers can utilize these study findings to improve their advertising strategies in freemium game promotion. They can generate more effective marketing tactics and effective initiatives by considering gamers' preferences in wider aspects.

By focusing on the insights of the current study, marketers can create more interactive adverts with authentic intervals or transitions during the player's game playing, and through that, they can enhance the recognition and engagement of players towards these advertisements. More importantly, the game developers should use the contents of the advertisements to lure and retain the players by providing details regarding comparable games based on the player's previous play history, unique attributes, awards, and incentives obtaining the sense that the promoted new games have exceptional traits. Adopting these various approaches offers an uninterrupted and integrated experience for players. On top of that, adequate oversight of these factors is necessary to present targeted and valuable pop-up advertisements, thus contributing to the profitable marketing of the new game. Finally, being aware of the identified aspects will be beneficial to provide better contributions to the players' experience and can help the game developers modify their approaches to foster stronger player engagement.

Limitations and directions for future studies. The current study has few hindrances and restrictions. First, the present investigation's existing literature on the influence of pop-up advertisements on download frequencies has not been thoroughly studied and explored more comprehensively. As an outcome, accumulating the precise information and data for this study was exceptionally complicated due to the scarcity of the related content. The databases such as "Statista", were the only source discovered that contained the gamer's details around the globe (Hollebeek, 2018). However, when examining the gaming scope in Sri Lanka, there was a lack of details and a database that had tailored specific details related to the gaming industry of Sri Lanka. As a consequence of the previously stated limitations, the

study's outcome has been generated strictly based on the data related to the identified sample.

Second, the study sample was selected from undergraduate gamers in Sri Lanka, who belong to Generation Z, which yields a limited generalizability of the study findings. Further, according to a survey done in 2022, second most gamers are below 18 years old, which represents 24% of the total gaming population (Clement, 2023a). However, due to ethical considerations, the participants who were below 18 years of age were not considered in the study. Therefore, future studies can be conducted considering various age categories and different geographical regions to overcome this limitation.

Moreover, further researchers may consider the effect of different alternative variables related to pop-up advertisements, such as incentives, frequency, and time intervals, in addition to the independent variables on players' intention to install advertised new games. In the same way, in addition to considering the players' intention to install new games, it would be interesting to explore the actual purchases of new games in a freemium gaming nature (Cheung et al. 2015). Further, future investigations on this study area should be tackled with the identified issues in the limitations through wider sample size, more coverage for geographical locations, and enhanced availability of comprehensive and diversified databases, and that will facilitate more detailed and innovative investigations on this study area. Further, future studies can be improved by offering incentives for participants by expecting them to engage more actively and enthusiastically in the data collection process (Liao & Shi, 2009).

Data availability

The data supporting this study's findings are provided in the supplementary file

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Author contributions

All authors contributed to conceptualization, Supuni Vidanagama, Nuthara Ulapane, and Danushi Thilakarathne wrote the main manuscript. Chirayu Wijekoon conducted the analysis and prepared figures and tables, supervision and project management by Krishantha Wisenthige and Chathuni Aluthwala; all authors reviewed the manuscript.

Competing interests

The authors declare no competing interests.

Ethical approval

The study was conducted with the ethical approval of the Sri Lanka Institute of Information Technology (SLIIT) Business School Ethics Review Committee, under approval number SLIIT/ERC/SBS/2024/08) on 12th February 2024. All research procedures adhered to the ethical guidelines and standards set forth by the committee to ensure the protection and rights of the participants.

Informed consent

All participants in this study provided informed consent prior to their inclusion. The purpose, procedures, potential risks, and benefits of the research were clearly explained to each participant, and they voluntarily agreed to participate. Participants were assured of their right to withdraw from the study at any time without any negative consequences. All concerns were clarified prior to obtaining consent for participation. Explicit written consent was obtained from each respondent by ticking the consent statement in questionnaire during the data collection process from 20th February 2024 to 30th March 2024. Participation was entirely voluntary, and only those who explicitly consented were provided with access to the questionnaire. This consent process was witnessed by the authors. Confidentiality and anonymity of the participants have been strictly maintained throughout the research process.

Additional information

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1057/s41599-026-07297-7>.

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