

Deceptive Design and Advertising in Mobile Games for Young Children

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Abstract

Mobile gaming apps are embedded in the daily lives of millions of young children, yet the interfaces they encounter are rarely designed with children’s best interests in mind. We analyzed 20 popular, free-to-download children’s games in German-speaking markets through persona-based cognitive walkthroughs, examining the prevalence of deceptive design patterns and advertising strategies. Every app contained multiple deceptive patterns (median: 5.5 per app); advertising appeared in 90% of apps and was predominantly non-skippable. Crucially, advertising and deceptive design frequently co-occurred within the same interaction sequences, with ads often presented through deceptive triggers, progression gates, or reward structures. Our findings reveal gaps in current platform review mechanisms and EU regulatory frameworks, with implications for usable privacy and child protection.

1 Introduction and Background

When a four-year-old taps a gift icon in a mobile game and is instead shown an advertisement, she encounters a paradigmatic instance of deceptive design: interface elements crafted to steer users toward choices they would not have otherwise made [1]. Despite the EU’s General Data Protection Regulation (GDPR) [2] and Digital Services Act (DSA) [3], deceptive designs remain pervasive across digital environments [6, 7]. In mobile games, they prolong playtime and enable monetization through slowed progression, time-based rewards, and manipulative advertising [8, 10]. This can be especially consequential for young children, whose develop-

ing executive function, impulse control, and limited capacity to recognize commercial intent leave them unable to resist persuasive cues or distinguish play from commerce [10, 11]. The UN Committee on the Rights of the Child (UNCRC) has extended children’s rights to play (Art. 31) and protection from exploitation (Art. 32) to digital environments [12]. Van der Hof et al. [13] argue that monetization-driven design can infringe on these rights when it deploys affective pressure or manipulative monetization mechanics. Prior empirical work has documented manipulative features in U.S.-market apps [10] and Australian apps [9] using Gray et al.’s ontology [4], but the European context remains less documented despite GDPR, DSA, and age-classification reforms. We extend this work by examining popular free-to-download children’s games in German-speaking markets that were accessible through Google Play’s children- or family-oriented app environment and displayed platform-level indicators of child appropriateness. We ask how deceptive design and advertising appear, and how they co-occur in interaction sequences.

RQ1. What deceptive designs appear in popular, free-to-download children’s mobile games? **RQ2.** What advertising strategies appear in these games? **RQ3.** How do deceptive designs and advertisings co-occur within app interaction flows?

2 Method

We followed a three-step procedure: (1) systematic app selection, (2) persona-based cognitive walkthroughs, and (3) structured classification.

App selection. We screened apps in the Google Play Store’s children- and family-oriented app environment in November 2024, selecting titles that were free to download, had ≥ 50 million downloads, and displayed platform-level indicators of child appropriateness, including the *Teacher Approved* badge where available. This sampling was intended as a conservative test case: if manipulative patterns appear even in highly visible, platform-certified apps, this raises concerns about the

adequacy of current review mechanisms. The threshold of 50 million downloads was set to focus on widely used titles while keeping the analysis feasible, yielding $N = 20$ apps.

Cognitive walkthroughs. Two researchers independently explored each app for 60 minutes, simulating preschool-like interaction: tapping visually salient elements first, accepting prompts without extended deliberation, and treating advertisements as part of the game environment [10, 14]. In a five-app pilot, both researchers coded independently and resolved disagreements jointly to establish a shared codebook based on Gray et al.’s ontology and Radesky et al.’s advertising typology, supplemented by an inductive skippability distinction.

Classification. Both researchers independently classified all recorded designs using the Meso-Level of Gray et al.’s [4] three-level deceptive design ontology and Radesky et al.’s [10] advertising typology. Disagreements were resolved through joint review of the corresponding screen recordings and screenshots; rare unresolved cases were discussed with the full research team. Each deceptive design pattern was coded as present or absent per app. Advertising was counted as ad exposures across both 60-minute sessions, resulting in 120 minutes of observation per app.

3 Results

Deceptive design patterns. Every app in the sample ($N = 20$) contained at least one deceptive pattern, with a median of 5.5 distinct patterns per app (total: 116 instances). *Interface Interference* was universal, most commonly through *Manipulating Choice Architecture* (80%), where interface structures steered children toward ad-gated or premium options while suppressing alternatives. *Sneaking* appeared in 90% of apps, predominantly as *Bait and Switch*, where a gift icon triggered an advertisement rather than an in-game reward. *Obstruction* (70%), *Forced Action* (55%), and *Social Engineering* (40%) completed the pattern landscape.

Advertising strategies. Advertisements appeared in 90% of apps. Across 40 hours of observation we documented 500 advertisements: 225 Roadblock Ads (median: 7/app), 190 Ads with Reinforcement (median: 2/app), and 85 Strategically Timed Ads (median: 2.5/app). Fully 71.8% were non-skippable. One app (*Bubbu Pet Cat*) displayed 108 advertisements across the two sessions. One game displayed an advertisement for a “nude scanner” app containing explicit imagery, illustrating failures of ad moderation.

Structural intertwining. Advertising and deceptive design were not deployed independently. *Forced Action* operationalised ads as gatekeepers to progression; *Sneaking*

disguised ad triggers as in-game rewards; *Emotional or Sensory Manipulation* had in-game characters deliver commercial prompts through parasocial appeals. Deceptive patterns, in turn, gained their effect from the underlying commercial logic: gamification mechanisms created grinding cycles resolvable only by ad consumption, and manipulated choice architectures foregrounded ad-locked options.

4 Discussion

Our findings suggest that deceptive design and advertising constitute a single persuasive system in children’s apps. Children’s ability to recognize commercial intent, resist persuasive cues, and disengage, capacities guaranteed under the UNCRC [12], is undermined by the cumulation of these elements [5]. All apps carried Google’s *Teacher Approved* badge, yet every one exhibited multiple manipulative patterns, illustrating that platform-level review does not capture them. The reformed classification criteria of Germany’s USK (2023) and PEGI (2026) address usage risks in traditional game distribution but do not extend to mobile app stores.

Limitations. The sample covers 20 free-to-play apps from German-speaking markets; paid, iOS-exclusive, and region-restricted titles are not represented. Adult researchers simulating child-like play limits ecological validity but avoided exposing minors to manipulative content and enabled systematic classification. Testing each app for 60 minutes per researcher likely underestimated features emerging through extended use, while ad content may vary by time, location, device profile. Finally, Gray et al.’s [4] unweighted ontology captures diversity but not severity; future work should add harm-weighted approaches [7].

Implications. Closing this gap requires: (1) risk-based classification and review criteria for children’s mobile apps that include advertising frequency, skippability, monetization mechanics, and emotional pressure; (2) manipulative-design awareness in developer education, platform certification, and app review; and (3) parental guidance that clarifies what platform badges can and cannot guarantee. Future work should pursue longitudinal, cross-jurisdictional, severity-weighted, and ethically safeguarded participatory studies.

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