Chapter 9
Algorithmically Objectified:
The Datafied Child Consumer in AI-Driven Marketing Ecosystems

Azize Şahin
http://orcid.org/0000-0002-3115-6812
School of Business, İstanbul University, Istanbul, Turkey

ABSTRACT

This chapter examines how AI-driven marketing systems transform children's digital activities into datafied consumer profiles. It develops the concept of the datafied child consumer to explain how behavioral traces, contextual signals, inferred vulnerabilities, and attention patterns are captured, profiled, targeted, and monetized within platform-based marketing ecosystems. Using a structured thematic conceptual review, the chapter maps the recursive cycle linking child digital interaction, data capture, algorithmic inference, marketing activation, behavioral feedback, and commercial value extraction. It also evaluates the implications of this process for children's autonomy, privacy, consumer socialization, and digital well-being. The chapter concludes by proposing a rights-based, child-centered framework for responsible AI-driven marketing grounded in developmental appropriateness, data minimization, inference limitation, transparency, auditability, and limits on exploitative personalization.

INTRODUCTION

Children's digital lives are increasingly organized through platforms that educate, entertain, socialize, recommend, reward, track, and monetize. Video-sharing

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services, mobile games, learning applications, social media platforms, connected toys, voice assistants, and virtual environments have become ordinary infrastructures of childhood. These environments are often presented as personalized, interactive, convenient, creative, or educational. Yet many of them are embedded in commercial systems that depend on data capture, behavioral prediction, engagement optimization, and AI-enabled personalization (Barassi, 2020; Lupton & Williamson, 2017; Mascheroni & Siibak, 2021; Zuboff, 2019).

This shift changes the marketing status of the child. Children have long been recognized as consumers, influencers of household purchases, future brand loyalists, and participants in consumer socialization processes (Calvert, 2008; John, 1999; Ward, 1974). What is distinctive in AI-driven marketing ecosystems is that children are no longer only audiences for persuasive messages or learners of marketplace norms. Their actions become data inputs; their attention becomes an optimization target; their inferred preferences become targeting criteria; and their responses become feedback for systems that learn how to influence future behavior (Davenport et al., 2020; Huang & Rust, 2021; Puntoni et al., 2021).

AI-driven marketing uses computational systems to support segmentation, recommendation, personalization, targeting, pricing, service automation, content curation, and customer engagement (Davenport et al., 2020; Huang & Rust, 2021). In adult markets, these practices raise concerns about privacy, manipulation, fairness, autonomy, and consumer agency (Acquisti et al., 2016; Martin & Murphy, 2017; Susser et al., 2019). For children, the concerns are sharper because marketplace understanding, persuasion knowledge, privacy literacy, impulse control, future-oriented reasoning, and self-regulation develop gradually across childhood and adolescence (Calvert, 2008; John, 1999; Rozendaal et al., 2011). A child may understand that an advertisement tries to sell something, yet still fail to recognize that pauses, clicks, searches, viewing duration, game choices, voice inputs, location signals, and emotional responses can be transformed into predictive profiles and used to shape later digital experiences.

This chapter develops the concept of the datafied child consumer to capture this transformation. The concept refers to a developing consumer whose digitally mediated actions, contexts, relationships, emotions, and inferred vulnerabilities are continuously translated into data, transformed into predictive profiles, and activated by AI-driven marketing systems to optimize attention, persuasion, monetization, and future consumer value. The concept foregrounds a structural tension in contemporary digital marketing. Children are rights-bearing persons with evolving capacities, yet platform-based commercial systems may treat them as data sources, attention resources, market segments, household influence channels, and future revenue streams (Barassi, 2020; Lupton & Williamson, 2017; UNICEF, 2021, 2025).

The chapter addresses three research questions. How do AI-driven marketing systems capture, process, and interpret children's behavioral, contextual, and inferential data? How are datafied child profiles converted into commercial value? What ethical and governance implications arise for children's autonomy, privacy, consumer socialization, and digital well-being?

The chapter makes three contributions. Conceptually, it differentiates the datafied child consumer from related categories such as child user, child consumer, data subject, vulnerable consumer, and algorithmic consumer. Theoretically, it integrates consumer socialization theory, the Persuasion Knowledge Model, surveillance capitalism, platform capitalism, hypernudging, and children's rights theory to explain why AI-driven marketing represents a distinctive transformation in child-directed commercial influence (Friestad & Wright, 1994; John, 1999; Yeung, 2017; Zuboff, 2019). Practically, it develops a rights-based governance framework that moves beyond consent-centered privacy compliance toward constraints on inferential profiling, engagement-maximizing design, behavioral steering, affective targeting, and exploitative personalization.

CONCEPTUAL FOUNDATIONS

Childhood Datafication and Commercial Visibility

Datafication refers to the transformation of social, behavioral, and embodied activities into digital traces that can be stored, aggregated, analyzed, exchanged, and acted upon (van Dijck, 2014). In childhood contexts, datafication is distinctive because data trails can begin before children develop meaningful agency over their digital identities. Pregnancy applications, parental sharing, educational technologies, connected toys, household devices, learning analytics, gaming platforms, and social media interactions may all contribute to the construction of children as data subjects (Barassi, 2020; Lupton & Williamson, 2017; Mascheroni & Siibak, 2021).

The problem is not simply that data are collected. The deeper issue is that children's activities become commercially legible. A video watched repeatedly, a game level abandoned, a toy preference, a search query, a pause before purchase, a peer interaction, a voice command, or a pattern of late-night engagement can become a signal within marketing systems. These traces may be interpreted as indicators of interest, affect, vulnerability, habit, social influence, or consumption propensity (Barassi, 2020; Zuboff, 2019).

Children and caregivers often understand privacy in immediate and relational terms, such as who can see a photograph, who knows a password, or whether a stranger can contact the child (Livingstone et al., 2019; Stoilova et al., 2020). AI-

driven marketing operates at another level. It converts dispersed behavioral traces into profiles, predictions, and intervention opportunities. This creates a gap between what children and parents can observe and what commercial systems can infer.

AI-Driven Marketing and Algorithmic Profiling

AI-driven marketing refers to the use of machine learning, predictive analytics, recommender systems, automated decision systems, natural language processing, and consumer-facing AI applications to support marketing decisions and interactions (Davenport et al., 2020; Huang & Rust, 2021; Puntoni et al., 2021). In child-facing environments, AI appears not only as a visible chatbot or adaptive learning tool but also as an invisible infrastructure that ranks content, selects advertisements, predicts engagement, recommends products, triggers notifications, and adjusts interface features.

Algorithmic profiling is central to this process. Profiles do not merely record what children have done. They estimate what children are likely to do, want, watch, buy, ask for, share, avoid, return to, or influence within the household. In this sense, a child's profile is not a neutral representation. It is an operational marketing object built to guide decisions. It can encode interests, routines, attention patterns, peer influence, spending propensity, emotional responsiveness, and susceptibility to specific cues (Boerman et al., 2017; Radesky et al., 2020; Susser et al., 2019).

This is where AI-driven marketing differs from traditional child-directed advertising. Earlier advertising often relied on age segments, program context, broad media placement, recognizable characters, and visible persuasive content (Calvert, 2008; Montgomery & Chester, 2009). AI-driven marketing can operate through individualized, adaptive, and less visible forms of influence. Persuasion shifts from message exposure to environment optimization.

Child Consumer Socialization Under Algorithmic Conditions

Consumer socialization theory explains how children acquire marketplace knowledge, brand meanings, consumption skills, purchase influence strategies, and persuasion understanding through interactions with family, peers, schools, media, and commercial institutions (John, 1999; Ward, 1974). Classic accounts emphasize developmental stages and the gradual acquisition of advertising literacy. These accounts remain essential, but they require extension in AI-mediated environments.

In traditional advertising contexts, children may learn to recognize commercial intent by identifying advertising formats, slogans, characters, product demonstrations, or visible separation between program and advertisement (Calvert, 2008; John, 1999). In AI-driven ecosystems, commercial influence is often embedded in recommen-

dation systems, influencer content, personalized feeds, gamified rewards, native advertising, virtual goods, and in-app purchase prompts (De Veirman et al., 2019; Radesky et al., 2020). The commercial cue is not always visible as advertising. It may appear as entertainment, personalization, play, social validation, or convenience.

This undermines the sufficiency of classic persuasion knowledge. The Persuasion Knowledge Model suggests that consumers cope with persuasion attempts by recognizing persuasive intent, interpreting persuasion tactics, and adjusting their responses (Friestad & Wright, 1994). In algorithmic environments, however, persuasion may be embedded in recommendation sequences, reward timing, notification architecture, scarcity cues, influencer relationships, and personalized interfaces (Rozendaal et al., 2011; Susser et al., 2019; Yeung, 2017). Children may know that a commercial message is persuasive while failing to recognize that an entire choice environment has been optimized to increase attention, return visits, or spending.

Attention, Hypernudging, and Developmental Vulnerability

The attention economy treats attention as a scarce and commercially valuable resource, particularly in digital platforms whose revenues depend on engagement, advertising exposure, behavioral prediction, and repeated interaction (Davenport & Beck, 2001; Wu, 2016; Zuboff, 2019). Children are especially exposed to this logic because play, curiosity, novelty seeking, social belonging, reward sensitivity, and identity exploration are central to development (Calvert, 2008; John, 1999).

Hypernudging explains how AI-driven systems intensify commercial influence through adaptive, data-driven choice architecture (Yeung, 2017). Unlike static nudges, hypernudges can be updated through observed behavior and predicted responsiveness. In child-facing environments, this may involve personalized notifications, autoplay, endless scroll, variable rewards, streaks, time-limited offers, social proof, or in-app purchase cues (Gray et al., 2018; Mathur et al., 2019; Susser et al., 2019).

The ethical issue is not that all personalization is harmful. Personalization can support learning, accessibility, safety, age-appropriate discovery, and creative participation (UNICEF, 2021, 2025). The concern arises when personalization is optimized primarily for commercial metrics such as watch time, click-through, conversion, retention, or spending rather than developmental appropriateness and child well-being.

METHODOLOGICAL POSITIONING: A STRUCTURED THEMATIC CONCEPTUAL REVIEW

This chapter adopts a structured thematic conceptual review rather than a systematic review or meta-analysis. The objective is not to estimate empirical effect sizes or provide an exhaustive account of all studies on children, AI, and digital marketing. Instead, the chapter integrates theoretically relevant literature across marketing, information systems, communication, child development, privacy research, and AI governance to develop a conceptual framework explaining how AI-driven marketing systems transform children's digital interactions into commercially actionable profiles (Thomas & Harden, 2008; Webster & Watson, 2002).

The review was organized around six literature domains: AI-driven marketing and consumer experience; online behavioral advertising and personalization; childhood datafication and children's privacy; consumer socialization and advertising literacy; digital well-being and child platform use; and child-centered AI governance. Academic studies were treated as theoretical and empirical sources, whereas legal and policy documents were treated as normative governance materials. This distinction is important because policy documents do not provide empirical evidence of effects, but they reveal how institutions define acceptable and unacceptable data practices involving children (European Union, 2016, 2024; Federal Trade Commission, 2013, 2025; Information Commissioner's Office, 2020; UNICEF, 2021, 2025).

The synthesis followed three analytical moves. The literature was examined to identify recurring datafication mechanisms, including tracking, interaction logging, sensing, cross-context aggregation, algorithmic inference, profiling, and behavioral feedback (Barassi, 2020; Boerman et al., 2017; Lupton & Williamson, 2017; van Dijck, 2014). These mechanisms were then mapped onto marketing functions such as segmentation, targeting, recommendation, personalization, engagement optimization, in-app monetization, and brand relationship development (Davenport et al., 2020; Huang & Rust, 2021; Radesky et al., 2020). The final stage interpreted these functions through child-centered outcomes, particularly autonomy, privacy, inferential harm, consumer socialization, and digital well-being (Livingstone et al., 2019; Odgers & Jensen, 2020; Orben & Przybylski, 2019; UNICEF, 2021, 2025).

This approach supports conceptual theory-building while avoiding an overstated claim of systematic evidence aggregation. The chapter therefore offers an integrative conceptual framework rather than a claim of exhaustive empirical coverage.

THE DATAFIED CHILD CONSUMER: DEFINITION AND CONCEPTUAL BOUNDARIES

The datafied child consumer is defined as a developing consumer whose digitally mediated actions, contexts, relationships, emotions, and inferred vulnerabilities are continuously translated into data, transformed into predictive profiles, and activated by AI-driven marketing systems to optimize attention, persuasion, monetization, and future consumer value.

This definition contains four elements. The child is a developing consumer, which means that market understanding, persuasion knowledge, privacy literacy, self-regulation, and future-oriented reasoning remain in formation (Calvert, 2008; John, 1999; Rozendaal et al., 2011). The child is datafied, which means that ordinary activities become machine-readable traces (Barassi, 2020; Lupton & Williamson, 2017; van Dijck, 2014). The child is profiled, which means that AI systems generate predictions that may exceed what the child knowingly disclosed (Boerman et al., 2017; Radesky et al., 2020; Zuboff, 2019). The child is commercially activated, which means that profiles are used to shape content, advertisements, recommendations, prompts, rewards, notifications, purchase opportunities, and platform experiences (Davenport et al., 2020; Huang & Rust, 2021; Puntoni et al., 2021).

The concept differs from adjacent terms. A child consumer participates in markets, but the term does not capture continuous algorithmic profiling. A child user interacts with technology, but the term does not specify commercial data extraction. A digital child describes childhood mediated by digital technologies, but it does not isolate AI-driven marketing infrastructures. A data subject is a legal category, but it does not explain how marketing value is produced from behavioral traces. A vulnerable consumer highlights reduced market power or capacity, but it does not explain dynamic inference and feedback. An algorithmic consumer describes consumers shaped by algorithms, but it often assumes adult-level agency and does not foreground developmental vulnerability.

The datafied child consumer therefore captures a distinctive marketing condition: the child becomes both a target of commercial influence and a source of training data for future influence. Children's behavior is not only interpreted by AI-driven marketing systems. It helps those systems learn how to structure subsequent choice environments. This dual status is the core theoretical contribution of the concept.

Table 1. Conceptual Boundaries of the Datafied Child Consumer

Related concept	Core meaning	Limitation for this chapter	Distinctive value of the datafied child consumer
Child consumer	Child as marketplace participant	Does not capture algorithmic profiling	Adds predictive datafication and AI-mediated commercial activation
Child user	Child as technology user	Treats interaction as use rather than monetizable trace	Shows how digital use becomes marketing intelligence
Digital child	Child growing up with digital media	Broad sociocultural category	Specifies commercial AI infrastructures
Data subject	Individual governed by data protection law	Legal category rather than marketing category	Links data rights to targeting, engagement, and value extraction
Vulnerable consumer	Consumer with reduced capacity or power	Often lacks platform and AI specificity	Explains vulnerability as inferred, predicted, and commercially activated
Algorithmic consumer	Consumer shaped by algorithmic systems	Often adult-centered	Adds child development, rights, and consumer socialization

THE RECURSIVE DATAFICATION CYCLE

The formation of the datafied child consumer can be conceptualized as a recursive cycle: child digital interaction, data capture, algorithmic inference, marketing activation, behavioral feedback, commercial value extraction, and developmental and ethical consequences.

Children's digital interactions generate behavioral and contextual traces, including clicks, views, pauses, searches, purchases, location signals, device identifiers, social interactions, voice inputs, and in-game behavior (Barassi, 2020; Reyes et al., 2018; Radesky et al., 2020). These traces are captured through platform infrastructures, cookies, SDKs, account systems, analytics tools, advertising identifiers, and third-party integrations (Boerman et al., 2017; Feal et al., 2020; Reyes et al., 2018). AI systems then generate inferences about interests, attention patterns, emotional responsiveness, purchase propensity, churn risk, social influence, and possible vulnerability (Davenport et al., 2020; Huang & Rust, 2021; Zuboff, 2019).

The profile becomes consequential when it activates marketing interventions such as personalized recommendations, targeted advertisements, gamified prompts, notifications, scarcity cues, reward schedules, influencer amplification, in-app purchase offers, or dynamic content sequences (De Veirman et al., 2019; Gray et al., 2018; Mathur et al., 2019; Radesky et al., 2020). The child's response then produces additional data, allowing the system to refine future predictions and interventions. Commercial value is generated through advertising revenue, engagement optimiza-

tion, in-app monetization, brand relationship formation, household influence, data enrichment, and lifetime value estimation (Davenport et al., 2020; Montgomery & Chester, 2009; Zuboff, 2019).

The developmental concern is that this cycle may shape children's preferences, attention, autonomy, privacy expectations, marketplace learning, and well-being before they possess adult-level capacities to understand or contest the process (Calvert, 2008; John, 1999; Livingstone et al., 2019; UNICEF, 2021).

Table 2. AI-Driven Datafication Cycle of the Child Consumer

Stage	AI or data process	Marketing function	Child-related risk
Digital interaction	Play, viewing, searching, learning, communicating	User engagement and exposure	Normalization of commercialized environments
Data capture	Tracking, logging, sensing, device identification, SDKs	Audience intelligence and analytics	Opacity, excessive collection, limited comprehension
Algorithmic inference	Profiling, prediction, propensity scoring, affective inference	Segmentation and targeting	Inferential harm, misclassification, vulnerability detection
Marketing activation	Recommendation, personalization, targeted ads, prompts	Conversion, retention, persuasion	Hidden influence and reduced autonomy
Behavioral feedback	Clicks, views, pauses, purchases, disengagement	Model updating and experimentation	Recursive behavioral shaping
Commercial value extraction	Ad revenue, in-app spending, lifetime value estimation	Monetization and ecosystem lock-in	Developmental exploitation
Governance response	Audit, minimization, transparency, inference limits	Responsible AI marketing	Accountability and child-centered protection

AI-DRIVEN MARKETING MECHANISMS IN CHILD-FACING DIGITAL ECOSYSTEMS

Data Capture Mechanisms

Child-facing platforms capture behavioral and contextual signals through account data, cookies, device identifiers, software development kits, interaction logs, location signals, purchase histories, viewing duration, scrolling patterns, search behavior, social interactions, voice inputs, and in-game behavior (Boerman et al., 2017; Reyes et al., 2018; Radesky et al., 2020). In educational and entertainment contexts, data capture may be framed as personalization, safety, progress tracking, or service im-

provement. These purposes may be legitimate, but they can also create pathways for secondary commercial use (Livingstone et al., 2019; Stoilova et al., 2020).

The asymmetry is structural. Children and parents may see an app, a game, a toy, or a video platform. They rarely see the adtech intermediaries, analytics vendors, SDK providers, cloud systems, data brokers, and model infrastructures that support profiling and monetization (Boerman et al., 2017; Feal et al., 2020; Reyes et al., 2018). This infrastructural opacity makes traditional parental mediation less effective because monitoring visible content does not reveal individualized targeting or backend data flows (Livingstone & Helsper, 2008; Livingstone et al., 2019).

Algorithmic Inference Mechanisms

AI systems can infer interests, engagement likelihood, purchase propensity, churn risk, peer influence, emotional responsiveness, and potential vulnerability from behavioral traces (Davenport et al., 2020; Huang & Rust, 2021; Zuboff, 2019). These inferences are ethically significant because they may affect children without being visible to them. A child does not need to disclose insecurity, boredom, loneliness, frustration, impulsivity, or social anxiety for a platform to treat behavioral patterns as proxies for such states (Susser et al., 2019; Yeung, 2017).

In marketing terms, inference increases efficiency. It allows firms to deliver more relevant content, predict engagement, identify commercially valuable moments, and refine intervention timing (Davenport et al., 2020; Puntoni et al., 2021). In child-centered terms, inference creates risks because predicted vulnerability may become a targeting opportunity. This is why governance must address not only raw data collection but also the generation and activation of inferred traits (Lupton & Williamson, 2017; UNICEF, 2021, 2025).

Recommendation and Content Curation

Recommendation systems shape what users see, repeat, prefer, and normalize over time (Adomavicius & Tuzhilin, 2005; Ricci et al., 2015). In child-facing environments, recommendation systems select videos, games, music, toys, learning activities, creators, social content, branded content, or purchase opportunities based on prior behavior, similar users, content attributes, and predicted engagement (Davenport et al., 2020; Radesky et al., 2020).

For children, recommendation systems can influence preference formation. Repeated exposure to particular brands, genres, influencers, aesthetics, products, characters, or consumption scripts may normalize specific identities and desires (Calvert, 2008; De Veirman et al., 2019; Montgomery & Chester, 2009). The system does not need to persuade through explicit advertising. It can make some options

familiar, salient, easy, and socially validated while making others less visible. Autonomy is therefore affected not only by the child's ability to choose among visible options but also by how visibility itself is algorithmically organized (Susser et al., 2019; Yeung, 2017).

Behavioral Targeting and Programmatic Advertising

Online behavioral advertising uses observed or inferred online activity to deliver targeted commercial messages (Boerman et al., 2017; Smit et al., 2014). Programmatic advertising automates the buying and selling of ad inventory, often through audience segments, real-time bidding, tracking infrastructures, and data-driven targeting (Boerman et al., 2017; Martin & Murphy, 2017). In adult markets, these practices are typically justified in terms of relevance and efficiency. In child-facing environments, the trade-off is unequal because children may not understand the data exchange or the persuasive intent behind individualized advertising (Calvert, 2008; Radesky et al., 2020; Rozendaal et al., 2011).

Behavioral targeting also complicates parental mediation. Parents may not see the same advertisements as their children because targeting is individualized. They may therefore be unable to monitor persuasive exposure or assess cumulative commercial influence. This undermines traditional assumptions that parents can supervise media content by watching with children, choosing channels, or reviewing visible advertisements (Livingstone & Helsper, 2008; Livingstone et al., 2019).

Gamification, Persuasive Interface Design, and Dark Patterns

Gamification uses points, badges, levels, streaks, rewards, progress bars, rankings, challenges, and time-limited incentives to increase engagement, persistence, and motivation (Hamari et al., 2014). In children's environments, game-like design can support learning, creativity, and skill development. The problem arises when gamification is integrated with commercial objectives and AI-driven optimization. Platforms can learn which reward intervals sustain attention, which scarcity cues prompt urgency, which visual cues increase purchases, and which social comparison features intensify use (Mathur et al., 2019; Susser et al., 2019; Yeung, 2017).

Dark patterns refer to interface designs that steer users toward choices they may not otherwise make, such as hiding privacy settings, making cancellation difficult, creating artificial urgency, or encouraging overspending (Gray et al., 2018; Mathur et al., 2019). These designs are problematic for adults and more problematic for children because children may not recognize the architecture of influence. In child-facing systems, persuasive interface design can operate through defaults, friction,

notifications, scarcity prompts, social proof, rewards, and personalized recommendations (Radesky et al., 2020; Susser et al., 2019).

Influencer Marketing and Relational Persuasion

Influencer marketing is particularly relevant for children because sponsored content may be embedded in entertainment, play, parasocial relationships, trusted creator formats, and peer-like communication (De Veirman et al., 2019; Radesky et al., 2020). Unlike traditional advertising, influencer marketing often blurs the boundary between social relationship and commercial persuasion. This blurring is developmentally important because children and adolescents are especially responsive to belonging, identity expression, peer norms, and social validation (Calvert, 2008; John, 1999).

AI-driven platforms intensify this mechanism by recommending creators, amplifying sponsored content, matching influencer content with inferred interests, and optimizing exposure based on engagement signals (Davenport et al., 2020; Puntoni et al., 2021). The child is not only exposed to influencer marketing. The child's behavioral responses may also train future influencer recommendations and sponsored content placement.

Affective Inference and Emotionally Responsive Marketing

Affective inference involves attempts to estimate emotional states through facial expression, voice tone, sentiment, interaction tempo, typing behavior, viewing patterns, or other behavioral cues. The scientific validity and ethical legitimacy of emotion inference remain contested, but its commercial appeal is clear. If a system can estimate excitement, frustration, boredom, uncertainty, loneliness, or vulnerability, it can adapt content and prompts accordingly (Susser et al., 2019; Yeung, 2017).

For children, affective marketing is especially problematic because emotional responses are part of development, not merely signals for conversion. Turning frustration, loneliness, excitement, or insecurity into marketing inputs risks commercializing emotional life. Even inaccurate inferences can shape what children see, how platforms respond, and which commercial stimuli become salient (Lupton & Williamson, 2017; UNICEF, 2021, 2025).

COMMERCIAL VALUE EXTRACTION AND RECURSIVE DATAFICATION

Children's data generate commercial value through several channels. Advertising revenue is the most direct. More granular profiles allow platforms and advertisers to deliver messages to children or child-influenced household segments with greater predicted effectiveness (Boerman et al., 2017; Montgomery & Chester, 2009; Radesky et al., 2020). Children's data may improve targeting not only for child-specific products but also for household consumption categories because children influence family purchasing decisions (Calvert, 2008; John, 1999).

Engagement optimization is another major channel. Longer sessions, repeated visits, higher interaction rates, and stronger retention produce more advertising inventory and more behavioral data. This creates a reinforcing cycle: engagement generates data, data improve prediction, prediction improves engagement, and engagement increases monetization (Davenport & Beck, 2001; Wu, 2016; Zuboff, 2019).

In-app monetization is especially relevant in games and freemium applications. Virtual currencies, cosmetic items, subscriptions, premium features, loot boxes, upgrades, and time-limited offers can be personalized to increase purchase likelihood. These practices are ethically sensitive because children may not fully understand monetary abstraction, probability, scarcity cues, or cumulative spending (Calvert, 2008; Hamari et al., 2014; Radesky et al., 2020).

Brand relationship formation adds a longer-term marketing logic. Childhood has always mattered for brand familiarity, preference development, and future loyalty (Calvert, 2008; John, 1999; Ward, 1974). AI-driven ecosystems intensify this logic by tracking early interactions, reinforcing preferences, and embedding brands within play, social identity, entertainment, and education. The child's value is therefore not limited to current spending. It includes future consumer value, household influence, data enrichment, ecosystem lock-in, and early brand socialization (Montgomery & Chester, 2009; Zuboff, 2019).

Secondary use and data brokerage extend this logic beyond the original service context. Data generated in a learning app, gaming environment, video platform, connected toy, or social application may become valuable when combined with third-party analytics, advertising networks, or platform partners (Barassi, 2020; Boerman et al., 2017; Reyes et al., 2018). Even when direct sale of children's personal data is restricted, inferred categories, analytics flows, and pseudonymous identifiers may create indirect value chains.

The central issue is not only whether data collection is lawful. It is whether the business model depends on converting children's developmental conditions, attention patterns, emotional signals, and behavioral histories into commercial advantage.

This is why child-centered marketing ethics must examine value extraction itself, not only data protection procedures.

ETHICAL AND DEVELOPMENTAL CONSEQUENCES

Autonomy and Preference Formation

Autonomy refers to the capacity to form preferences, evaluate options, and make decisions without undue manipulation. Children's autonomy is developmental. It grows through experience, reflection, parental guidance, peer interaction, education, and increasing cognitive capacity (Calvert, 2008; John, 1999). AI-driven marketing can interfere with this process when it narrows visible options, adapts persuasive pressure to behavioral signals, or repeatedly reinforces predicted preferences (Susser et al., 2019; Yeung, 2017).

Autonomy is not only the ability to choose. It also depends on how choices are presented, which alternatives become visible, which cues are made salient, and how much friction is attached to disengagement. Recommendation systems, streaks, scarcity prompts, autoplay, personalized offers, and social proof can shape the conditions under which children make decisions (Gray et al., 2018; Mathur et al., 2019; Radesky et al., 2020). Over time, algorithmic prediction may become self-reinforcing. A system predicts a preference, exposes the child to more of it, and then interprets continued engagement as confirmation.

Privacy, Data Sovereignty, and Inferential Harm

Children's privacy cannot be reduced to control over disclosed information. AI-driven marketing relies heavily on inference. A child may never disclose low self-esteem, impulsivity, family circumstances, social anxiety, or emotional vulnerability, yet a system may infer proxies from behavior and use them to shape marketing exposure (Livingstone et al., 2019; Stoilova et al., 2020; Susser et al., 2019).

Inferential harm occurs when predictions affect treatment, opportunities, autonomy, privacy, or well-being regardless of whether the underlying inference is accurate. For children, inferential harm is intensified by developmental opacity. Children may not understand that they are being classified, cannot easily inspect or contest the classification, and may be affected by profiles that persist beyond childhood (Lupton & Williamson, 2017; UNICEF, 2021, 2025). This creates a temporal injustice: data produced under childhood conditions may shape future digital treatment after the child's interests, identity, and capacities have changed.

Consumer Socialization and Commercial Identity Formation

AI-driven marketing changes consumer socialization by embedding commercial learning into personalized and adaptive environments. Children learn not only from parents, peers, schools, and media but also from algorithmically curated feeds, influencer ecosystems, virtual goods, branded games, recommendation sequences, and reward architectures (Calvert, 2008; De Veirman et al., 2019; John, 1999). These environments can normalize consumption as self-expression, social belonging, play, status, or emotional regulation.

This does not mean that children are passive recipients of commercial influence. Children interpret, negotiate, resist, and appropriate media content in active ways (Livingstone et al., 2019). Yet their agency is exercised within systems designed by adult firms and algorithms with superior information, technical capacity, and commercial incentives. The asymmetry lies not in children's lack of agency but in the imbalance between developing capacities and adaptive commercial systems.

Digital Well-Being

Digital well-being concerns whether technology use supports psychological, social, educational, and developmental flourishing. It should not be reduced to screen time. The same amount of use can involve creativity, learning, social connection, compulsive engagement, social comparison, harmful content, or commercial manipulation (Livingstone & Helsper, 2008; Odgers & Jensen, 2020; Orben & Przybylski, 2019).

Evidence on digital technology and youth well-being is complex and context-dependent rather than uniformly harmful (Odgers & Jensen, 2020; Orben & Przybylski, 2019). The stronger argument is therefore not that digital media are inherently harmful. It is that AI-driven commercial optimization may create specific risks when systems prioritize engagement, monetization, and prediction over developmental appropriateness. The distinction between beneficial personalization and exploitative personalization is essential. Beneficial personalization supports learning, accessibility, safety, and meaningful participation. Exploitative personalization uses behavioral or emotional signals to intensify engagement, increase spending, or refine persuasion without meaningful safeguards (Radesky et al., 2020; UNICEF, 2021, 2025).

TYPOLOGY OF CHILD DATAFICATION RISKS

The datafied child consumer framework identifies six interrelated risk types. These risks are not mutually exclusive. A single platform feature, such as a personalized

notification linked to an in-app purchase, may involve informational, inferential, attentional, emotional, relational, and developmental risks.

Table 3. Typology of Child Datafication Risks

Risk type	Mechanism	Marketing manifestation	Child-related concern
Informational exploitation	Excessive data capture	Cross-context tracking, SDKs, device identifiers	Loss of privacy and limited comprehension
Inferential exploitation	Prediction of traits or vulnerabilities	Propensity scoring, emotional inference, vulnerability detection	Invisible classification and inferential harm
Attentional exploitation	Engagement maximization	Autoplay, endless feeds, streaks, notifications	Reduced self-regulation and habit formation
Emotional exploitation	Use of affective signals	Mood-sensitive prompts, emotion-based content adaptation	Commercial use of developmental emotions
Relational exploitation	Peer and creator-based influence	Influencer marketing, social proof, creator recommendations	Blurred social and commercial boundaries
Developmental exploitation	Long-term preference shaping	Early brand lock-in, habit formation, lifetime value estimation	Premature commercialization of identity

REGULATORY AND GOVERNANCE GAPS

Existing governance frameworks provide important protections but do not fully address the marketing-specific risks of AI-driven child datafication. COPPA requires covered operators to provide notice and obtain verifiable parental consent before collecting personal information from children under 13 (Federal Trade Commission, 2013). The FTC's 2025 amendments strengthen COPPA by requiring separate parental opt-in consent for certain third-party disclosures related to targeted advertising, limiting indefinite data retention, expanding the definition of personal information to include biometric and government-issued identifiers, and increasing transparency expectations for Safe Harbor programs (Federal Trade Commission, 2025). These changes are important, but they do not fully resolve the challenges of inferential profiling, adaptive persuasion, or engagement optimization.

The GDPR provides broader protections for personal data, including transparency, lawful processing, data minimization, rights of access and erasure, and provisions relevant to children's consent and protection (European Union, 2016). However, GDPR-based compliance can still struggle with complex adtech ecosystems, inferred data, behavioral steering, and the opacity of recommender systems. Privacy notices and consent mechanisms do not necessarily help children or caregivers understand

how predictive profiles shape future experiences (Livingstone et al., 2019; Stoilova et al., 2020).

The EU AI Act is relevant because it addresses AI practices that use manipulative or deceptive techniques or exploit vulnerabilities related to age, disability, or social and economic situation in ways that materially distort behavior and cause or are likely to cause significant harm (European Union, 2024). For child-facing marketing systems, this raises important questions about when engagement optimization, affective targeting, dark patterns, or personalized persuasion should be treated as manipulative rather than merely commercial.

The UK Age Appropriate Design Code provides a design-centered governance model. It emphasizes the best interests of the child, high privacy by default, data minimization, restrictions on data sharing, geolocation protections, profiling protections, and limits on nudge techniques that encourage children to provide unnecessary data or weaken privacy settings (Information Commissioner's Office, 2020). This approach is especially relevant to AI-driven marketing because it shifts attention from one-time consent to design choices, defaults, profiling settings, and child-facing interface architecture.

UNICEF's guidance on AI and children provides a rights-based orientation by emphasizing child development, inclusion, fairness, transparency, safety, accountability, and participation (UNICEF, 2021, 2025). Its value lies in treating children not merely as consumers, users, or data subjects but as rights-bearing persons whose best interests should constrain AI system design and deployment.

The main governance gaps are therefore clear. Consent does not adequately address future inferences. Identifiability rules may not capture pseudonymous or probabilistic targeting. Privacy notices do not govern behavioral steering. Platform accountability remains weak when data flows involve multiple intermediaries. Most importantly, existing frameworks often regulate data processing more directly than the commercial objectives that drive child profiling.

Table 4. Regulatory Gaps and Child-Centered Governance Responses

Regulatory gap	Why current frameworks struggle	Child-centered governance response
Consent gap	Parents and children cannot anticipate future inferences and secondary uses	Move from one-time consent to ongoing accountability
Inference gap	Laws often focus on collected data rather than predicted traits	Restrict sensitive commercial inferences
Behavioral steering gap	Privacy rules address data flows more directly than adaptive persuasion	Evaluate recommender objectives and persuasive design
Ecosystem gap	Data moves across platforms, adtech, SDKs, brokers, and analytics providers	Require traceable data flows and third-party accountability

continued on following page

Table 4. Continued

Regulatory gap	Why current frameworks struggle	Child-centered governance response
Developmental gap	Adult-oriented privacy models understate evolving capacities	Apply age-appropriate design and developmental safeguards
Audit gap	Harms are often invisible from the user interface	Require independent audits of child-facing AI systems

A RIGHTS-BASED CHILD-CENTERED FRAMEWORK FOR RESPONSIBLE AI-DRIVEN MARKETING

A rights-based and child-centered framework begins from the premise that children are developing persons whose dignity, autonomy, privacy, participation, and well-being should constrain commercial design (UNICEF, 2021, 2025). This framework does not reject AI, personalization, or digital innovation. It asks whether such systems support children's interests or convert developmental vulnerability into commercial advantage.

Developmental Appropriateness

Developmental appropriateness requires marketing systems to reflect children's evolving cognitive, emotional, and social capacities. Persuasive intensity, disclosure format, reward design, interface friction, privacy defaults, and purchase prompts should be calibrated to developmental stage rather than optimized only for engagement or conversion (Calvert, 2008; John, 1999; UNICEF, 2021).

Data Minimization

Data minimization requires platforms to collect and retain only the data necessary for a clearly specified child-centered purpose. Data collected for safety, learning, or functionality should not automatically become available for behavioral advertising, cross-context profiling, or commercial experimentation (European Union, 2016; Information Commissioner's Office, 2020).

Inference Limitation

Inference limitation extends governance from raw data to predicted traits. Sensitive inferences about emotions, vulnerabilities, family circumstances, mental states, social status, health, or developmental limitations should not be used for commercial

targeting. Without inference limitation, firms may comply with collection rules while still producing commercially powerful child profiles (Lupton & Williamson, 2017; Susser et al., 2019; UNICEF, 2025).

Meaningful Transparency

Meaningful transparency requires explanations that children and caregivers can understand. Transparency should cover not only data collection but also personalization, recommendation, advertising, profiling, and commercial influence. Long privacy policies are insufficient when children cannot connect legal disclosures to everyday platform experiences (Livingstone et al., 2019; Stoilova et al., 2020).

Auditability

Auditability requires independent examination of child-facing AI systems. Audits should assess data flows, recommender objectives, targeting criteria, third-party SDKs, dark patterns, discriminatory outcomes, and well-being risks. Auditability is essential because many harms are invisible from the user interface (Reyes et al., 2018; Radesky et al., 2020; UNICEF, 2025).

Limits on Engagement-Maximizing Design

Limits on engagement-maximizing design require firms to evaluate whether features such as autoplay, endless scroll, streaks, scarcity prompts, loot boxes, and personalized notifications are compatible with children's sleep, learning, self-regulation, emotional development, and family life. Engagement should not be treated as a neutral proxy for value when users are children (Odgers & Jensen, 2020; Radesky et al., 2020; UNICEF, 2021).

Child Participation

Child participation recognizes that children should not be treated only as objects of protection. Age-appropriate participation can inform safer and fairer digital environments through child advisory panels, participatory design, youth consultations, and feedback mechanisms. However, participation must not shift responsibility from firms, designers, regulators, and adult institutions to children themselves (UNICEF, 2021, 2025).

Table 5. Principles for Responsible AI-Driven Marketing to Children

Principle	Core requirement	Illustrative application
Developmental appropriateness	Design and persuasion should reflect evolving capacities	Age-appropriate disclosures and limits on persuasive intensity
Data minimization	Collect only data necessary for a child-centered purpose	Separate service functionality from advertising data use
Inference limitation	Restrict commercial use of sensitive inferred traits	No targeting based on emotional vulnerability or mental state
Meaningful transparency	Explain profiling and personalization in accessible ways	Layered explanations of recommendations and advertising
Auditability	Enable independent review of child-facing AI systems	Audits of recommender objectives, ad delivery, and dark patterns
Limits on engagement optimization	Avoid maximizing attention at the expense of well-being	Review autoplay, streaks, notifications, and endless scroll
Child participation	Include children's perspectives without shifting responsibility	Participatory design panels and age-appropriate feedback tools

FUTURE RESEARCH AGENDA

Future research should develop validated measures of children's exposure to AI-driven personalization, perceived profiling, algorithmic awareness, persuasive vulnerability, privacy understanding, and digital well-being. Existing advertising literacy measures may not capture algorithmic persuasion because children may not recognize recommendation systems, personalization, influencer amplification, or interface prompts as commercial influence (Friestad & Wright, 1994; Rozendaal et al., 2011; De Jans et al., 2018).

Experimental studies should examine how specific design features affect children's attention, affect, understanding, and choices. Relevant features include autoplay, streaks, variable rewards, scarcity cues, in-app purchase prompts, influencer recommendations, personalized notifications, recommendation sequences, and privacy defaults (Gray et al., 2018; Mathur et al., 2019; Radesky et al., 2020). Such studies should distinguish between age groups because children's cognitive capacity, impulse regulation, privacy literacy, and persuasion knowledge vary across development (Calvert, 2008; John, 1999).

Longitudinal research is especially important. The effects of datafied profiling may accumulate over time through habit formation, brand familiarity, platform lock-in, privacy expectations, and preference reinforcement. Cross-sectional studies cannot adequately capture these developmental processes (Barassi, 2020; Lupton & Williamson, 2017; Zuboff, 2019).

Research should also revisit parental mediation. Parents can regulate screen time or content access, but they often cannot observe individualized targeting, backend profiling, or third-party data flows. New forms of mediation must account for algorithmic opacity and platform asymmetry (Livingstone & Helsper, 2008; Livingstone et al., 2019; Stoilova et al., 2020).

Cross-cultural research is needed because children's datafication is shaped by regulatory regimes, family norms, platform penetration, socioeconomic conditions, educational systems, and cultural beliefs about childhood, privacy, and consumption. Emerging markets deserve particular attention because rapid digital adoption and uneven regulation may intensify exposure to exploitative data practices (Mascheroni & Siibak, 2021; UNICEF, 2021, 2025).

Information systems scholars can contribute methods for auditing child-facing AI systems. Marketing scholars can examine how AI-driven personalization shapes consumer socialization, brand relationships, persuasion knowledge, and lifetime value logics. Legal scholars can clarify accountability across adtech ecosystems. Child development scholars can assess age-specific vulnerability and resilience. Communication scholars can examine how influencer ecosystems, social proof, and platform curation blur the boundaries between peer culture and commercial persuasion.

PRACTICAL, MANAGERIAL, POLICY, AND SOCIETAL IMPLICATIONS

For marketers, the chapter implies that child-oriented AI-driven marketing requires a higher ethical threshold than adult personalization. Firms should separate service personalization from advertising personalization, avoid sensitive inference-based targeting, reduce dependence on engagement-maximizing metrics, and treat children's trust as a developmental responsibility rather than a conversion asset (Martin & Murphy, 2017; Radesky et al., 2020; UNICEF, 2021).

For platform managers, the central issue lies in objective functions. If recommender systems optimize watch time, spending, or return frequency without developmental constraints, harm can arise even when individual messages are not explicitly inappropriate. Child-centered AI marketing therefore requires changes in system objectives, not only better disclosures (Adomavicius & Tuzhilin, 2005; Ricci et al., 2015; Yeung, 2017).

For product designers, responsible design requires friction against impulsive spending, high privacy defaults, age-appropriate explanations, reduced manipulative prompts, limited autoplay, and careful evaluation of streaks, rewards, scarcity cues, and notifications. These recommendations align with child-centered design principles

embedded in the UK Age Appropriate Design Code and UNICEF's guidance on AI and children (Information Commissioner's Office, 2020; UNICEF, 2021, 2025).

For policymakers, the chapter supports a shift from consent-centered privacy regulation to accountability-centered AI governance. Regulators should address inferential profiling, affective targeting, manipulative design, cross-context tracking, third-party SDKs, adtech accountability, and long-term data retention (European Union, 2024; Federal Trade Commission, 2025; UNICEF, 2025).

For educators and parents, algorithmic literacy is necessary but insufficient. Children should learn that recommendations, advertisements, rewards, and notifications are designed and often commercially optimized. However, responsibility should not be transferred to families. Literacy cannot substitute for structural safeguards, high privacy defaults, independent audits, and responsible platform design (Livingstone et al., 2019; Stoilova et al., 2020; UNICEF, 2021).

For society, the broader question is whether childhood should become a site of continuous behavioral prediction and commercial experimentation. AI can support children's learning, creativity, safety, inclusion, and participation. These benefits require governance models that prevent the conversion of developmental vulnerability into marketing advantage.

CONCLUSION

AI-driven marketing ecosystems are transforming the relationship between children, platforms, and markets. Children are no longer only exposed to advertisements or socialized into consumption through visible media content. They are increasingly constructed as datafied consumer subjects whose behaviors, attention patterns, inferred preferences, emotional responses, social interactions, and developmental vulnerabilities can be captured, profiled, monetized, and fed back into commercial systems.

The concept of the datafied child consumer makes this transformation visible. It shows how children's digital interactions become data, how data become algorithmic inferences, how inferences activate marketing interventions, and how children's responses refine future targeting and optimization. This process is not merely technical. It is a marketing logic that can turn childhood into predictive commercial infrastructure.

Existing privacy and AI governance frameworks provide important protections, but they remain incomplete when they focus primarily on data collection, consent, transparency, or formal compliance. The most difficult questions concern inferential profiling, behavioral steering, engagement-maximizing design, affective targeting, and the long-term developmental consequences of algorithmic personalization.

The central claim is therefore not that children should be excluded from digital innovation. Nor is it that personalization is inherently harmful. The claim is more specific: AI-driven marketing becomes ethically problematic when it treats children's developing capacities, attention, emotions, relationships, and emerging preferences as optimization opportunities. Responsible AI-driven marketing must respect children not as data assets or future revenue streams, but as developing persons with rights, dignity, agency, and futures that should not be preconfigured by commercial prediction systems.

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KEY TERMS AND DEFINITIONS

AI-driven marketing: The use of artificial intelligence, machine learning, predictive analytics, recommender systems, and automated decision systems to support marketing decisions, personalization, targeting, customer engagement, and commercial optimization.

Algorithmic profiling: The computational classification or prediction of users' traits, preferences, behaviors, vulnerabilities, or future actions based on observed, contextual, and inferred data.

Behavioral targeting: The delivery of marketing content based on users' observed or inferred online behavior.

Child-centered AI governance: A governance approach that evaluates AI systems according to children's rights, developmental needs, privacy, safety, participation, and well-being.

Childhood datafication: The conversion of children's activities, interactions, environments, relationships, and developmental experiences into digital data that can be stored, analyzed, shared, inferred from, and monetized.

Datafied child consumer: A developing consumer whose digitally mediated actions, contexts, relationships, emotions, and inferred vulnerabilities are continuously translated into data, transformed into predictive profiles, and activated by AI-driven marketing systems to optimize attention, persuasion, monetization, and future consumer value.

Digital well-being: The extent to which digital technology use supports psychological, social, educational, and developmental flourishing.

Hypernudging: Adaptive, data-driven choice architecture that continuously modifies the user environment based on behavioral data and predicted responses.

Inferential harm: Harm arising when data-driven systems generate or apply predictions about a person in ways that affect autonomy, privacy, treatment, opportunities, or well-being.

Online behavioral advertising: Advertising that uses information about a user's online behavior to deliver targeted commercial messages.

Persuasive interface design: The design of digital environments to steer attention, choices, or behavior through defaults, prompts, rewards, friction, scarcity, social proof, or other interface features.