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Young Consumers' ICT Use and Digital Maturity: A Computational Literature Review, Integrative Framework, and Future Research Agenda

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ABSTRACT

This study conducts a computational literature review (CLR) of 1076 peer-reviewed publications (1972–2024) to map how youth ICT engagement has been studied across the social sciences. Using unsupervised topic modeling, we identify 14 latent topics, which cluster into five domains: digital learning, online risk and well-being, identity and social interaction, digital marketing, and media consumption. Our findings reveal deep fragmentation—particularly the lack of integration between emotional regulation, autonomy, and digital literacy. Building on these insights, we propose an integrative framework that positions digital maturity as a developmental mediator and conceptual bridge linking antecedents (e.g., family environment, platform design) with behavioral outcomes such as agency, adaptability, and resilience. This synthesis provides a nuanced theoretical perspective for explaining behavioral development in digital contexts, advancing theory beyond discrete, skills-based models. Finally, the paper offers practical insights for educators (e.g., tailoring instruction to digital maturity archetypes), marketers (e.g., designing ethical, age-appropriate digital tools), and policymakers (e.g., refining youth digital literacy and citizenship initiatives) to support the successful maturation of young consumers in a digital world.

1 | Introduction

Information and communication technologies (ICTs)—including social networks, mobile apps, and digital platforms—are now embedded in nearly every aspect of daily life, profoundly reshaping businesses, society, and consumer behavior. Driven by the rapid advancement and integration of the Internet of Things, Artificial Intelligence (AI), metaverse, and Augmented Reality/Virtual Reality, these technologies enable ubiquitous presence, enhanced capabilities, and the creation of immersive environments (Alzoubi et al. 2025; Paul et al. 2024). As key enablers of digital transformation, they facilitate personalized user experiences by providing tailored recommendations and

expanding the range of interactive and participatory opportunities for consumers (Paul et al. 2023; Sharma et al. 2025). As such, digital transformation is not only evolving technologically but also redefining how consumers interact and navigate commercial and digitalized environments (Shwedeh 2024; Yas et al. 2024). For young consumers, these technologies influence how they connect, learn, and make consumption decisions (Pradhan et al. 2023). This review focuses specifically on young consumers' use of information and communication technologies (ICTs), not their general consumption behavior. While the two may intersect, our emphasis is on digital engagement—how it shapes identity, decision-making, and behavior in ICT-mediated consumer contexts.

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Although often labeled “digital natives” (Prensky 2001), young people’s digital fluency varies widely depending on context, motivation, and access (Bennett et al. 2008; Helsper and Eynon 2010). Recent research underscores that ICT use is not monolithic—it reflects deep individual and structural variation. From a consumer behavior perspective, young people are a distinct segment with evolving identities that influence their decision-making under uncertainty, with heightened susceptibility to social influence (Livingstone et al. 2017). Their digital behaviors reveal how identity, autonomy, and influence intersect in modern consumption. Building on this, generative AI tools (e.g., ChatGPT) introduce advanced capabilities that further shape customer interactions and decision-making processes (Sharma et al. 2025), thereby raising pressing concerns regarding young consumers’ vulnerability and the broader influence of modern consumption on customer experiences and engagement in digital environments (Paul et al. 2023). Indeed, the behavioral implications of youth ICT use are significant. Understanding how young consumers navigate digital risks, respond to targeted marketing, or embrace sustainable digital habits helps advance theories of consumer socialization, bounded rationality, and value-driven behavior. While studies have explored youth as early adopters and experiential consumers (e.g., Pine and Gilmore (2013); Rogers et al. (2014); Sharma et al. (2025)), fewer have examined how digital ecosystems (i.e., social network services) shape their behavioral development over time. Throughout the manuscript, we use ‘consumer behavior’ in relation to ICT use and digital environments, not broader marketplace activity.

A growing body of literature explores ICT use among young people across domains such as education (Selwyn 2009), well-being (Keles et al. 2020), identity formation (Uhls et al. 2017), and consumer behavior (Bassiouni and Hackley 2014). However, this research remains fragmented, lacking a comprehensive, integrated view of how youth develop and navigate digital capabilities over time. Concepts like digital literacy and digital competence have been used to describe functional or technical skills, but they fail to capture the developmental trajectory of young people’s digital lives (Ilomäki et al. 2016; Spante et al. 2018). In contrast, a novel conceptualization of young consumers’ digital maturity—defined as the capacity to engage with ICTs autonomously, adaptively, and emotionally—has emerged as a broader, more developmental lens that includes not only skills but also autonomy, adaptability, and socio-emotional regulation in digital contexts (Laaber et al. 2023). Thus, young consumers’ digital maturity is a developmental framework that could better capture long-term consumer behavior trajectories.

While digital maturity has recently gained traction as a theoretical construct, its role within youth-specific developmental trajectories remains underexplored. Adolescence is a period of profound neurocognitive, emotional, and social transformation (Crone and Konijn 2018) and digital maturity in this context encompasses not only technical proficiency but also autonomy, socio-emotional regulation, and adaptability in increasingly algorithmic environments (Livingstone et al. 2023). Persistent fragmentation across key developmental concepts such as emotional regulation, autonomy, and digital literacy remains unmapped. At the same time, advancements in computational methods have opened new avenues for literature synthesis that

go beyond manual reviews, enabling scalable, reproducible mapping of research trends. In particular, Antons et al. (2023) demonstrate the value of computational literature reviews (CLR) for theory development and uncovering latent structures within fragmented domains—an approach that aligns with our own. This study addresses these gaps by applying a CLR to identify thematic patterns and trajectories in the literature on young consumers’ ICT use. Our study makes a unique contribution by repositioning digital maturity as a developmental mediator that integrates antecedent conditions (e.g., family environment, digital access) with behavioral outcomes such as agency, resilience, and risk management, addressing a structural blind spot in youth ICT research and offers a framework to unify fragmented findings across disciplines. Specifically, we aim to:

1. Map and categorize existing research on youth ICT use through unsupervised topic modeling (chapter 2–5).
2. Develop an integrative framework that positions digital maturity as a central construct (chapter 6).
3. Propose a future research agenda grounded in both data-driven insights and theoretical synthesis (chapter 7–8).

By addressing these objectives, this research contributes to a deeper understanding of how young consumers interact with modern marketplaces and why these interactions are essential for shaping future research agendas, providing a robust basis for future research and applied interventions. On a practical level, this study provides actionable insights for marketers and policymakers aiming to engage young consumers more effectively. Organizations can use these insights to design interventions that not only promote ethical digital engagement but also strengthen the emotional and cognitive capacities central to digital maturity. For policymakers, understanding these structures could aid in designing campaigns that resonate with younger audiences, particularly in areas like health promotion and environmental sustainability. The remaining sections of this paper are organized as follows. First, we will briefly describe the background for our study, focusing on young consumers as a vulnerable consumer segment, together with the concept of digital maturity. Next, we describe the research methodology used before presenting our findings. After discussing these findings, we propose an integrative research agenda for future work on this important issue. Finally, we suggest important theoretical and managerial implications resulting from the work¹.

2 | Study Background

2.1 | Vulnerability of Young Consumers in a Digitized World

The segment, “young consumers”, is comprised of children (Lupiáñez-Villanueva et al. 2016), pre-teens (Lichy et al. 2023), teenagers, and young people (Berg 2018). The vulnerability of young consumers (and children in particular) in a digital world may be understood from various perspectives (i.e., social class, state of mind, individual characteristics) and environments (i.e., situation or context), and influenced by important socialization agents (i.e., parents, peers, teachers, and other family members) (Spotswood and Nairn 2016).

The use of digital technologies is another factor contributing to young people's vulnerability, functioning in ways similar to traditional socialization agents. The adoption of digitalized product and services—ranging from Internet of Things to the metaverse, AI, and both augmented reality and virtual reality—has transformed the modes of communication but also decision-making processes (Paul et al. 2024). While these technologies provide notable opportunities such as enhanced engagement, improved services, and personalization, they also present risks to consumer autonomy and privacy (Paul et al. 2023, 2024). Young people are shown to have high levels of acceptance and adoption of these technologies, perceiving them as convenient and efficient (Sharma et al. 2025). For example, the use of generative AI has raised concerns about overreliance on generated recommendations, uncritical trust, and an overlook of inherent biases given in responses (Paul et al. 2023). Consequently, these technologies shape young consumers' decision making and digital experiences but might also act as influential socialization mechanisms that can inadvertently reinforce young consumers' susceptibility to manipulation, misinformation, and diminished agency.

Despite protective efforts, young consumers face increasing exposure to harmful commercial pressures (Berg 2018). For instance, it is well understood that they experiment with their identities on social media during the transition from childhood to adulthood (Kirwil and Laouris 2012). Online experimentation is risky and can lead to unintended consequences. For instance, the frequent sharing of selfies may expose unwitting consumers to targeted marketing campaigns (Berg 2018). Other examples of online risks to young consumers include cyberbullying, addictions, and harassment (Ólafsson et al. 2013). Young consumers who are exposed to these online risks are more likely to exhibit maladaptive ICT use (e.g., anxiety, sleep disturbance, aggression and irritability characteristic of addiction) (Díaz-López et al. 2020). However, young consumers who use ICTs in adaptive ways are better able to enjoy the benefits of digital activities, including the creation of digital content (i.e., images, videos, blogs), self-expression, and civic- or political engagement, without the vulnerabilities and risks (Ólafsson et al. 2013).

Associated with young consumers' vulnerability in an ICT context, the evolution of research on young consumers' ICT use emphasized in the beginning the digital divide and access disparities (Helsper and Eynon 2010). Over time, the focus shifted to the “second-level digital divide”, examining disparities in digital skills and usage quality. Recent studies have emphasized digital engagement as developmental, involving cognitive, social, and affective capacities (Laaber et al. 2023). Youth ICT use is now viewed as complex, with links to identity formation, mental health, and skill-building (Crone and Konijn 2018; Twenge et al. 2019).

2.2 | Digital Maturity as a Core Concept

As research on young consumers' ICT use is complex and fragmented, the novel conceptualization of digital maturity has the potential to act as an anchor and mediator between different components of young consumers' ICT-related behavior (Laaber

et al. 2023). Digital maturity is a theoretical lens grounded in existing literature (Laaber et al. 2025, 2024), and not derived from our computational analysis.

The concept has its roots in organizational research, where it emerged as a useful framework for evaluating an organization's abilities and progress toward digital transformation. Since its introduction, several digital maturity models have been developed for different purposes (Thordsen et al. 2020). However, Laaber et al. (2023) recently extended the concept to young consumers. As is the case with organizations, consumers also require certain adjustments to a digital world. Recent research on this concept of digital maturity has shown to be useful for explaining young consumers' problematic mobile device use as well as certain aspects of well-being and dysfunction (i.e., life satisfaction; (Laaber et al. 2024)). Moreover, digital maturity has been linked to personality traits in young consumers (e.g., Big5 (Laaber et al. 2023)), self-regulation (Koch et al. 2024), socio-economic status (Koch et al. 2024), parental mediation (Koch et al. 2024), and social connectedness (Koch et al. 2025). In addition, structural factors such as content and context (Laaber et al. (2023); Hofmans et al. (2024)) appear to play a role in the digital maturity of young consumers. The notion of digital maturity has been developed to investigate beneficial technology use in the context of young consumers. It assumes that the beneficial use of digital devices by young consumers can be strengthened by giving them a set of capabilities and attitudes that foster their individual development as well as social adjustment in the digital environment (Laaber et al. 2023).

First, young consumers should be able to use digital technologies in autonomous and self-determined ways in relation to their consumption patterns; this means having the ability to decide when, how, and why they will engage in digital activities (i.e., Autonomous Choice to Use Mobile Devices) or consume and interact in digital contexts (i.e., Autonomy Within Digital Contexts). Second, young consumers should be able to increasingly master and solve digital challenges and problems; this includes being able to safely navigate digital environments (i.e., Digital Literacy), having appropriate awareness of salient risks (i.e., Digital Risk Awareness), knowing how to grow and develop their capacities (i.e., Individual Growth), and being able to seek out support (i.e., Support-Seeking regarding Digital Problems) when needed. Third, young consumers should be able to interact appropriately with others and contribute to society. This can be achieved through their ability to control feelings and manage frustrations in a digital context (Regulation of Negative Emotions and Regulation of Impulses). Furthermore, they should be able to exhibit respectful behavior (i.e., Respect Toward Others) and have the capabilities to participate as a citizen in the digital society (i.e., Digital Citizenship) (Laaber et al. 2023, 2024).

Digital maturity is a multidimensional construct encompassing the three described capacities and is distinctive to established concepts such as digital literacy and digital competences (Laaber et al. 2025). Digital literacy typically refers to basic skills for navigating digital interfaces (Eshet-Alkalai 2004), while digital competence emphasizes functional skills in specific societal contexts (Ferrari and Punie 2013). Digital maturity goes beyond both, incorporating developmental and contextual understanding, integrating personal agency and socio-emotional growth

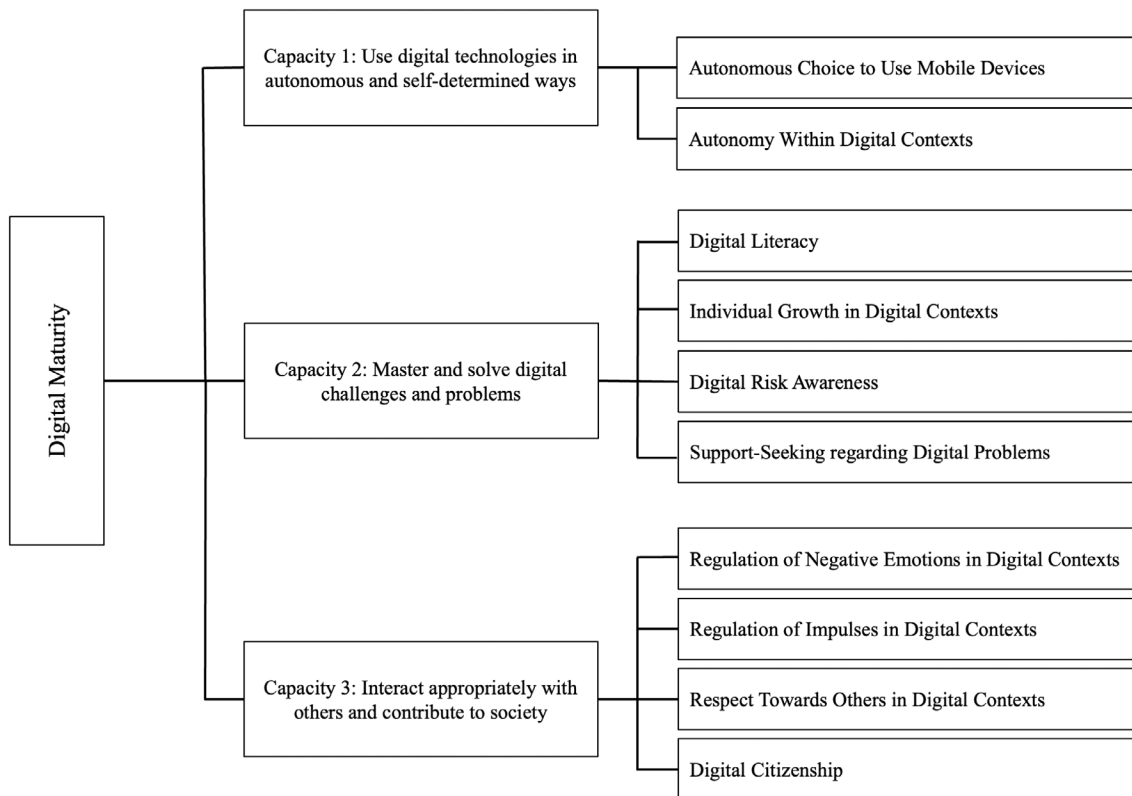


FIGURE 1 | Young consumers' digital maturity.

(Laaber et al. 2023). See Figure 1 for a visualization of young consumers' digital maturity.

3 | Methodology

3.1 | Computational Literature Review

The exponential growth of scientific publications has significantly increased the challenges of synthesizing large bodies of knowledge using traditional literature review methods. In response, computational literature reviews (CLRs) have emerged as a novel approach that augments human researchers' analytical capabilities with machine learning techniques to process and synthesize extensive textual data. As defined by Antons et al. (2023), a CLR is "a structured process intended to augment human researchers' information processing capabilities through the use of machine learning algorithms that help analyze the content of a comprehensive text corpus in a specific knowledge domain in a way that is scalable and real-time capable." Unlike traditional reviews that rely heavily on manual reading and coding, CLRs leverage natural language processing, topic modeling, and machine learning techniques to uncover latent patterns, research topics, and conceptual structures within scientific literature.

Literature reviews vary considerably in their aims, methods, and the type of data (vom Brocke et al. 2015). CLRs main strength lies in scalability and the ability to process vast and diverse datasets with reduced human bias, making them particularly suitable for fragmented or rapidly evolving fields (Antons et al. 2023). CLRs primarily analyze unstructured textual data,

such as abstracts or full-text articles. By contrast, systematic literature reviews (SLRs) are designed to answer specific research questions through a transparent, replicable process of literature identification, selection, and synthesis (Okoli 2015). They offer strong methodological rigor and are well suited for evidence-based evaluations, but their manual and time-intensive nature often limits the number of included studies. SLRs rely on structured data, including full-text articles and predefined coding schemes. Bibliometric reviews, by comparison, aim to map the structure and development of a scientific field through the analysis of publication metadata, such as citations, co-authorship, and keywords (Donthu et al. 2021). Their strength lies in revealing publication trends, influential works, and research constituents, but they do not account for the substantive content of the literature and often favor highly cited, established publications. Bibliometric reviews are based on structured metadata rather than document content. Finally, narrative reviews aim to provide an interpretive synthesis of existing literature, often to develop new theoretical perspectives or offer conceptual clarity (Ferrari 2015). Their flexibility allows for deep contextual insight, but this comes at the cost of transparency and reproducibility, as the selection and interpretation of sources are subject to author bias. Narrative reviews are typically based on a purposively selected subset of full-text articles, interpreted qualitatively.

Considering these differences, we adopted a CLR approach for this study. The CLR method is well-suited to mapping a broad, fragmented literature such as research on young consumers' ICT use, where multiple disparate streams of work coexist without a single unifying theory. Traditional SLR techniques, while rigorous, would face feasibility challenges in capturing

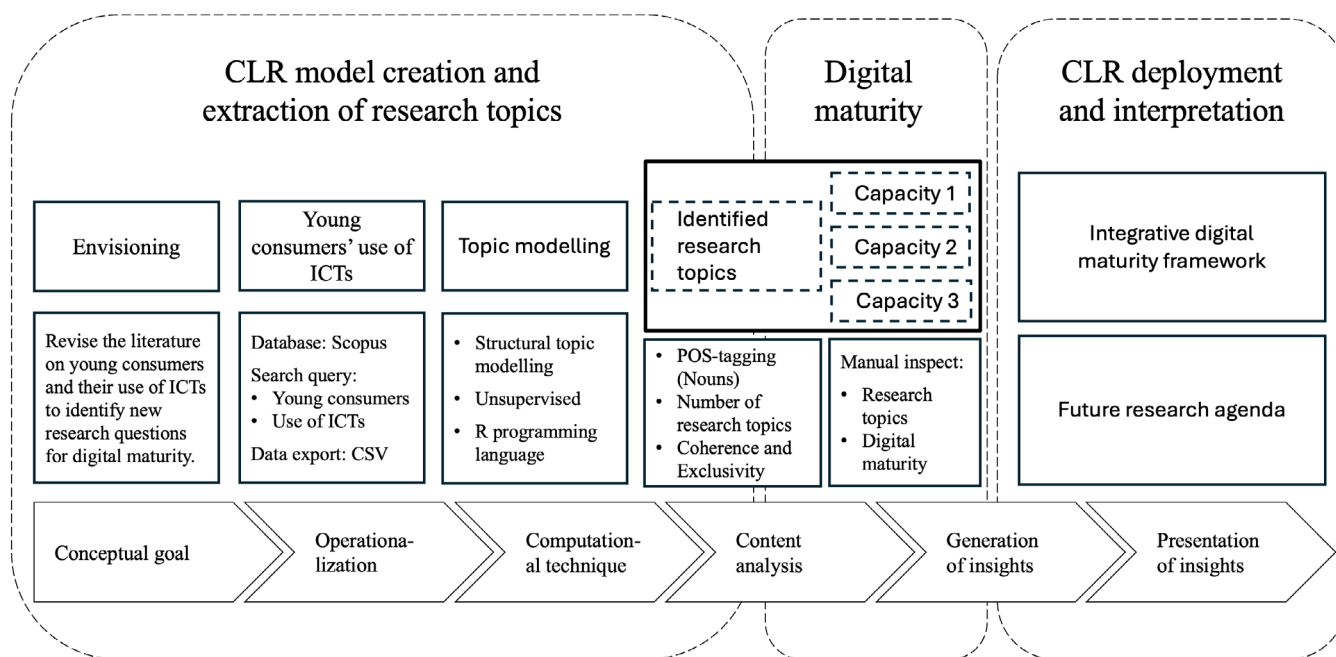


FIGURE 2 | CLR design and execution process (Adapted from Smacchia and Za (2022)).

this diverse landscape given the large number of publications and varying foci across studies. On the other hand, bibliometric analysis could reveal networks of citations but not directly uncover the underlying topical content of the papers (e.g., the actual issues being studied). A narrative review could qualitatively discuss selected themes but risk missing the “big picture” and introducing subjective bias. In contrast, a CLR approach allows us to inductively derive research topics from the text of the publications themselves, providing an empirically grounded, comprehensive overview of the knowledge base. In addition, with CLR we can reduce human bias in identifying themes while processing far more studies than a manual review could accommodate. Thus, given our goal to map the current research landscape and integrate it with the nascent concept of digital maturity, the computational approach offers the dual benefits of breadth and analytical depth.

3.2 | CLR Design and Execution

To conduct our computational literature review, we followed the six-step process outlined by Antons et al. (2023), which provides a structured framework for designing and executing CLR. First, we defined a clear conceptual goal to guide the review and ensure alignment with the intended contribution. Second, we operationalized the CLR by establishing the scope and boundaries of the literature to be examined. Third, we selected a computational technique—specifically, topic modeling—that was most appropriate for our conceptual aims. Fourth, we prepared and preprocessed the data, then applied the chosen technique to perform the content analysis. Fifth, we generated original insights by interpreting the model outputs, identifying latent research topics, and examining their interrelationships. Finally, we presented the findings in a structured and accessible way, including visual representations and an integrative framework. This six-step process, which we have tailored to fit our analytical design

as illustrated in Figure 2, forms the methodological backbone of our study. In this section, we will detail the first four steps of this process, while the final two steps will be discussed in subsequent sections.

3.3 | Conceptualization and Operationalization

Our conceptual goal is to envision the literature at the intersection of young consumers and their ICT usage by identifying prevalent research directions, and revising these findings to highlight fruitful research questions for fostering digital maturity. The search strategy combined two sets of keywords representing “young consumers” and “use of ICTs”. We did not include the keyword “digital maturity” in the initial query to avoid prematurely narrowing the dataset. Since the concept has only recently gained attention in youth-focused research (e.g., Laaber et al. (2023)), using it as a filter would likely have excluded many relevant papers. Instead, we allowed the construct to emerge deductively through theoretical synthesis. The terms within an element were set as alternatives and specified with the Boolean operator “OR”. The query focused on broad coverage using inclusive terms such as “young people,” “children,” and “adolescence*.” While terms like “teenagers” and “youth” were not explicitly included, many of those studies were captured under the broader terms used. The goal was to balance specificity with breadth, ensuring we retrieved a large yet relevant corpus for topic modeling. Next, the elements, including several terms, were concatenated utilizing the “AND” Boolean operator to indicate that both search criteria needed to be fulfilled in the following fields within a record: “abstract”. This search query was restricted to the main types of scientific literature documents, namely the types: articles and proceedings papers written in English. To focus the results on social science, we added the following subject areas: Arts and Humanities, Business, Management, and Accounting, Decision Sciences, Economics,

Econometrics and Finance, Psychology, and Social Sciences. This resulted in the following search query: ABS (“technology use*” OR “use of technology” OR “ICT use*” OR “use of ICT*” OR “use of digital device*” OR “digital device use”) AND ABS (“young people” OR “children” OR “adolescence” OR “adolescence*”) AND (LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “cp”)) AND (LIMIT-TO (SUBJAREA, “SOCI”) OR LIMIT-TO (SUBJAREA, “BUSI”) OR LIMIT-TO (SUBJAREA, “ARTS”) OR LIMIT-TO (SUBJAREA, “DECI”) OR LIMIT-TO (SUBJAREA, “PSYC”) OR LIMIT-TO (SUBJAREA, “ECON”)) AND (LIMIT-TO (LANGUAGE, “English”)). Following research using a systematic literature review approach (Abrizah et al. 2013; Moro et al. 2019; Verma and Yadav 2021), the search for publications was performed in the Scopus database on April 17, 2024. Scopus was chosen due to its broad coverage of social science journals, particularly in fields relevant to consumer behavior, education, and psychology².

We retrieved information and metadata about all eligible publications found within the database ($N=1092$). As the primary objective of this review was to achieve a comprehensive mapping of an emerging, interdisciplinary field: young consumers’ use of ICT, we did not impose journal quality cut-off criteria (i.e., impact factor) and included both journal articles and conference papers in our dataset. All sources were required to be peer-reviewed and indexed in Scopus, which maintains baseline quality standards, but the inclusion was broad in terms of venue. This was followed by a new query specifically targeting the abstracts for each publication. First, all duplicates were removed ($N=3$). If a publication did not include an accompanying abstract, it was excluded ($N=0$). Inspection of the remaining abstracts showed that some had limited relations to the field of interest. To further ensure relevance, we manually screened abstracts and excluded 13 that were only tangentially related to youth or ICT use. Two reviewers (including the first author) independently assessed inclusion, resolving disagreements through discussion. We acknowledge that manual screening may introduce bias; to mitigate this, we used a predefined relevance rubric and documented screening decisions. Our approach builds on recent advancements in computational literature reviews, including Suominen and Toivanen (2016) demonstration of topic modeling to map research trends, and Antons et al. (2023) refinement of automated theme extraction protocols. These methods—including data cleansing, topic coherence validation, and automated PRISMA compliance as applied in large-scale analyses such as those done by Principe et al. (2022) support both the robustness and scalability of our modeling strategy. While our approach enhances scalability and transparency, it is not without limitations. Full-text analysis was not feasible at this scale, and our reliance on abstracts may have excluded some relevant nuance. Nonetheless, the method offers a rigorous, reproducible foundation for mapping research trends.

3.4 | Computational Technique

Antons et al. (2023) distinguish between three categories of computational text analysis: unsupervised, supervised, and dictionary-based methods. Unsupervised techniques infer patterns from unlabeled data (no prior coding of documents is required), whereas supervised techniques require predefined

categories or training examples, and dictionary-based approaches rely on an existing lexicon or classification scheme. Given that no exhaustive list of research topics in our domain was available a priori, an unsupervised approach was most appropriate for discovering the underlying structure of the literature. In other words, we let the data itself reveal the themes, rather than imposing preconceived labels. To accomplish this, we employed topic modeling, a form of unsupervised machine learning that identifies latent topics (i.e., clusters of co-occurring words) within the corpus. Topic modeling algorithms seek hidden semantic structures by analyzing word co-occurrence patterns across documents. Several algorithms are available for this, but latent Dirichlet allocation (LDA) is the most commonly used technique (Li and Lei 2021) as it seeks out hidden semantic structure by estimating a generative probabilistic model where abstracts are represented as random mixtures over topics allowing each one to belong to several ones (Blei et al. 2003). Since its introduction, several extensions of LDA have been developed. One of the extensions is the Structural Topic Model (STM), which can incorporate metadata in the estimation of the model and better supports interpretability across large, heterogeneous corpora (Roberts et al. 2013). Incorporating metadata can be useful, for example, to examine how topic prevalence varies by year, by publication outlet, or other attributes.

For our analysis, we utilized the STM implementation from Roberts et al. (2013) (via the R *stm* package) to take advantage of its enhanced capabilities. Each of the 1076 abstracts was treated as a separate document in the model. We did not include additional metadata as topic predictors in the model (our primary goal was to let topics emerge from content alone), but using STM still facilitated richer diagnostics (such as topic correlation analysis) and offered flexibility for future inclusion of covariates if needed. Furthermore, it allowed for the presence of correlations between identified topics. After fitting the topic model to uncover latent topics from the corpus, we computed the correlations between topics using the approach provided by the R package *STMinsights* (Schwemmer 2021). These inter-topic correlations offer insight into how research topics are interrelated—for instance, whether papers that heavily discuss one topic also tend to discuss another. We leveraged network graph techniques to visualize the correlation matrix of topics, which helped us identify higher-level clusters of topics.

3.5 | Data Pre-Processing and Content Analysis

We carried out extensive data pre-processing to prepare the text for analysis. All abstracts were cleaned and standardized through a series of steps. We corrected encoding issues and spelling errors, and removed extraneous information (e.g., publication details or copyright statements) that could artificially influence the result. More specifically, we used the *TM* package (Feinerer and Hornik 2020) to clean the references accordingly, including wrongly encoded words and misspellings. General information such as journal name, year, and data rights was removed to avoid unwanted correlations between the abstracts. We pruned numbers and punctuations, lowercased words, and applied POS-tagging to annotate each of the words in the abstracts. Only nouns were selected for this analysis. A list of stop words was generated to exclude

academically common words that occur frequently across abstracts that otherwise would have added noise to the analysis. For the removal of stop words, we followed the procedure of Schofield et al. (2017) which recommends removing these types of words after model training. To decrease the word variations, all words were lemmatized to convert them back to their root form. Hereafter, we created a document-term matrix with unigram tokenization. The final document-term matrix consisted of 1966 terms, indicating a rich vocabulary on which the model could operate.

A critical decision in content analysis, and topic modeling in particular, is choosing the number of topics to extract—in our case, determining how many distinct research topics best represent the literature. There is no single optimal solution for the “right” number of topics; rather, it depends on the research objectives and the level of granularity desired (DiMaggio et al. 2013). If too few topics are chosen, each topic will be broad and heterogeneous, potentially mixing different themes together; if too many topics are chosen, some may be trivial or overly fragmented. To balance these considerations, we adopted a multi-step strategy combining quantitative metrics and qualitative judgment. The quantitative evaluation relied on two commonly used metrics: coherence (Mimno et al. 2011), which measures how frequently the top words in a topic co-occur, and exclusivity, which measures how unique those words are relative to other topics. We selected a narrower set of models (10–20 topics) for further qualitative inspection. The qualitative evaluation involved manually inspecting the generated topics for interpretability, structure, and theoretical relevance (DiMaggio et al. 2013). Three authors independently reviewed the top 10 most representative documents per topic and assessed interpretability based on three criteria adapted from Antons et al. (2023): (1) semantic coherence among the top keywords, (2) alignment of titles and abstracts with the emerging theme, and (3) conceptual distinctiveness from other topics. Disagreements were discussed in iterative meetings until consensus was reached. Topics were then assigned human-readable labels based on this interpretive process.

Fan et al. (2022) highlight the importance of balancing systematicity with generativity in literature reviews, emphasizing that computational methods like topic modeling must go beyond descriptive analysis to contribute theoretically. Their framework for advancing review methodology through rigor, scope, and transparency informs our approach, ensuring that our findings are both replicable and conceptually meaningful. While this process adds conceptual depth, we acknowledge that manual labeling introduces potential bias. We mitigated this by involving multiple reviewers, using standardized evaluation criteria, and ensuring reproducibility by re-running models with different random seeds.

This blended evaluation strategy led to the selection of a 14-topic solution, which was deemed optimal for this study's aims. Selected topics informed the development of research clusters, the integrative digital maturity framework, and the resulting research agenda. Topic quality was evaluated using established coherence metrics (Semantic coherence score = X , Exclusivity = Y), following validation protocols from (Mimno et al. 2011). According to Schmiedel et al. (2019), these metrics strengthen the methodological rigor of the validation process

by ensuring that extracted topics are interpretable and aligned with theoretical constructs. In keeping with Antons et al. (2023) emphasis on quantitative validation in computational reviews, the resulting coherence metric indicates that our model's interpretability exceeds chance levels (baseline = Z), supporting the selection of 14 topics.

4 | Findings and Discussion—Analysis of Topics

4.1 | Identified Topics Within Research on Young Consumers and Their Use of ICTs

To select the final number of topics, we fitted several models. The guiding process for capturing meaningful topics was in line with the explained procedure. The semantic coherence and exclusivity scores of the nearby models were calculated, and all models were explored before the final number of topics was set. From the examination of the different models, the model with 14 topics was chosen. See Table 1 for names of the topics, top words ranked from the most to the least representative, and PoC. We carried out a semantic validation of the main references that were classified into a particular topic with a high probability, and these allowed for manually naming each one of the topics. The identified top 10 words show higher probabilities of occurring in references related to a particular topic compared to their average chance of appearing across all references. Additionally, we checked for external validity by analyzing the 273 articles extracted from Web of Science for their fit regarding the identified topics. Each article was preprocessed as outlined in 3.5, and the topic distribution for the Web of Science references was inferred using the trained model. The degree of topic fit was assessed by computing the topic probability per article, and then we assessed the dominance of certain topics (see Appendix A for a detailed description and information on paper-topic correlations). This validation process showed that the thematic content of these additional articles from Web of Science aligns with the overall topics identified using the Scopus database.

Within the field of research on young consumers and their use of ICTs, the identified topics are 1—parental mediation and care, 2—child development and skills, 3—teachers' use of ICT, 4—digital risks, 5—technology acceptance and adoption, 6—interventions and treatments, 7—family environment, 8—gaming, 9—health and well-being, 10—screen-time and online activities, 11—social media sites and social networks, 12—divides/differences, 13—education, and 14—learning tools.

4.1.1 | Topic 1—Parental Mediation and Care

Topic 1 reflects a growing shift in the literature from parental control toward more collaborative approaches to guiding youth ICT use. Studies explore how parenting styles, mediation strategies, and parental device use influence children's digital habits, family relationships, and developmental outcomes (Dworkin et al. 2023). A notable theme is the role of “technoference” (McDaniel and Radesky 2018; Zayia et al. 2021)—the disruption of parent-child interaction by parents' device use—and its impact on youth well-being. More recently, the concept of active mediation has emerged as a positive developmental influence,

TABLE 1 | Topics identified through STM.

#	Name of topic	Top words	PoC
1	Parental mediation and care	Parent, child, mediation, home, parenting, practice, attitude, level, perception, concern	8.3%
2	Child development and skills	Child, development, language, play, disability, need, education, skill, read, environment	9.1%
3	Teachers' use of ICT	Teacher, classroom, teach, educator, childhood, child, practice, datum, literacy, learn	9.5%
4	Digital risks	People, risk, adolescent, internet, life, youth, cyberbullying, self, bully, problem	9.9%
5	Technology acceptance and adoption	Application, user, process, intention, field, app, way, people, tool, acceptance	6.9%
6	Interventions and Treatments	Child, intervention, service, health, pandemic, Covid, treatment, care, caregiver, challenge	7.0%
7	Family environment	Family, child, practice, home, member, life, relationship, case, datum, environment	6.0%
8	Gaming	Game, woman, child, usage, girl, relationship, phone, prevention, adolescent, internet	3.7%
9	Health and well-being	Time, health, activity, adolescent, behavior, sleep, internet, child, quality, development	4.7%
10	Screen-time and online activities	Child, device, activity, age, time, screen, tablet, home, development, skill	7.3%
11	Social media sites and social networks	Medium, student, people, community, network, participation, issue, datum, university, relation	6.2%
12	Divides/differences	Computer, adult, child, gender, attitude, difference, role, access, support, way	4.1%
13	Education	Education, student, program, teach, process, school, skill, tool, competence, curriculum	10.3%
14	Learning tools	School, project, access, learn, practice, learner, country, way, engagement, context	6.8%

Note: PoC is the abbreviation for the proportion of the body of work.

enabling children to navigate digital environments with greater autonomy and critical awareness. This topic directly supports the development of digital maturity by highlighting how emotionally supportive and dialogic mediation practices help youth build self-regulation, media literacy, and digital citizenship. However, few studies explicitly link these mediation strategies to long-term behavioral trajectories or structural inequalities.

4.1.2 | Topic 2—Child Development and Skills

Topic 2 focuses on the ways ICTs influence children's cognitive, emotional, and social development. Studies in this area emphasize skill-building, creativity, empathy, and early literacy—outcomes often fostered through interactive tools and content (Igwesi et al. 2012; Walker and Venker Weidenbenner 2019; Zhou and Li 2021). This aligns with the cognitive and emotional dimensions of digital maturity, particularly how children learn to express themselves, relate to others, and adapt to increasingly digital environments. Despite its early prominence, this topic has seen declining prevalence over time.

4.1.3 | Topic 3—Teachers' Use of ICT

Topic 3 examines how teachers facilitate digital learning and shape students' ICT engagement within formal education environments. Educators are often portrayed as agents of digital transformation, with research emphasizing their training, technological confidence, and ability to adapt pedagogy to evolving tools (Blackwell et al. 2014; Sahin et al. 2016; Turbill 2001). This aligns closely with the cognitive and behavioral dimensions of digital maturity, especially in cultivating student agency, digital literacy, and adaptive learning habits. However, several studies highlight gaps in teacher preparedness and institutional support, which may widen inequalities in digital learning outcomes.

4.1.4 | Topic 4—Digital Risks

Topic 4 captures the rising attention to online risk, including cyberbullying, digital addiction, online gambling, and threats to data privacy (Amendola et al. 2020; Diaz-Lopez et al. 2024; Sharma et al. 2017). While early studies focused on risk

enumeration, more recent work explores how youth perceive and manage risk, highlighting agency, coping strategies, and protective behaviors (Burnell et al. 2023; Fontana et al. 2023; Lareki et al. 2017; Mitchell et al. 2018). These dynamics are closely tied to the emotional regulation and autonomy dimensions of digital maturity: youth must learn to set boundaries, seek help, and respond to negative digital experiences. However, despite growing interest in resilience, few studies take a longitudinal approach or examine structural factors—such as socio-economic status or platform design—that shape risk exposure and coping capacity.

4.1.5 | Topic 5—Technology Acceptance and Adoption

Topic 5 applies and extends technology acceptance models to young consumers, focusing on constructs such as perceived usefulness, ease of use, social influence, and lifestyle compatibility. Youth-specific factors—such as gamification, peer engagement, and contextual relevance—emerge as key drivers of adoption (Phan et al. 2020; Wang and Li 2017; Wut et al. 2021). A recurring theme is the gap between access to digital tools and actual engagement or usage. While most studies focus on short-term behavioral intentions, this topic contributes to the autonomy dimension of digital maturity, emphasizing how young consumers develop preferences and make independent decisions around technology use. However, few studies connect technology acceptance to broader developmental outcomes or link it to behavioral regulation over time.

4.1.6 | Topic 6—Intervention and Treatment

Topic 6 covers both clinical and educational interventions designed to mitigate digital harm and promote healthier technology use among youth. Recent work has shifted from restrictive frameworks to more proactive digital well-being programs that empower young consumers to reflect on their habits and make autonomous choices (Chafouleas et al. 2020; He et al. 2023; Plevinsky et al. 2022). These approaches align with all three dimensions of digital maturity—cognitive, emotional, and behavioral—by cultivating self-awareness, emotional regulation, and adaptive media practices. Despite these promising developments, intervention studies often lack longitudinal follow-up and rarely assess how interventions influence broader consumer behavior.

4.1.7 | Topic 7—Family Environment

Topic 7 examines how young consumers' digital practices are embedded in broader family dynamics, including parenting values, home routines, and socio-economic conditions (Kumar and Sriram 2021). Studies highlight that ICT use is not solely an individual choice but part of intergenerational exchanges and social learning processes. These dynamics directly affect all three dimensions of digital maturity—cognitive, behavioral, and emotional—by shaping how youth access, interpret, and manage digital content within the family system. For example, economically constrained households may foster adaptive skills or reinforce digital inequalities depending on access and support

structures. Yet, this topic remains underdeveloped in terms of causal mechanisms: few studies investigate how family norms evolve alongside youth digital competencies or how intra-family power dynamics affect digital autonomy.

4.1.8 | Topic 8—Gaming

Topic 8 occupies a contested space in the literature, recognized both for its risks—such as addiction and social withdrawal—and its developmental potential. Recent studies explore how games can support identity formation, resilience, and prosocial behavior when embedded in supportive environments (Díaz-López et al. 2020; Ohannessian and Vannucci 2020; Smith et al. 2015). This duality makes gaming highly relevant to the emotional and behavioral dimensions of digital maturity. Emotion regulation, impulse control, and respectful interaction within digital play environments are recurring subthemes. Yet, few studies explicitly assess how gaming habits influence or reflect broader developmental trajectories.

4.1.9 | Topic 9—Health and Well-Being

Topic 9 reflects the growing emphasis on how digital engagement shapes young people's psychological and physical well-being. Moving beyond simplistic screen-time metrics, recent studies explore the quality, context, and intentionality of ICT use—highlighting sleep patterns, physical activity, and mental health outcomes (Fomby et al. 2021; Perrino et al. 2019). This topic intersects with all three dimensions of digital maturity. For example, emotionally regulated youth may experience fewer negative affective consequences from digital use, while cognitively mature youth are better able to evaluate health information and monitor their own media habits. However, few studies examine how digital behaviors interact with lifestyle choices over time.

4.1.10 | Topic 10—Screen-Time and Online Activities

Topic 10 interrogates simplistic narratives linking screen time with harm by shifting focus to the context, content, and purpose of youth ICT engagement. Studies show that not all screen time is equivalent; rather, the cognitive demands, interactivity, and social affordances of digital tools vary significantly (Cerniglia et al. 2021; Shatskaya et al. 2023). For example, youth interactions with touchscreen technologies (Dempsey et al. 2018) and voice assistants Oranç and Ruggeri (2021) demonstrate a growing sophistication in how children navigate digital interfaces. These studies align with the cognitive and behavioral dimensions of digital maturity, particularly in highlighting the development of functional digital literacy and media habits. However, relatively few studies assess how device-specific engagement supports self-regulation or decision-making.

4.1.11 | Topic 11—Social Media and Social Networks

Topic 11 explores how youth use social media platforms to construct identity, maintain peer relationships, and participate

in digital communities (Calenda and Meijer 2011; Osman et al. 2023; Pang 2023). Affective dynamics—such as social comparison, validation-seeking, and peer reinforcement—emerge as key behavioral patterns, with strong ties to the emotional and social dimensions of digital maturity. Participatory culture is a recurring theme, suggesting both empowerment and pressure: while some youth gain confidence and voice, others experience stress, exclusion, or self-censorship. Yet, few studies address how young consumers navigate conflicting social cues or manage their emotional responses over time.

4.1.12 | Topic 12—Divides/Differences

Topic 12 highlights persistent digital inequalities related to socioeconomic status, gender, and geographic location (Jackson et al. 2008; Tondeur et al. 2011). While early studies focused on access, more recent work emphasizes structural enablers of digital inclusion and the concept of meaningful use. These disparities intersect closely with the development of digital maturity, particularly in shaping young consumers' opportunities to develop cognitive, emotional, and behavioral competencies. For instance, unequal exposure to quality digital environments may limit the ability to develop media literacy or regulate screen time effectively. However, research on this topic remains relatively fragmented and often lacks longitudinal depth.

4.1.13 | Topic 13—Education

Topic 13 focuses on how formal education systems integrate ICTs to support differentiated learning, foster inclusion, and enhance curriculum responsiveness (Hoogland and Tout 2018; McLinden et al. 2006; Muñoz-Repiso and Caballero-Gonzalez 2019; Pařová et al. 2020). Educational settings are portrayed not only as sites of technology adoption but also as critical environments for developing digital maturity—particularly cognitive and behavioral dimensions. For instance, exposure to robotics, adaptive learning platforms, and interactive tools may cultivate skills in problem-solving, digital collaboration, and self-regulated learning. Despite this potential, there is limited research on how educational institutions support emotional aspects of digital maturity, such as resilience or digital citizenship.

4.1.14 | Topic 14—Learning Tools

Topic 14 explores the role of digital tools in facilitating informal and lifelong learning, often outside the structure of formal education (Bulfin and North 2007; Lewin and Luckin 2010; Sørensen et al. 2007). Emphasis is placed on usability, learner autonomy, and the evolving ecosystem of educational technologies, including apps, gamified environments, and self-paced platforms. These tools are particularly relevant for supporting the cognitive and behavioral dimensions of digital maturity, enabling youth to acquire new knowledge, develop digital skills, and build habits of self-directed learning. However, most existing studies focus on tool functionality rather than

how learners interact with these technologies across developmental stages.

4.2 | Most Cited References (Validation)

To understand the topics identified from the topic model that have been influential in shaping the research field, we classified the most cited references from the corpus. For each of the references, the model produced a topic distribution with probabilities for belonging to each of the topics. The topic distribution for each reference is shown in Table 2. From Table 2, our analysis showed that the most cited references within this field of research have devoted their attention to a mix of several topics. However, some topics are more dominant than others.

Orben and Przybylski (2019) focused mainly on health and well-being (Topic 9) and explored the association between well-being and the use of digital technology among young consumers. Mishna et al. (2012) also examined digital risks (Topic 4) but from an educational perspective (Topic 13). Przybylski and Weinstein (2017) investigated digital risks (Topic 4) combined with health and well-being (Topic 9) as well as screen time and online activities (Topic 10). Margaryan et al. (2011) examined education (Topic 13) alongside social media sites and social networks (Topic 11) and learning tools (Topic 14) by investigating the extent to which young consumers use digital technologies for learning and socializing. Roschelle et al. (2000) combined a mix of the topics, teachers' use of ICT (Topic 3), technology acceptance and adoption (Topic 5), divides/differences (Topic 12), education (Topic 13), and learning tools (Topic 14), to explore the various ways in which digital devices can facilitate learning in an educational setting. Bennett and Maton (2010) sought to get a more nuanced understanding of young consumers' technology experiences and focused on two topics; technology acceptance and adoption (Topic 5) as well as social media sites and social networks (Topic 11). See Table 2 for most cited references and their connection to extracted topics.

5 | Findings and Discussion—Thematic Cluster Extraction

This review follows Antons et al. (2023), demonstrating the robustness of computational literature review for field mapping, especially where topic diversity is high. Their framework guided our analytic pipeline from data extraction to manual validation.

5.1 | Thematic Cluster Extraction Through Topic Co-Occurrence

In Figure 3, the correlation network for the identified topics is visualized. The extent to which the topics correlate positively can be seen in Table 3. Overall, three major clusters and two single-research-topic clusters were observed. The first cluster—education and learning theme (blue cluster)—entails the single

TABLE 2 | Most cited references and topic associations.

References	Topic distribution													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Orben and Przybylski (2019) [Cit: 639]	0.017	0.019	0.003	0.307	0.119	0.042	0.017	0.012	0.376	0.015	0.022	0.011	0.017	0.023
Margaryan et al. (2011) [Cit: 633]	0.006	0.016	0.032	0.044	0.044	0.005	0.004	0.005	0.005	0.007	0.192	0.009	0.48	0.151
Roschelle et al. (2000) [Cit: 389]	0.008	0.037	0.138	0.01	0.167	0.007	0.003	0.006	0.003	0.014	0.012	0.108	0.373	0.114
Bennett and Maton (2010) [Cit: 385]	0.005	0.03	0.055	0.021	0.618	0.005	0.003	0.005	0.005	0.009	0.128	0.006	0.09	0.021
Przybylski and Weinstein (2017) [Cit: 384]	0.022	0.009	0.001	0.049	0.015	0.021	0.012	0.007	0.798	0.029	0.015	0.007	0.005	0.009
Mishna et al. (2012) [Cit: 384]	0.035	0.005	0.006	0.748	0.006	0.004	0.003	0.007	0.006	0.003	0.016	0.025	0.119	0.017

Note: The topic distribution for each reference sums up to 1. Bold probabilities highlight influential topic(s).

topic from an educational perspective with (i) teachers' use of ICT (Topic 3), education (Topic 13), and learning tools (Topic 14) together with young consumers perspective with Topic 2 (child development and Skills). The second cluster—ICT use, young consumers' well-being, and parental style (red cluster)—consists of a network of potential antecedents of young consumers' health and well-being (Topic 9) such as (i) screentime activities (Topic 10) and (ii) divides/differences (Topic 12) mediated by parental mediation and care (Topic 1), family environment (Topic 7), and intervention and treatment (Topic 6). The third major cluster—social interaction (green cluster)—connects the two topics: digital risks (Topic 4) with social media sites and social networks (Topic 11), relating insights on digital opportunities and risks with young consumers' way of socializing and connecting through technology. Additionally, the two stand-alone clusters were technology acceptance and adoption (Topic 5) and gaming (Topic 8).

5.2 | Thematic Cluster Discussion

5.2.1 | Cluster 1—ICT Education and Learning for Young Consumers

This cluster highlights research on young consumers' use of ICT in educational settings and their digital competencies. It focuses on how ICTs serve as learning tools in classrooms, as noted by Sutherland et al. (2004). The effectiveness of ICT use in schools often depends on teachers' attitudes and experience with technology. For example, Bodsworth and Goodyear (2017) discuss barriers and facilitators for teachers using ICT educationally, while they emphasize the need to equip teachers with the latest technology. There is a link between teachers' ICT use and child development, suggesting that teachers can enhance young consumers' digital skills. Research in this area explores how teachers can foster digital literacy among young consumers (Comber et al. 2017).

5.2.2 | Cluster 2—ICT Use, Young Consumers' Well-Being and Parental Style

This is the largest cluster, focusing on young consumers' behavior with ICTs at home. ICT use is linked to well-being, affecting physical and mental health, social skills, and relationships. Differences in online activities and screen time are influenced by age, gender, socio-economic status, and ethnicity, as studied by McKenney and Voogt (2010). These topics connect to parental mediation and care, highlighting the role of parental style in ICT use. Parents' concerns and interactions with children on digital devices are crucial (Danet 2020; Wood et al. 2016). Parental ICT use can impact young consumers, with Yang et al. (2023) noting negative effects of parental phubbing on well-being. Parents' mediation roles vary with age and experience (Vaterlaus et al. 2015). The family environment influences ICT use, affecting communication (Rudi et al. 2015) and family practices (Plowman et al. 2008). Creating a positive ICT environment at home is essential.

From the family environment, there is a link to intervention and treatment. ICT-enhanced service delivery supports low-income families (Anton et al. 2016) and those in rural areas (Olsen

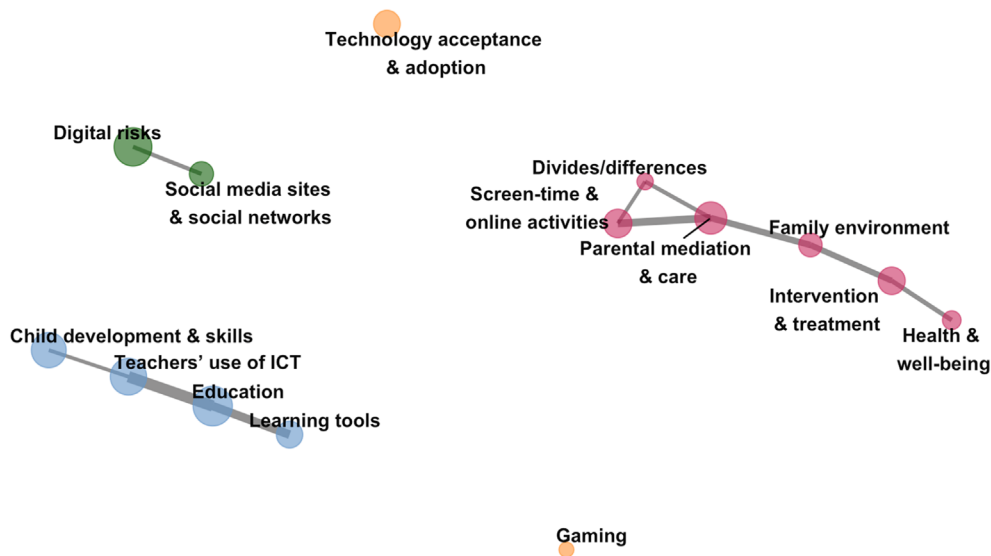


FIGURE 3 | Correlation network of the topics estimated by STM. *Note:* Node size is scaled by PoC and edges as well as edge width are calculated from the correlations.

et al. 2012). It also aids young consumers needing support due to disabilities or disorders, impacting family functioning. ICT-enhanced interventions help prevent issues like obesity among young consumers (Faisal et al. 2022; Tate et al. 2013), linking intervention, treatment, and well-being.

5.2.3 | Cluster 3—Social Media Interaction and Digital Risks in Young Consumers

This cluster explores how young consumers' interactions on social media influence their consumption behavior and perceptions of risk and privacy. It also highlights the digital risks they face. The connection between these topics is illustrated by (Chen et al. 2017), where the relationship between certain predictors and cyberbullying perpetration and victimization is examined.

5.2.4 | Cluster 4—Young Consumers Technology Acceptance and Adoption

This cluster plays an ambivalent role in the literature on young consumers' ICT behavior, as it is not connected to the three main clusters shown in Figure 3. This may suggest that the topic is highly focused on specific constructs related to young consumers' acceptance and behavioral intentions with digital devices. For instance, Koenig-Lewis et al. (2015) expanded the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to predict young consumers' adoption of mobile payments. Phan et al. (2020) also used the latter theory to explore factors influencing young consumers' behavioral intentions.

5.2.5 | Cluster 5—Young Consumers and Gaming

This gaming cluster shows little correlation with other topics, possibly due to its lack of coherence based on key terms. Some references concentrate on specific game design (Al Mahmud et al. 2007;

Ribeiro and Raposo 2014), while others examine video game usage (Smith et al. 2015) or the application of computing techniques to enhance games for young consumers (Graven et al. 2014).

5.3 | Cluster Evolution Over Time

As research on young consumers' ICT use is evolving, the prevalence of each topic within their thematic cluster was plotted as a linear function of time to look into trends. The expected topic proportions were obtained for each topic across time. The trajectories of the identified topics within each thematic cluster are shown in Figure 4.

In Cluster 1: ICT Education and Learning for Young Consumers, there is a noticeable decline in research interest in recent years across all associated topics. This trend may reflect the growing debate around the role of ICTs in education, including arguments for their restriction or even removal from learning environments (Selwyn and Aagaard 2021). Concerns over the disruptive nature of these technologies, alongside evidence that ICT use does not consistently improve academic outcomes (Anthony et al. 2021; Beland and Murphy 2016), may explain the declining publication trend within this area. In contrast, most topics within the same cluster—such as social media interaction and digital risks among young consumers—have gained increased scholarly attention. One exception is the subtopic of digital divides and differences, which has experienced a decrease in publication volume. This decline may be tied to diminishing focus on issues of access, as indicated by the reduced prominence of the term “access” among key terms. As Scheerder et al. (2017) observe, the research landscape has shifted away from access-related inequalities and toward examining how the internet is used. Consequently, research on divides and differences appears to be increasingly integrated into broader, usage-focused themes.

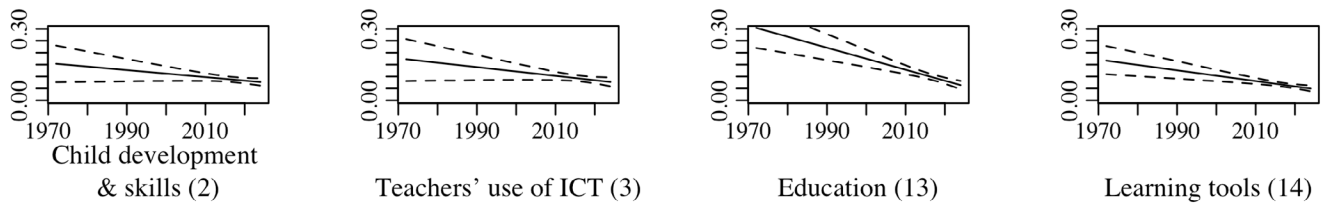
In Cluster 4: Technology Acceptance and Adoption, publication activity has remained relatively stable over time. This steadiness

TABLE 3 | Positive correlations between topics.

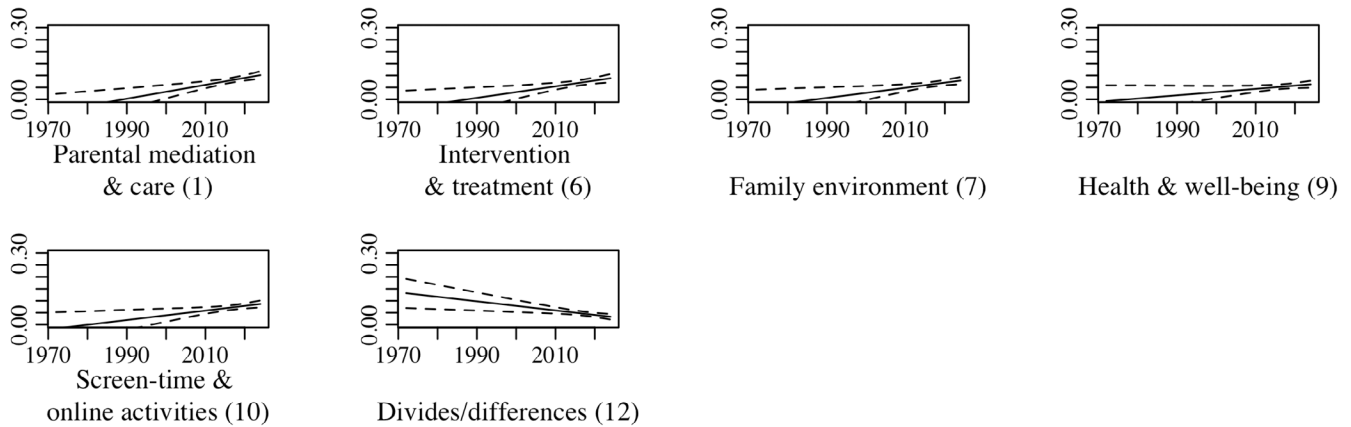
Topics	Topics													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Parental mediation and care	0.000	0.000	0.000	0.000	0.000	0.000	0.061	0.000	0.000	0.093	0.000	0.006	0.000	0.000
Child development and skills	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teachers' use of ICT	0.000	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.170	0.000
Digital risks	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.008	0.000	0.000	0.000
Technology acceptance and adoption	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Interventions and treatments	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.000	0.024	0.000	0.000	0.000	0.000	0.000
Family environment	0.061	0.000	0.000	0.000	0.000	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gaming	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Health and well-being	0.000	0.000	0.000	0.000	0.000	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Screen-time and online activities	0.093	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000
Social media sites and social networks	0.000	0.000	0.000	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Divides/differences	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.002	0.000	0.000	0.000	0.000
Education	0.000	0.000	0.170	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.108
Learning tools	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.108	0.000

Note: 1 = Parental mediation and care; 2 = Child development and skills; 3 = Teachers' use of ICT; 4 = Digital risks; 5 = Technology acceptance and adoption; 6 = Interventions and treatments; 7 = Family environment; 8 = Gaming; 9 = Health and well-being; 10 = Screen-time and online activities; 11 = social media sites and social networks; 12 = Divides/differences; 13 = Education; and 14 = Learning tools. See Table 1 with name, top words, and PoC.

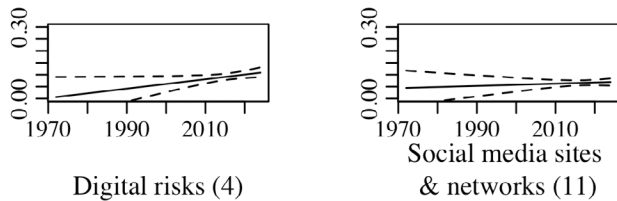
Cluster 1 - ICT Education and Learning for Young Consumers



Cluster 2 - ICT Use, Well-being and Parental Style



Cluster 3 - Social Media Interaction and Digital Risks



Cluster 4 - Technology Acceptance AND Cluster 5 - Gaming

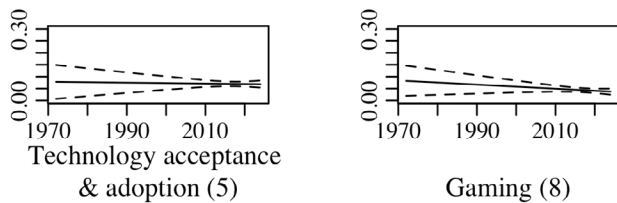


FIGURE 4 | Topic prevalence over time.

may reflect the continuous emergence of new technologies and applications, which sustain interest in the field. Notable examples of such innovations include virtual assistants (Teixeira et al. 2022; Wald et al. 2023) and robotic technologies (Conti et al. 2017; Kossewska and Klosowska 2020; Teixeira et al. 2022). Meanwhile, Cluster 5: Gaming demonstrates a downward trend in research output. This reduction could be due to the topic's increasing integration into broader digital consumption themes. Rather than

treating gaming as a standalone subject, current research more often situates it within discussions of digital risks, screen time, and social media use—topics found in Cluster 2, which have shown a growing relevance. For instance, Metin-Orta and Demirtepe-Saygili (2023) explored gaming alongside social media and networking site use as potential cyberloafing behaviors among young consumers. Similarly, Keen and Gainsbury (2021) identified connections between gaming and digital risk exposure.

6 | Derivation of an Integrative Digital Maturity Framework

Following the computational literature review, the proposed integrative digital maturity framework (Figure 5) is grounded in both the emergent thematic clusters from our computational analysis and deductively formed theoretical models of digital maturity. For the first evidence of observable connections between our

computational literature review and the novel concept of young consumers' digital maturity and to offer a start, Table 4 presents a correlational overview that links the 14 identified topics from the computational literature review (see Table 1) with the current literature that explicitly references digital maturity, drawing primarily from Laaber et al. (2023). This analysis reveals meaningful interconnections between the broader topic landscape and the conceptual underpinnings of digital maturity, but also identifies

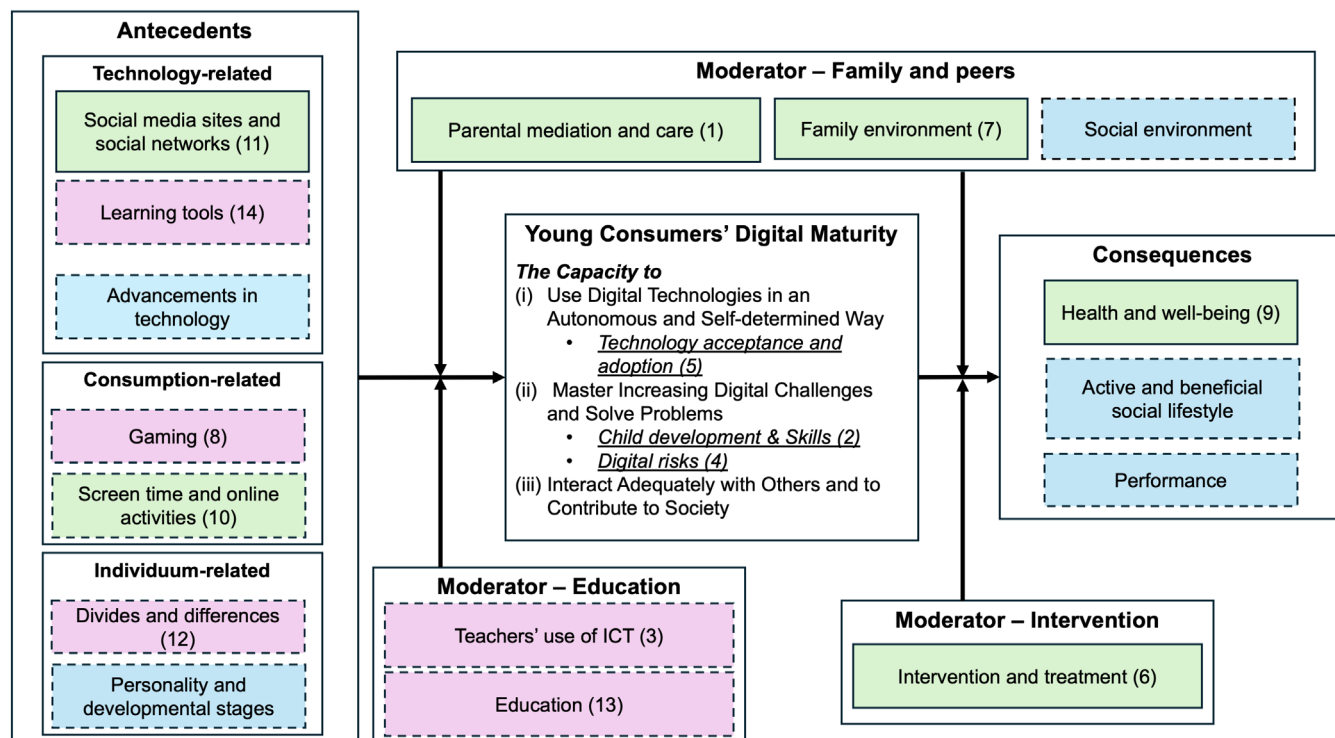


FIGURE 5 | Integrative digital maturity framework. *Note:* Green=topics with an increasing output; red=topics with a declining output, blue=new/neglected topics (see Figure 4); straight line=topics connected to digital maturity research, dotted line=topics not connected to digital maturity (see Table 4).

TABLE 4 | Interdependency between research on young consumers' digital maturity and extracted topics.

References	Topics													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Arenas and Yazdi (2022)	0.030	0.118	0.024	0.092	0.298	0.158	0.024	0.028	0.028	0.044	0.032	0.046	0.043	0.035
Gracia et al. (2023)	0.020	0.047	0.018	0.181	0.295	0.014	0.009	0.016	0.012	0.021	0.096	0.187	0.044	0.040
Hofmans et al. (2024)	0.017	0.033	0.027	0.071	0.460	0.066	0.011	0.033	0.045	0.024	0.035	0.063	0.080	0.036
Koch et al. (2024)	0.189	0.007	0.000	0.381	0.004	0.017	0.294	0.007	0.058	0.008	0.011	0.006	0.002	0.007
Laaber et al. (2023)	0.042	0.014	0.001	0.245	0.007	0.033	0.350	0.006	0.169	0.087	0.013	0.010	0.004	0.014
Laaber et al. (2024)	0.014	0.031	0.008	0.031	0.553	0.019	0.008	0.014	0.158	0.026	0.027	0.067	0.027	0.017

Note: 1= Parental mediation and care; 2= Child development and skills; 3= Teachers' use of ICT; 4= Digital risks; 5= Technology acceptance and adoption; 6= Interventions and treatments; 7= Family environment; 8= Gaming; 9= Health and well-being; 10= Screen-time and online activities; 11= social media sites and social networks; 12= Divides/differences; 13= Education; and 14= Learning tools. See Table 1 for more information.

topics that are currently not covered or connected. Importantly, while educational topics (e.g., Topics 3, 12, 13, 14), screen time (Topic 10), and gaming (Topic 8) show weaker associations with digital maturity in the literature, other themes—particularly digital risk (Topic 4) and technology acceptance and adoption (Topic 5)—are well represented in recent empirical work on youth digital engagement (Arenas and Yazdi 2022; Gracia et al. 2023; Hofmans et al. 2024; Koch et al. 2024; Laaber et al. 2023, 2024). These links support the need for a holistic framework that integrates diverse research topics and reflects the complexity of young consumers' developmental pathways in digital environments.

Against these insights, Figure 5 provides a visual synthesis of how the thematic clusters and topics identified through our computational literature review relate to the concept of digital maturity in young consumers. The figure categorizes each topic and cluster according to its conceptual role: some are positioned as antecedents of digital maturity (e.g., social media sites and social networks, or screen time and online activities), others are framed as consequences (e.g., health and well-being), while certain streams are understood to function as moderators (e.g., parental mediation and care, or teachers' use of ICT). The color coding further conveys the temporal trajectory of each stream, with green nodes indicating areas of increasing scholarly attention and red nodes reflecting declining research output over time. Additionally, the figure highlights a subset of neglected or emerging themes—depicted in blue—that, despite their lower prevalence, may hold potential for understanding digital maturity and warrant further exploration.

The integrative framework anchored within young consumer digital maturity positions digital maturity as a mediating construct within a broader causal model linking technology-related, consumption-based, and individual-level antecedents to attitudinal and behavioral outcomes. Given the contextual nature of young consumers' ICT engagement and the formation of digital maturity (Hofmans et al. 2024), the model incorporates key moderating variables such as educational influences (Gracia et al. 2020), peer and family dynamics (Koch et al. 2024), and external interventions (Hofmans et al. 2024). By anchoring the framework in the concept of digital maturity, it becomes possible to unify the currently fragmented literature on youth ICT behavior under a cohesive theoretical structure. This integrative perspective offers a clearer roadmap for future research, highlighting digital maturity as a central lens through which to explore the developmental, contextual, and behavioral dimensions of young consumers' digital lives (see Figure 5).

7 | Future Research Agenda and Implications

The integrative digital maturity framework proposed in Figure 5 offers a theoretical lens for understanding how digital engagement evolves during youth, bridging siloed research across education, media studies, and consumer behavior. Building on the insights and future directions presented in Figure 5, this section discusses and consolidates the theoretical and practical contributions of the study and articulates a coherent agenda for future research. Our findings deepen the understanding of digital maturity as a central construct in young consumers' digital engagement, revealing how distinct digital maturity archetypes are shaped by motivational, behavioral, and strategic dimensions of

ICT use. It invites future work discussed in the following sub-chapters to explore digital maturity not only as an outcome but also as a mediating mechanism through which digital experiences, social environments, and platform designs influence consumer trajectories.

7.1 | Core Concept—Young Consumers Digital Maturity

Young consumers' digital maturity is grounded in three main capacities: the capacity to (i) use digital technologies in an autonomous and self-determined way, (ii) master increasing digital challenges and solve problems, and (iii) interact adequately with others and contribute to society (Laaber et al. 2023). The findings of our computational literature review suggest three extracted topics connected to the three conceptualized capacities of digital maturity (see Figure 5).

First, technology acceptance and adoption (5) is an important mechanism underlying the development of the capacity to use digital technologies in autonomous ways. Technology acceptance and adoption is often associated with important constructs such as the perceived usefulness and ease of use of technological devices, but also with facilitating conditions and lifestyle compatibility (Blut et al. 2021); constructs crucial for allowing young consumers to act autonomously and with self-determination in relation to technology and content use (Laaber et al. 2023). Although technology acceptance and adoption is an important driver of ICT use behavior (Blut et al. 2021), the topic shows no strong connection to young consumers' ICT use behavior (see Figure 3). Thus, applying the strong research base on technology acceptance and adoption (Blut et al. 2021) in combination with the concept of digital maturity could open up for a more interdisciplinary approach. The identification of drivers and inhibitors of technology acceptance and adoption, as well as how these relate to digital maturity in young consumers, offers novel research directions for understanding the role autonomy and self-determination play in interaction with mobile devices and digital content. Future research might show, for example, how perceived effort expectancy or ease of use of automated and personalized digital content (Meyer 2016; Mtshali et al. 2023) supports or inhibits the establishment of self-determination in young consumers (Kucirkova 2019; Nota et al. 2011).

Second, with regard to the capacity to master increasing digital challenges and solve problems, the extracted topic of digital risks (4) has strong associations to underlying dimensions. The topic offers insights on digital maturity research (Laaber et al. 2023, 2024) in relation to the awareness of risks in a digital environment. The topic is an important component for young consumers' potential for navigating safely in digital environments (Haddon and Livingstone 2017). Regarding future research avenues, it is evident that the establishment of digital maturity and the topic of digital risk are highly interrelated (Hofmans et al. 2024; Koch et al. 2024; Laaber et al. 2023, 2024). Research should start to focus more on a nuanced and detailed investigation within segments of young consumers based on their digital maturity (Arenas and Yazdi 2022) and what type of content and application might lead to lower or higher awareness and perception of digital risk. In addition, another topic of child development and

skills (2) shows a correlation with digital maturity. This topic seems important for young consumers individual growth within digital environments (Laaber et al. 2023) and ability to seek support (Haddon and Livingstone 2017). While the topic of digital risks (4) shows an increase in prevalence, child development and skills are declining in research output, which might be a critical direction. As the establishment of digital literacy and skills (Livingstone and Helsper 2010) is not always directly connected to beneficial consequences (e.g., performance), the potential of digital maturity as a denominator and different theoretical angles could support a new direction and rejuvenation of research. Future research might investigate not only the necessity of building the “right” skills and literacy, it might also investigate which skills support individual growth and thus young consumers’ digital maturity from a lifelong learning perspective.

Third, with regard to the capacity to interact adequately with others and to contribute to society, none of the extracted topics could be directly associated. Although parts of the capacity are embedded in emotional reactions (Kaymakçı et al. 2022) and prosocial behavior (Moyle 2014), research is needed to shed more light into one of the more complex and under-researched capacities of young consumers’ digital maturity. As this capacity—compared to the other two capacities—has a stronger theoretical grounding in young consumers’ capabilities to interact and to add value to societal activities, research is needed to investigate what establishes and describes digital citizenship or emotion regulation in a digital world. Could we identify differences and similarities between the online and offline worlds? Is there a more normative approach to set concrete benchmarks of digital citizenship to support the evaluation of increases or decreases in digital maturity and the related capacity?

7.2 | Antecedents and Consequences of Young Consumers’ ICT Behavior

Within the integrative framework, we assume a causal relationship between antecedents and consequences of young consumers’ ICT behavior mediated by young consumers’ digital maturity. Regarding antecedents, we differentiate between technology-, consumption-, and individual-related antecedents. Regarding consequences, we propose the integration of the extracted topic on health and well-being (9)—crucial and strongly connected to young consumers’ ICT behavior (see cluster 2) and also used in research associated with digital maturity (Laaber et al. 2024). Furthermore, we propose the integration of two new consequences—active and beneficial social lifestyle (e.g., consumption style) and performance (e.g., academic)—which have been seen as increasing outcomes of research on ICT behavior in general and are strongly connected with advancements in technology (e.g., new tools of interaction, consumption, knowledge sharing) (François et al. 2023; Khalil and Abdallah 2013).

7.2.1 | Technology-Related Antecedents and Consequences

First, a major topic in young consumers’ ICT behavior as well as still increasing in prevalence is social media sites and social networks (11). As the topic delves into young consumers’

platform use for diverse purposes (e.g., networking, peer interaction, knowledge and information seeking) (Calenda and Meijer 2011), it plays a major role for positive (e.g., peer support; Drouin et al. (2020)) but also negative (e.g., technostress, bullying; Bravo-Adasme and Cataldo (2022); Sulc et al. (2021)) consequences of their usage. Thus, linking the topic of social media sites and networks to potential consequences through young consumers’ digital maturity offers research opportunities to clarify their role when, how, and why the use of social media will indicate a more positive or negative consequence on young consumers’ well-being (McLoughlin et al. 2018) and lifestyle (Nwegbu and Echezona 2010). According to this, the network analysis already indicates an important connection to the topic of digital risks (4)—an important dimension of digital maturity (Laaber et al. 2023). Nevertheless, future research could shed light on a nuanced analysis of the differences and purposes of social media networks (e.g., TikTok, Instagram, WhatsApp; Žanić et al. (2023)), their underlying mechanisms and algorithms of persuasion. For example, studies could analyze social network effects on digital maturity dimensions (e.g., seeking for support, respect toward others, emotion regulation) and how those dimensions—if enabled—either buffer negative effects or facilitate positive effects of network usage (e.g., privacy behavior, consumption behavior).

Second, the topic of learning tools (14) is part of the educational cluster and is strongly decreasing in research relevance over time. As digital maturity is mainly conceptualized in everyday activities and is not directly related to education (Laaber et al. 2023), the topic shows only marginal correlation with explicit digital maturity research (see Table 4). Although it might be of interest to investigate how the impact of (digital) learning tools on performance measures (e.g., academic success) might be mediated through digital maturity, we would not indicate this research as a top priority. Reasons are related to the decline in research interest in learning tools, with a potential peak during the Covid19crisis (Izci et al. 2023), but also due to the blurred lines of mobile devices being able to be used within and outside of learning environments. Nevertheless, future research could especially investigate the impact of digital maturity mediating the relationship between the application of learning tools and academic success within a seamless learning experience (e.g., using learning application in and out of class activities). Furthermore, research could reinvestigate the effects of ICT education and learning tools on (i) young consumers’ creativity and problem-solving skills, (ii) young consumers’ social skills and relationships, or (iii) young consumers’ career choices for the digital economy—mediated by dimensions of young consumers’ digital maturity.

Third, as digital transformation and technological advances develop rapidly, new types of human-object activities (Hoffman and Novak 2018) evolve, such as (service) robots (Kossewska and Klosowska 2020; Li and Wang 2022), virtual and augmented reality (Møller et al. 2020) or underlying advanced learning mechanisms such as artificial intelligence (Flogie et al. 2019). Although neither extracted within the computational literature review nor explicitly connected to young consumers’ digital maturity, these topics—advancements in technology—call directly for future research—with young consumers on the forefront of adopters and target

group. Thus, future research could examine if digital maturity has the potential to mediate the relationship between the use of emerging technologies like generative AI and performance. For example, studies could analyze young consumers prompting behavior in relation to the digital maturity dimension related to young consumers problem-solving skills (e.g., seeking for support) and how this dimension can either lead to a positive or negative effect on the exploitation of opportunities within the digital environment.

7.2.2 | Consumption-Related Antecedents and Consequences

First, the topic on gaming (8) as a standalone cluster was surprisingly not connected to other research clusters and only shows marginal correlations to the digital maturity literature (see Table 4). Despite its decline in research interest, we believe that a better connection to the concept of digital maturity could be the missing link to provide new evidence on how gaming might not only negatively impact the consequences of young consumers' ICT behavior (e.g., gaming addiction; Kaymakçı et al. (2022)). While gaming is often investigated under the umbrella of addiction and social exclusion (Keen and Gainsbury 2021), the connection with digital maturity and especially with the capacity to interact adequately with others and to contribute to society (Laaber et al. 2023) could also create a more nuanced view of gaming on the emotion regulation process, the establishment of respect toward others, and digital citizenship, which in consequence should impact for example young consumers' well-being.

Second, the topic of screen time and online activities (10) is a very prevalent, but also ambivalent topic. While research indicates that higher screen times are negatively related to young consumers' well-being (e.g., Paulich et al. (2021); Twenge and Campbell (2018)), other topics conclude that screen time is a problematic measure of deriving implications for beneficial and/or maladaptive ICT behavior (Haddon and Livingstone 2017). As digital maturity follows a self-determination approach, the connection to the topic on screen time and digital activities from a consumption perspective needs to be developed and researched. For example, screen time and digital activities without context of application will create incongruent findings on young consumers well-being and performance (Granic et al. 2020). However, anchoring this topic around digital maturity embeds context-dependency. This could lead to a potential clearer picture on what consumption type of online activities, consumption of screen time passively (watching a video) or actively (writing a comment) might be beneficial or maladaptive.

7.2.3 | Individuum-Related Antecedents

First, the topic of divides and differences (12) is connected to the second cluster on ICT use, young consumers' well-being, and parental style, and has connections to the digital maturity conceptualization (Gracia et al. 2023). It is an important cluster as it deals with an individual's role within digital environments. However, it is an abstract and often complex topic, which makes concrete research on it difficult (e.g., no access to digitally excluded young consumers). By further improving the connection of the topic to

digital maturity, a potential avenue exists in the exploration of the differences in young consumers attitudes toward becoming more mature with their use of ICTs, but also an examination of their own role as a young consumer and what type of consumer they aim to be. Furthermore, it could be investigated how digital divides/digital inequalities—mediated by young consumers' digital maturity—are impacting young consumers' access to and use of ICT for consumption of information (Ertiö and Räsänen 2019) for education and learning, and thus, their performance indicators.

Second, the new topic on personality and developmental stages could offer another venue for interdisciplinary research on adding substantial psychological and neuroscientific insights on the establishment of young consumers' digital maturity (Lamblin et al. 2017; Toner et al. 2012). It is evident that personality components of young consumers, such as the Big5 personality traits (e.g., openness to experience, extraversion), as well as their self-regulation capacities, are strongly connected to young consumers' ICT behavior and can positively or negatively impact their well-being and performance (Azucar et al. 2018; Wartberg et al. 2021). Furthermore, different age-related segments in young consumers go through different developmental stages (e.g., brain developments), which have an impact on young consumers' decision making and well-being (Wartberg et al. 2021). Especially, the importance of peer influences and social connectedness—as part of young consumers' social learning—is crucial and dynamic within different developmental stages (Albert et al. 2013). Thus, as digital maturity implies a process of maturation and development (Laaber et al. 2023), future research could connect psychological and neuroscientific studies on young consumers' personality and developmental stages with its impact on digital maturity and in consequence on young consumers' well-being and consumption patterns (Benn 2004). For example, research could identify mechanisms of young consumers developing the ability neurologically to pivot between task-oriented—and abstract thinking at will—and do so freely as devices tend to pull—and lock young consumers into task orientation and cannibalize abstract thinking, meaning-making, and so on, which is critical for well-being outcomes. Furthermore, behavioral and neurological components of social learning and the relationship to young consumers' decision making (Hofmans and van den Bos 2022) could be supported by a better understanding of the mediating role of young consumers' digital maturity.

7.3 | Moderators of the Antecedents–Digital Maturity–Consequences Relations

The integrative framework proposes three major moderators—family and peers, education, and interventions—which either weakens/strengthens both relational paths from antecedents to digital maturity and from digital maturity to consequences (family and peers) or only the antecedent—digital maturity relation (education) and digital maturity—consequences relation (intervention) (see Figure 5).

7.3.1 | Moderator—Family and Peers

First, parental mediation and care (1) as well as family environment (7) are two highly connected and prevalent topics within

cluster 2—ICT use, young consumers' well-being, and parental style (Bodrožić Selak et al. 2023; Scott 2022). Furthermore, both topics show some alignment with the establishment of digital maturity (Koch et al. 2024). As parents and associated family are an impactful context factor (Gracia et al. 2023), the integrative framework proposes a moderating effect on the formation of digital maturity through, for example, the use of technology or influences on young consumers' screen time as well as on the translation into consequences through their parental styles (Koch et al. 2024). Thus, future research should not only integrate the concept of digital maturity into existing topics (e.g., within cluster 2), it could address issues if the limitation or deliberation of screen time through parental styles will weaken or strengthen dimensions (e.g., risk awareness, emotion regulation, autonomy) of young consumers' digital maturity. Additionally, it could be interesting to investigate the moderating role of parental style on young consumers' digital maturity and well-being relations.

Second, while parents and family are a strong moderator by nature (Mindrescu and Enoiu 2022), the social environment including peers (e.g., friends) but also parasocial interactions (e.g., with influencers) (Lau et al. 2022; Vrontis et al. 2021) could have a similar impact or even create contradictions between parental perspectives and peer activities. As this novel topic seems to be under-researched, it offers an opportunity—in connection with digital maturity—to shed light on similarities and differences compared to parental/family influences and with regard to the formation of digital maturity and translation into consequence. Future research could investigate the influence of perceived digital social norms among family members, peers, or influencers. Another interesting research avenue is to put focus on the socialization process, which may have become more influenced by peers or parasocial interactions present in a digital world.

7.3.2 | Moderator—Education

The topics teachers' use of ICT (3) and education (13) are a major part of cluster 1—ICT Education and Learning for Young Consumers. Both, teachers' use of ICT (e.g., teachers' level of digital literacy) and the educational framework (e.g., use of ICT in the classroom) are valuable context moderators for the formation of young consumers' digital maturity. Nevertheless, both topics are declining in interest due to a potential saturation, but with the uprise of novel digital technologies and advancements in the classroom, they could be useful for future research avenues—especially in a consumption context. Although the conceptualization of digital maturity has no direct association to educational context (Laaber et al. 2023), both topics show a connection to an important component of digital maturity—child development and skills (See Figure 3). As young consumers' adaptability to technology is influenced by educational aspects and social interaction within education (Love 2013; Nikolopoulou and Gialamas 2015), teachers' use and experiences of ICT and the framework of technology adoption within an educational setting could act as potential mediators of antecedent—digital maturity relations. Especially, digital maturity dimensions in relation to mastering challenges and skill development as well

as in relation to interactions with others offer crucial venues for future research. Thus, future research could investigate if and when teachers positive/negative experiences with technology weaken or strengthen the relationship between young consumers' technology adoption or use of learning tools and young consumers' digital literacy and skills for the digital economy as part of the digital maturity conceptualization. Furthermore, another avenue of research could be specifically the moderation of the digital divide/digital inequality on digital maturity capacities through young consumers' access to and use of ICT for education and learning.

7.3.3 | Moderator—Interventions

An important topic—increasing in research interest—is interventions and treatment (6). The topic is part of the bigger research cluster on ICT use, young consumers' well-being, and parental style (cluster 2) and could be seen as an important mediator in translating young consumers' ICT use behavior into well-being and a more beneficial consumption pattern (Montague et al. 2015). It currently shows some connections to digital maturity (Arenas and Yazdi 2022; Hofmans et al. 2024), but still offers potential avenues for research. Future research could, for example, show how young consumers' establishment of digital maturity and the positive relation to young consumers' well-being could be strengthened by intervention schemes (Hofmans et al. 2024; Laaber et al. 2024) or technology-supported interventions (Dean et al. 2021). Gamification applications and the development of reasonable UX designs for young consumers (Wut et al. 2021) could be a fruitful research and innovation area. Furthermore, research with regard to advertising and persuasive messages and social media platforms could be a valuable context to investigate technology-related interventions and how they weaken (e.g., act as distractions) or strengthen (e.g., act as support mechanism, knowledge provider) (Grace et al. 2014) the translation of young consumers' digital maturity into an active and socially beneficial lifestyle and increased performance (Schneider et al. 2015).

Table 5 offers an overview and exemplified summary of the discussed research agenda and potential research propositions derived from the integrative framework for digital maturity.

7.4 | Managerial and Practical Implications

This study offers practical insights for key stakeholders: educators, marketers, and policymakers. In the case of educators, our review emphasizes that educational interventions should be tailored to youth's digital maturity levels to be most effective. Rather than the one-size-fits-all approach to digital education, our study suggests stratifying learners by their maturity profiles. For instance, for the identified “self-contained” archetype, educators may design motivation-enhancing strategies to stimulate technology use. By contrast, for the “strategic navigators” archetype, educators may design interventions empowering them to be digital peer leaders. In other words, teachers and school programs should provide extra support and inspiration to less engaged students, helping them build confidence and interest in productive ICT use, and simultaneously harness the abilities of

TABLE 5 | Exemplified avenues for future research.

Framework dimension	Topic	Research agenda	Research propositions (examples)
Core concept— Young consumers digital maturity	Technology acceptance and adoption (5)	<ul style="list-style-type: none"> Explore the drivers and inhibitors of technology acceptance and adoption, as well as how these relate to digital maturity in young consumers 	<ul style="list-style-type: none"> How does perceived effort expectancy or ease of use of automated and personalized digital content supports or inhibits the establishment of self-determination in young consumers
	Digital risks (4)	<ul style="list-style-type: none"> Investigate segments of young consumers based on their digital maturity Explore what type of content and application might lead to lower or higher awareness and perception of digital risk 	<ul style="list-style-type: none"> How does structural factors—such as socio-economic status or platform design—shape risk exposure and coping capacity? How do risk navigation functionalities on digital platforms support or hinder digital development over time?
	Child development and skills (2)	<ul style="list-style-type: none"> Investigate the necessity of building the ‘right’ skills and literacy Investigate which skills support individual growth and thus young consumers’ digital maturity from a lifelong learning perspective 	<ul style="list-style-type: none"> How do developmentally appropriate ICT experiences support long-term personal growth? When do these competencies evolve into mature digital behaviors in young consumers?
Antecedents and consequences of young consumers’ ICT behavior— Technology-related antecedents and consequences	Overall capacities for digital maturity	<ul style="list-style-type: none"> Explore the differences and similarities between young consumers’ online and offline world Investigate if there is a more normative approach to set concrete benchmarks of digital citizenship to support the evaluation of increases or decreases in digital maturity and the related capacity 	<ul style="list-style-type: none"> What similarities or differences exist between young consumers’ online consumption and their buying patterns in offline world. What ethical and moral considerations applies to young consumers’ online worlds and how are they reflected in digital citizenship for digital maturity?
	Social media sites and social networks (11)	<ul style="list-style-type: none"> Explore social network effects on digital maturity dimensions (e.g., seeking for support, respect toward others, emotion regulation) and how those dimensions—if enabled—either buffer negative effects or facilitate positive effects of network usage (e.g., privacy behavior, consumption behavior) 	<ul style="list-style-type: none"> How do differences and purposes of social media networks and their underlying mechanisms and algorithms effect levels of persuasion (i.e., from advertising)
	Learning tools (14)	<ul style="list-style-type: none"> Investigate the impact of digital maturity mediating the relationship between the application of learning tools and academic success within a seamless learning experience (e.g., using learning application in and out of class activities) 	<ul style="list-style-type: none"> How do young consumers cultivate digital autonomy and self-regulation through repeated engagement with learning tools? How factors like design, motivation, and digital access shape these experiences?
Advancements in technology (new)		<ul style="list-style-type: none"> Explore young consumers prompting behavior in relation to the digital maturity dimension related to young consumers problem solving skills (e.g., seeking for support) 	<ul style="list-style-type: none"> How do emerging technologies like generative AI and performance enhance young consumers’ problem-solving skills and exploitation of opportunities?
		<ul style="list-style-type: none"> Explore positive or negative effects of advanced technologies regarding the exploitation of opportunities within the digital environment 	<ul style="list-style-type: none"> When does digital maturity has the potential to mediate the relationship between the use of emerging technologies like generative AI and performance?

(Continues)

TABLE 5 | (Continued)

Framework dimension	Topic	Research agenda	Research propositions (examples)
Antecedents and consequences of young consumers' ICT behavior— Consumption-related antecedents and consequences	Gaming (8)	<ul style="list-style-type: none"> Investigate gaming pattern, which might not only negatively impact consequence of young consumers' ICT behavior (e.g., gaming addiction) Investigate different consumption types of online activities, consumption of screen time passively (watching a video) or actively (writing a comment) with regard to their beneficial or maladaptive effects 	<ul style="list-style-type: none"> How digital maturity influence gaming outcomes, distinguishing between maladaptive patterns (e.g., compulsive use) and those that foster autonomy, learning, and digital citizenship When digital maturity mediates passive and active consumption types of online activities with regard to their beneficial or maladaptive effects
	Screen time and online activities (10)	<ul style="list-style-type: none"> Exploration of the differences in young consumers attitudes toward becoming more mature with their use of ICTs Investigate their role as a young consumer and what type of consumer they aim to be Investigate digital divides/digital inequalities—mediated by young consumers' digital maturity—is impacting young consumers' access to and use of ICT for consumption of information education and learning and thus, their performance indicators 	<ul style="list-style-type: none"> What attitudes (i.e., beliefs, feelings and intentions) shape a mature consumption of ICTs among consumers? How can young consumers from marginalized contexts develop compensatory strategies or face compounded disadvantages in digital environments? When is digital inequalities in online opportunities mediated by digital maturity?
Antecedents and consequences of young consumers' ICT behavior— Individualism-related antecedents	Divides and differences (12)	<ul style="list-style-type: none"> Explore how psychological and neuroscientific studies on young consumers' personality and developmental stages are impacted by digital maturity and in consequence on young consumers' well-being and consumption pattern Investigate behavioral and neurological components of social learning and the relationship to young consumers' decision making 	<ul style="list-style-type: none"> What mechanisms of young consumers are responsible for developing the ability neurologically to pivot between task-oriented—and abstract thinking at will—and do so freely as devices tend to pull—and lock young consumers into task orientation and cannibalize abstract thinking, meaning-making, and so on, which is critical for wellbeing outcomes? How is social learning influencing young consumers' decision making in online environments?
	Personality and developmental stages (new)	<ul style="list-style-type: none"> Explore how diverse parenting contexts foster or hinder digital maturity in young consumers Investigate the moderating role of parental style on young consumers' digital maturity and well-being relations 	<ul style="list-style-type: none"> What social contexts (i.e., the co-use of ICTs with e.g., a parent) can increase digital maturity in young consumers? How do limitation or deliberation of screen time through parental styles weaken or strengthen dimensions (e.g., risk awareness, emotion regulation, autonomy) of young consumers' digital maturity?
Moderators of the antecedents—digital maturity—consequences relations Moderator—Family and peers	Parental mediation and care (1)	<ul style="list-style-type: none"> Investigate the influence of perceived digital social norms among family members, peers, or influencers Explore the socialization process, which may have become more influenced by peers or parasocial interactions present in a digital world 	<ul style="list-style-type: none"> How does intra-family power dynamics affect digital autonomy? How do familial routines and roles mediate the development of digital maturity, particularly in the context of socio-cultural diversity and shifting domestic technologies
	Family environment (7)		

(Continues)

TABLE 5 | (Continued)

Framework dimension	Topic	Research agenda	Research propositions (examples)
Moderators of the antecedents—digital maturity—consequences relations Moderator—education	Teachers' use of ICT (3)	<ul style="list-style-type: none"> Explore, if and when teachers positive/negative experiences with technology weaken or strengthen the relationship between young consumers' technology adoption or use of learning tools and young consumers' digital literacy and skills for the digital economy as part of the digital maturity conceptualization Explore the moderation of the digital divide/digital inequality on digital maturity capacities through young consumers' access to and use of ICT for education and learning 	<ul style="list-style-type: none"> How do teacher-led ICT practices foster—or constrain—students' long-term digital autonomy and critical engagement beyond the classroom?
Moderators of the antecedents—digital maturity—consequences relations Moderator—interventions	Education (13) Interventions and treatment (6)	<ul style="list-style-type: none"> Investigate, gamification applications and the development of reasonable UX designs for young consumers Explore advertising and persuasive messages and social media platforms, to investigate technology-related interventions and how they weaken (e.g., act as distractions) or strengthen (e.g., act as support mechanism, knowledge provider) the translation of young consumers' digital maturity into an active and socially beneficial lifestyle and increased performance Investigate which types of interventions best support the formation of digital maturity over time and whether these effects extend beyond screen use to include consumption, identity, and well-being outcomes 	<ul style="list-style-type: none"> How do systemic factors—such as teacher training, policy support, and infrastructure—shape the role of schools in fostering holistic digital development among youth? Young consumer's perception of applications for digital well-being and what are critical design elements When do advertising and persuasive messages and social media platforms weaken or strengthen young consumers' active and socially beneficial lifestyle and increased performance and how is it mediated by digital maturity How young consumers' establishment of digital maturity and the positive relation to their well-being can be strengthened by intervention schemes or technology-supported interventions

more digitally mature students by involving them in mentoring or co-designing digital projects.

For parents, the findings underscore the need for adaptive mediation strategies. Rather than applying uniform screen-time limits or content restrictions, parents could benefit from tools that assess and respond to their child's digital maturity stage. For instance, "self-contained" users may need encouragement and structured exposure to prosocial online activities, whereas "emergent participants" may benefit from co-use and reflective dialog that supports value-based decision making. For policymakers, the results point to a need for developmental sensitivity in designing national frameworks around digital readiness, media literacy, and child online safety. Rather than using one-size-fits-all approaches based on age or grade level, policy initiatives could incorporate maturity-based segmentation to better target interventions—particularly in areas such as digital ethics, risk navigation, and digital rights education. Our findings also suggest a case for publicly funded support tools that help institutions assess digital maturity in ways that are inclusive and culturally responsive.

For marketers and digital service providers, the framework presents an opportunity—and a responsibility—to refine segmentation strategies beyond age demographics. Campaigns targeting young consumers can integrate maturity-sensitive messaging, tone, and interactivity. For example, gamified interfaces or social features may engage emergent users, while more autonomy-supportive content may be more appropriate for strategic navigators. Ethically, the segmentation framework reinforces that personalization should be developmentally attuned and never exploitative, promoting long-term trust and well-being. Another example for practical application: the segmentation might be used to equip young users with an understanding of how algorithms shape their digital environments. Helping them grasp how algorithmic recommendation systems influence and curate the content they are exposed to, how this may powerfully but imperceptibly impact their worldview, perceptions, choices, and biases is an increasingly important component of digital literacy. Educators and parents play a pivotal role here, while policymakers must ensure safeguards against opaque or manipulative algorithmic practices, particularly in youth-facing platforms. Furthermore, in the case of policymakers, our results imply that government agencies and public institutions should update and refine their strategies—for example, national curricula, public awareness campaigns, or youth protection regulations—to cover the multifaceted aspects of digital maturity. Rather than isolated initiatives, a coherent policy approach is needed that simultaneously addresses technical skills (digital literacy), safety and resilience (risk management), and ethical participation (digital citizenship).

By grounding digital design, education, and communication in developmental maturity rather than chronological age alone, this study opens new avenues for meaningful, ethical engagement with young consumers in digital ecosystems.

8 | Conclusion

This study offers a comprehensive synthesis of the diverse and often siloed research landscape on young consumers' ICT

engagement. By using computational topic modeling to systematically analyze over a thousand scholarly abstracts, we identified key themes, conceptual overlaps, and underexplored areas across disciplines. In doing so, the study highlights not only what is known, but more importantly, what remains fragmented or overlooked in the current literature. As a response to this fragmentation, we propose an integrative framework that positions digital maturity as a unifying construct through which these disparate themes can be connected. This framework is not presented as a final theory, but as a scaffolding for future research: a way to structure empirical inquiry and theoretical development in a field that is increasingly complex, interdisciplinary, and rapidly evolving.

Ultimately, the study's core contribution lies in elucidating the conceptual terrain and offering a roadmap for future work. By organizing existing knowledge and exposing gaps, it supports a more cumulative and coherent research agenda—one that can better inform educational practice, policy decisions, and the design of digital technologies for and with young people.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

Endnotes

¹ We reflected and followed carefully—when applicable—the DOs and don'ts discussed in the paper by Paul (2024) regarding the theoretical background and methodology and by creating meaningful and needed theoretical and managerial contributions. Furthermore, we followed Paul (2025) and the recommended thumb rules in order to create and impactful systematic literature review.

² A subsequent cross-check using Web of Science (WoS) was conducted to ensure comprehensive topical coverage. This step revealed 273 additional articles not indexed in Scopus but falling within the same search criteria. These articles were used to add external validation to our unsupervised computational topic modeling approach (see Methodology and Appendix A).

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** Supporting Information.