Agency in Child–AI Interaction: A Review of How It Is Conceptualised, Studied, and Supported in HCI

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Abstract

Children's lives are increasingly intertwined with AI systems, from recommender algorithms to generative models, raising concerns about potential impacts on children's agency. Although supporting human agency, autonomy, and empowerment is a widely shared HCI goal, we lack clear definitions of these concepts in designing child-AI interaction. Through a review of 25 recent HCI studies, we find agency is rarely explicitly defined and its conceptualisation varies across something children innately possess and something to be developed. Our literature mapping shows that researchers observed agency through children's planning and self-regulation, asserting control over AI systems, and critique and re-design of the status quo. Conditions reported by researchers that enable or constrain agency span epistemic conditions, interactional design, social context, and motivational orientation. Our review highlights gaps in research on designing for children's agency. We advocate for conceptual clarity by drawing upon existing frameworks and highlight the importance of considering children's agency through a relational lens.

CCS Concepts

• **Human-centered computing** → **HCI theory, concepts and models**; • **Computing methodologies** → *Artificial intelligence*; • **Applied computing**; • **Social and professional topics** → **Children**; **Adolescents**;

Keywords

children, agency, AI, data-driven systems, autonomy, empowerment, datafication

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1 INTRODUCTION

Children are increasingly interacting with artificial intelligence (AI) systems, both knowingly and unknowingly. Recent surveys have found that between half and three-quarters of 9- to 17-year-olds use AI technologies, such as ChatGPT, with a large proportion of them doing so at least weekly [45, 60, 75, 79]. Behind the scenes, algorithmic decision-making systems now recommend content, filter information, and influence everyday choices made by children online [63, 65, 98, 106]. While these technologies offer new opportunities for learning, creativity, and social connection, they also raise concerns among parents, educators, and children themselves. Their concerns range from content safety and data privacy to deeper questions about how such systems may influence children's cognitive and emotional development [22, 52].

A key area of concern is the potential impact of AI systems on children's *agency*. Agency can be defined as the ability to act intentionally, making informed decisions and enacting them, to achieve desired outcomes. It is a concept that has been considered in depth in psychology, sociology, educational science, and philosophy, with seminal definitions from Bandura [11], Emirbayer and Mische [27], and Sen [88], among others. Different accounts of agency operate at different levels of analysis [92]: some focus on biophysical processes [12, 35], others on psychosocial capacities [11, 93] or sociocultural contexts [6, 81]. Historically, children have been viewed

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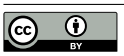

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as lacking meaningful agency, but this assumption is being challenged as children's developing capacity to make informed choices gains greater recognition [40, 76].

The notion of *agency* is closely linked to *autonomy* and *empowerment*. They are often used interchangeably to mean some aspect(s) of action or interaction, though each term carries different connotations. In fields like philosophy, developmental psychology, learning sciences, and sociology, authors variously disambiguate these terms without consensus [4, 49, 80, 91, 109]. This suggests the need for domain- or context-specific definitions. In human-computer interaction (HCI) and child-computer interaction (CCI) research, agency is sometimes linked to initiating action [34], autonomy to independence and self-endorsed volition [82], and empowerment to achievement of personally meaningful outcomes [85], but there is no universally agreed-upon distinction. This was conveyed in a recent review of 30 years' of HCI research by Bennett et al. [13], where they showed that the field lacks clear definitions of agency and autonomy. Instead, these concepts are often used as umbrella terms to indicate broad and diverse design goals, like user enablement (e.g., [24]) and positive user experience (e.g., [71]).

Regardless of the term used, these concepts remain important in HCI; respecting autonomy is a key ethical principle in value sensitive design [32] and empowering people through technology has been the focus of HCI [87] and CCI research [85]. However, the lack of clarity on the conceptualisation of agency, autonomy, and empowerment hampers efforts towards replicability and cumulative knowledge building, and risks creating knowledge siloes due to use of different terminology for similar concepts. This lack of clarity also complicates the application of agency-supporting design for children. Children's developmental needs vary across age groups and require explicit and systematic consideration of their cognitive abilities and self-regulation capacities [55, 97]. Without a shared understanding of what it means to design for agency, research may result in misplaced focus and misaligned design objectives, ultimately undermining the value of children's time and contributions in child-centred research.

This critical gap creates an urgent need to clarify how agency is conceptualised, examined, and supported in child–AI interaction specifically, as Bennett et al.'s [13] literature review of agency and autonomy in HCI research was conducted in 2022, before the introduction of many now ubiquitous generative AI tools that challenge traditional notions of agency in HCI. Through a review of recent HCI literature on children's agency in interacting with AI systems, we identify gaps in understanding children's agency in the context of AI and propose avenues moving forwards. To do so, we examine the following research questions:

- RQ1: How do HCI researchers conceptualise children's agency in the context of AI?
- RQ2: What evidence of agency have researchers found, and how?
- RQ3: What do researchers suggest enables and constrains agency?
- RQ4: What are researchers' recommendations for supporting agency in child-AI interaction?

Our primary contribution is a mapping of recent HCI literature studying children's agency in the context of AI. We identify gaps and directions for future HCI research. We find that in current research agency is still rarely explicitly defined in the HCI literature and its conceptualisation varies across something children innately possess and something to be developed. Our literature mapping shows that HCI researchers have often observed agency through children's reported planning and self-regulation, asserting control over AI systems, and critique and re-design of the status quo. Conditions reported by researchers that enable or constrain agency span epistemic conditions, interactional design, social context, and motivational orientation. Our review highlights gaps in HCI research on designing for children's agency. We conclude by highlighting the need for conceptual clarity while recognising the plurality of agency and the importance of looking beyond individual agency by drawing on literature from other related disciplines.

2 BACKGROUND

Current AI systems often operate with partial autonomy and limited transparency, leaving the users as passive collaborators or recipients of technologies [80, 110]. Human agency can be eroded by systems that provide anthropomorphic answers, believable content, recommendations, or automated choices on the user's behalf [8, 64, 69]. Furthermore, AI systems may be designed, even without explicit intent, in ways that produce manipulative effects (e.g., sycophancy, persuasion, or blackmail), as a result of training on datasets with manipulative human behaviours or in the process of optimising for narrow objectives [19, 23, 62]. This dynamic raises attention to designing for users' agency [54, 80], which is increasingly recognised as a neglected aspect in the age of automation and agentic digital future.

The challenge of enabling users to form intentions, make choices, and enact them in this context is especially pronounced for children, who are still developing their cognitive and metacognitive capacities that are foundational to decision-making [9, 108]. While the HCI community has a long history of taking a child-centred approach, designs often prioritise protection-focused options, to ensure that children experience a safe environment [103]. For example, parental controls, content filtering, or age-assurance mechanisms are regularly integrated in technologies or used to enable online safety for children. Scholars are increasingly arguing that children's agency should be central to child-centred design [52], because protection-focused approaches alone are often insufficient to build the resilience and decision-making skills children need.

Foundational literature from psychology, learning sciences, and philosophy provide rich conceptualisations that help us understand components of agency, autonomy, empowerment. In educational psychology, Zimmerman's self-regulated learning cycle [112] conceptualises agency as unfolding across cycles of forethought, volitional control, and self-reflection. This recognises that children's agency develops through a process rather than presents as a formative ability. In the context of AI-assisted learning, Brod [17] characterises agency as learners' capacities to make decisions and enact them, emphasising the action-taking aspect of agency. From a philosophical standpoint, Levinson [58] understands agency as the capacity to act intentionally, encompassing both the desires and beliefs that motivate action and the mental processes through which individuals interpret and transform their environment. Autonomy, in turn, is defined as self-endorsed volitional choice in Self-Determination Theory [82]. Empowerment highlights whether

such choice can actually be exercised and translated into outcomes: for Alsop et al. [4, p. 14], empowerment depends on the existence of meaningful choices, the ability to use them, and the possibility of achieving desired results.

In the context of childhood, we must consider the conditions under which children are afforded the opportunity to develop and exercise these capacities, given that genuine agency requires not only internal cognitive ability but also an environment that supports intentional, self-directed action. Children's agency differs from adults' because children are usually not in a position of (direct) control. Adults, like parents and teachers, often limit children's control to protect them from harm. For children, socially-mediated, indirect modes of agency offer ways to enact decisions and achieve desired outcomes. Many prevalent agency definitions emphasise the agent's social environment. For instance, in Social Cognitive Theory, Bandura [11] defines agency as an emergent, interactive capacity to exercise control over the nature and quality of one's life, where agency is both realised through interactions an agent has with and on its environment and influenced by that environment. It further distinguishes three modes of agency: *individual agency*, associated with an individual's motivation and intentionality; *proxy agency*, which involves relying on others to act on one's behalf, and *collective agency*, which encourages a socially coordinated effort [10].

Recent child-centred studies recognise children's unique position and strive to support their agency, data autonomy, and computational empowerment [70, 85, 101, 105]. However, as found by Bennett et al. [13], HCI studies mix up different terminology between agency and autonomy, and rarely state explicit definitions, yet focus on different things, which makes it difficult to synthesise prior research. Our goal is therefore to establish how these concepts are defined and assessed in HCI research, so we can facilitate the development of an agency design research roadmap for child-AI interaction and help future research to determine whether design interventions are genuinely achieving their goals.

3 METHODS

This paper aims to systematically map and synthesise research within the HCI community that addresses child-AI interaction agency. To achieve this, we conducted a structured literature review to identify the key conceptualisations, assessment methods, and recommendations in recent research in the field.

3.1 Literature search

We conducted a review with a systematic search protocol based on the PRISMA framework [67]. To structure our search strategy, we used the PCC (Population, Concept, Context) framework [78], focusing on **children** (Population), **agency** (Concept), and **artificial intelligence** (Context).

Through iterative testing, we established the following set of search keywords, which were combined with the `AND` operator:

- child* `OR` teen* `OR` youth `OR` adolescen* `OR` K*12
- agency `OR` agentic `OR` autonomy `OR` empowerment
- AI `OR` artificial intelligence `OR` ML `OR` machine learning `OR` data* `OR` algorithm `OR` media `OR` recommender `OR` generative

We included autonomy and empowerment (see section 2) because in our preliminary reading, these terms were frequently used interchangeably with agency, as also acknowledged by Bennett et al. [13] in their review. However, while Bennett et al. [13] excluded empowerment, we noted empowerment is a commonly used term in the CCI literature when it comes to making and enacting decisions (e.g., [85, 99]), and so decided to include it as a relevant concept term. Given how freely much of the literature moves between these three terms and how difficult it is to infer authorial intent behind the use of different terms (see Supplementary Material), we use the core term "agency" in our reporting unless deliberately distinguishing agency, autonomy, or empowerment in accordance with the authors' use of specific terms.

To capture the HCI research community's perspective, we queried the ACM Digital Library (including conferences and journals), but not including any additional sources from specific application areas like educational technology (which we note is a limitation of this approach). We used fielded searching to increase the likelihood the search keywords were central to the work, searching the title, abstract, and keyword fields of publications. The search was not time-bound, because we did not want to restrict our focus to any specific type of AI systems.

Our search was conducted in August 2025 and yielded 152 publications. These were imported into Covidence[1] for screening and data extraction. Figure 1 provides an overview of the paper screening process.

3.2 Screening of papers

To screen papers for relevance, we looked for evidence of the following in the titles and abstracts: 1) discussion of child-computer interaction, 2) mentions of agency, autonomy, and/or empowerment relating to children's interaction with systems, and 3) original research, rather than a workshop proposal or keynote talk. Two authors independently reviewed entries, removing 56 irrelevant papers; unclear cases and the remaining 96 papers advanced to full-text review.

During full-text review, at least two authors independently assessed each paper against our inclusion criteria, with conflicts resolved through discussion between the first three authors:

- **Empirical Papers:** We removed 10 papers describing proposed ideas or prototypes that that did not include an empirical user study with children.
- **AI Systems:** We removed 44 papers that were not about AI. Defining AI is a much acknowledged challenge in the field [53, 84, 107], so here our principle was to include any systems that relied on data-intensive methods to make decisions, like large language models, robots, social media and recommender systems, and smart home devices. Works were excluded if they reported on technologies with no evidence for data-driven decisions, for example, papers discussing data collection without considering how the data would be used, such as those investigating children's agency in the design and use of health data trackers [5, 77].
- **CCI Agency:** We removed 17 papers where agency was defined not in relation to children's interaction with technology, such as agency in choosing learning topics about AI (e.g., [29, 72, 83]) or on children's agency as designers of AI

[1] https://www.covidence.org

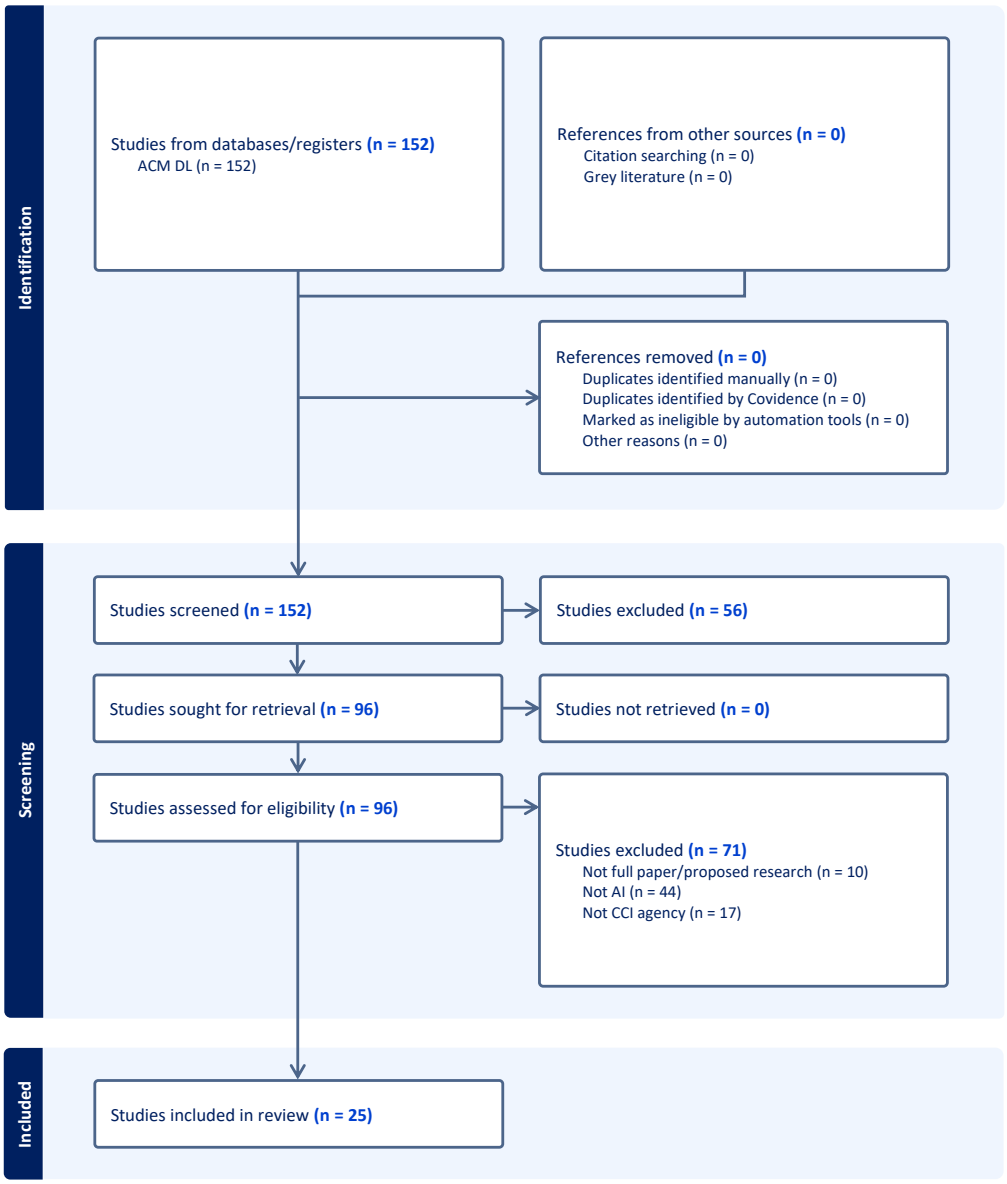

Figure 1: Flowchart (PRISMA) illustrating the paper selection process.

systems, i.e., how their voices can be heard in the design of technologies (e.g., [2]) without considering child-AI interaction. However, we included studies of children's imagined interactions with future AI systems.

3.3 Data extraction and analysis

We analysed the final 25 papers using an inductive qualitative approach comprising three phases: structured data extraction, collocation analysis [14], and reflexive thematic analysis [16]. Collocation analysis was used alongside thematic analysis to examine language use patterns and complement interpretation of themes [95]—see subsubsection 3.3.2 for further details.

3.3.1 Phase 1: Data Extraction. In the first phase, we read and systematically extracted descriptive information from each paper using a structured template, which included:

- Stated research purpose(s)
- Research methods
- Participant sample size and age groups
- Type(s) of AI involved and the nature of the child-AI interaction
- Terms used related to agency, autonomy, and/or empowerment
- Definitions for agency, autonomy, and/or empowerment (if any)

This template was agreed a priori based on our primary research question—how agency is conceptualised and studied. Each paper was read and extracted independently by two authors. After the independent data extraction, three authors met to review discrepancies and reach consensus across the dataset. The extracted data was used to summarise and compare study characteristics, definitions of agency (RQ1), and employed study methods (RQ2). It also helped the authors get familiar with the data and informed subsequent deeper analysis.

3.3.2 Phase 2: Collocation Analysis. In the process of data extraction, it became apparent that few papers provided definitions for agency. As such, we applied collocation analysis to identify words and phrases frequently used with agency, autonomy, and empowerment in an attempt to infer authors' conceptualisations (RQ1) [14]. To do this, we chose agency, autonomy, or empowerment (as appropriate) to be our node word, identified all uses of the word, and considered a span of four words either side, identifying frequently appearing adjective-noun (e.g., "full agency", "more agency"), verb-noun (e.g., "develop agency", "exercise autonomy"), and noun-preposition-noun (e.g., "lack of agency", "sense of autonomy") collocates. Due to the small size of the corpus, this was done manually.

3.3.3 Phase 3: Thematic Analysis. Four authors used Taguette[2] to review the papers again and to highlight passages regarding expressions, evidence, and measures of agency (RQ2), enablers and constraints (RQ3), and recommendations by authors (RQ4). We highlighted passages using semantic (descriptive) codes independently and focused on quotes that represented the authors' claims and reflections regarding their own findings, rather than adding secondary synthesis of prior literature, speculation, or discussion.

Three authors then iteratively organised quotes into different groups of shared meanings (or themes) independently and through discussions, focusing on clarifying each individual's coding rationale and interpretation of the data. By reaching a shared clarification of the codes and interpretations of the data, we produced a stable thematic categorisation.

Additionally, to mitigate the risk of over-interpretation, we restricted our analysis to passages that the original authors explicitly linked to agency, autonomy, empowerment, and related terms (regardless of whether they had defined them explicitly). This approach aimed to remain grounded in the researchers' reported perspectives, but we acknowledge the subjective nature of our analysis reflected in choices of examples and thematic groupings.

4 FINDINGS

In this section, we report our analysis of the literature corpus of 25 papers. First, we summarise the characteristics of the studies included. We then address how researchers define and conceptualise agency (RQ1). Next, we present how and where researchers found evidence of agency (RQ2), before describing what researchers present as enablers and constraints of agency (RQ3). Finally, we present the recommendations for supporting agency in child-AI interaction that emerged from the corpus (RQ4).

[2]https://app.taguette.org/

Throughout our findings, we endeavour to reflect the specific terms used by researchers. As such, we use underline to emphasise the authors' use of a specific term, e.g., agency, autonomy, empowerment. Where several terms are used in a similar way (within or across papers) without clear distinction, we use the core term "agency" without emphasis.

4.1 Study characteristics

Table 1 summarises the 25 reviewed papers. Participants ranged from age 3 to 21. Most studies targeted specific developmental stages: four focused on early childhood (ages 3–6), eight on middle childhood (ages 7–12), and sixteen on adolescence (ages 13 and over), with six studies spanning more than one of these brackets. Only one study, Toivonen et al. [96], included participants across this entire age range.

Geographically, research was predominantly situated in the Global North, with fifteen studies in the USA, four in England, two each in Canada, Scotland, and Finland, and one in Denmark. A few studies were international: one was co-located in Scotland and Türkiye, one included workshops in USA, India, and Finland, while another, held online, involved individual participants from eleven different countries.

Research settings varied: three studies took place in participants' homes [41, 104, 111] and five were conducted partly or entirely online [1, 26, 33, 42, 104], but the majority (eighteen studies) were held in external locations, including schools [8, 25, 68, 86, 89, 101], clubs, libraries, and community centres [25, 30, 38, 39, 46, 51, 57, 89], research spaces [21, 57, 102, 106], a science fair [96], and a workplace [56].

The number of children involved in the research varied significantly from 6 to approximately 150. The median was 30 participants, with twelve studies having 25 or fewer participants. Sixteen studies involved children working in peer groups, and ten had children working individually. In twelve studies, children participated alongside close adults such as parents or teachers. The duration of the studies ranged from a single interaction session [1, 26, 30, 39, 42, 57, 96, 101, 102, 104, 106] to activities taking place over multiple consecutive days [8, 21, 38, 68, 86], or multiple sessions spaced over several days, weeks, or months [7, 25, 33, 41, 46, 51, 56, 111]. One study combined different one-off and multiple-week workshops [89].

The studies investigated diverse AI technologies, including robotics [57, 111], social media recommender and moderation systems [1, 30, 46, 101, 104, 106], generative AI systems [38, 39, 68], voice assistants [33, 42], coding assistants [25, 26], other machine learning systems [41, 56, 86, 96, 102], and AI more broadly [7, 8, 21, 51, 89].

Nine studies explored imaginary AI systems, eight studies used existing, publicly available applications like ChatGPT, while another eight built and tested interactive research prototypes. A further five used non-interactive demos or mock-interactive (e.g., Wizard of Oz) systems to simulate AI behaviour. These technologies were examined across several domains, most commonly education [7, 21, 25, 33, 38, 39, 51, 68, 86, 89, 111], social media [1, 8, 30, 46, 51, 56, 86, 101, 104, 105], home and daily life [8, 21, 33, 41, 56, 57, 89, 102, 111], creative activities (writing, storytelling, art, music, dance) [38, 39, 42, 56, 57, 68, 96], and programming [25, 26, 86].

Table 1: Summary of included studies

Author	Year	Participants	Region	Type of AI	Ag.	Au.	Em.
Agha et al. [1]	2024	20, aged 13 to 18	USA	Mock		✓	✓
Atabey et al. [7]	2025	72, aged 10 to 12	Scotland; Türkiye	Imaginary	✓	✓	✓
Babai et al. [8]	2025	43, aged 11 to 12	Finland	Imaginary	✓	✓	✓
Chang et al. [21]	2024	15, high-school age	USA	Imaginary	✓		
Druga and Ko [25]	2021	52, aged 7 to 12	USA	Prototype	✓	✓	
Druga and Ko [26]	2025	18, aged 7 to 12	International*	Prototype	✓		✓
Fiani et al. [30]	2024	13, aged 8 to 16	Scotland	Mock; imaginary	✓	✓	✓
Garg [33]	2021	22, aged 13 to 17	USA	Public; imaginary	✓	✓	
Han and Han [38]	2025	12, aged 8 to 14	USA	Prototype	✓		
Han et al. [39]	2024	12, aged 8 to 12	USA	Public	✓	✓	
Hiniker et al. [41]	2018	25, aged 3 to 5	USA	Prototype	✓	✓	
Hubbard et al. [42]	2021	33, aged 4 to 5	USA	Prototype	✓	✓	
Irannejad Bisafar et al. [46]	2020	49, aged 14 to 21	USA	Public	✓		✓
Kenny et al. [51]	2025	6, aged 14 to 17	Canada	Imaginary	✓		✓
Lee et al. [56]	2022	16, aged 15 to 19	USA	Public	✓	✓	✓
Levinson et al. [57]	2024	15, aged 12 to 17	USA	Public; Mock	✓	✓	
Morales-Navarro et al. [68]	2025	35, aged 14 to 15	USA	Public; Prototype			✓
Schaper et al. [86]	2023	11, aged 14 to 15	Denmark	Public; imaginary	✓		✓
Sharma et al. [89]	2024	73, aged 9 to 12	USA; India; Finland	Public; imaginary	✓		✓
Toivonen et al. [96]	2022	~150, aged 5 and up	Finland	Prototype	✓		
Wang et al. [104]	2022	48, aged 7 to 13	England	Public	✓	✓	
Wang et al. [106]	2023	53, aged 7 to 14	England	Public; Mock; imaginary	✓	✓	✓
Wang et al. [101]	2024	109, aged 10 to 13	England	Prototype	✓	✓	✓
Wang et al. [102]	2025	30, aged 8 to 13	England	Mock; imaginary		✓	✓
Zhang et al. [111]	2023	31, aged 4 to 6	USA	Prototype	✓	✓	

Ag.=agency, Au.=autonomy, Em.=empowerment

* 11 countries: USA, Spain, Singapore, China, Mexico, Romania, Jamaica, Canada, India, Israel, New Zealand

Most studies in the corpus did not set out to examine agency directly. Most research focused on the qualitative understanding of youth opinions, perspectives, needs, and challenges [7, 8, 21, 30, 33, 38, 39, 42, 46, 51, 56, 57, 86, 89, 101, 102, 104, 106]. Among these, there was a series of consequent studies investigating datafication and data autonomy [101, 102, 104, 106]. Another significant focus area was analysis of reported and/or observed youth behaviour when interacting with AI systems [1, 25, 26, 41, 46, 56, 68, 96, 104, 111]. Some of the research aimed to inform the design and development of artefacts [1, 21, 30, 33, 38, 39, 42, 101, 106]. Finally, a few studies aimed to evaluate systems [26, 38, 42, 101, 111] and research interventions [51, 68, 89, 102]. Children's exhibition of agency emerged as part of some of these research studies. This provides a critical context for our analysis of how agency is reported in existing research.

4.2 Conceptualisation of agency (RQ1)

4.2.1 Definitions. The terms agency, autonomy, and empowerment were rarely explicitly defined in the papers. As summarised in Table 2, the nine works that provided formal definitions often drew on established theoretical traditions such as Social Cognitive Theory and Cultural-Historical Activity Theory.

A few papers used a term, then provided a reference to a definition, but without expanding in the body of the text. For example, Garg [33] referenced a paper on autonomy from moral and political philosophy after using the word autonomy, but did not include any quote or explicit definition. Likewise, Schaper et al. [86] referenced Iversen et al. [47] after mentioning computational empowerment.

As shown in Table 1, many works used multiple terms of agency, autonomy, and/or empowerment. Some used the terms in close conjunction suggesting a similarity or deep connection between the terms, e.g., systems may impact or teenagers may establish "agency and autonomy" [8, 39, 57, 111]. Hubbard et al. [42] was an exception in elucidating the relationship between the terms according to the authors—they describe autonomy as an "element" of agency. However, in other works, the terms agency and autonomy have often been used interchangeably without the authors drawing an explicit distinction.

Some papers used the term "sense of agency" [8, 25, 41, 46, 56, 57, 96, 101], potentially acknowledging the discrepancy between agency and self-perception of agency. Wang et al. [101] explicitly

Table 2: Explicit definitions of agency, autonomy, and empowerment in the reviewed papers

Paper	Construct	Definition
Babai et al. [8]	Agency	"socially mediated capacity to act" [3]; "a temporally embedded process of social engagement, informed by the past (in its habitual aspect), but also oriented toward the future (as a capacity to imagine alternative possibilities) and toward the present (as a capacity to contextualize past habits and future projects within the contingencies of the moment)" (quoting Emirbayer and Mische [27])
Hubbard et al. [42]	Agency	"the power to take meaningful action; exercising control over "processes, motivation, action, and environment"" [10]
Wang et al. [106]	Autonomy	"hav[ing] greater autonomy, i.e., [taking] more active roles when coping with datafication practices"
Hiniker et al. [41]	Autonomy	ability to "plan, set goals, and choose their own actions with intention"
Sharma et al. [89]	Empowerment	"increased control and mastery for individual children or entire collectives over their own lives, i.e. having increased agency in the sense of capacity to act, [...] as an individual and collective construct" [44, 48]
Chang et al. [21]	Transformative agency	"the initiative and commitment to transform the context(s) of their activity for personal, academic, life in the work force and/or civic ends" (quoting Kajamaa and Kumpulainen [50])
Kenny et al. [51]	Transformative agency	"ability to actively change their own matters, their shared matters, or even societal matters for the better and more just society" [43]
Toivonen et al. [96]	Data agency	"data agency (people's volition and capacity for informed actions that make a difference in their digital world)" [94]
Babai et al. [8]	Data agency	"the ability to understand, control, and meaningfully engage with data-driven systems" [94]
Wang et al. [101]	Data Autonomy	"empowerment and capability of individuals to comprehend, exercise control over, and reflect on the collection, processing, and inference of their data within the digital realm"

Note: The remaining 16 papers in the corpus did not provide explicit definitions for agency, autonomy, or empowerment.

differentiated between sense of autonomy and autonomy, but other papers used a mix of "sense of agency" and "agency" without clear differentiation.

4.2.2 Collocated words and conceptual metaphors. In the absence of explicit definitions, we analysed the words collocated with agency to infer how the authors may have understood agency.

One prevalent metaphor (conceptualisation) framed agency as *something children innately have*, which must be "preserved", "maintained", or "retained" [1, 8, 21, 26, 33, 111]. Under this conceptualisation, agency is vulnerable to loss—children can "lose" it or "lack" it [7, 8, 21, 30, 33, 39, 56, 106]. Another metaphor used language of *opposition*, describing agency as being "restricted", "undermined", "diminished", or "limited" by something [1, 8, 21, 33, 41, 56, 106]. Both conceptions positioned agency as *something under threat.*

Alternatively, a number of papers used a *development or cultivation* metaphor for agency, positioning it as something children "develop", that can be "fostered", "nurtured", or "supported" [21, 41, 56, 96, 104]. This view was particularly prevalent in Chang et al. [21], which focused on supporting children to develop transformative agency. Here, agency is not simply possessed but grows through the appropriate conditions and care.

A conception of agency that traversed these concepts is as *something with degrees*, i.e., children can have greater agency in one circumstance than another. Druga and Ko [26] described children's agency as "strong" and Zhang et al. [111] described one experimental condition as offering "complete agency". Other papers talked about "increasing" agency [38, 42, 56, 89, 104] or "reducing" autonomy [1, 8, 41, 106]. This conception of degrees was also implied by papers that described agency as something that can be developed or strengthened and those that describe it being diminished.

Clusters of papers offered slightly different views of the relationship between agency and action. Some indicated agency to be something internal made externally visible to others through action, using verbs like "express", "demonstrate", "display", and "manifest" [8, 21, 26, 41, 56, 89]. Others implied that actions turn the potential for agency into agency—agency is "exercised", "enacted", "asserted", and "established" [8, 56, 57, 104].

All papers presented children's agency as a positive quality. Several papers implied a duty or responsibility of other agents, usually designers, to "respect", "prioritise", or "promote" agency [7, 26, 38, 39, 41, 106].

4.3 Methods applied in studying agency (RQ2)

Studies adopted three approaches for analysing agency: 1) deductively seeking evidence of agency using theoretical frameworks, 2) adopting an inductive approach with an explicit focus on agency, or 3) surfacing agency incidentally as part of other concerns, such as fairness, privacy, or AI literacy.

Most commonly, agency was included tangentially or incidentally in studies focused on adjacent constructs such as fairness, privacy, or AI literacy [1, 7, 25, 30, 33, 38, 42, 46, 51, 56, 57, 68, 86, 96, 104, 106, 111]. For example, while Agha et al. [1] focused on understanding the social and contextual factors that mattered for creating online safety nudges for teens, autonomy (as the option to override automated decision making) was considered as a design requirement rather than as a focus of the original analysis. Lee et al. [56] used ethnographic observation and interviews to investigate how youth engage with and question AI technologies, and searched for meaningful moments in this data according to three aspects of critical computational literacy: critical pedagogy, computational thinking and creative expression; youth agency was discussed as an incidental theme linked to critical computational literacy. Similarly, while Kenny et al. [51] used Veldhuis et al.'s four-dimensional framework of Critical AI Literacy [100] to structure their workshop activities and theorised how it could lead to computational empowerment, they focused on identifying ways of how youth cultivated Critical AI Literacy using reflexive thematic analysis.

Several studies explicitly focused on agency and employed inductive, interpretive analysis [8, 26, 39, 41, 89, 101, 102]. For instance, Babai et al. [8] used iterative inductive-deductive coding and nexus analysis of children's speculative future narratives to examine power dynamics. Here, agency was inferred from how children position actors and propose ways of acting within data-driven systems. Druga and Ko [26] transcribed children's AI-assisted coding sessions and through open coding identified three recurring manifestations of agency: direct rejection, adaptive integration (selecting from and modifying), and pre-emptive control of AI copilot suggestions. Wang et al. [101] used thematic analysis to categorise evidence of a sense of data autonomy (including being "in control", "empowered", and "having a say") in children's reflections about algorithmic social media.

Only one study [21] used a theoretical framework for deductive analysis, pre-specifying indicators of agency and systematically looking for these indicators in data; Chang et al. [21] examined youth transformative agency as per the four indices of historical actors from Gutiérrez et al. [37]: double binds (identifying dilemmas that cannot be adequately resolved using current cultural resources), breach of the social order (challenging power structures and the status quo), cycles of experimentation (iterative trials in creating new worlds, considering own positionality and roles of tools in their contexts), and expansion of the object of activity (interrogating purposes and meanings of existing activities).

4.4 Observations of agency (RQ2)

Researchers reported empirical evidence of agency observed in children's verbal expressions, choices, and actions. We clustered these examples in three themes of expanding targets of action: *agency over the self* (shown through engaging in planning and self-regulation), *agency over the system* (shown through asserting control during interactions), and *agency over the environment* (shown through critiquing and re-designing the status quo).

4.4.1 Agency over self. This theme includes children engaging in planning and self-regulation, seen through them articulating intentions and enacting decisions. Within our corpus, explicitly labelled instances were concentrated in Hiniker et al. [41], where young children using "Coco's Videos" planned viewing sessions in advance (building a playlist of YouTube videos, selecting how long to watch videos for, and what activity to do next). They demonstrated agency by implementing self-defined plans independently during transitions (e.g., one child explained, "I'm ready to go outside...I clicked 'going outside' after my videos" or another reaffirmed, "No, I picked play outside", when their mother jokingly suggested, "What will you do next? Clean the living room?") [41]. Hiniker et al. [41] connect these observable children's expressions of intentionality and behaviours to internalisation of norms, self-regulation, agency, and autonomy.

4.4.2 Agency over system. This theme captures instances where children asserted control in their interaction with an AI system, as owners of their outputs or their interaction flow with AI. For example, during creative coding with an AI copilot, study participants demonstrated agency by rejecting, adapting, and pre-empting system outputs. Some positioned the AI system as a helper rather than a co-creator ("It's like a teammate who knows coding tricks, but I'm the captain"), refused AI suggestions ("No, that's not my idea!"), prompted iteratively ("I was expecting it to give something more unique. [...] Maybe it will give something else [...] Sky Beak is good!"; "I asked for an elf then added 'full body and no background'."), and experimented on their own (e.g., "Wait, let me try first.!") [26].

Other instances of control were exhibited in children's perceptions of data-driven social media: children reported feeling more empowered when they could adjust data controls and immediately see recommendation changes [101]. Together, these accounts observe agency as control, which is observable through verbal expressions and actions that reassert the child's direction when engaging with an interactive AI system.

Notably, examples of control were clearest when children opposed systems. As Han et al. [39] illustrated, instances of uncritical acceptance (e.g., when a child copied an AI-generated story and said, "I'm done, I like the story, so why should I change it?") are ambiguous, as they could represent either active deliberate approval or passive resignation.

4.4.3 Agency over environment. Here, children acted upon the broader socio-technical environment, not just to navigate it, but to interrogate and critique the status quo and imagine alternatives that redistribute voice, power, or governance. In speculative co-design workshops, youth identified "double binds" in cooperative house living arrangements (safety and comfort requiring enforcement, yet surveillance itself producing harm) and proposed "breaches in the social order" that reconfigured accountability and care hierarchies [21]. In another (school) context in the same study, participants iterated through "cycles of experimentation" by extending, repurposing, and testing speculative mechanisms (e.g., imagining how a

tool could "give voice to the students"), and in doing so "expanded the object of activity" by contesting what schooling should optimise for beyond narrow outcomes like efficiency [21].

4.5 Constraints and enablers of agency (RQ3)

Although the reviewed papers tended to foreground design implications rather than theorising causal factors behind observed outcomes, they nevertheless identified a range of conditions that constrain or enable children's agency in child–AI interaction. We organise these findings into four dialectical groups of conditions: *epistemic conditions* (where knowledge about AI systems offsets system opacity), *interactional design* (where opportunities for choice, control, and self-expression oppose volition displacement and system rigidity), *social context* (where influence, participation, and support contend with power asymmetries), and *motivational orientation* (where self-efficacy counters resignation).

4.5.1 Epistemic conditions. Limited knowledge about AI systems was presented as limiting children's agency. For example, Wang et al. [104] argued that critical gaps in understanding "who are involved in the data processing" prevented children "exercising informed choices". Similarly, in speculative narratives, children portrayed harms as stemming from lack of awareness ("Jimmy wasn't aware that he was being tracked" and "billbob blindly clicked the 'agree to share' info about him – don't be like billbob") [8]; they responded by positioning data literacy as a route to empowerment and informed action [8].

Understanding how AI systems work enables children to act more independently, strategically, and critically. Although the manifestation of agency varies with age, some studies [41, 42, 111] show that even very young children (aged 3–6) can use tools independently when given sufficient experience with how these tools work. Toivonen et al. [96] described how short guided explorations of an image-recognition system enabled children to shift from self-blame ("Maybe I just can't draw") to recognising system limitations, and strategically adapt drawings and improve classification outcomes. Similarly, Lee et al. [56] reported that collective interpretation allowed youth to "manipulate and 'hack'" algorithms. After learning how Spotify scored 'danceability', they questioned the algorithm's authority and built their own rating system to better reflect their views.

4.5.2 Interactional design. Studies described agency being inhibited when AI systems subtly or overtly displace the child's role in decision-making, through constraining choices, steering decisions, or encouraging passivity. Participating students in a creative writing study reported that "the AI bot kept steering me toward a specific storyline", leading them to "question the extent of their own agency" and to ask for more open-ended control of story development [38]. Garg [33] observed that system guidance "could restrain one from thinking independently" particularly for personal decisions ("I HATE getting advice or being given a limited number of choices. I want to make that decision independently"), recognising that "providing limited to no choices can negatively impact one's agency, but too many choices or guided recommendations can be a hindrance" too. In a social media context, Wang et al. [101] reported that around one in three children characterised their algorithmic social media use experience as passive, and one participant described a sensation of drift towards loss of autonomy: "the TikTok algorithm is deciding for you what you can like, and the more your data is collected, the more you just become a zombie". Nudging application behaviour (or worse, manipulative "dark patterns" [36]) can also encourage passivity: Hiniker et al. [41] found that automatic post-play videos reduced children's autonomous transitions from video watching to other activities. Druga and Ko [26] highlighted a tension between support and over-reliance in creative coding with an AI copilot: while AI suggestions could be helpful, older (aged 10–12) participants worried about "losing originality" and authors emphasised "the need to not rely too heavily on the tool, to maintain agency and control" [26].

When children were provided with meaningful opportunities for choice, control, and self-expression with visible consequences, this often led to increased agency. For example, Druga and Ko [26] described how some children used AI suggestions to overcome creative blocks while coding without letting the system take over, by getting ideas for inspiration, as a scaffolded starting point, which they could then extend or alter by themselves. In the context of voice agent design, Hubbard et al. [42] documented how children exhibited agency by choosing the agent's voice, adjusting interaction pacing, and role-switching/puppeteering the agent. Children using CHAITok, a customisable social media app, experienced increased feelings of empowerment and engagement when data controls could be adjusted and immediately changed content recommendations ("Now, I'm actively making choices, rather than just whatever is thrown at me") [101]. Studies also suggested providing the opportunity to challenge or override AI decisions was important for enabling agency. Druga and Ko [26] explained that the AI copilot "requires active user confirmation for AI suggestions and promotes iterative refinement of code" as an explicit strategy to foster agency and avoid user over-reliance [26]. In safety moderation systems, teens wanted proactive risk prevention but with autonomy to override safety nudges, rather than enforced censorship [1]. In social VR gaming, children worried that automated embodied moderators would take punitive action before arguments could be disputed or resolved, undermining their agency [30], leading the authors to suggest that children should be able to customise the automated embodied moderators and choose "if they would want to be guided (fully automated moderator) or have a say in the decision-making (semi-automated)", framing such customisation as enhancing children's sense of control.

4.5.3 Social context. Without meaningful participation, children's agency can be constrained by existing adult or institutional power dynamics, potentially amplified by AI systems. In scenarios with a smart home robot, teens framed privacy and agency as the ability to control who has access to data and for what purposes, and worried when the robot was not transparent about when it acted autonomously (e.g., covertly collecting or sharing information, acting as "snitches"), interpreting this as a threat to their agency [57]. In social VR gaming, experts raised concerns that automated moderation could make children feel watched or behave less authentically, reducing perceived agency and control [30]. Even where children attempt self-governance, adult intervention can override it, as seen

in Hiniker et al. [41], where although children could set their own activity plans and video watching limits, parents sometimes intervened and forced changing activities. At an institutional level, youth expressed frustration with "not being heard" by school administrators, which Chang et al. [21] linked to their lack of agency as students. Together, these studies show that surveillance and power asymmetries constrain agency both by shaping what children feel safe to do and by structuring who ultimately decides outcomes.

In multiple studies, agency was enabled when children and young people were meaningfully involved, taken seriously, and given opportunities to translate perspectives into action. Hubbard et al. [42] argued that "meaningfully involving children in technology design" can support their agency and empowerment. Kenny et al. [51] emphasised "taking action" as a critical AI literacy dimension, where participants are encouraged to translate critique into praxis by imagining or producing more just AI systems; they suggested workshops should connect reflections to actionable projects, including appropriating existing AI technologies to resist oppressive systems. Chang et al. [21] detailed an example of how participatory design can surface and contest institutional power; in their speculative design, youth explicitly called for collaboration that would "give voices to the students and not be silenced" and produced a video message to school administrators presenting their invention, while asserting that administrators must recognise and address issues beyond what technology alone can fix. In this way, agency was framed as not solely individual, but socially distributed—children needed support from other actors and systems to achieve desired outcomes. In children's speculative narratives about data-driven social media challenges, Babai et al. [8] noted "children's reliance on the agency of external actors, such as parents, consultants, or law enforcement" to address problems. They interpreted this reliance as potentially reflecting perceived children's limited autonomy, while also emphasising the importance of accessible support systems that children can mobilise to exercise agency when direct control is not possible or constrained [8]. These examples show that possibilities to be involved and influence others can enable agency.

4.5.4 Motivational orientation. Some studies highlighted how feelings of resignation can pervade children's experiences with AI and hinder their perceived ability to act. Participants in Wang et al. [101] described a sense of resignation regarding the permanence of their digital footprint, noting, "I don't think we have autonomy. Once you enter your data, you can't change or delete it", as well as a normalisation of datafication and internalisation of responsibility for these conditions [101]. Kenny et al. [51] cautioned that pedagogies focused only on AI's societal impacts can promote deterministic thinking (framing AI outcomes as inevitable and beyond one's control), which may undermine children's perceived capacity to stimulate social change and potentially leave youth feeling disempowered.

To support agency, existing research also explored how to enable young people to see AI futures as changeable and themselves as capable of contributing to change. Speculative design activities in Babai et al. [8], Kenny et al. [51], and Chang et al. [21] showed potential to help children overcome a perceived lack of influence by distancing away from the status quo (e.g., by designing for the future) yet drawing on their lived experiences to imagine technological alternatives. Chang et al. [21] further highlighted the importance of research setting and facilitation for creating a sense of possibility; bringing participants to a cooperative house, an unfamiliar yet relatable environment, helped youth actively imagine themselves in alternative arrangements and relationships. Taking a different approach, Kenny et al. [51] engaged participants in a worldbuilding exercise and encouraged them to move away from "entrenched imaginations" rooted in present-day constraints by prompting consideration of power relations and whose voices might be missing in their speculative designs.

4.6 Recommendations on supporting agency (RQ4)

While often an implicit goal in HCI and CCI literature, seven papers in our corpus provided justifications for supporting agency, across three categories: ethical reasons [1, 7, 26, 30, 101], such as the protection of children rights [101] and minimising the potential for manipulation [1]; benefits of supporting agency for children's learning and development [26, 111]; and children's desire for greater agency [1, 26, 41]. Based on these motivations, authors formulated recommendations for designers, HCI researchers, policymakers, and educators.

4.6.1 Recommendations for designers. Design recommendations clustered around four strategies to equip children with the means to exercise agency:

- **Control:** Give children increased control over the AI tools or platforms. Agha et al. [1] recommended that the ultimate decision-making control should be placed in the hands of teens, Fiani et al. [30] argued that children could be enabled to set rules for the interaction and control when to turn the tool off. Hiniker et al. [41] suggested to support agency by providing opportunities for children to plan and make their own choices, and Hubbard et al. [42] recommended allowing children to choose how much input they wanted to receive from the tool.
- **Choice:** Design systems with a broader variety of meaningful options. Atabey et al. [7] recommended design choices that afforded children options to monitor and manage their data, and emphasised that these options should be understandable and enable easy interaction; Druga and Ko [26], from a different perspective, argued that AI tools should be designed with a range of options to support children with diverse backgrounds and experience.
- **Scaffolded Literacy:** AI literacy must adapt to the developmental phase of children. Papers like Wang et al. [106] and Druga and Ko [25], highlighted the critical need to support AI literacy through design patterns that prompt children to understand the tools' limitations and offer technical and conceptual information in a scaffolded manner.
- **Active Participation:** Multiple authors argued that one of the most relevant ways to support children's agency is to included them as active participants in design spaces and decision-making [21, 57, 68, 102].

These design recommendations align with the manifestations of agency discussed in subsection 4.4, particularly regarding the capacity to resist, override, or contest AI tool outputs. Most importantly, they reinforce the argument that children can and should be equipped with the cognitive and epistemic means to exercise their agency in meaningful ways that serve their interests, goals, and needs.

4.6.2 Recommendations for HCI researchers. Papers that made recommendations to other HCI researchers focused mainly on the urgent need to include children in the studies in a more active way, and with a focus on their agency. Babai et al. [8], for instance, argued that such a focus could encourage children to offer more open and honest responses in studies. Furthermore, Chang et al. [21] and Kenny et al. [51] recommended conducting co-design studies over longer periods of time and establishing lasting community collaborations to truly foster transformation in children's lives.

4.6.3 Recommendations for policymakers. A few papers positioned regulatory structures as essential enablers of agency and suggested that they require a prior understanding of the importance of supporting children's agency to take purposeful action. Agha et al. [1] emphasised the importance of providing educational resources that go beyond generic community guidelines, while Atabey et al. [7] stressed that data laws should ensure transparency in the information provided to children. They also noted that meaningful consent mechanisms should be developed before data is shared with third-party vendors and that these mechanisms should be easy to understand.

4.6.4 Recommendations for educators. Recommendations to educators focused on two areas. First, they were encouraged to promote AI literacy by providing opportunities for developing and practising skills in a critical manner in formal educational settings. Druga and Ko [25] recommended that designers and educators work together to foster children's development of critical thinking regarding AI systems. Second, they were encouraged to adopt the role of facilitators rather than gatekeepers in order to help students develop a responsible understanding of these tools.

5 DISCUSSION

5.1 Conceptual clarity as a foundation for supporting agency

Consistent with Bennett et al. [13], we find that agency in child–AI interaction remains ill-defined in CCI research. This hinders collective interpretation of findings. While the field does not require a single universal definition, authors should explicitly articulate their conceptualisation because different premises yield distinct design implications.

There is general consensus on a few aspects of agency, e.g., as having degrees, but the view on the extent to which it already exists in children or needs to be developed varies. For instance, viewing agency as *something developed or cultivated* implies a need for 'positive liberty' (i.e., providing enabling conditions), where educators should provide improved epistemic conditions through AI literacy education and interaction designers should focus on giving children meaningful choice and control. On the other hand, viewing agency as *something children innately have* that is often opposed implies a need for 'negative liberty' (i.e., removing barriers), where designers should address AI nudging behaviour and researchers should find ways to break down power dynamics during studies.

The negative liberty view may risk trapping researchers in a zero-sum mindset regarding children's agency and system agency, assuming that if a system makes decisions or initiates actions, the child necessarily loses agency. However, maximising choice is not always beneficial. Children can suffer from 'choice overload' [61, 66] and often benefit from the scaffolding provided by 'lower' agency conditions, particularly in learning contexts [18, 111]. Thus, supporting agency requires balancing opportunities to make decisions with appropriate support [17].

This is not to say that the CCI community needs to settle on a single definition—agency is a complex, multifaceted concept, and no one definition is likely to capture all of the concept—but authors should strive to be clear when defining terms for their specific context and to use them consistently. The current literature in HCI covers different accounts of agency at different levels of analysis, primarily sociocultural contexts (e.g., [21, 51]) and psychosocial capacities (e.g., [41, 96]), but largely falls short of addressing the influence of cognitive factors, social structures, and other agents. Research in CCI could advance by drawing on cognitive and developmental perspectives and conceptions of agency from educational technology and psychology literature, e.g., Brod [17].

5.2 Forms of agency in child-AI interaction

The diversity of agency examples synthesised in subsection 4.4 indicates that agency takes many different forms in child-AI interaction. Across studies in our review, authors observed agency in children's planning and self-regulation behaviours, asserting control over AI applications, and critiquing and re-designing the status quo. Here we highlight how these forms of agency are reflected in literature on agency in other fields, which may be useful for CCI researchers to further ground and expand their work.

Planning and self-regulation resonates with Bandura's conception of agency in Social Cognitive Theory [11], Zimmerman's self-regulated learning cycle [112], Brod's model of agency in AI-assisted learning [17], and autonomy in Self-Determination Theory [82]. Asserting control relates to using opportunities to make decisions and choices, framed as central to agency [17] and empowerment [4]. Interactional control can foster a sense of agency [59]. Design that balances automation with human control aligns with HCI principles of direct manipulation and User/Human-Centred System Design [73, 74, 90]. Critiquing and re-designing the status quo overlaps with transformative agency [21, 51], "transformative possibilities" [8] , and "action towards social transformation" [56]. These ideas are rooted in Cultural-Historical Activity Theory [28] and Freire's critical pedagogy [31].

Despite the emphasis on agency, current HCI literature lacks structured approaches to its evaluation, usually relying on exploratory observations. While early research necessarily focused on establishing *whether* children could exercise agency in using AI systems and explored what this might look like, the field now possesses a sufficient vocabulary to characterise *how* agency might manifest. Consequently, new studies do not need to investigate

agency from first principles each time. Instead, researchers can build on this foundation to specify what forms of agency are in scope and design research protocols to deliberately elicit them. This transition would enable more systematic and comparable research.

We argue that the next step for research towards effectively supporting agency in child–AI interaction is to develop methods to evaluate to what extent AI systems support (or hinder) children's agency. Targeting particular forms of agency will help to scope down constructs to operationalise. Literature from other fields offers relevant methods to assess forms of agency in different contexts [20]. Importantly, child-centred research on agency with AI will need to focus not just on individual user experience, but also on distributed capacity shared across peer groups, families, and communities.

5.3 Looking beyond individual agency

While agency is often considered as an individual trait, research in psychology and sociology [10, 27] and our review corpus findings [8, 21, 51, 57] highlight that children are not isolated individuals, they are embedded in rich and complex social networks and situated in changing environments (as evidenced in subsubsection 4.5.3). Yet, current recommendations (see subsection 4.6) largely overlook this, targeting design of single-user tools.

We propose a *relational lens* to bridge this gap. In simple terms, a relational lens highlights the importance of the relationships that individuals form in concrete practical contexts and how they influence, in this case, the exercise of agency of children when using AI tools. In formal learning environments (e.g., schools or institutes), children acquire specific social identities (e.g., as students or pupils) and are enabled to enter into particular kinds of relationships (e.g., student–teacher or pupil–educator). These relationships often have distinctive characteristics; for instance, they are hierarchical. In this context, the hierarchical relationship between teacher and student impacts children's access to technology, as the teacher has the role of educator. A relational lens would prompt designers to consider this particular power dynamic and make design choices that provide educators with options to enable children to exercise their agency.

Concretely, designers can draw on educational research to inform their thinking about how to apply a relational lens to children's use of AI. When designing for learners' agency in educational technology, Brod et al. [18] suggest answering four questions: "what can be chosen", "who has choice", "when can choices be made", and "where can choices be made". In asking these questions, a designer is prompted to consider the relationship between system design, students, and any other individuals facilitating the process (such as parents or teachers). When answering them, assumptions about agency may arise that can be further investigated with the involvement of the children who will use the tool.

HCI researchers can adopt it as a conceptual framework to reflect the interdependencies and situated practices that exist in real life. In this case, co-design and the exploration of children's previous experiences with, and future concerns about, AI systems, as seen in the corpus, provide a starting point for the process. Following Kenny et al. [51], a relational lens could extend these methodologies by encouraging researchers to reflect on the broader social, institutional, and technical contexts that shape AI use. This could involve other individuals who facilitate children's access to or use of the technology, or consideration of the setting in which the technology will be used (or not).

A relational lens may also help policymakers and educators develop strategies that provide children with the knowledge needed to make informed decisions about their use of AI. Building on work that explores agency in an educational context, Biesta [15] suggests that asking the questions 'effective for what?' and 'effective for whom?' can prevent AI literacy education from being limited to a narrow curriculum of technical proficiency and socialisation into 'responsible use'. Instead, it creates space for young people to engage more broadly with the purposes and possibilities of AI, including developing critical positions that may involve rejecting or resisting particular tools.

5.4 Limitations

This review offers valuable insights into how children's agency in AI-mediated interactions is understood and supported within HCI research, but several limitations should be noted. First, our scope was intentionally narrow: we focused on work published in the ACM Digital Library to capture the HCI perspective. Which this helped maintain relevance, it excludes relevant recent contributions from related fields such as education, psychology, and philosophy, which could have included interdisciplinary viewpoints.

Second, the literature itself presented challenges. Key concepts of agency, autonomy, and empowerment were often used inconsistently or left undefined, making it difficult to compare studies systematically. Methods for agency assessment varied widely, and few papers offered clear measures. This limits our ability to generalise findings and draw concrete conclusions about cause and effect.

Finally, the reviewed studies were predominantly conducted in the Global North, with limited representation from diverse cultural contexts. Most also focused on individual agency rather than collective or relational forms, overlooking the social and institutional factors that shape children's experiences. In our review, we excluded grey literature, which may have left out emerging ideas. These constraints highlight the need for future research that is more inclusive, conceptually precise, and methodologically consistent.

6 CONCLUSION

Supporting children's agency is an important goal for the HCI community, yet this review confirms that agency remains a widely used but nebulous concept. The lack of a shared understanding hinders our ability to assess challenges and design solutions. In the course of this review, we mapped varied conceptualisations of children's agency in AI contexts and compiled definitions from the literature. We found researchers observe agency through children's choices, verbal expressions, and actions, which we cluster into three themes of expanding targets of action: *agency over the self* (shown through engaging in planning and self-regulation), *agency over the system* (shown through asserting control during interactions), and *agency over the environment* (shown through critiquing and re-designing the status quo). We synthesised conditions that enable and constrain these behaviours, spanning *epistemic conditions*, *interactional design*, *social context*, and *motivational orientation*. Finally, our review identifies important gaps in the current HCI literature. We

conclude by highlighting the need for conceptual clarity while recognising the plurality of agency and the importance of looking beyond individual agency.

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SELECTION AND PARTICIPATION OF CHILDREN

No children participated in this work.

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