

Let Kids Wonder, Question and Make Mistakes: How the Designers of Children’s Technology Think about Child Well-being

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ABSTRACT

To gain deeper insight into how the creators of children’s technology operationalize child well-being, we conducted semi-structured interviews with 24 industry professionals who create child-centered interactive technologies, including platforms, content, and policies. Interviewees’ descriptions of well-being clustered into four hierarchical categories, focusing on creating experiences that were: 1) safe, 2) usable, 3) educational, and 4) meaningful. We found that organizational culture influenced designers’ self-reported ability to create child-centered products, and companies with a culture that explicitly prioritized child well-being and drew on input from experts were able to scaffold even novice employees in attending to child users’ developmental needs. Finally, we found that companies struggled to define product metrics that reflected the full continuum of child well-being and often fell back on simplistic measures like engagement and download counts. We contribute a framework outlining current industry conceptualizations of designing for child well-being, with the depth of well-being support mapped to one axis and respect for children’s agency mapped to the other.

CCS CONCEPTS

• **Social and professional topics** → **Children**; • **Human-centered computing** → **Human computer interaction (HCI)**; *Empirical studies in HCI*.

KEYWORDS

Child-Computer Interaction, CCI Research, Design for Well-being

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1 INTRODUCTION

Prior research has reported disparate effects of technology on children’s well-being. Researchers have identified ways in which popular technologies undermine children’s sleep [12], expose them

to aggressive and manipulative advertising [47], and lead to alienation and ostracism [4], while other work has robustly shown that technology can support learning gains [37], foster meaningful interpersonal relationships [28], and scaffold adolescents’ identity development [26]. Technology therefore can be both a challenging source of tension for families and a positive force that fosters growth and connectedness [32, 42, 56].

These differences in outcomes are not arbitrary; they are systematically shaped by the design of a system, which, for example, can influence whether or not children self-regulate their usage [30], disclose sensitive data [43], participate in toxic conversations [17], or engage their critical thinking faculties [41]. As a result, child advocates have asked the technology industry to shift their designs to align with children’s needs [48] and for regulators to enforce such a shift [33]. To support making digital spaces more child-centered, researchers have published design guides and other practitioner-oriented content that describes children’s developmental needs in the context of technology and outlines best practices for products (e.g., [7, 14, 20]).

Despite these efforts, industry has not yet achieved the publicly desired end-state of building a digital ecosystem that broadly supports child well-being. Today, designs that *undermine* child well-being are pervasive; for example, popular technologies routinely collect data invasively [25], use manipulative design patterns to exert purchase pressure on child users [49], and/or assume all users are adults [25]. Governing bodies in Europe and the United States have begun to pass piecemeal regulations requiring companies to support child well-being in particular ways (such as requiring age-appropriate language in privacy disclosures [2] and banning on targeted advertising to children [3]), but these regulations remain inconsistent, incomplete, and in some cases, easily circumvented [45]. The industry also has not coalesced around a common definition of well-being [39], making the larger conversation about how to support children’s well-being online an unwieldy and fragmented one.

Given the current gap between the desired and actual state of products for children, we sought to understand how industry practitioners are currently thinking about the impact of their products on the children who use them. Specifically, we asked:

- RQ1: How (if at all) do creators of children’s technology think about child well-being in the context of their product?
- RQ2: How (if at all) do these perspectives translate into the product’s design?
- RQ3: How (if at all) do these creators measure the actual impact of their product on users’ well-being?

To investigate these questions, we conducted semi-structured interviews with 24 industry experts that included content creators,



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platform designers, producers, founders, and user researchers who create digital products for children and parents. In doing so, we aimed to document current practices and perspectives among industry practitioners, surfacing themes in both: 1) the ways that these creators are currently striving to support the well-being of child users, and 2) potential gaps in this support.

Through a thematic qualitative analysis, we found that participants' descriptions of their teams' goals for supporting child well-being clustered into four hierarchical categories, ordered by increasing sophistication and complexity of their conceptualization of well-being. Specifically, participants reported that their teams focus on creating experiences that are: 1) safe, 2) usable, 3) educational, and 4) meaningful. While some design teams primarily focused on the early levels of this continuum (for example, protecting children from online predation [Level 1] and ensuring interfaces are navigable [Level 2]), others embraced all four levels (for example, designing to support children's self-actualization [Level 4], meta-cognition [Level 3], and interpersonal relationships [Level 4]). We also found a Goldilocks effect of organizational focus on child development. Companies with a culture that explicitly prioritized child well-being were able to scaffold novice employees in attending to child users' developmental needs, while those with many developmental specialists at times were paralyzed by the abundance of input. Finally, we found that companies struggled to define product metrics that measured their progress against more sophisticated Level 3 and Level 4 goals and often fell back on simplistic measures like engagement and downloads.

This work contributes a framework outlining the perspectives of current industry professionals with respect to designing for child well-being (which complements prior theoretically grounded models that focus on children's needs, e.g., [7, 14, 20]). We further contribute a synthesis of open opportunities for increasing support for child well-being across the industry, such as innovating new metrics of product success that align with children's development.

2 RELATED WORK

2.1 Conceptualizing Child Well-Being

Well-being is defined as the quality of a person's life [34, 59] and operationalized as having two component parts, *subjective* or internal well-being and *objective*, or externally measured well-being [18]. Other theoretical frameworks that seek to model and make sense of fulfillment and happiness build off of these foundational well-being constructs. For example, self-determination theory (SDT) [53], which seeks to explain human motivation, identifies autonomy, competence, and relatedness as key determinants of subjective well-being [54].

Prior work varies in its approach to measuring and evaluating the well-being of children [18]. A developmental approach, for example, uses developmental stage based metrics to predict future development [16], while the rights-based approach, which relies on the United Nations Convention on the Rights of the Child (UNCRC) definition [5] of children's rights, emphasizes the child's right to be heard, have autonomy, and be protected. More recent publications provide further differentiation between the practice-informed definitions of child well-being used by child welfare professionals and definitions informed by the experiences of children themselves [60].

This collective prior work demonstrates the complexity of defining, and thereby measuring, child well-being, even before contextualizing it within the digital environment. Our study seeks to contribute to this space by probing how industry professionals deal with this complexity and respond to the challenge of defining, supporting, and measuring child well-being in their own products.

2.2 Child Well-Being Online

Young children spend an extensive amount of time with digital media [38]; in the United States, children age 8 and under spend almost two and a half hours using screen media each day [52], much of it on platforms originally designed for adults, such as YouTube. More educational apps have been created for children under 5 than for any other age group [55], highlighting the profit potential of the children's technology market. A growing body of research points to problematic industry incentive structures [25] within companies, whose cultures and incentives do not often explicitly prioritize user well-being, and may incorporate it into their designs as an afterthought [39]. The success of a product or service is often defined as maximizing the time users spent with it, which has been linked with detrimental outcomes in children [11, 21, 40].

As a result, children's technology is often viewed with suspicion, and some child advocates emphasize the relationship between increases in media use and increases in negative outcomes, such as attention disorders [29] and obesity risk [36]. Monitoring and controlling screen time, therefore, has long been the focus of policy efforts regarding children's technology and media [31]. For many, supporting children's digital well-being means promoting time *away* from screens rather than cultivating more holistic understandings of what children need to thrive in digital contexts [39].

Studies show, however, that screen time's relationship to children's well-being is more nuanced than is portrayed in mainstream discourse [44] (where this relationship is sometimes even portrayed misleadingly [8, 22]). More recent definitions of digital well-being acknowledge these complexities and dependencies upon the interaction between people and the media surrounding them [58]. Recent studies have focused, for instance, on the positive impacts of media and shown that interacting with digital content can be linked to increases in social and emotional learning [10, 50], enjoyment [15], empowerment [57], and skill development [23, 51]. Child-centered media like Sesame Street has also been shown to foster early academic skills [23].

This collective prior work shows that children's well-being is shaped by the experiences they have online, whether positively or otherwise. Given the importance of the link between well-being and design, in this study, we sought to examine how product teams engage with this topic in practice.

2.3 Designing for Child Well-Being

In addition to examining how current technologies affect children's well-being, prior work has also sought to articulate guidance for intentionally designing future technologies to promote children's well-being. For example, child-centered design advocates have explained that digital spaces that provide for children's needs will:

allow space for safe exploration and failure, consider the child’s relationships, respect the child’s need for varied experiences, and help the child self-regulate their media use without heavy-handed intervention from parents [48]. Similarly, researchers created the Positive Technological Development (PTD) framework [7] that aims to match technology design approaches to considerations of children’s growth and development. Other works have created frameworks for promoting designs that prioritize: subjective well-being [20], happiness and health [14], and psychological well-being [13].

However, these frameworks have not been consistently applied to commercially available design, and it is not known how industry conceptualizations or day-to-day practices regarding child well-being align with or diverge from such frameworks. Today, most of the commercially available tools that aspire to support children’s well-being are designed as controls and restrictions [61] and are culturally and contextually anchored in ways that limit their applicability to diverse user populations [35]. Researchers have investigated how theoretical insights about well-being might be translated into actionable paradigms [46], but recent prior work reports this translational goal remains elusive for the industry today [39].

Thus, we set out to understand the state of the world on the ground and to investigate how (if at all) designers consider child well-being when creating products for children. The current study: 1) examines this complex backdrop and how it has shaped what designers do today, and 2) identifies open opportunities for industry-wide shifts to increase support for child well-being online.

3 METHODS

3.1 Participants

We conducted semi-structured interviews with 24 industry professionals from 17 companies who create digital products for children and parents, with varying backgrounds and amounts of experience in the child-focused industry. Among them were interaction designers, producers and content creators, researchers, founders, innovation officers, creative leads, and business strategists. To protect participants’ anonymity while also reporting their wide range of experiences and roles, general characteristics such as role, years of experience in child-focused industries, and primary product focus are listed in Appendix A. Participants were recruited through word of mouth, convenience sampling, and snowball sampling. Recruitment efforts included posting on social media channels, reaching out directly to child focused practitioners through information provided on their company page, and through personal connections of the researchers. Of 42 companies invited to participate, 24 individuals from 17 companies enrolled. At the recruitment stage, all interviewees (and companies) were guaranteed anonymity, researchers signed non-disclosure agreements when requested, and informed consent was obtained from all individual participants. In building this report, we chose quotes and details about products and companies that would not be personally identifying, and thus aimed to protect companies’ and individuals’ anonymity.

3.2 Procedure

All participants completed a one-hour, semi-structured interview over Zoom. All interviews were conducted during the spring and summer of 2022 and were audio recorded. After gathering basic

demographic information, interviewees were asked to reflect on the product design and evaluation procedures at their company, how child well-being is defined and communicated to employees, and what metrics are used in their organization (full interview protocol in Appendix B). The interview also included a short reflection about the Age Appropriate Design Code by 5Rights Foundation [24]. At the conclusion of the session, each participant received an Amazon gift card worth 50 U.S. dollars as a token of our appreciation. Audio recordings or interviews were then transcribed for analysis.

3.3 Data Analysis

Throughout the data collection and analysis process, the team met weekly as a group to discuss new and existing data collaboratively, following a thematic analysis approach [9]. Before each meeting, each team member reviewed new transcripts individually, noting initial codes and identifying connections to previously identified codes. During group meetings, team members shared these codes and discussed collaboratively; we then collaboratively refined codes by comparing against examples from the transcripts until reaching consensus on their language, scope, and meaning. The team then organized these refined codes into themes, noting connections and hierarchical relationships between codes, and edited and re-worked themes for clarity and cohesiveness. After finalizing our themes, we re-reviewed all transcripts and selected vivid exhibits [6] to illustrate each theme. These themes were robust across differences in role, company size, and career duration of the interviewee. Based on guidance from prior work on interview studies, we chose to not capture inter-rater reliability as an agreement metric, and instead resolve disagreements through discussion and consensus-building [27]. The authors came to collective agreement on all of the codes and themes reported here. As the team iterated, some codes required additional discussion to build consensus, for example, (1) codes about parenting styles (which the team ultimately decided were not robust enough to include), and (2) codes about designing to promote ‘digital creation’ (which the team ultimately decided was not sufficiently represented across our data set to stand on its own as category of well-being design). Upholding Hammer and Berland’s stance on qualitative work [27], we report on these disagreements for transparency and to illustrate the iterative nature of our coding.

4 RESULTS

4.1 The Well-being Continuum of Design

We found that participants described different levels of complexity and nuance in their conceptualization of what it means to support child well-being. These varying perspectives clustered into four categories, with each building on the next and later categories encompassing earlier ones. Here, we describe each of these four levels of support.

4.1.1 Level 1: Designing Safe Experiences. When asked what it means to design for child well-being, participants described the importance of creating experiences that are legally compliant, privacy-conscious, and harm-free. They explained that “*well-being is just knowing that in our app, they have a safe place; they’re not going to purchase something from an ad right now... they’re not going to be taken in by an algorithm to some crazy damaging videos, like,*

it's a very safe place for them" (P14). In these instances, they operationalized the work of supporting child well-being as a *lack of action*—specifically, the choice to *refrain* from introducing designs with the potential to harm. They described supporting child well-being through avoidance, and for example, making the deliberate choice not to include anything “*too adult or too scary or inappropriate*” (P3), “*content that's gonna upset a child*” (P4), or “*commercial content [and] click-bait*” (P18). In the Level 1 conceptualization of well-being, support means holding back and, participants said that they “*don't share data*” (P10), have “*no ads in the app*” (P14), and avoid designs that connect children to “*strangers and people they don't know*” (P5).

Some participants saw achieving this first level of well-being support as sufficient and defined child well-being in entirely protective language. For example, P18 described their work saying:

“In terms of the content they view, I'm always determining whether it's age appropriate. So not necessarily that it's developmentally appropriate—like it's specifically made for a certain age. More that there's just no risk of harm in them—in a child—viewing this type of content. And so a lot of the stuff that we did, we always have a risk-of-harm scale and a severity scale, and looking at content and determining at what age it's age appropriate for” (P18).

Other participants felt that achieving Level 1 well-being support was essential but not sufficient. For example, participants said things like, “*there's some non-starters... kids' safety, number one, first and foremost... like data collection, all the data kids' privacy is secure, all those things. Number one*” (P6). Across interviewees, providing children with an environment free from harm was seen as a first priority, with some describing it as a first step and others describing it as the sum total of the work required to support the well-being of children in digital spaces.

Many participants were critical of their competitors' lack of Level 1 support and broader industry trends that they view as failing to meet a do-no-harm standard. For example, they described other products saying things like, “*it's really easy for videos to veer into like weird territory*” (P14) and “*there's a lot of really freaky animations out there—so little kids cycle [through] those nursery rhyme things that just kind of play on a loop*” (P1). Several saw invasive data collection as a failure to achieve this level of well-being support and said things like, “*This app wants to know your location? Why? They're just gonna sell it... do the best privacy you can, otherwise you're a crook*” (P2). They also suspected that other companies ignore regulations designed to achieve Level 1 support for well-being, saying things like, “*When it comes to COPPA, I think far too many companies just ignore [that] kids are on the platform. They just gonna say, 'No, our terms say 13-plus; not our problem'*” (P5).

4.1.2 Level 2: Designing Usable Experiences. In describing how they support child well-being, participants stressed the importance of creating developmentally appropriate interfaces that children could understand and navigate. They described the importance of creating a “*user experience that was still going to be easy to use*” (P5) noting that “*at the younger age, you have to make the interaction a little more simpler, while at the older ages, you wanna keep them engaged*” (P3). They explained that this can be a challenge because,

for example, “*creating something that can work for a three-year-old and an eight-year-old is nearly impossible*” (P15). Participants said they strive to create interfaces that require a “*minimum amount of voice-over and explanation*” (P3) regardless of age, and that they “*try to design in such a way that you can hand the device off your child; they can figure it out on their own*” (P10).

Participants explained that supporting usability is essential to supporting well-being because it requires product teams to “*treat children like children because you're remembering their development and their capacities and where they are in life*” (P2). By meeting children at their level, designers enable children to “*play independently, learn independently, and to enjoy the experience independently,*” which they saw as essential to facilitating positive, self-directed experiences (P10). Participants highlighted their efforts to create usable interfaces, including, “*using vocabulary and visual language that is around them in their day to day lives*” (P11), “*mak[ing] it simple and non-text-based... because our age group tend[s] not to know how to read*” (P10), and carefully attending to “*vocabulary and cognitive load and clarity*” (P4).

These usability goals guided participants throughout their iterative process and required significant investment on the part of design teams. Participants explained that they and their teams “*do testing for every piece with kids after we've made it to a certain point, just to make sure that everything is making sense to them*” (P1), pointing to the fact that “*I feel like people don't understand that it's harder than they think it is to do it the right way. There's a lot of challenges to it to make sure that kids know how to play it*” (P3).

Participants also explained that they saw industry-wide shortcomings in the usability of children's products. They described these interfaces as “*excessively noisy*” (P10) and “*built around monetization*” (P20). P20 explained that when designers prioritize profit motives, the “*incentives are just not in a good place. Because if you build stuff around ads, your KPI that you're targeting as a designer or product person [it's] like, you want them to stay in the app as long as possible. So you're building more and more hooks there.*” (P20).

4.1.3 Level 3: Designing Educational Experiences. Third, for many, supporting child well-being through technology means creating products that result in learning gains, regardless of whether their product has an educational focus. For these practitioners, creating safe and usable products (i.e., achieving Levels 1 and 2) is important because it enables the loftier goal of teaching children. These participants spoke about their products and processes in goal-oriented ways, saying that they are striving to support things like “*one two threes and ABCs*” as core elements of a larger “*learning framework*” (P4) and explaining that “*really every piece of content that we make [serves] a curriculum goal*” (P1). Other participants talked about their goals of teaching children about “*coding... 'cause it's almost as important as learning your ABCs probably for the future*” (P10), “*the world... nature, and science*” (P2), and “*shapes... and recognizing them in everyday household objects*” (P12). Participants explained that they are continuously examining content to ensure it “*has a learning purpose or a learning outcome associated with it in some way*” (P13). For many participants, supporting children's well-being by educating them also meant supporting the meta-cognitive skills that enable learning, and they described building scaffolding into

their products to help child users “*reflect on their learning*” (P16) and develop a “*learner mentality*” (P19).

Some participants felt that supporting child well-being meant vigilantly looking for opportunities to pack in educational content using appealing interface elements. For example, they explained that “[*children*] believe these characters are real, and they have relationships with them. And we take that and we leverage it to help them learn” (P2). Another participant compared the content they deliver to “*broccoli*” and described design as a tool to “*make it [broccoli] more appealing*” (P6). Many described the integration of educational goals and engaging interfaces as a point of tension for their teams; they explained that “*it is a tricky balance to strike... of what is creative and engaging and entertaining and also educational... The problem isn't that writers don't know about kids. It's more about writers and curriculum kinda need to have a closer relationship in order to write a story that is tightly aligned to their educational goals*” (P9).

Some participants were critical of products that lacked educational goals or merely paid lip-service to them. They explained that lack of robust investment in children's learning comes from the incentive structure of company business models saying, for example, “*there's a constant push and pull between commercial requirements and learning design requirements*” (P10) and explaining that “*if things aren't successful business-wise, then it [any learning goal] is all a moot point, right?*” (P6). P3 described the shallow educational content that results from prioritizing business objectives, saying:

“The worst thing is a lot of people see kids games as a money grab, and so they will... try to make it educational somehow, like, ‘collect all the letters in a row as you're running across the screen,’ and I feel like that's the worst because it does grab kids' attention for one, but they're not figuring—they're not trying to really teach the kids anything, they're just kind of throwing the basics out at them and hoping that their parents would pay a lot of money for it.”

In these and other examples, participants expressed disdain for designs that prioritized profit over learning and felt that these interfaces did not serve children's well-being. However, participants were reluctant to eschew profit motives entirely, and they expressed a pragmatic acceptance of the need to perform well against marketplace success metrics. They explained that “*this is where I think there's a lot of negotiation and discussion around balancing gamification and rewards in a kids' app between folks that want to support child well-being and intrinsic motivation versus, like, we need to make a viable product that has enough daily active users who are logging in every day. And so that becomes very complicated and not very well defined*” (P15).

4.1.4 Level 4: Designing Meaningful Experiences. Finally, participants described supporting well-being by designing to support a holistic, meaningful, self-actualized digital experience that carries over into children's larger life. As P9 explained:

“It's all this kind of whole-child sort of perspective where the child is not just getting their basic needs met, but they're also being intellectually stimulated,

they feel emotionally safe, they have supportive caregivers, they have close relationships with the adults around... it's feeling free to play and wander and be curious and having stable relationships around you.”

In many instances, participants described these Level 4 goals by juxtaposing them against lower-level goals of safety, usability, and education. They explained that they design “*outside of the school curriculum*” (P1) and go beyond “*purely academic*” competencies (P2). Similarly, P4 described their company's wide-angle approach to designing for well-being by explaining that they consider “*social and emotional well-being, physical well-being, health and wellness, cognitive well-being, so, thinking skills, problem solving executive function... relationship well-being and personal skills—so I think we look at well-being very comprehensively*” (P4).

Some participants described taking a holistic view of well-being as a way of cultivating the people their users will become. They explained that they sought to “*really help the child become a... child that's well prepared for the world out there that they're gonna go into when they get to school and, you know, start interacting with their peers*” (P1) and help children become “*good citizens of the world, recycling and things like that, but also how to be a good friend*” (P14). Similarly, P4 explained that, “*if you want a child to be a compassionate human being as an adult, you need to start modeling and demonstrating, and practicing compassion now in the pre-school years. So I think really recognizing that this—we have them for this really special window of opportunity that we should actively use, and intentionally use, and not sort of waste.*”

Other participants explained that they set Level 4 goals for well-being by following children's lead and seeking to support what their users say they find meaningful. As P15 explained, “*we really want to not only help children learn to read, but we want children to love to read. I think that's part of well-being—feeling empowered.*” Similarly, P8 described child-defined meaning as an end goal, saying, “*I'm really interested in just kid empowerment in general.*” P3 described the design decision to have characters look out at the user and ask them questions as a mechanic that enables them to support children in sense-making and creating their own meaning. They explained, “*that's why we always make sure the character's looking out and... asking the kids questions and listening: [to] be patient and give that time for the the kid to wonder and question and make mistakes*” (P3).

Collectively, designers with a Level 4 definition of child well-being sought to support a broad range of activities that they saw as facilitating a meaningful life. These included social and emotional learning supports to help children cultivate self-awareness and self-regulation, mental and physical health supports to empower children to take ownership of their wellness, social experiences to help children deepen their relationships and grow close to others, a diversity of representation to broaden children's worldview, and playful experiences to provoke curiosity, exploration, and joy. Participants both sought to create digital experiences that children would find meaningful in the moment and experiences that would give them tools for building a meaningful life outside of the product.

4.2 Designing with Respect

Independent of these four conceptualizations of well-being, we also saw a dichotomy in how children themselves were conceptualized, with some participants describing children as agents in their own right and others taking a more paternalistic stance that positioned children as receptacles for learning or developmental skills. Here, we describe three different areas in which a subset of participants surfaced the importance of respecting children as autonomous beings with expert understanding of their own needs, capabilities, and contexts.

4.2.1 Respecting Autonomy. A subset of participants surfaced the importance of respecting children’s autonomy as a cross-cutting principle that should drive decisions related to all aspects of their well-being, including safety, usability, learning, and meaning. They explained that these more specific well-being goals should be supported by a foundational respect for the child as an agent capable of cultivating their own well-being through self-directed choices. In these instances, participants described the role of designers by saying things like:

“As an alternative to protecting and dictating what a child should see and what a child should watch and saying—like, getting out the ‘shoulds,’ and—because that’s power dynamic. So, instead of that, thinking about guiding a kid toward recommendation, so recommend things like guiding a kid towards something that might be helpful, something they might be interested in, and not gate-keeping children from things that might help them, because you don’t think it’s appropriate for them, or you don’t think they would like it. Let the child make those choices for themselves, and so that’s what I mean by facilitation, I mean, guidance of like, here is—‘You’re interested in that thing, here are a bunch of different options for you. You’re interested in that thing? Here are a bunch of different options for you. Go forth and prosper.’” (P11).

Others explained that many well-intended digital offerings with learning objectives fail to fully live up to the ideal of supporting child well-being because of the paternalism embedded in their approach to educating children. They explained, “*we want the kids to have this knowledge, you know, and we’re, like, flushing it in their direction, but we’re not really thinking, trying to listen to them or hear their opinion or have them draw something or tell their story. And it’s difficult in interactive media, but it can definitely be done*” (P2). Some participants felt that this paternalism at times leads the industry to lose sight of children’s well-being altogether, explaining: “*A lot of people think that kids need education. And that’s true, I think we all need education, but I don’t understand this obsession with educating kids... I am not so sure if it’s the kids’ needs that we’re trying to meet or our own needs by trying to make ourselves feel better by educating kids and thinking that we’re making the world better. So kids are becoming this object for a lot of people in interactive media*” (P2).

To combat this paternalism, participants described, for example, building experiences that “*show [children] they can do something*” (P3), designing for “*inclusion and belonging and empowerment*” (P15), and designing to give “*the child more autonomy over what they want*

to [do] and not sort of automatically assuming we know what they want to be doing” (P1). Across all participants who highlighted respect for autonomy as an essential principle for designing for children’s well-being, the common thread was, “*I think it really boils down to just treating kids with respect and understanding that they’re full whole humans with wants, desires*” (P11). P16 added the nuance that respecting children’s autonomy requires letting go of the attention-economy agenda that seeks to capture children’s attention and ignore how the child might otherwise choose to spend their time. They explained, “*The idea of agency and control is something that I think is one of the big determinants of whether kids are able to understand well-being and manage it on some level. Because a lot of digital products... the video platforms, the social and communication tools, the games, tend to be designed for attracting their attention and keeping it as long as possible. And sometimes the loss of well-being to me is, the opportunity cost of other things that they’re not doing in their life.*”

Participants who valued child autonomy as a guiding principle emphasized the importance of incorporating children’s voices into the design of products, and viewed the act of following children’s lead as a way of respecting children’s vision for what their digital spaces should look like. They explained that they saw untapped potential to look to children for design guidance, saying, “*I think there’s a lot of opportunity there. And the thing that always strikes me, is how much stuff in the world gets made without really doing effective consultation with the [child] user, or, and not just thinking of them as informants, or and testers, but actually partners... if you really know your audience, you’ll serve them better*” (P16). Other participants felt similarly, emphasizing the importance of children being “*part of the conversation, hav[ing] a seat at the table*” (P5) and exploring together with children to understand “*how they think about the content*” (P3). Many described seeking direction from children throughout the design and production process, and as one participant explained, “*what we are all constantly learning is that, if you’re really going to design something for kids, you need to get it in front of kids and learn from what they will show you and tell you*” (P17).

4.2.2 Respecting Capability. In addition to respecting children’s choices and goals, some designers also pointed to the importance of assuming competence in their child users and respecting their ability to work through cognitive challenges and engage with sophisticated content. For example, they explained the importance of respecting children’s ability to face complex and even stressful ideas, saying that “*[it is important to] make things developmentally appropriate, but nothing should necessarily be off the table because kids experience the world, we know that, you know?*” (P8). Similarly, P12 described an industry trend of assuming a lack of capability, which they found disrespectful and at odds with the goal of supporting child well-being. They recounted other designers saying things like, “*Oh, kids won’t understand these words. These are too complicated of topics,*” but went on to explain, “*but I completely disagree, to be honest; I think that there is a lot of stuff in there that even if they can’t pick out all of the instrumental pieces that are important within those segments, they can get the gist and they can also go back in the future and then look at what they were watching as a kid and be like, ‘Oh my gosh, that was such an interesting thing*

to learn about; I can't believe that that was taught to me at such a young age."

Other participants emphasized the importance of respecting the child's cognitive and problem-solving abilities. One designer described choosing in-app vocabulary that is relevant and accessible to child users but qualified this choice, saying, *"I don't mean by that, that you dumb it down, if anything, you make it more challenging because children are capable of learning really challenging, receptive vocabulary"* (P4). Many participants saw value in giving children the space to struggle with challenges online and considered it a sign of respect to assume child users have the ability to take on something difficult and learn through the experience. They explained, *"you can have, you have failure and loss in a game, there's no harm with that because failure and loss is part of life, it's part of living and it creates resilience, determination, diligence and learning comes from failure. We learn to walk because we fall over"* (P13).

Finally, participants explained that when they encounter design elements that they see as problematic for children or beyond their capabilities, they pause to consider whether this inability reflects a shortcoming in the child or in the design element itself. They described elements that problematic for children as likely to be problematic for adults as well, saying things like, *"my perspective is, kids aren't that different from adults. So if someone believes that an endless feed is bad for grownups, then they should feel the same way for kids. But if they feel like endless feeds are okay for grownups, then why would they not feel that way for kids? Like, in the case of the kid, there's also a grownup who can be like, 'Okay, stop it now.' You don't have that as a grown-up, there's no one telling you to stop. So I almost think it's a bigger problem for grownups"* (P2). Thus, although designers emphasized that children need thoughtful usability considerations that reflect the developmental arc of childhood, they also need adults to respect their capability to engage with cognitively and emotionally demanding experiences and, with appropriate scaffolding, leverage these experiences to grow, learn, and make meaning.

4.2.3 Respecting Culture and Context. Many participants felt that the work of supporting well-being should be guided by the principle of respecting the children's unique circumstances and position in the world. They explained that, *"I think it's really, really important to remember that children are coming to you with their family, and their existing backgrounds, and they're not kinda coming as a blank slate. So I think that acknowledging the importance of their family and their background in everything that you do... that's just critical to be thinking of... they're not just sort of, this sort of blank thing for you to write all over, they are coming already with something"* (P4). For many, showing such respect means *"creating content where kids can see themselves"* and *"focusing on representation"* (P8). Others explicitly sought to support children in working through challenging aspects of their own situated experience *"like having a family maybe where you don't feel as supported or being part of a family that doesn't look nuclear like other people's families do, or being part of a community that is underrepresented or that does not have as many resources as another community"* (P12). Participants described having a goal of supporting *"what is going to help them grow up in their way, rather than kind of trying to be very normative"* (P7) and *"trying to be really conscientious about making sure I'm*

respecting kids and giving them the information they need to live happy lives as their authentic selves... and scaffolding out how they can understand themselves over time and develop language skills and an understanding of self in relationship to the world" (P11).

4.3 The Influence of Organizational Culture and Structure

Many participants said that their company culture and organization impacted both how they conceived of child well-being and the extent to which they were able to design for it effectively. Participants embedded in a culture that explicitly prioritized child well-being expressed more confidence in their ability to design for it and, for those who lacked a background in child development, that they had the opportunity to learn about child users' developmental needs.

Collectively, participants reported that they encountered a Goldilocks effect¹ regarding company emphasis on child well-being, such that just the right amount of support enabled them to most effectively attend to child users' interests.

Some participants explained that their organizations did not explicitly foreground child well-being or surface it as a formalized consideration in the design process. They said things like, *"to be honest, I feel like this, sort of like, the well-being of children is something that motivates everyone and is like in the back of everyone's minds, but we don't use that term on a daily basis... I'm not saying that we should or shouldn't, but just even talking through this with you, I'm like, 'why don't we put this at the forefront of what we talk about more?' [But] I think it's like—it's there all the time, and we're constantly kind of policing ourselves to say, 'This isn't good. This isn't appropriate,' especially in terms of the content"* (P14). In these instances, participants explained that they and their team members implicitly value child well-being but do not proactively discuss or define what this might mean or how it might translate into design. These teams did not have in-house or contractual support for designing or evaluating products from a developmental perspective. In these instances, participants explained that employees in their organization all have *"different perspectives on the product. And I think they look at it from that perspective. They might not look at it as 'creating a better human' or 'helping kids blossom,' [but] of course everyone wants that"* (P2). For these participants, the lack of explicit, top-down company culture centering child well-being led to a lack of product-team cohesion around this topic.

In contrast, a small number of participants experienced struggles integrating an abundance of developmental expertise and explicit, top-down emphasis on child well-being into their product and processes. They explained that they *"over-indexed early on, on childhood well-being... to the point of—I think it slowed us down almost too much at the beginning. We had so many advisors on, we had so many experts on social, emotional well-being"* and they described being *"careful [about child well-being] to the point of exhaustion"* (P6).

However, most participants reported that when supporting child well-being was an explicit organizing principle and that leveraging advice from developmental and curricular experts enabled even

¹A construct used in psychology and adjacent fields to describe the phenomenon of having just the right amount of something: not too little, and not too much.

novices to design for child well-being effectively. For example, participants said things like, “*it’s been really cool to see our newer producers sort of turn into mini learning experts through working on a curriculum; they know everything now*” (P1) and explaining that access to experts enabled “*internal learning and growth*” (P7). Others described witnessing a similar evolution in their colleagues’ skills, saying, “[*they*] *become experts themselves. It’s been really cool to see our producers sort of turn into mini learning experts through working on a curriculum; they know everything now*” (P1).

4.4 Metrics for Child Well-Being

Finally, we found that companies struggled to define product metrics that reflected the full continuum of child well-being and often fell back on simplistic measures like engagement and downloads to evaluate their product in the wild. When asked how they assess their products once they are deployed, participants explained that they measure “*how many kids are playing and for how long*” (P3), “*engagement levels—let’s say minutes per video, minutes per user*” (P16), “*where we rank*” (P12), and “*monthly active users*” (P6). In some instances, participants positioned their success metrics as being in tension with their well-being goals rather than in service of them. For example, P15 explained:

“There are still goals around like growth and metrics and daily active users or weekly active users and monthly active users and retention and all these things. [I’m] trying to balance my perspective which is like, ‘let’s have an open ended play and just let kids login whenever they want’ and [remembering that] we’re working on a business product that actually has to have a sustained amount of people using it over an amount of time.”

A smaller set of participants described measuring learning goals saying things like, “*we test for learning... it’s pretty rigorous, but we have detailed protocols where we know exactly what we’re looking for; we have learning objectives for every single piece of content*” (P4). However, more often participants explained that it was difficult to measure the effect of a product once it was released. They described this struggle saying, “*it’s hard; it’s almost like you have to see the kid play it and and hear them talk about it to know*” (P2) and explaining they rely “*purely [on] the number of times the kids are clicking on that piece of content and playing it*” (P1) as a proxy metric for estimating learning.

Without the benefit of post hoc analytics to assess the product’s impact on well-being, most participants relied on pre-deployment testing sessions for evaluation. Many said these sessions focused on usability concerns like “*mak[ing] sure... they’re not struggling with anything*” (P1) and observing “*if we see kids interacting with it, if they’re understanding it*” (P3). Some reported evaluating dimensions of well-being other than usability saying, for example, that they assess safety by conducting “*game testing to see how children react and respond to content. So, do they find the content threatening? Do they find the content disturbing?*” and evaluating “*if they learn from it*” (P8).

However, participants also said that they often found they were able to invest less in evaluation than they would like, and they rarely

mentioned concrete ways in which they measure the meaningfulness of their products with children. Several participants described the challenge of prioritizing deep evaluation and partnership with child users, critiquing the broader industry for its underdeveloped approach to evaluation... “*I always try not to directly be like, ‘Oh, my nephew didn’t like this, so that means this piece of content didn’t work.’ And I think people do tend to do that sometimes in the kids media world... just, ‘my kid played it’*” (P14). Participants proactively described wish-list metrics that they hoped to evaluate someday, saying things like, “*I would ask parents about basic things like, is your child sleeping okay, eating okay? Are they engaging socially with other children? How is your child’s emotional well-being? Like when they have like huge emotional break, like outbreaks, like what happens? Are you able to soothe them?*” (P9) and “*measuring in some capacity, how often kids ask to read outside of the app, so, are they asking to read more books?*” (P15). These metrics would, in theory, evaluate well-being effects with more sophistication, but as of yet, participants said these deeper assessments were out of scope.

5 DISCUSSION

5.1 Modeling the Current Approach to Designing for Child Well-Being

Participants’ collective reflections depicted a space of well-being considerations that we modeled in four tiers (see Figure 1). Currently, child-centered design professionals consider: (1) designing for safety, centering design methodologies and features around legal compliance, paying special attention to being privacy-conscious, and approaching both content creation and curation with a do-no-harm lens, (2) designing for usability, with design decisions grounded in the end user’s developmental stage and skills, (3) designing for educational experiences, usually focused on school-based curriculum and well-specified learning goals, (4) designing for meaningful experiences considering the holistic child.

This hierarchical ordering reflects the increasing complexity that we encountered in participants’ conceptualizations of how to support children, with more straightforward approaches (e.g., meeting legal requirements) reflected in Level 1, and more complex goals and conceptualizations (e.g., scaffolding a love of learning over time) reflected in Level 4. Higher levels subsumed lower ones, and participants who described striving for Level 4 or 3 goals typically also sought to support the safety and usability goals of lower levels.

Separately, we found that at each of these four levels, well-being goals could be framed to either foreground or foreclose the child’s autonomy. In some instances, designers sought to support children’s well-being by crafting an environment that would direct the child, leading them to specific curated experiences. In others instances, designers sought to support children’s well-being by crafting an environment that the child could direct and giving them the space to choose what to do, learn, and experience.

By capturing existing practices, this framework complements existing ones in at least two ways. First, it captures grassroots insights and ideas from practitioners with real-world experience creating products for children and families, competing in the marketplace, and navigating regulations. Unlike frameworks that bring research constructs to industry, the categories presented here reflect industry practices for the academic community to learn from. Second, it

offers a map of the current state of child-centered industry goals and practices. Current frameworks strive to propose ideal structures with the aim of inspiring better design; we hope that our framework can serve this end, but here we also document current practices to help the research community understand real-world implementation, variation across companies, potential shortcomings and growth opportunities, and ways to compare a product against the larger landscape.

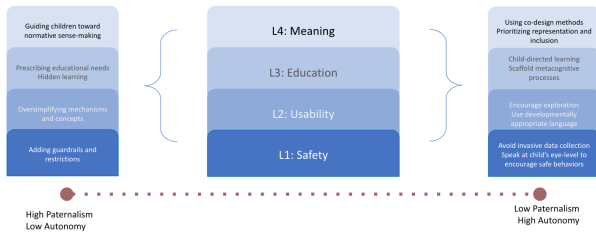


Figure 1: Industry professionals consider child well-being across four levels of increasing sophistication and depth. At each level, we encountered perspectives that were, alternatively, more or less autonomy-supporting in their conceptualization of the child. Here, we show examples of each perspective translated into design decisions.

5.2 Open Opportunities for Prioritizing Child Well-Being in the Design of Technology

Our data also revealed potential opportunities for evolving current practices in service of child well-being.

5.2.1 Improving Well-Being Metrics. Most participants reported that their organization has not advanced their measurement tools beyond unprompted fan letters, focused user studies, and basic engagement metrics (i.e., clicks and watch time). All the while, creators talked about striving to support complex learning and meaning-making goals and yet measured their products only for their safety and usability. This misalignment between the aspirations a company has for a product and the metrics they use to measure its success presents both a concern and a huge opportunity for innovative thinking. Future work to design more robust measurement tools that effectively capture the influence of a product on deeper well-being considerations like relationship quality, sense of belonging, or growth mindset would be of great value. If the adage that “*you make what you measure*” holds true [19], the child-centered design industry is currently limited to building what children will click on and watch for extended periods of time.

5.2.2 Explicit Corporate Articulation of Well-Being as a Design Goal. Participants who came from organizations with a culture where supporting child well-being was a central and explicit goal said that they felt empowered to create products that they were proud of. They explained that this effectiveness was a result, in part, of the fact that their organizations had both: 1) made an explicit commitment to prioritizing the well-being of child users, and 2) allocated resources to back up this commitment, such as advisory boards

and access to developmental experts. Our results suggest that companies should make this two-part investment, as it was sufficient to scaffold novices without child development experience in creating products that are sensitive to children’s needs and designed to support their well-being.

5.2.3 Striving for Level 4 Well-Being Support. Many of the creators we spoke to were doing truly amazing things: thinking deeply about the experiences they bring into children’s worlds, constantly striving to improve children’s experiences in whatever niche of digital landscape they occupy. One of our goals in modeling current practices was to share these inspirational anecdotes with others who work in child-focused spaces and to encourage product teams expand the ways in which they strive to support child well-being. Participants described designing for empowerment, self-awareness, representation, love of learning, close relationships, and much more, showcasing the rich set of well-being goals for which digital design can strive. However, this complexity was not universal, and we see an opportunity for practitioners to close this gap. Product evaluators and independent third-party certifications might also look to these four levels when evaluating the quality of a product.

5.3 Limitations and Future Work

Our results are drawn from a small sample of creators in the child-focused digital space self-reporting on their own experiences and viewpoints, which participants knew in advance would be recorded and documented. Although anonymity was a high priority and the research team signed NDAs on request, our results may be skewed by a Hawthorne effect in which the act of observation influenced the behaviors of participants. In addition, we did not assess how participants’ unique professional backgrounds or disciplinary biases might have influenced their reflections. Future work would ideally involve a follow-up study where industry professionals use and evaluate our proposed framework. In addition, it will be important for caregivers and/or youth to provide feedback on the framework, how it resonates with their digital experiences, and whether it might help promote digital literacy about product design and well-being, as has been done in recent work in educational technology [1]. Innovating novel, practical metrics for evaluating the effect of a product on different dimensions of child well-being would also be of great value; This is a rich area for future work, as even companies with sophisticated goals for supporting children’s well-being struggle to measure their impact in the wild.

6 CONCLUSION

This work describes how creators of child-focused technology platforms, content, and services think about and design for child well-being. Synthesizing the perspectives and stories of 24 child-focused designers and creators, we identify a hierarchy of four levels of well-being support that industry professionals consider during the design process. At each level, we encountered differences in perspectives regarding how designers conceive of children, with some taking a paternalistic approach to designing for well-being and others grounding their approach in respect for the child’s autonomy. Despite the sophistication of the goals participants had for their

products' effects on children, they reported that organizational metrics for assessing product impact remain simplistic and lag behind teams' ideals.

As regulators and the public continue to push for higher quality products, our results indicate that design teams can (and do) engage with this challenge by: making child well-being a stated priority; investing in access to experts in child development; striving for well-being goals that go beyond legal compliance and demand meaningful, autonomy-supportive experiences; and innovating metrics that capture whether children experience this meaning and autonomy-support in practice.

7 SELECTION AND PARTICIPATION OF CHILDREN

No children participated in this work.

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A PARTICIPANT DESCRIPTORS

Participant	Role	Experience (Years)	Company Size	Primary Product	Focus Demographic (Age)
P1	Director of Authoring	6	Medium	Educational App	3-5
P2	Creative Lead	10	Medium	Educational App	3-6
P3	Creative Strategist	7	Small	Entertainment	2-8
P4	Senior Director of Learning	10	Medium	Educational App	3-6
P5	Founder	1	Small	Social Media	6-12
P6	Research Director	10	Small	Entertainment	3-6
P7	Lead Content Researcher	6	Medium	Educational App	1-4
P8	Creative Director	1	Large	Entertainment	3-6
P9	Director of Content Research	1	Large	Entertainment	3-6
P10	Writer	7	Small	Entertainment	3-8
P11	Founder	7	Small	Entertainment	3-6
P12	Associate Producer	5	Medium	Entertainment	4-6
P13	Director of Learner Experiences	10	Large	Entertainment	8-12
P14	Creative Producer	8	Medium	Educational App	2-8
P15	Researcher	1	Small	Educational App	3-7
P16	Executive Director	20	Small	Nonprofit	6-9
P17	Content Strategy	15	Medium	Nonprofit	2-10
P18	Product Policy	10	Large	Entertainment	9-12
P19	Innovation Officer	9	Medium	Educational App	9-12
P20	Usability Designer	10	Small	Entertainment	2-5
P21	Research Director	10	Small	Nonprofit	6-9
P22	Content Designer	10	Medium	Nonprofit	2-10
P23	Creative Lead	1	Small	Entertainment	2-7
P24	Business Strategist	5	Medium	Entertainment	2-8

Table 1: Participant Descriptors. Company size assigned to ‘Small’ (less than 20 employees), ‘Medium’ (up to 100 employees), ‘Large’ (100+ employees).

B INTERVIEW PROTOCOL

B.1 Introduction

- What is your role at [company]? How long have you been there?
- Have you worked at any other companies?
- Can you describe the team you work with? How many people are on your team? In the whole company?
- How does your team fit into the larger company - is it a small branch, or is child centered design the main focus?
- What is the target age of the children who use your products?

B.2 Definition of Child Well-Being

- How does your company define the idea of child well-being?
- Does your company have an official definition of well-being goals to strive for? Or a mission statement about what you hope to bring to children’s experiences?
- Does your company have a “double bottom line” or similar company-wide goal of improving child well-being?
- How is that done or communicated to teams? What are the metrics you use?
- Does your specific design team or analytics team have the same or different definitions of child well-being in practice? Why is this?

- Does your personal view of well-being differs from/aligns with the company view?
- What does the design process look like at your company?
- How do you identify blind spots or unintended consequences within that process?
- What do you think of the recent publications like the IEEE guidelines for child-centered design? Are they realistic?
- How would your team do [Have you heard of] a child impact assessment? Do you have a mechanism for this?
- What are the metrics you use to determine whether a product is successful? Why did your team choose those?
- What aspects of your competitors' designs support your definition of child well-being? What aspects pose a threat?
- Give me three words to describe your company's approach to design for child well-being.

B.3 Design Based Questions

- What features/elements in your design process would you say are meant to “capture” (keeping them engaged) your audience, and align with platform recommender systems?
- Tell me of a time when you wanted to do something with the product to support child well-being, but couldn't (and the opposite).
- How do your designs let kids take a break if at all?
- How do your designs encourage kids to move off into physical spaces, if at all?
- What sorts of designs do you see in your competitors that you wish your company was doing?
- What sorts of designs do you see your competitors using that are unethical or inappropriate, if any?
- What do you know about your users? What analytics are you using? What matters most to you?
- How are you sorting your customers (kids)?
- How do you take parents into consideration in your designs, if at all?