Drawing Privacy: How Children Conceptualize Regulation and Content Across Development

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Abstract

Children's understanding of privacy develops as they navigate both physical and digital spaces. This study examines how children aged 3- to 13- years-old conceptualize privacy through their drawings, analyzing data from the *Privacy Illustrated* dataset. We explored two key dimensions: *regulation* (mechanisms controlling access, such as doors) and *content* (what children consider private, such as bedrooms or intellectual property). Our findings suggest that as children get older, they are more likely to view privacy as something that can be actively managed using physical barriers and control mechanisms. In contrast, younger children often depicted privacy as simply being alone. Content-related depictions remained relatively stable across ages, though older children included more abstract ideas, such as digital privacy. This study provides a novel framework for examining privacy development, highlighting distinct but interrelated dimensions of privacy.

Keywords: privacy development; regulation; content; visual representations

Introduction

Privacy has long been recognized as a crucial aspect of human interaction. It is deeply intertwined with personal agency and security. It can be seen as a dynamic regulation of interpersonal boundaries, and by adulthood it appears to be a fluid and context-dependent concept (Altman, 1976; Marshall, 1972; Solove, 2002). Indeed, adults often view privacy through legal frameworks (Gligorijević, 2019), and the concept of privacy in adults is greatly shaped by societal and conventional factors. The present paper asks how privacy develops during childhood. It is important to ask what the developmental starting point of privacy concepts is given the clear social and conventional influences on adult privacy concepts.

Children are active participants in both online and offline environments, where privacy is critical (Stoilova et al., 2019). For example, privacy concepts regulate both their everyday decisions to close the door when they go to the bathroom and the kinds of information they share with in-person and online agents. And so, anecdotally a concept of privacy must begin sometime during early to middle childhood. However, it is not well understood how the concept of privacy begins during development.

The present study investigates how children conceptualize privacy through their drawings. Drawings provide a non-verbal medium through which children can express complex ideas, making them particularly valuable for studying how younger children conceptualize abstract concepts (Fabris et al., 2023). In particular, drawings can provide a method for measuring children's abstract conceptualizations by examining what children view as the most salient dimensions of a given concept. For example, when children draw rooms, children draw what they view as conceptually important; namely the object in the rooms and their relation to one another, as opposed to what they view as walls and other less important elements (Dillon, 2021).

Our investigation conducts a secondary analysis on an existing data set of privacy drawings authored by children in middle childhood. The data set, "Privacy Illustrated", is specifically a collection of drawings that are the result of the Deep Lab project at the STUDIO for Creative Inquiry at Carnegie Mellon University (Deep Lab, 2014). Through its examinations of these visual representations, the present study seeks to address several critical questions: *How do children conceptualize privacy? How might children's conceptualization of privacy change or stay the same with age?*

This dataset was previously used in a paper authored by Oates et al. (2018). In this work, the authors utilized this entire dataset of 366 illustrations of privacy to understand how children, adults, experts, and non-experts, think about privacy. Expert drawings were those classified as done by professionals or students at classes and events for security and privacy. In their coding of the drawings, they found that experts focused on the relation between privacy and control over information (Oates et al., 2018). Further, they found that young children disproportionately depicted physical privacy compared to online privacy (Oates et al., 2018). They also noted that children under 10-years-old frequently drew bathrooms or bedrooms and often focused on preserving privacy in these spaces. They reported that kids older than 10

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and teenagers tended to draw content related to digital contexts more often noting examples like devices, digital information and social media. In their analysis they focused on how the omission of digital privacy in younger children could be used as a framework to understand children's ability to make privacy-conscious decisions online (Oates et al., 2018). Altogether, this original paper broadly analyzed all illustrations in the dataset and compared differences in the illustration's themes, symbols, and contexts between children, adults, experts, and non-experts. However, the original researchers were not developmental scientists, and did not examine the dataset for broad developmental trends or patterns across age.

In this study, we will investigate how children 3- to 13-years-old understand privacy. Before we present our proposal, we next review what is known about privacy development during this crucial age range. Previous research suggests that privacy concepts indeed change with age. Prior work can be divided into work on physical privacy and work on digital privacy.

Previous research has shown that children's understanding of physical privacy develops significantly during early and middle childhood. As early as 4- to 5-years old, children, particularly girls, begin to internalize societal expectations about modesty and bodily boundaries. For example, Ferreira's (2013) ethnographic study suggests that children's understanding of bodily privacy was deeply influenced by cultural norms and adult guidance. Girls, in particular, were found to navigate these expectations by monitoring their behavior during group activities and adjusting how they dressed or moved to align with societal standards. This awareness is often shaped by direct adult interventions, such as verbal reminders from parents or caregivers about modesty (Ferreira, 2013). Relatedly, children in this age range also demonstrate discomfort during medical examinations when their bodily privacy is violated, particularly when verbal explanations or reassurances are absent (Hansson et al., 2009). Children, at around this same time point spend time in spaces like nooks under stairs or estrades, because these spaces allow them to observe their surroundings while remaining unseen (Sevinçli & Şahin, 2024). By 7– to 8-years-old children are concerned about protecting their physical privacy, such as preventing siblings or peers from tampering with their belongings (Zhang-Kennedy et al., 2016). 10- to 13-year-old children are more likely to engage in privacy coded behaviors like closing bedroom or bathroom doors, as compared to younger children (2-9 years-old), but are also less likely to do so compared to older adolescents (Parke & Sawin, 1979). Similarly, adolescents 12- to 15-years-old increasingly report using secrecy as a strategy to manage their autonomy, particularly in response to perceived parental intrusions (Dietvorst et al., 2018).

While the literature on physical privacy focuses on physical space, actions, and interactions, studies on digital privacy involve navigating complex systems, such as data collection, tracking, and online threats. This literature shows that by the time children are 5- to 7-years-old, they are primarily concerned with interpersonal privacy including safeguarding personal information from their friends or siblings (Stoilova et al., 2019). At this age, children believe their data is stored locally and is confined to their apps or devices (Sun et al., 2021). Children as young as 5-years-old are also able to differentiate between self-tracking and other tracking but generally view tracking more favorably than adults (Gelman et al., 2018). By ages 7- to 9-years-old, children recognize that apps can be invasive and can infer certain characteristics such as gender or age based on their actions (Sun et al., 2021). They also start to identify interpersonal threats, such as peers tampering with their devices or parents monitoring their activities (Livingstone, 2017). Qualitative work suggests that by the time children are 8- to 11-years-old, they view digital privacy as being alone or being able to restrict access to their device, especially from friends or siblings (Zhang-Kennedy et al., 2016). Further, their concepts of digital risk relied on whether or not their digital activity would be punished (Zhang-Kennedy et al., 2016). Finally, children ages 13- to 15-years-old highly value privacy for personal devices. For example, by actively resisting parental intrusions, viewing monitoring as a violation of trust, as they view these spaces as extensions of personal space (Cranor et al., 2014). However, while children in this age range can view monitoring as a violation of trust, they still often lack the tools and strategies to address the broader implications of data profiling and surveillance (Livingstone, 2018).

Altogether, prior work highlights how children's thinking about privacy is likely developing during middle childhood. Because of its heterogenous nature in topic and method, this prior work falls short of providing a holistic picture of privacy development. This gap in the literature is in part due to the focus of prior works on specific applications or elements of privacy (e.g., GPS tracking, privacy in only digital spaces, privacy of a specific place or room). Nonetheless, in integrating what is known across literatures about children's concepts of privacy, we can see a few notable patterns. One recurring theme across papers is the need to understand the boundaries among public and private, or "content" based reasoning. For example, we can see that to understand privacy across contexts young children must be able to make judgments about matters like personal or bodily boundaries (Hansson et al., 2009) or the kinds of information that need to be safeguarded (Gelman et al., 2025). Second, there are notions of the way privacy influences actions and/or normative beliefs. For example, we can see that children must be able to make judgments about the acceptability of privacy invasions in both digital (Gelman et al., 2021) and physical contexts (Hansson et al., 2009). Drawing on these elements in prior work we propose that early privacy concepts likely contain two focal elements: 1) judgments about what is private or content-based thinking, and 2) judgments about privacy actions that regulate privacy (see work on ownership for a similar conceptual framework; Nancekivell et al., 2019).

In terms of development, it remains unclear whether children acquire notions of regulation and content

simultaneously or if there is a dissociation where one dimension of privacy develops before the other. For example, it could be that children acquire content-based understandings before others as they are more concrete. Namely, it is easy to represent these content-based understandings, like bathrooms are private and school rooms are not, because such judgments often involve tangible and observable elements. In contrast, normative and action-based considerations related to how privacy entails regulating access to content, or regarding how efforts to regulate privacy should be respected by others, likely require more abstract reasoning as regulation and control fewer tangible concepts. Given these are distinct dimensions, it seems likely that these dimensions of privacy could develop at different rates.

Present Study

The present study investigates children's conceptualizations of privacy by analyzing drawings from the Privacy Illustrated Project (Deep Lab, 2014). Children between 3- to 13-years-old were given the prompt "What does privacy mean to you?" and were asked to illustrate their own ideas of privacy. The pictures were accompanied by descriptive captions generated in collaboration with the children. For the present study, we included and analyzed drawings from participants ages 3 to 13-years-old as this is the timepoint at which privacy concepts seem to develop. We are expecting that younger children will depict privacy primarily through more concrete content-based elements focusing on physical spaces. In contrast, we expect older children to incorporate more elements of regulation, focusing on elements related to the active regulation of privacy. As we reviewed above, prior work suggests that as children age, they are more likely to demonstrate and talk about regulatory elements of privacy, such as using verbal means to establish clear privacy boundaries with others (e.g., Hansson et al., 2009; Parke & Sawin, 1979; Zhang-Kennedy et al., 2016).

Methods

Participants

The final sample for the present study consisted of 105 drawings authored by children published in the publicly available Privacy Illustrated dataset (Deep Lab, 2014). Children's ages ranged from 3-to 13 years-old, corresponding to a broad developmental spectrum from early childhood to early adolescence. Those who did not explicitly include their age were given the mean age for that particular grade (4.5 years old for Kindergarten, 6.5 years old for Grade 1, 8.5 years old for Grade 3). The dataset provided no identifying information about the participants other than their age or grade and, in some cases, first names. Drawings were excluded from our analysis if they did not have a caption.

Research Design

To understand the nature of children's drawings we coded their content. The drawings were coded in two ways. First, we coded the drawings for our two focal dimensions 1) regulation, and 2) content. Drawings were given a *regulation* code if they included elements related to who could access or control the private content. We also included mentions of solitude or being alone in this code as these notions are related to regulation as they directly relate to privacy as an access issue. Drawings were given a *content* code if they included specific depictions of things that are "private" or depicted boundaries between private and public. Codes were non-mutually exclusive. Children could receive multiple codes if they included multiple distinct elements in their drawing relevant to a given dimension. When coding the drawings, we considered both the content of the drawing and the caption.

After broadly categorizing the drawings, additional subcategories were added using a bottom-up inductive coding method. These additional categories allowed us to better understand the nature of the elements in children's drawings as well as understand the diversity of elements they included. For the regulation dimension of privacy, we inductively generated subcodes for: covering, curtain, locks, looking/peeking, alone/isolated, alone (with others), and doors. For content dimension of privacy, we generated subcodes of: bedroom, room, sleeping, bathroom, showering/bath, bodies (changing), intellectual property (e.g., schoolwork, tests, information, etc.), and digital content (e.g., computer passwords, private accounts, digital interactions, etc.). These codes were "at-least-once" in that children could receive only a singular code for mentioning any given element once. For example, they would get one bathroom code even if they draw four bathrooms.

Results

Analytic Plan

To analyze the dataset, we first created two scores: a regulation score and a content score. These scores were created by summing the number of distinct elements that fell into each category. For example, if a child drew both a bathroom and a bedroom then they would get a "2" as their content score. To examine the relationship between the focal categories (e.g., regulation and content) and age, we used Spearman's rank correlation coefficient. R was used for the analyses.

We also examined the prevalence of specific subcategories within regulation and content across different age groups. Due to the exploratory nature of our subcodes, we did by focusing on descriptive statistics like frequencies. These frequencies allow us to capture the nature of any age-related changes detected in our initial analysis, as well as the relationship between age and the complexity or diversity of children's representations of privacy in their drawings. Percentages were calculated by summing the at-least-once

codes and dividing by the number of children. Finally, to understand relation between age and codes we split participants into two age groups based on the median age of 78 months (6.5 years) and compared the percentages of target dimensions throughout the results.

Privacy as "Regulation"

Bivariate correlations were calculated between age (months) and both overarching dimensions of "regulation" and "content" using Spearman's rank correlation coefficient. We found that age was positively correlated with depictions of regulation (r = 0.212, p > 0.03) which indicated that children's viewed privacy as a matter of regulation slightly more with age. 80% of children included regulation elements at least once in their drawings. Older children included regulation related elements 12.9% more often than younger children. Children's drawings typically only included a singular element related to regulation with older children mentioning two or more elements of regulation 17.8% more often than younger children. **Figure 1** provides examples of these trends using children's drawings.

Next, we characterize the nature of children's drawings using our subcategories. The most frequently illustrated subcategories within the regulation dimensions were: alone/isolated (33%), doors (34%), and locks (23%). We next compare these categories across age groups (see Table 1). Older children mentioned doors 17.8 % more than younger children. They provided the only mention of locks as younger children never mentioned them. Younger children focused on solitude or being alone 8.7% more than older children.

Together, these findings highlight that children's appreciation of privacy as a regulatory process is growing with age. Even when younger children included elements related to regulation, they tended to focus on elements of physical separation and isolation whereas older children focused on elements related to control.

Privacy as "Content"

The correlation between age (months) and content (r = 0.054, p = 0.58) was non-significant. This suggests that children think about the role of content in privacy consistently with age. 60% of children included at least one content-related element in their drawings. Younger children included content-related elements 4.8% more often than older children. When examining the number of content-related elements children included in their drawings, we found that young children were 23.6% more likely to mention only one element in their drawings, indicating that their drawings were more homogenous than older children's drawings. Figure 3 shows related trends.

We next examined the top three categories for younger children as compared to older children. The most frequently illustrated subcategory for both age groups was bathrooms but older children mentioned bathrooms 12% more than younger children. Both age groups also mentioned intellectual property with almost the same frequency (21.1% for older children and 19% for younger children). However, older children provided the only mention for digital content elements. In general, younger children were more likely to focus on physical, tangible elements, as they mentioned bedrooms 5.4% more and bodies (changing) 11.3% more than older children. Table 1 highlights these trends.

Together, these findings highlight that children's appreciation of privacy as a content process is changing less with age. However, when younger children included elements related to content, they tended to focus on elements of physical elements whereas older children were able to conceptualize digital elements as well.

Table 1. Summary of Age-Based Differences

		Young (< 78 m)	Old (> 78 m)
Regulation	One or more elements present	37.1%	42.9%
	Alone (isolated)	37.7%	28.8%
	Doors	24.5%	42.3%
Content	One element or more elements	42.8%	38.1%
	Bathroom	18.9%	30.8%
	Intellectual property	18.9%	21.1%

Figure 1. Drawings with different elements of regulation. *Note. Captions associated with images were as follows.* ***1A****: Being on my own. By Anabel, age 6.* ***1B****: Making a picture under the covers because it is a surprise. Ruby: age 4.* ***1C****: It is a person in a house with blinds so they have privacy. By*

Oliver, age 12. ***1D****: Listening to music and being alone. By Jayla, age 13.* ***1E****: sign on door to keep out, passcode, bathroom, locks on lockers.* ***1F****: locked door, password, both texting to strangers, keeping Instagram posts private, not meeting strangers face to face, restricted area. Luke: age 11.* ***1G****: My clubhouse in my basement is private. My brothers and me have secret meetings. Felicity 5.* ***1H****: When I want privacy I hide under my covers, I hide from my sister. Rhiannon: age 5.*

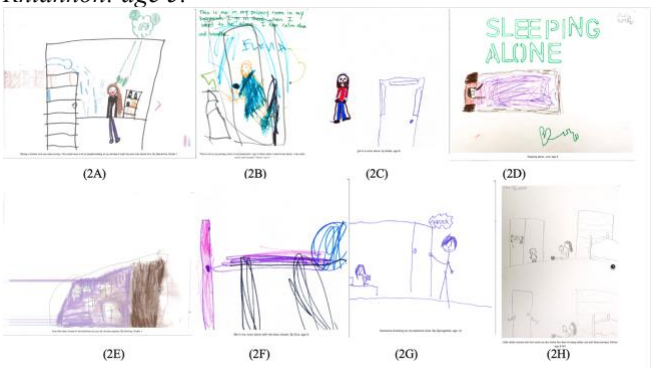

Figure 2. Drawings relating to being alone/isolated or doors as mechanisms of regulating access.

Note. Captions associated with images were as follows. ***2A****: Taking a shower and you want privacy. You could have a lot of people looking at you all day it might be your only alone time. By Samantha, Grade 1.* ***2B****: This is me in my privacy room in my basement. I go in there when I want to be alone. I can calm down and breathe. Elena: age 5.* ***2C****: girl in a room alone, by Addie, age 8.* ***2D****: Sleeping alone. Julia: age 8.* ***2E****: Have the door closed in the bathroom so you do not see anyone. By Krishna, Grade 1.* ***2F****: Me in my room alone with the door closed. By Eva, age 6.* ***2G****: Someone knocking on my bedroom door. By SpongeBob, age 12.* ***2H****: Little sister comes into her room so she locks the door to keep sister out and have privacy. Elena: age 8 ¾.*

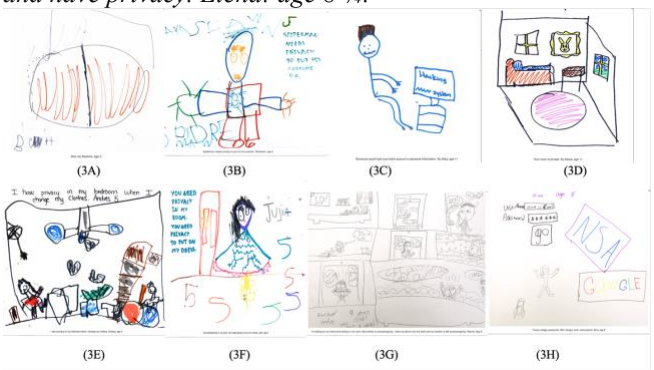

Figure 3. Drawings with different content-based elements.

Note. Captions associated with images were as follows. ***3A****: Butt. By Beatrice, age 5.* ***3B****: Spiderman needs privacy to put his costume on. Takshawn, age 5.* ***3C****: Someone could hack your bank account or personal information. By Abby, age 11.* ***3D****: Your room is private. By Alexa, age 11.* ***3E****: I have privacy in my bedroom when I change my clothes. Andres, age 5.* ***3F****: You need privacy in my room. You need privacy to put on my dress. Julia, age 5.* ***3G****: I'm talking to my friend and texting in my room. My brother is eavesdropping. I take my phone into the bath and my brother is still eavesdropping. Rachel: age 9.* ***3H****: Privacy collage: passwords, NSA, Google, toilet, naked person. Nina, age 8.*

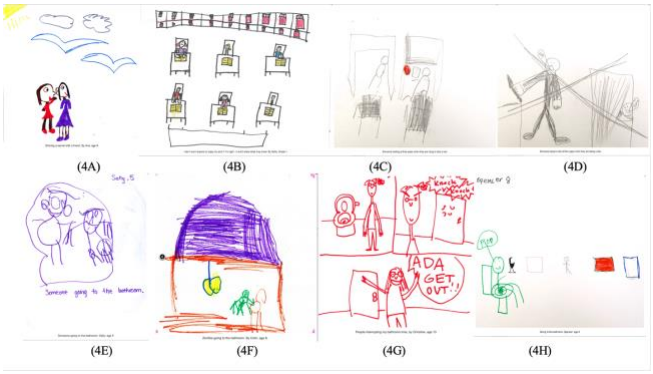

Figure 4. Drawings relating to intellectual property or bathrooms.

Note. Captions associated with images were as follows. ***4A****: Sharing a secret with a friend. By Ava, age 6.* ***4B****: I don't want anyone to copy my work, if I'm right-it won't show what they know. By Sofia, Grade 1.* ***4C****: Someone looking at their paper when they are trying to take a test. Anonymous, Grade 3.* ***4D****: Someone trying to look at their paper when they are taking a test. Anonymous, Grade 3.* ***4E****: Someone going to the bathroom. Sally, age 5.* ***4F****: Zombie going to the bathroom. By Colin, age 6.* ***4G****: People interrupting my bathroom time, by Christine, age 13.* ***4H****: Going to the bathroom. Spencer, age 8.*

Discussion

This present study examined how children ages 3- to 13-years-old conceptualized privacy through their drawings, focusing on two key dimensions: regulation and content. Our findings suggest that children's conceptualizations of privacy changed with age and that our novel framework for understanding privacy is likely useful for mapping development. Before we discuss our findings further, it is worth noting that the present findings are only preliminary in nature as they relied mostly on frequency analyses. We hope to replicate the present findings using experimental methods in the future.

In terms of regulation, children at all ages mentioned some element of regulation. Younger children were more likely to depict privacy as physical separation or isolation focusing on a singular dimension of aloneness. In contrast, older children appeared to view privacy as a more active process involving actions that regulate access. Namely, older children were more likely to include elements like doors and locks which would allow someone to control access to a private space. This pattern suggests that as children age, children might transition from viewing privacy as a more passive state, which is related to being left alone, to understanding it as an active process involving mechanisms to regulate access. These patterns are compatible with broader literature where children ages 4- to 6-years-old preferred hiding spots that still allowed them to observe their surroundings without being

seen (Sevinçli & Şahin, 2024), compared to older children (10- to 13-years-old) who were more likely to use physical markers such as closed doors to indicate boundaries.

In contrast to regulation, content-based elements appeared more consistently regardless of age. At similar rates children included items they viewed as "private" in their drawings indicating an appreciation at all ages that privacy entails an understanding of boundaries between private and other types of things. For example, many children of diverse ages included concrete private places like bathrooms and bedrooms in their depictions. Nonetheless, we also found some age-related changes in children's depictions with older children being more likely to also include elements like intellectual property and digital property types in their drawings. This pattern may reflect an increasing appreciation of more abstract types of private content. This pattern is also compatible with broader literature where children as young as 4-to 6-years-old showed discomfort when their bodily privacy was violated in medical examinations. Similarly, it is unsurprising that older children showed a deeper understanding of more abstract elements. This aligns with previous literature wherein children ages 13- to 15-years-old view their personal devices and text messages as an extension of their personal private space (Cranor et al., 2014).

In putting our findings together, we can begin to see a preliminary developmental story emerging. At a young age, children appear to understand privacy in more concrete content-based dimensions. They also have a cursory understanding of the regulatory nature of privacy. Namely, their focus on dimensions of aloneness and solitude indicates an understanding that privacy must, to some degree, include elements of separation or limiting access. As children aged, they appeared to view privacy as more multifaceted and abstract. In terms of content, children discussed more abstract types of private content (e.g., ideas). In terms of regulation, older children depicted elements that indicate that they view privacy as an active regulatory process that involves controlling access to private content.

The conclusions of this study should be considered in light of a few limitations. Due to the nature of our secondary data, we had no control over how the original data was collected, including the prompts or instructions provided to participants. This potential limitation in the original data was collected and therefore could have influenced the final drawings and our age-related findings. Additionally, the choice of method may have constrained the responses of some children and therefore introduced variability by age based on drawing ability. For future experiments, we aim to replicate these prior findings using a force choice methodology as to ensure the development we found in the present study represents the conceptual development of privacy.

Together our findings contribute to the literature by demonstrating that regulation and content are distinct but interrelated dimensions of privacy that are worth mapping separately across development. They also suggest that these two dimensions of privacy likely develop along similar but distinct trajectories with more age-related change likley occurring along regulation-related dimensions.

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