United States
Consumer Product Safety Commission

May 2025

CPSC Staff Statement[1] on Westat's Final Report: "Investigation of Smart Toys and Additional Toys through Child Observations"

The Final Report from Westat Corporation entitled, "Investigation of Smart Toys and Additional Toys through Child Observations," presents results of toy observations and caregiver questionnaires of young children under IDIQ Contract 61320619D0101 Task Order 2 613206120F1014. The objectives of Task Order 2 were to obtain data from 50 young children, ages 2- through 4-years-old, interacting with nine (9) toys from the following six (6) categories: Plush Toys with Electronic Components, Take-Apart Toys, Figurine Toys, Manipulatives, Musical Instruments, and Smart Toys.

This contract was conducted in response to public comment received on a draft version of the CPSC staff 2020 *Age Determination Guidelines: Relating Consumer Product Characteristics to the Skills, Play Behaviors, and Interests of Children*. At the time, multiple stakeholders commented that there are categories of toys in the *Guidelines* that have yet to be addressed or need further research such as toy figurines, take-apart-vehicle toys, musical instrument sets, and smart interactive toys. This research provides an understanding of the ages of children who are interested in these toys and who possess the skills and cognitive ability to use them as the manufacturer intended. Results of the contractor's report are limited by small sample sizes and the limited number of toys studied.

[1] This statement was prepared by the CPSC staff, and the attached report was prepared by Westat for CPSC staff. This statement and the attached report have not been reviewed or approved by, and do not necessarily represent the views of, the Commission.

Westat

Improving Lives Through Research®

Investigation of Smart Toys and Additional Toys through Child Observations

Final Report

January 26, 2025

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1.0 Background

In 2023, an estimated 167,500 toy-related injuries were treated in U.S. hospital emergency rooms.[1] Of the 209,500 toy-related injuries, an estimated 76% happened to children 14 years or younger, 69% occurred to children 12 years or younger, and 38% happened to children 4 years or younger. Many of these injuries resulted from parents underestimating their child's mouthing behavior, giving toys to a child that are intended for an older age group, a child inadvertently gaining access to a toy meant for an older sibling, or a child using a toy in an unintended manner.

Age determinations are of paramount importance in reducing toy-related injuries as they help enforce regulatory requirements for toys and the applicable mechanical testing parameters to which they will be subjected. For example, the use and abuse tests under 16 CFR 1500.50-.53 vary for different age groupings of children (i.e., ages 18 months and younger, 19-35 months, and 36-95 months). Toys intended for children less than 3 years old cannot possess small parts or small balls. Additionally, since 2008, children's products for ages 12 years and younger, as defined in section §3(a)(2) of the Consumer Product Safety Act (CPSA), are subjected to lead limits. There also is a prohibition against certain phthalates in children's toys as defined in the Consumer Product Safety Improvement Act (CPSIA) §108(b)(3)(e)(1)(B). Thus, the regulatory requirements and any testing required for children's products are based on the expected age group of the intended user.

Numerous toy characteristics are considered when making an age determination. These include the physical characteristics of the toy (e.g., size and weight of the toy and its components), the cognitive requirements for using the toy as intended, the fine motor or other physical skills required to use the toy as the manufacturer intended, and the toy's theme and appearance. The *Guidelines for Determining Age Appropriateness of Toys* (hereafter referred to as *Guidelines*) provide details and examples for applying each of these characteristics to different age groups. The Guidelines present age-grading information in the form of recommendations for toys and other articles, children's toys, childcare articles, and children's products.

In 2020, the Consumer Products Safety Commission (CPSC) staff released an update to the *Guidelines.* The revised *Guidelines* were extensively updated based on research conducted under an interagency agreement with staff of the National Institutes of Health Eunice Kennedy Shriver's National Institute of Child Health and Human Development (NICHD). This research study investigated over 100 novel and classic toys, and children observed play patterns at different ages. The researchers also administered a questionnaire to parents while their children played with the toys. While the *Guidelines* include extensive information about a large variety of toys, there are some toy categories that need further research. While smart toys are discussed in the *Guidelines,* this category of toys evolves rapidly, so what is currently in the market may not be represented in the *Guidelines*. Other toys, such as figurines, interlocking building sets, and musical toys, are discussed in the *Guidelines*, though not extensively. This research endeavor will begin to fill in the gaps identified in the current *Guidelines* by gathering information about current toys in these different categories and enrich CPSC's understanding of the ages of children who are interested in these toys and who possess the skills and cognitive ability to use them as the manufacturer intended. CPSC will use the findings from this research to inform the development/modification of age-determination *Guidelines* for these toy categories.

2.0 Methodology

The purpose of this study was to provide useful information and enrich the CPSC's understanding regarding the ages of children who are interested in toys from six toy categories (smart toys, take-apart vehicles, musical instruments, figurines, plush toys with electronic components, and manipulatives), which age groups can use the toys as the manufacturer intends, and caregiver perceptions of how their child will

[1] The Consumer Product Safety Commission: Toy_Report_2023_Final.pdf (cpsc.gov)

interact with the toys. Information was gathered from children by documenting their play patterns through direct human observations of children's interactions with toys and from caregivers through their responses to questionnaires over two data collection sessions. Each session included introducing the child to 4-5 selected toys. A researcher demonstrated how to use each toy for the child and then documented the child's play patterns, noting when they interacted with each toy as the manufacturer intended. Coding checklists were used to document real-time observations of the child's interactions with the toys, in the form of occurrence of concrete behaviors across different modalities, such as gross motor (e.g., hitting the drum with drumsticks), fine motor (e.g., slid switch on/off), behavioral (e.g., fed an animal, engaged in pretend play with one or multiple figurines) demonstrating the child's use of the toy as intended. Caregivers filled out a questionnaire asking about their perceptions of the child's ability to interact with the toy as intended, potential purchasing decisions for the specific toys, and whether they would demonstrate how to play with the toys or some of the components.

2.1 Office of Management and Budget and Institutional Review Board Approval

This study and associated data collection received clearance under the Paperwork Reduction Act (OMB Control No. 3041-0201) and approval from Westat's Institutional Review Board (IRB). The Westat IRB registration number listed with the OHRP is IRB00000695 (IRB #1).

2.2 Toy Selection

Westat and CPSC collaboratively identified a final list of toys for inclusion in the study. Selected toys do not represent the full range of toys within any of the six categories but, instead, represent various designs, sizes, and functionalities. The toys have different levels of sophistication, anticipated uses, specific goals, and play objectives. They also varied in the cognitive abilities required for the child to engage appropriately in different elements of play. Within the results section for each toy, a dedicated table presents key information, including the toy category, a brief description of the toy, the product dimensions, the manufacturer's intended age, and our classifications for fully intended play. The selected nine toys include the following:

- Toy 1: Plush Toy with Electronic Components
- Toy 2: Take-Apart Toy 1
- Toy 3: Take-Apart Toy 2
- Toy 4: Figurine Toy 1
- Toy 5: Figurine Toy 2
- Toy 6: Manipulatives–Bubbles
- Toy 7: Musical Instrument Set
- Toy 8: Smart Toy 1 Robotic Animal
- Toy 9: Smart Toy 2 Programmable Robotic Animal

2.3 Initial Assessment of Toys

Initially, researchers developed a list of each toy's features and functions as well as relevant child behaviors that would indicate a child was fully utilizing the toy as intended by the manufacturer. The list of features and functions informed the selection of behaviors that define the manufacturer's fully intended use for each

toy, the development of the caregiver questionnaire, and the formation of the real-time coding scheme for each toy. For each of the selected toys, researchers documented the following relevant information:

- Manufacturer's positive age label (e.g., 3+ years)
- Characteristics of the toy:
  - Number of parts
  - Dimensions
  - Theme
- Specific features of the toy that are intended to be handled and manipulated:
  - Interactive features (e.g., pressing a button that generates sound)
  - Toy components that can be taken apart (e.g., a princess dress)
  - Features that require gross motor play (e.g., shaking maracas)
  - Features that require fine motor play (e.g., using the drill with the toy plane)

2.4 Recruiting and Scheduling Participants

Participants' dyads (caregiver and child) were recruited through Westat's intranet website, social media (Facebook and Instagram), email blasts to caregivers of children attending local daycare centers, and snowball recruiting (i.e., referrals). All ads and emails provided a brief description of the study, its requirements, the timeline, and incentives. The ads and emails included a website link or QR code that took caregivers directly to the screener instrument, which was programmed using Qualtrics online survey software.

The screener collected respondent demographic information, including the number, age, and gender of the children in the household, whether the child had conditions or behaviors that might interfere with them completing the sessions, toy purchasing habits, household income, and their caregiver's highest level of education. Researchers used the screener to document the inclusion criteria, select the sample, and capture sociodemographic information. Caregivers were also asked about their availability to ensure the caregiver and child could complete the study during the field period. Caregivers who did not meet the screening criteria were informed immediately of their ineligibility.

If interested parties met the inclusion criteria, they were contacted via phone to schedule two data collection sessions at Westat headquarters. The recruiter outlined the procedures and answered any questions the caregiver had related to scheduling, participation, and incentive payment. Once scheduled, a confirmation email was sent to the caregiver with detailed directions to Westat offices and a brief description of the study, including the observational procedures and safety protocols. Researchers also sent a copy of the consent form, including the audio and video release, for the caregiver to read through before their first session. Caregivers were sent a second email 24 hours prior to their scheduled sessions as a reminder to increase the likelihood of participants keeping their appointments.

2.5 Study Materials

This section identifies and describes the materials used to code children's interactions with the toys and document caregiver responses to the toy-specific questionnaires. In developing these materials, Westat adapted a format originally developed by Dr. Carol Pollack-Nelson in her prior work.

2.5.1 Coding Checklist

Westat worked closely with CPSC staff and our consultant, Dr. Carol Pollack-Nelson, to identify play behaviors and develop coding schemes for each of the selected toys to ensure that the data gathered accurately captured the child's interactions with the toy. Researchers developed tailored coding checklists for each toy (see Appendix A), depending on their functions and features. The coding scheme documented specific observations that are more concrete in nature, such as type of play, presence or absence of physical and verbal interactions with the toy, and affective behaviors such as crying or jumping with joy. These behaviors were to be recorded in real time using simple, concrete, and observable descriptions to allow the researcher to document them easily while simultaneously monitoring the child. The coding form also noted whether the child played with the toy for the intended length of time and included key behaviors associated with using the toy and its features as intended. Figure 1 is an example of the finalized coding sheets for Figurine Toy 2.

Figure 1. Coding sheet for Toy 5: Figurine Toy 2

Figurine Toy 2
Allotted Playtime: 4 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Turns the figurine's head		
Moves the figurine's arms		
Makes the figurine stand		
Makes the figurine walk/run/jump and do other movement		
Puts the figurine in mouth		
Names characters		
Engages in pretend play with one or multiple figurines (e.g., creating interactions between figurines, creating dialogue between figurines, speaking for the figurines)		
Shows frustration with the toy		
Expresses interest in the figurine verbally		
Plays with 1 figurine, 2 figurines, 3-5 figurines, or 5+ figurines		Circle #: 1 2 3-5 5+

Other Items of Note:

2.5.2 Caregiver Questionnaire

The objective of the caregiver questionnaire was to gain an understanding of the caregiver's views on their child's ability to interact with each of the toys as intended. The data collected from the questionnaire allowed researchers to compare caregiver perceptions of their child's interactions with the toy to the actual observed interactions. Caregivers had an opportunity to interact with the toy when completing each questionnaire so they could provide informed responses. The toys were made available to the caregiver in their original packaging. Additionally, the questionnaire was self-administered to increase the overall efficiency of data collection sessions and encourage caregivers to be more forthcoming and honest with their responses.

The questionnaire for each toy was as succinct as possible to ensure the accuracy of data while balancing the amount of information needed with the length of the questionnaire. The questions were primarily "toy-centric," focusing on the following:

- Characteristics of the toy pertaining to safety, likeability, and likelihood of purchase
- The age for which they believed the toy was most suitable
- How their own child would interact with the toy
- How they would introduce the toy to their child

The format of the questions was multiple-choice and open-ended. The questions were structured such that the main response of the caregiver (e.g., yes/no, age, rating on the scale, factors affecting the decision) was recorded, but could also document any explanations offered by the caregiver for a toy. The questionnaire for each toy was tailored to begin with questions that are more generic in nature and progress to questions that address the features and functions of each toy. The finalized caregiver questionnaires for each toy are in Appendix (B).

2.6 Pilot Testing

As part of the development process, researchers conducted a pilot test of the study materials with three children ($n = 3$) and their caregivers, including the observation protocols, coding schemes, and caregiver questionnaires, as well as the methods for conducting the observational sessions. Pilot testing allowed staff to identify anomalies, revise the coding schemes or caregiver questionnaires, and address any unforeseen challenges prior to the start of data collection. This process also provided an opportunity for researchers to validate their codes by comparing them to the video recordings of the pilot sessions and to have their data undergo quality assurance reviews to ensure inter-rater reliability. None of the children who participated in the pilot study were included in the final sample.

2.7 Training of Observers and Coders

Westat trained researchers with prior experience working with children and conducting on-site data collection, including semi-structured interviews and child observations. All researchers were required to attend a day-and-a-half training one week prior to the start of data collection. The training took place at Westat's usability lab. It included a comprehensive review of the study materials, including observation protocols, coding schemes, caregiver questionnaires, informed consent documents, and debriefing scripts used for each session. Researchers familiarized themselves with each toy and received instructions on preparing and sanitizing the lab and toys for each session. Researchers were trained on how to interact with the child, including presenting the toy in a neutral and engaging manner, encouraging exploration without prompting or directing play, transitioning smoothly between toys, and documenting the child's interactions with each toy, including their play behaviors and affective responses (e.g., jumping up and down with joy, crying, throwing the toy in frustration). They were also trained on instructing caregivers on how to complete the questionnaire for each toy. The training included role-playing exercises, strategies for interacting with children of different ages and temperaments, and techniques for handling potential challenges, such as separation anxiety.

Experienced coders trained the researchers on the use of standardized coding protocols to observe and record the child's behaviors in real time as they interacted with each toy. Prior to independent data collection, researchers observed a member of the project staff conducting a session, and then the researchers were observed while conducting a session themselves. To ensure the highest quality of data collection, an experienced coder periodically checked the data for gradual changes and inconsistencies in coding that may occur overtime to maintain consistency.

2.8 Data Collection Sessions

This section describes the processes for preparing the lab, including setting up the observation area, observing children as they interact with the toys, and instructing the caregiver to complete the self-administered questionnaires. Every effort was made to collect data from each caregiver/child dyad for all nine selected toys. To be mindful of the limited attention spans of the ages of children we were observing, data collection was broken into two sessions.

2.8.1 Session Protocol

Westat developed a standard observational protocol with detailed procedures and policies covering all aspects of data collection, including preparing the lab for each session, conducting the observational sessions, defining data entry procedures, and saving the video data at the end of each session. The protocol detailed instructions for greeting the participants, introducing questionnaires to caregivers, introducing toys to the children, interacting with and observing the children as they played with the toys, and handling potential challenges, such as separation anxiety or unexpected child behavior.

More specifically, the protocol detailed procedures on the following topics:

- Receiving the family, making them feel comfortable, and building rapport with the child
- Responding to questions about the study
- Administering the consent form
- Providing decision tools on when to start, pause, and end the observational sessions
- Introducing each of the toys to the child and transitioning between toys
- Administering the caregiver questionnaire.
- Managing the presentation of toys to the child and responding to any caregiver questions
- Using the real-time coding forms
- Providing strategies to prevent and address child distress
- Debriefing the caregivers and escorting them out
- Entering data and performing quality control checks

2.8.2 Preparation of the Lab

The lab was equipped with high-definition video-recording equipment, including cameras strategically placed to capture the child's interactions with the toys from multiple angles. It was also covered with cushioned floor mats to enhance the safety, comfort, and ease of child play. The space was childproofed, including the use of outlet covers and corner bumpers for furniture. To ensure a comfortable and welcoming environment, researchers also made available healthy snacks (individually wrapped), tissues, diapers, wipes, and bottled water for young children and their families.

Prior to each family's arrival, the researcher confirmed that all toys and surfaces were sanitized and that all necessary paperwork was readily available (consent forms, coding forms, payment receipts, etc.). Next, the researcher laid out the toys in the order in which they were presented to the child. The toys were organized behind a partition, ensuring that the child could only view the toy when it was presented to them. This arrangement helped to maintain the child's interest and minimize distractions during the session. The order of presentation was randomly assigned to ensure counterbalancing across participants and to preclude the effects of fatigue and learning from one toy to the next. Additionally, the randomization safeguarded against two Take-Apart toys, or two figurine toys being presented during the same session. A similar approach was

employed when presenting the toys to the caregivers when responding to the questionnaires. That is, the toys were laid out in the order with which the caregiver was to interact with them and respond to the questionnaires.

Video recording equipment was tested before every session to ensure proper functionality, including audio and video quality, and to check for any technical issues. The video recordings were used as a reference when the researcher had questions related to their initial observations and coding decisions. Additionally, video recording enhanced the feeling of safety for both the caregiver and researcher. Each camera included an SD card for media capture. Data from the SD cards were downloaded to a secure network location immediately after each session, and the SD card was then cleaned by erasing all existing data. Downloaded data was renamed to reflect the session details (e.g., session number, participant ID, date/time, etc.) to ensure unambiguous tracking of each session's data.

2.8.3 Data Collection

All children's toy observations were conducted in Westat's usability lab and were videoed or audio recorded. Session 1 lasted approximately 75 minutes, and Session 2 lasted 60 minutes. After the caregiver signed the consent form, the researcher escorted the caregiver to a separate area outside the play space where they could complete the toy-specific questionnaires while familiarizing themselves with the toys. The caregiver had their own set of toys so they could examine the toy while filling out the questionnaires. Researchers returned to the play space and sat on the floor with the children. Each toy was then presented unboxed and ready for play, one at a time, allowing the child to explore the toy freely while the researcher observed their interactions.

Varying times were allotted for each child/toy interaction depending on the complexity of the toy (see Table 1). The researcher had a discreet timer and allowed the child to play with the toy for a pre-determined amount of time. The researcher demonstrated how to interact with each toy and remained in the room during the play session to record any observations, encourage the child to interact with the toy if the child was disinterested or became frustrated, and always ensure the child's safety.

Table 1. Product and time allotted for play

Name	Time allotted for play
Plush Toys with Electronic Components	
Toy 1: Plush Toy with Electronic Components	Up to 5 minutes
Take-Apart Vehicles	
Toy 2: Take-Apart Toy 1	Up to 15 minutes
Toy 3: Take-Apart Toy 2	Up to 15 minutes
Figurines	
Toy 4: Figurine Toy 1	Up to 3 minutes
Toy 5: Figurine Toy 2	Up to 4 minutes
Manipulatives	
Toy 6: Manipulative	Up to 3 minutes
Musical Instruments	
Toy 7: Musical Instrument	Up to 4 minutes
Smart Toys	
Toy 8: Smart Toy 1 Robotic Animal	Up to 5 minutes
Toy 9: Smart Toy 2 Programmable Robotic Animal	Up to 10 minutes

If the child stopped interacting with the toy or sought comfort from the caregiver, the researcher tried to reengage the child and redirect the child's attention back to the toy. If the trial was nearing the maximum allotted time for the toy, the researcher would introduce the next toy. About a half-minute before the end of

the trial, the researcher gave the child a verbal warning that this toy would be removed, and another toy would be introduced.

The researcher followed the observation protocol and used the coding checklist to observe and code the child's interactions while they played with the toys. The researcher documented interactions with respect to physical, cognitive, and behavioral functions. This procedure was repeated until the child had an opportunity to interact with all five toys in Session 1 and the remaining four toys in Session 2.

2.8.4 Data Security

Westat employed several strategies to protect the data (e.g., video and audio recordings, as well as other personally identifiable information). All data collected was stored on servers running on Westat's data centers, which met the Federal Information Security Management Act (FISMA) moderate standard. Security measures implemented during the study included carefully controlled access to the WesNet secure server location associated with the aggregated subject data via project director and system administrator authorization. In addition, participants were identified by a unique subject numbering convention that was kept separate from the recruitment data files and used only for study administration personnel requirements.

2.9 Target Populations and Eligibility Requirements

The target population was children 2 to 4 years of age and their primary caregivers in the greater Washington, DC area. Fifty children and their primary caregivers were recruited by administering a recruitment eligibility screener. Caregivers were required to meet the following guidelines:

- Be 18 years or older at the time of the study
- Speak and read English
- Be responsible for at least one child between the ages of 2 and 4 years old when they completed the study
- Be the primary caregiver for the target child(ren) and engage in child-rearing activities more than four days a week (more than 50% of the time)
- Routinely purchase toys for the child—either online or in stores
- Willing to commit to participating in the two study sessions in the lab setting

An inclusion criterion for child participants was applied to minimize the probability of missing data and ensure the observational sessions could proceed smoothly. The child was required to meet the following guidelines:

- Be between 2 and 4 years old at the time of the study.
- Not be diagnosed with known congenital conditions, attention deficit hyperactivity disorder (ADHD), developmental delay or disabilities, or pervasive developmental disorders (severe impairment in psychosocial development such as autism spectrum disorder). Additionally, a pediatrician had not advised the caregiver to have the child tested for known congenital conditions or pervasive developmental disorders.
- Not have problems with hearing or vision.
- Not show extreme separation anxiety from the caregiver (i.e., can engage with other people or objects).
- Be able to focus on and engage with a toy for more than 1 minute.
- Not engage in destructive behaviors in the household.

Researchers strived to have a similar number of boys and girls within each age group, which was heterogeneous with respect to family socio-demographics (see Table 2). Two-year-olds were intentionally oversampled to enable researchers to observe younger children's interactions with these toys and to provide insights into how caregivers of younger children perceive toys.

Table 2. Target sample size by age group

Gender	Age		
	2 years	3 years	4 Years
Female	10	8	7
Male	10	7	8

Researchers analyzed coded observational data of children's interactions with the toys to understand how children engage with the selected toys and to determine the age range within which children demonstrated the most interest and engagement with each toy. The analysis provided an age-group-specific synopsis for each toy, examining whether there were significant associations between behaviors and children's ages (2 to 4 years old). Researchers also analyzed the child's behavior data alongside caregiver questionnaire responses, comparing the observed interactions with the caregiver's impressions of the toy, their thoughts regarding how their child would engage with the toy, and their assessment of the toy's age appropriateness. These associations were assessed using the likelihood-ratio chi-square statistic, which compares the likelihood of the data under the null hypothesis (independence) versus the alternative hypothesis (association between age and child behavior).

For each toy, the results are organized by (1) observed child behaviors and (2) caregiver responses. We examined whether children played with the toy as the manufacturer fully intended or did not fully engage with the toy's intended functions. We then calculated the percentage of children in each age group who interacted with the toy as intended. Next, we summarized caregiver responses to questions for each toy. Finally, we compared the observed child interactions with each toy to the caregiver responses to assess the consistency between observed interactions and caregiver perceptions.

Due to the small sample size and low frequencies within individual cells (e.g., the number of children in a specific age group demonstrating a particular interaction with a toy), we emphasize general trends and patterns rather than individual cell frequencies. Additionally, we analyzed caregiver responses to individual questions to preserve the granularity of their feedback. However, for questions with numerous response categories, we aggregated responses into broader categories to facilitate interpretation and ensure sufficient cell frequencies for meaningful analysis. These recategorizations are noted within the text.

Overall, the sample consisted of 49 children aged 2 to 4. Four caregivers enrolled 2 children in the study. A total of 26 2-year-olds were recruited because 7 were dropped due to behavioral issues, such as separation anxiety, language issues, and fatigue. As a result, we could only collect data from 19 (versus the planned 20) 2-year-olds. Table 3 shows the age and gender distribution of the sample and the percentages within each age group. There were similar percentages of girls and boys and 2-, 3-, and 4-year-olds (χ^2 (2) = 0.921, *ns*). Twenty-three (47%) children were Caucasian, 5 (10%) were African American, 7 (14%) were Asian, and 14 (29%) were Multiracial or Other.

Table 3. Age and gender distribution of the sample

Gender	Child age (yrs)			
	2	3	4	Total
F	10 (52.6%)	8 (53.3%)	7 (46.7%)	25 (51.0%)
M	9 (47.4%)	7 (46.7%)	8 (53.3%)	24 (49.0%)
Total	19 (38.8%)	15 (30.6%)	15 (30.6%)	49 (100.0%)

With respect to education, 17 (37%) caregivers attained an advanced degree, 23 (51%) attained a bachelor's degree, three (7%) attained a high school degree or GED, and two (4%) elected not to provide a response. One (2%) caregiver reported an annual household income less than $50,000, nine (20%) reported an annual household income between $50,000–$100,000, 11 (24%) reported an annual household income between $101,000–$150,000, 11 (24%) reported an annual household income between $151,000 -$200,00, and 10 (22%) reported an annual household income over $200,000.

3.0 Results

3.1 Toy 1: Plush Toy with Electronic Components 1

3.1.1 Description of Toy 1

This electronic interactive dog features a hard plastic internal structure covered in soft fur and comes in various dog breeds. Pressing buttons on the leash activates walking, tail wagging, and barking motions. The manufacturer stated age for this toy is 3+ years (see Table 4).

Table 4. Product description, manufacturer's stated age, dimensions, and play behaviors for the plush toy with electronic components

Name	Product description	Manufacturer's stated age	Dimensions
Plush Toy with Electronic Components	Electronic interactive dog. Hard plastic internal structure covered by soft fur. They are available in the shapes of different dog breeds. Pressing buttons on the handle of the leash activates the dog. It walks, wags its tail, moves its head, and barks.	3+ years	Length: 11 inches; Width 5.5 inches; Height: 9 inches
	Behaviors demonstrating the manufacturer's intended use		
	a. Walks the animal by pressing the "walk" button on the handle of the controller (does more than one time) AND b. Makes the animal bark and wag its tail by pressing the "bark/wag" button on the controller (does more than one time)		

3.1.2 Child Behaviors when Interacting with Toy 1

To introduce the Plush Toy with Electronic Components, the researcher demonstrated pressing one button to make the dog bark and wag its tail and pressing another to make the dog walk. Then, the child was invited to play with the toy for 5 minutes. Play behaviors were only coded during the free play period.

Overall, 48 of the 49 children played with the battery-operated dog with a leash for at least 3 minutes, with most children (89.8%) playing for the full 5 minutes. Table 1 shows the frequencies and percentages of children exhibiting individual behaviors when interacting with the battery-operated dog within each age group and across all age groups (total column). There were no significant differences by age group for any of the behaviors coded during the study sessions, as evidenced by the non-significant chi-square values. To illustrate, approximately one-third of the sample (34.7%) pet the dog more than once. However, there was no significant difference in this behavior across the three age groups. Similarly, approximately one-third of the sample (36.7%) walked the dog by pulling on the leash, but the distribution of this behavior across the three age groups was not significantly different.

A greater percentage of children exhibited behaviors that were consistent with the manufacturer's intended use. That is, 87.8% of the children walked the dog by pressing the "WALK" button, 93.9% made the dog bark and wag its tail by pressing the "TAIL" button, and 61.2% walked with the dog while pressing the

"WALK" button. However, the distribution across the three age groups for these behaviors were not significantly different. Very few children appeared to be afraid of the toy (8.2%) or showed frustration with the toy (6.1%) (see Table 5).

Table 5. Percentage of children exhibiting individual behaviors with the plush toy with electronic components by age group

Child behavior	Child age (yrs)				
	2	3	4	*Total*	*Chi-square (X^2)*
Pets dog more than one time	8 (42.1%)	4 (26.7%)	5 (33.3%)	*17 (34.7%)*	*0.91, ns*
Walks dog by pulling on the leash without using the buttons on the handles	9 (47.4%)	4 (26.7%)	5 (33.3%)	*18 (36.7%)*	*1.66, ns*
Walks the dog by pressing the "walk" button on the handle of the controller more than one time	18 (94.7%)	14 (93.3%)	11 (73.3%)	*43 (87.8%)*	*3.85, ns*
Makes the dog bark and wag tail by pressing the "bark/wag" button on the controller more than one time	17 (89.5%)	14 (93.3%)	15 (100%)	*46 (93.9%)*	*2.44, ns*
Child walks with the dog while pressing on the "walk" button on the controller	11 (57.9%)	9 (60%)	10 (66.7%)	*30 (61.2%)*	*0.29, ns*
Puts part of the toy in mouth	0	0	0	*0*	
Appears to be afraid of the toy (i.e., fearful facial expression)	1 (5.3%)	2 (13.3%)	1 (6.7%)	*4 (8.2%)*	*0.74, ns*
Shows frustration with the toy	2 (10.5%)	1 (6.7%)	0	*3 (6.1%)*	*2.44, ns*

3.1.3 Fully Intended Play for Toy 1

Researchers explored whether children within each age group demonstrated fully intended play with the plush toy with electronic components. Fully intended play for the battery-operated dog, where fully intended play was defined as the following:

- Walking the dog by pressing the "WALK" button on the handle of the controller more than one time; and
- Making the dog bark and wag its tail by pressing the "TAIL" button on the controller more than once.

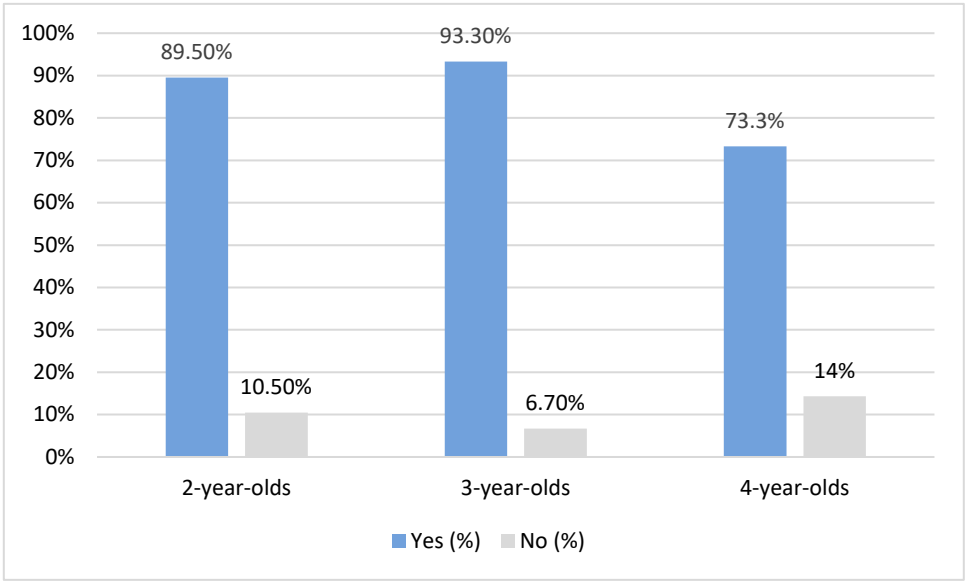
Forty-two children (85.7%) played with the battery-operated dog as the manufacturer fully intended, walking the dog by pressing the "WALK" button on the controller and making the dog bark/wag its tail by pressing the "TAIL" button on the controller. However, there was no significant association between the child's age and their behaviors with respect to playing with the toy as intended by the manufacturer (see Table 6).

Table 6. Age distribution of fully intended play for the plush toy with electronic components

Fully intended play	Child age (yrs)				
	2	3	4	*Total participants*	*Chi-square (X^2)*
No	2 (10.5)	1(6.7%)	4 (26.7%)	*7 (14.3%)*	*2.66, ns*
Yes	17 (89.5%)	14 (93.3%)	11 (73.3%)	*42 (85.7%)*	

Figure 2 shows approximately 89.5% of 2-year-olds, 93.3% of 3-year-olds, and 73.3% of 4-year-olds fully engaged with the toy.

Figure 2. Age distribution of fully intended play for the plush toy with electronic components



3.1.4 Caregiver Ratings for Toy 1

Researchers summarized caregiver responses to individual questions for the battery-operated dog (see Table 7). Caregiver perceptions of the physical and functional characteristics of the toy were not associated with the age of their child, as demonstrated by the results of the Chi-square tests—caregivers of 2-, 3-, and 4-year-olds expressed similar opinions of the toy. Almost all caregivers (98%) thought that the size of the battery-operated dog was appropriate for their child, safe to play with (98%), and had an overall appearance that would appeal to their child (91.8%). Only one caregiver of a 3-year-old child thought the toy was too small for their child. Another caregiver of a 2-year-old child believed the leash was unsafe and would not allow their child to play with the toy unsupervised. Ninety-five-point-nine percent of the caregivers indicated that their child would figure out the connection between pressing the different buttons and the dog's response/action.

Very few caregivers thought their child would be scared (12.2%), mentioning that the toy is very realistic and their child's fear of dogs. Additionally, some caregivers noted that the noise from the toy might be too loud for their child. Several caregivers (12.2%) indicated that their child would be frustrated with the toy, citing that their child was accustomed to wireless remote controls and would not be comfortable using something with wires or the toy would not walk fast enough. A little over half of the caregivers (57.1%) would purchase the toy for their child (see Table 8).

Table 7. Caregiver opinions of physical and functional characteristics of plush toys with electronic components and their child's reaction to the toy					
Caregiver questionnaires	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
	2	**3**	**4**		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child?	19 (100%)	14 (93.3%)	15 (100%)	*48 (98%)*	*2.41, ns*
Do you think this toy is safe for your child to play with?	18 (94.7%)	15 (100%)	15 (100%)	*48 (98%)*	*1.93, ns*
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	18 (94.7%)	13 (86.7%)	14 (93.3%)	*45 (91.8%)*	*0.74, ns*
Do you think your child will be scared by the toy in any way?	2 (10.5%)	3 (20%)	1 (6.7%)	*6 (12.2%)*	*1.29, ns*
Do you think your child will be frustrated by the toy in any way?	3 (15.8%)	2 (13.3%)	1 (6.7%)	*6 (12.2%)*	*0.73, ns*
Do you think your child will figure out the connection between pressing the different buttons and the dog's response or actions?	17 (89.5%)	15 (100%)	15 (100%)	*47 (95.9%)*	*3.92, ns*

Table 8. Percentage of caregivers who would consider purchasing the plush toy with electronic components					
Questions	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
	2	**3**	**4**		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child (at his/her current age)?	14 (73.7%)	7 (46.7%)	7 (46.7%)	*28 (57.1%)*	*3.57, ns*

Caregivers were asked to rate their child's interest in the toy on a scale of 1–5, with 1 = Will not play with this toy and 5 = This toy would be a favorite. Overall, the results show that caregiver ratings of their child's interest in the battery-operated dog were not significantly associated with the age of their child As seen in Table 9, more than half of the caregivers with a 2-year-old indicated that the child would play "quite a bit" (52.6%), with fewer caregivers of 3-year-olds (40.0%) and 4-year-olds (13.3%) selecting "quite a bit." In addition, several caregivers of 3- and 4-year-olds rated the toy more unfavorably ("will not play with this toy" and "play for a short time") as compared to caregivers or 2-year-olds. Very few caregivers indicated the toy would be their child's favorite.

Table 9. Caregiver perceptions of their child's interest in the plush toy with electronic components					
Question	Child age (yrs)				
Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = will not play with this toy and 5 = this toy would be a favorite.	2	3	4	*Total responses*	*Chi-square (X^2)*
Will not play with this toy	0	1 (6.7%)	1 (6.7%)	*2 (4.1)*	*8.95, ns*
Will play with it for a short time; then, likely will forget about it or disregard it Will play with it here and there, but the toy would not be a favorite	6 (31.6%)	7 (46.7%)	10 (66.7%)	*23 (46.9%)*	
Will play with it quite a bit; and would come back to	10 (52.6%)	6 (40%)	2 (13.3%)	*18 (36.7%)*	
This toy would be a favorite	3 (15.8%)	1 (6.7%)	2 (13.3%)	*6 (12.2%)*	

Tables 10 to 14 show caregiver responses to questions regarding their perceptions of how their child will interact with the toy and how they might introduce the toy to their child. There was a significant association between caregiver opinions of their child locating and pressing the buttons and child age (χ^2 (2) = 4.00, p<.05). Although most caregivers thought their child would press both buttons (93.9%) (see Table 10), caregivers of 2-year-olds and 4-year-olds were more likely to indicate that their child would press both buttons than caregivers of 3-year-olds.

Table 10. Caregiver perceptions of their child's pressing the button on the controller when playing with the plush toy with electronic components					
Question	Child age (yrs)				
Do you think your child will press the buttons on the green controller?	2	3	4	*Total responses*	*Chi-square (X^2)*
No	0	1 (6.7%)	0	*1*	*4.00, p<.05*
One button	1 (5.3%)	1 (6.7%)	0	*2 (4.1%)*	
Both buttons	18 (94.7%)	13 (86.7%)	15 (100%)	*46 (93.9%)*	

Table 11 shows the association between caregiver ratings of the difficulty level of the toy and child age (χ^2 (4) = 11.14, p<.05). While caregivers of 2-year-olds responses were equally distributed across "manageable," "somewhat easy," and "too easy" response options, caregivers of 3- and 4-year-olds were more likely to say the toy was "too easy."

Table 11. Caregiver ratings on the difficulty level of the plush toy with electronic components					
Question	Child age (yrs)				
On a scale of 1- 5, with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child? (Select one option)	2*	3	4	*Total responses*	*Chi-square (X^2)*
Too difficult	0	0	0	*0*	*11.14, p<.05*
Somewhat difficult	0	0	0	*0*	
Manageable	6 (33.3%)	1 (6.7%)	0	*7 (14.6%)*	
Somewhat easy	6 (33.3%)	4 (26.7%)	7 (46.7%)	*17 (35.4%)*	
Too easy	6 (33.3%)	10 (66.7%)	8 (53.3%)	*24 (50%)*	

*One caregiver of a 2-year-olds did not answer this question

Caregiver opinions of whether their child would walk alongside the dog while using the controller were not significantly associated with the child's age (see Table 12). Additionally, caregiver responses were well distributed across the response options ("maybe," "probably," and "yes").

Table 12. Caregiver opinions of whether their child will walk with the dog while pressing the button on the controller

Question	Child age (yrs)				
Will your child walk alongside the dog while using the controller/pressing the button that causes the dog to walk?	2	3	4	*Total responses*	*Chi-square (X^2)*
No	0	0	0	*0*	*0*
Probably not	1 (5.3%)	3 (20%)	1 (6.7%)	*5 (10.2%)*	*7.37, ns*
Maybe/Not sure	6 (31.6%)	1 (6.7%)	4 (26.7%)	*11 (22.4%)*	
Probably yes	7 (36.8%)	3 (20%)	4 (26.7%)	*14 (28.6%)*	
Yes	5 (26.3%)	8 (53.3%)	6 (40%)	*19 (38.8%)*	

Caregiver ratings of whether they would show their child how to operate the remote control were significantly associated with the age of their child (χ^2 (4) = 14.10, $p<.05$). Most caregivers of 3- and 4-year-olds said that they would not show the child how to operate the toy (60% and 80%, respectively). Fewer caregivers of 3-year-olds (26.7%) and only one of a 4-year-old (6.7%) said they would show how to operate the toy before giving it to their child. However, almost two-thirds of caregivers of 2-year-olds said they would show their child how to operate the toy by pressing one or both buttons (see Table 13).

Table 13. Caregiver opinions on showing their child how to operate the plush toy with electronic components

Question	Child age (yrs)				
Would you show your child how to operate the remote control before giving it to your child to use independently?	2	3	4	*Total responses*	*Chi-square (X^2)*
No	5 (26.3%)	9 (60%)	12 (80.0%)	*26 (53.1%)*	*14.10, p<.05*
Yes, I would press both buttons, but not describe the function	2 (10.5%)	2 (13.3%)	2 (13.3%)	*6 (12.2%)*	
Yes, I would press one or both buttons and/or describe the function	12 (63.2%)	4 (26.7%)	1 (6.7%)	*17 (34.7%)*	

The manufacturer's stated age for the battery-operated dog with leash is 3+ years. Only 28.6% of caregivers thought this toy was suitable for children aged 3+ years, while 71.4% believed the toy was appropriate for younger children, 1.5 to 2.5+ years (see Table 14). However, the difference in caregiver perceptions was not statistically significant.

Table 14. Caregiver opinions of the appropriate child's age for the plush toy with electronic components

Question	Child age (yrs)				
For what age do you think this toy is best suited?	2	3	4	*Total responses*	*Chi-square (X^2)*
1.5–2.5+	14 (73.7%)	12 (80%)	9 (60%)	*35 (71.4%)*	*1.53, ns*
3+	5 (26.3%)	3 (20%)	6 (40%)	*14 (28.6%)*	

3.1.5 Associations Between Caregiver Ratings for and Child Fully Intended Play with Toy 1

Researchers conducted a series of chi-square tests to explore potential associations between caregiver responses to questions regarding their child fully engaging with the toy, caregiver intentions to purchase the toy, caregiver perceptions of their child's understanding of the connection between button presses and the dog's actions and the observed patterns of child behavior documented during the sessions that indicated full intended use.

Table 15 shows there was not a significant association between the caregiver's intention to purchase the battery-operated dog and whether the child's play behavior matched the toy's intended use. Among the children who did not play with the toy as fully intended, 57.1% of the caregivers said they would not purchase the toy, and 42.9% said they would purchase the toy. Of those children who did fully engage with the toy as intended, 40.5% of the parents indicated they would not purchase the toy and 59.5% said they would purchase the toy. However, there were no significant differences across age groups.

Table 15. Association between caregiver intentions to purchase the plush toy with electronic components and child engaging in fully intended play

Fully intended play	Purchasing			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	4 (57.1%)	3 (42.9%)	*7*	*0.41, ns*
Yes	17 (40.5%)	9 (59.5%)	*42*	

Most caregivers of children who fully engaged (92.9%) with the toy believed their child would press both buttons (see Table 16). However, of the children who did not play as fully intended, 100% of the caregivers thought their child would press both buttons.

Table 16. Association between caregiver opinions about their child pressing one or both buttons and the child engaging in fully intended play with the plush toy with electronic components

Fully intended play	Press one or both buttons				
	No	One button	Two buttons	*Total participants*	*Chi-square (X^2)*
No	0	0	7 (100%)	*7*	*0.96, ns*
Yes	1(2.4%)	2(4.8%)	39 (92.9%)	*42*	

Similarly, there was no significant association between the caregiver expectations regarding their child's ability to figure out the connections between pressing the toy buttons and the toy's action and the child fully engaging in play as intended (see Table 17). Most of the caregivers (97.6%) whose child engaged in fully intended play believed that their child would understand the connection between the button presses and the toy's action. Whereas 85.7% of caregivers whose child did not fully engage with the toy correctly believed that their child would successfully figure out the connection.

Table 17. Association between caregiver opinions about child's ability to understand the relationship between their action and the child engaging in fully intended with the plush toy with electronic components

Fully intended play	Child's ability to understand the connection			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	1 (14.3%)	6 (85.7%)	*7*	*1.52, ns*
Yes	1 (2.4%)	41 (97.6%)	*42*	

There was a significant association (χ^2 (3) = 11.55, *p<.05)* between a caregiver perception that their child would walk the dog by pressing the appropriate button and their child fully engaging with the toy during play. Table 18 shows 45.2% and 28.6% of caregivers whose child fully engaged with the toy responded "yes" and "probably yes" when asked whether their child would walk the dog, respectively. In comparison, most of the caregivers whose child did not fully engage with the toy believed that their child would probably not walk the dog by pressing the button (42.9%).

Table 18. Association between caregiver opinions on whether the child would use the "walk" button appropriately and children fully engaging with the plush toy with electronic components

Fully intended play	Child will walk the dog by pressing the "walk" button					
	Probably not	Maybe/not sure	Probably yes	Yes	*Total participants*	*Chi-square (X^2)*
No	3 (42.9%)	2 (28.6%)	9 (28.6%)	0	*7*	*11.55, p<.05*
Yes	2 (4.8%)	9 (21.4%)	12 (28.6%)	19 (45.2%)	*42*	

There was no significant association between whether a caregiver believed they would need to demonstrate how to operate the toy before allowing their child to operate it independently and their child fully engaging with the toy during the trial (see Table 19). Approximately 38.1% of caregivers whose child fully engaged with the toy expressed that they would demonstrate pressing one or both buttons and/or describe the functions before giving the toy to the child to play independently, while 52.4% stated that they would not show their child how to use the toy. Among caregivers whose child did not fully engage with the toy, 57.1% expressed that they would not show their child how to operate it, and approximately 14.3% expressed that they would demonstrate one or more components before giving it to the child.

Table 19. Association between the caregiver demonstrating the toy and children engaging in fully intended play with the plush toy with electronic components

Fully intended play	Show operation before giving it to the child				
	No	Yes, press both buttons, but do not describe	Yes, press one or two buttons and/or describe the function	*Total participants*	*Chi-square (X^2)*
No	4 (57.1%)	2 (28.6%)	1 (14.3%)	*7*	*2.78, ns*
Yes	22 (52.4%)	4 (9.5%)	16 (38.1%)	*42*	

3.1.6 Age Recommendation for Toy 1

Manufacturer's Age Label: 3+

Recommended Age Group for the Guidelines: 2+ years

Justification for Recommended Age:

CPSC staff should consider addressing the subject toy under the 2+ years age group, which is younger than the manufacturer's suggested age label of 3+ years. Although not statistically significant, observational data indicated that 2-year-olds did not display any greater difficulty interacting with the toy than 3- and 4-year-olds. Approximately 89.5% of 2-year-olds, 93.3% of 3-year-olds, and 73.3% of 4-year-olds fully engaged with the toy. Additionally, most caregivers (71.4%) indicated that they would purchase the toy for 1.5 to 2.5+ year old children.

3.2 Toy 2: Take-Apart Toy 1

3.2.1 Description of Toy 2

Toy 2: Take-Apart Toy 1 is a 17-piece plastic building set with interchangeable parts for creating three different vehicle models. The manufacturer's stated age for this toy is 2+ years (see Table 20).

Table 20. Product description, manufacturer's stated age, dimensions, and play behaviors for the Take-Apart Toy 1

Name	Product description	Manufacturer's stated age	Dimensions
Take -Apart Vehicle 1	A 17-piece plastic mix-and-match vehicle parts that can be assembled into three different vehicle types.	2+ years	*Helicopter* Length: 9 inches; Width: 5 inches; Height: 8 inches; Weight: 3.52 ounces. *Note that these dimensions vary based on which toy is assembled.*
	Behaviors Demonstrating Manufacturer's Intended Use		
	a. Connects pieces in the order shown in the instructions b. Assembles one of the intended vehicles c. Assembles more than one of the intended vehicles d. Can pull two assembled pieces (of the intended vehicle) apart		

3.2.2 Child Behavior when Interacting with Toy 2

The researcher showed the child the pieces and explained that the child could connect the pieces to assemble a train, a helicopter, or a rocket by pushing the pieces together, referencing the pictures on the toy's box. They then allowed the child about one minute to get acquainted with the toy. Next, the researcher opened the instruction booklet and pointed to the rocket and demonstrated how to assemble the rocket one piece at a time. Finally, they demonstrated how to take apart the pieces. Then, the child was invited to play with the toy for 15 minutes. Play behaviors were only coded during the free play period.

All 49 children played with the Take-Apart Toy 1 for at least 5 minutes, with about two-thirds of the children (64.6%) playing for a full 15 minutes. Table 21 shows the frequencies and percentage of children exhibiting individual behaviors when interacting with the toy within each age group and across all age groups (total column).

There were significant differences in some of the play behaviors across different ages. Approximately 26.3% of the 2-year-olds and 13.3% of the 4-year-olds organized some toy pieces, focusing on organizing the wheels. However, no 3-year-olds organized the toy pieces (χ^2 (2) = 6.51, p<.05). When assembling the toy, all the 3- and 4-year-olds looked at the instructions or the images on the box, whereas 73.7% of the 2-year-olds referred to the instructions or the images on the box (χ^2 (2) = 10.39, p<.05). Similarly, 60% of the 3-year-olds and 80% of the 4-year-olds connected pieces in the order shown in the instructions. In contrast, 36.8% of the 2-year-olds did the same (χ^2 (2) = 6.71, p<.05).

The success rate for assembling one of the three vehicle types (rocket/train/helicopter) increased with age (χ^2 (2) = 16.22, p<.05). Approximately 21.1% of the 2-year-olds, 60% of the 3-year-olds, and 86.7% of the 4-year-olds assembled one of the three vehicle options during the trial. There was no significant difference in the success rate of assembling two or more of the vehicle types across the different age groups. Although 4-year-olds had the highest rate (33.3%), the difference was not significant compared to the other two age groups.

Most children (98%) could connect at least two of the toy pieces, and there was not a significant difference across the three age groups. Conversely, there was a significant difference across age groups with respect to pulling apart two assembled pieces (χ^2 (2) = 9.15, p<.05). The 3-year-olds (93.3%) and 4-year-olds (100%) had a higher rate compared to 2-year-olds (68.4%).

There was no significant association between the child's age and the following behaviors: putting toy pieces in their mouth, showing frustration with the toy, or losing interest in the toy, and whether the child asked for assistance from the researcher. Although 10.5% of the 2-year-olds and 6.7% of the 3-year-olds put toy pieces in their mouth, the sample size was too small to consider the result significant. A few children in each group showed frustration, but it was evenly distributed across the three age groups. More than half of the 2-year-olds (63.2%) lost interest in the toy compared to 33.3% of the 3-year-olds and 33.3% of the 4-year-olds, but this difference was not significant. Compared to 3-year-olds (28.6%), more 4-year-olds (53.3%) and 2-year-olds (64.3%) asked for help from the researcher. Researchers were directed to partially loosen the pieces to assist the child if they were having difficulty separating them, without completely disassembling the parts.

Compared to 2-year-olds (42.1%), a greater percentage of 3-year-olds (86.7%) and 4-year-olds (92.9%) could identify what they built at the end of the trial (χ^2 (2) = 13.10, p<.05).

Table 21. Percentage of children exhibiting individual behaviors with the Take-Apart Toy 1 components by age group

Child behavior	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Organizes pieces by color, shape, or other characteristics	5 (26.3%)	0	2 (13.3%)	*7 (14.3%)*	*6.51, p <.05*
Looks at instructions or box when assembling different vehicles	14 (73.7%)	15 (100%)	15 (100%)	*44 (89.8%)*	*10.39, p <.05*
Connects pieces in order shown in instructions	7 (36.8%)	9 (60%)	12 (80%)	*28 (57.1%)*	*6.71, p <.05*
Puts 2 pieces together	18 (94.7%)	15 (100%)	15 (100%)	*48 (98%)*	*1.93, ns*
Assembles one of the intended vehicles	4 (21.1%)	9 (60%)	13 (86.7%)	*26 (53.1%)*	*16.22, p <.05*
Assembles more than one of the intended vehicles	2 (10.5%)	2 (13.3%)	5 (33.3%)	*9 (18.4%)*	*3.07, ns*
Can pull apart two assembled pieces (of intended vehicle)	13 (68.4%)	14 (93.3%)	15 (100%)	*42 (85.7%)*	*9.14, p <.05*
Did the child require help?**	9 (64.3%)	4 (28.6%)	8 (53.3%)	*21 (48.8%)*	*3.86, ns*
Puts toy pieces in mouth	2 (10.5%)	1 (6.7%)	0	*3 (6.1%)*	*2.44, ns*
Shows frustration with the toy	3 (15.8%)	5 (33.3%)	3 (20%)	*11 (22.4%)*	*1.51, ns*
Loses interest in the toy	12 (63.2%)	5 (33.3%)	5 (33.3%)	*22 (44.9%)*	*4.22, ns*
Child's response to "What did you build?"	8 (42.1%)	13 (86.7%)	13* (92.9%)	*34 (70.8%)*	*13.10, p <.05*

*Data was missing for one 4-year-old.

**Percentage was calculated based on the number of children who can pull apart two assembled pieces.

3.2.3 Fully Intended Play for Toy 2

Researchers explored whether children within each age group fully engaged with the Take-Apart Toy 1 and interacted with it as the manufacturer intended. Researchers defined fully intended play for the Take-Apart Toy 1 as follows:

- Connecting pieces in the order shown in the instructions;
- Assembling one of the intended vehicles;

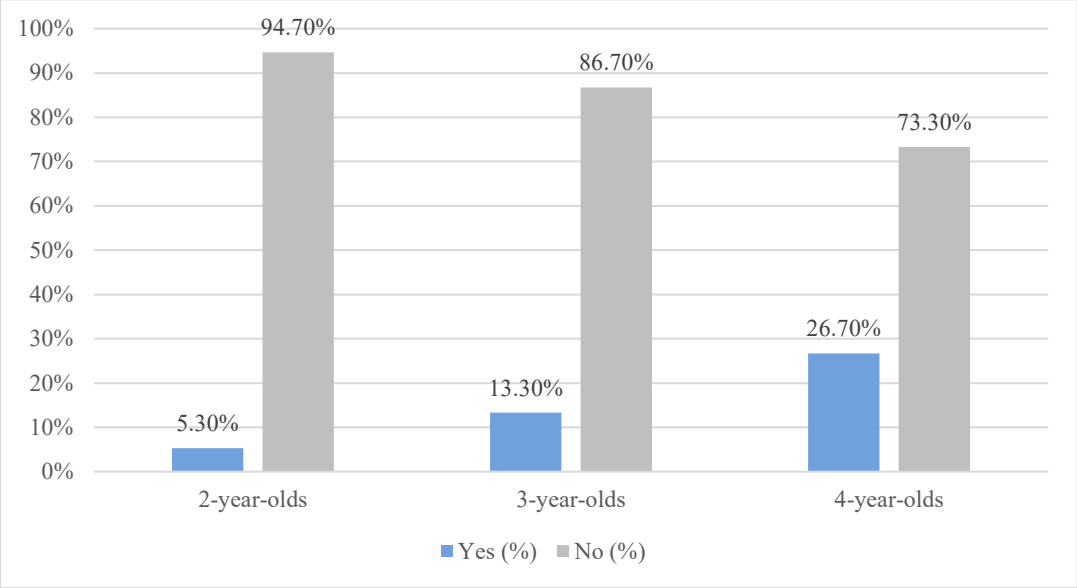
- Assembling more than one of the intended vehicles; and
- Able to pull two assembled pieces (of the intended vehicle) apart.

Seven children (14.3%) played with the Take-Apart Toy 1 as the manufacturer intended. Although there was no significant association between age and fully intended play behavior (χ^2 (2) = 3.18, *ns*), 26.7% of the 4-year-olds demonstrated fully intended play. In contrast, only 5.3% of the 2-year-olds and 13.3% of the 3-year-olds played with the toy as fully intended (see Table 22 and Figure 3).

Table 22. Age distribution of fully intended play for the Take-Apart Toy 1

Fully intended play	Child Age (Yrs)			*Total Participants*	*Chi-Square (X^2)*
	2	3	4		
No	18 (94.7%)	13 (86.7%)	11 (73.3%)	*42 (85.7%)*	*3.18, ns*
Yes	1 (5.3%)	2 (13.3%)	4 (26.7%)	*7 (14.3%)*	

Figure 3. Age distribution of fully intended play for the Take-Apart Toy 1



3.2.4 Caregiver Ratings for Toy 2

The caregiver questionnaire for this toy included Yes/No questions, rating questions (covering both interest and difficulty levels), and standard multiple-choice questions. Researchers summarized caregiver responses to individual questions for the Take-Apart Toy 1 (see Tables 23 -33). Overall, caregiver perceptions of the physical and functional characteristics of the toy were not associated with the age of their child, except for caregiver perceptions of their child's ability to pull apart the connected pieces of the toy as demonstrated by the results of the Chi-square test (χ^2 (2) = 8.09, p<.05). All caregivers of 4-year-olds indicated that their child could pull apart two connected pieces, compared to 78.9% of caregivers of 2-year-olds and 66.7% of caregivers of 3-year-olds.

No age-related differences were found regarding caregiver opinions on the appropriateness of size, safety concerns, and physical appeal of the toy for their child (see Table 23). Ninety-eight percent of the caregivers believed the toy size was appropriate for their child, and all caregivers indicated that the toy was safe for their child, and 95.9% of caregivers believed that the size, color, details, and design of the toy would be appealing to their child. Approximately 59.2% of caregivers indicated that their child would be frustrated by

the toy, but the percentage decreased as child age increased (63.2% for 2-year-olds, 60% for 3-year-olds, and 53.3% for 4-year-olds). However, there was no statistically significant difference among caregivers of children across age groups.

Table 23. Caregiver opinions on physical characteristics of the Take-Apart Toy 1 and their child's reaction to the toy

Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child?	19 (100%)	15 (100%)	14 (93.3%)	*48 (98%)*	*2.41, ns*
Do you think this toy is safe for your child to play with?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	18 (94.7%)	14 (93.3%)	15 (100%)	*47 (95.9%)*	*1.53, ns*
Do you think your child will be frustrated by the toy in any way?	12 (63.2%)	9 (60%)	8 (53.3%)	*29 (59.2%)*	*0.34, ns*
Once the vehicle is assembled, do you think your child would be able to take apart the pieces?	15 (78.9%)	10 (66.7%)	15 (100%)	*40 (81.6%)*	*8.09, p <.05*

Additionally, half of the caregivers (53.1%) expressed a willingness to purchase this toy for their child with no significant association between child age and caregiver willingness to purchase the toy (χ^2 (2) = 7.04, *ns*) (see Table 24).

Table 24. Percentage of caregivers who would consider purchasing the Take-Apart Toy 1

Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child (at his/her current age)?	13 (68.4%)	8 (53.3%)	5 (33.3%)	*26 (53.1%)*	*7.04, ns*

Caregivers were asked to rate their child's interest in the toy (see Table 25) and the toy's difficulty level for their child (see Table 26) on a scale of 1 to 5. There were no statistical differences in caregiver ratings across the child age groups. More than half of the caregivers (59.2%) believed their child would play with the toy occasionally, but it would not be a favorite.

Table 25. Caregiver perception of their child's interest in the Take-Apart Toy 1					
Question	**Child age (yrs)**			***Total responses***	***Chi-square (X^2)***
Rate your child's interest in the toy on a scale of 1–5, with 1 = will not play with this toy and 5 = this toy would be a favorite.	**2**	**3**	**4**		
Will not play with this toy	0	1 (6.7%)	0	*1 (2%)*	*6.94, ns*
Will play with it for a short time, and then likely will forget about it or disregard it; or will play with it here and there, but the toy would not be a favorite	10 (52.6%)	9 (60%)	10 (66.7%)	*29 (59.2%)*	
Will play with it quite a bit and will come back	6 (31.6%)	5 (33.3%)	3 (20%)	*14 (28.6%)*	
This toy would be a favorite	3 (15.8%)	0	2 (13.3%)	*5 (10.2%)*	

Approximately half of the caregivers thought the toy was either too difficult (18.4%) for their child or "somewhat difficult" (32.7%). A greater percentage of caregivers of 2-year-olds (36.8% versus 6.7% each for 3- and 4-year-olds) indicated that the toy would be "too difficult" for their child, while the "somewhat difficult" ratings were evenly spread across caregivers, ranging from 26.7% (caregivers of 3-year-olds) to 40% (caregivers of 4-year-olds). Only one caregiver, a parent of a 4-year-old, believed the toy was too easy.

Table 26. Caregiver ratings on the difficulty level of the Take-Apart Toy 1					
Question	**Child age (yrs)**			***Total responses***	***Chi-square (X^2)***
On a scale of 1-5, with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child?	**2**	**3**	**4**		
Too difficult	7 (36.8%)	1 (6.7%)	1 (6.7%)	*9 (18.4%)*	*11.37, ns*
Somewhat difficult	6 (31.6%)	4 (26.7%)	6 (40%)	*16 (32.7%)*	
Manageable	5 (26.3%)	7 (46.7%)	6 (40%)	*18 (36.7%)*	
Somewhat easy	1 (5.3%)	3 (20%)	1 (6.7%)	*5 (10.2%)*	
Too easy	0	0	1 (6.7%)	*1 (2%)*	

Researchers asked caregivers for their opinions on whether the number of toy pieces was appropriate for their child (see Table 27). Approximately 57.1% of caregivers indicated that the number of pieces was appropriate for their child. In general, as the age of the child increased, fewer caregivers indicated that there were too many pieces (47.4% for caregivers of 2-year-olds, 40% for caregivers of 3-year-olds, and 26.7% for caregivers of 4-year-olds). However, there were no significant differences in the opinions of caregivers across age groups for the Take-Apart Toy 1.

Table 27. Caregiver opinions on the number of pieces in the Take-Apart Toy 1					
Question	Child age (yrs)			*Total responses*	*Chi-square (X^2)*
For your child, do you think the number of pieces in the set is?	2	3	4		
Too few	0	1 (6.7%)	1 (6.7%)	*2 (4.1%)*	*3.28, ns*
Just right	10 (52.6%)	8 (53.3%)	10 (66.7%)	*28 (57.1%)*	
Too many	9 (47.4%)	6 (40%)	4 (26.7%)	*19 (38.8%)*	

There were significant differences in caregiver opinions across age groups on whether their child had the fine motor skills to connect the toy pieces together (χ^2 (2) = 15.45, p <.05). Only 21.1% of the caregivers of 2-year-olds thought their child would have the fine motor skills to put the pieces of the toy together, while 73.3% of caregivers of 3-year-olds and 80% of the caregivers of 4-year-olds indicated that their child would have the fine motor skills to assemble the toy (see Table 28).

Table 28. Caregiver opinions on children's fine motor skills for assembling Take-Apart Toy 1					
Question	Child age (yrs)			*Total responses*	*Chi-square (X^2)*
Do you think your child will have the fine motor skills to put the different pieces together?	2	3	4		
No	0	0	0	*0*	
Will try to, but not successfully	15 (78.9%)	4 (26.7%)	3 (20%)	*22 (44.9%)*	*15.45, p <.05*
Yes	4 (21.1%)	11 (73.3%)	12 (80%)	*27 (55.1%)*	

As shown in Table 29, caregiver expectations of their child's ability to fully assemble one or more of the vehicle types varied significantly by child age (χ^2 (8) = 23.30, p <.05). Relative to the caregivers of 3- and 4-year-olds, more caregivers of 2-year-olds (42.1%) believed that their child could partially assemble one of the vehicles. Caregiver expectations of their child's abilities increased with age, showing a notable shift in responses for caregivers of 4-year-olds, where 33.3% of caregivers expected their child to fully assemble two or more vehicle types.

Table 29. Caregiver opinion on child's ability to assemble one or more of the vehicle types for Take-Apart Toy 1					
Question	Child age (yrs)			*Total responses*	*Chi-square (X^2)*
Do you think your child will be able to put together any of the vehicles?	2	3	4		
No	6 (31.6%)	0	0	*6 (12.2%)*	*23.30, p <.05*
Yes, partially assemble 1 vehicle	8 (42.1%)	6 (40%)	2 (13.3%)	*16 (32.7%)*	
Yes, fully assemble 1 vehicle	0	2 (13.3%)	3 (20%)	*5 (10.2%)*	
Yes, partially assemble 2 or more vehicles	3 (15.8%)	5 (33.3%)	5 (33.3%)	*13 (26.5%)*	
Yes, fully assemble 2 or more vehicles	2 (10.5%)	2 (13.3%)	5 (33.3%)	9 (18.4%)	

There were no significant differences between age groups in caregiver beliefs about their child's motivations to take apart the assembled vehicle. Most caregivers (68.8%) thought their child would be motivated to take apart the vehicle after it was assembled, with only slight differences among caregivers of children in the different age groups (see Table 30).

Table 30. Caregiver opinion on child's motivation to take apart the assembled vehicle					
Question	Child age (yrs)			Total	Chi-square (X^2)
Do you think your child will take the assembled vehicle apart?	2	3	4*		
No, will continue using it assembled	7 (36.8%)	5 (33.3%)	3 (21.4%)	*15 (31.3%)*	*0.972, ns*
Yes	12 (63.2%)	10 (66.7%)	11 (78.6%)	*33 (68.8%)*	

*Data for one caregiver of a 4-year-old is missing.

As shown in Table 31, there was a significant difference in how caregivers would present the toy to their child (χ^2 (4) = 13.29, p <.05) across age groups. Compared to caregivers of 2-year-olds (42.1%), most caregivers of 3- and 4-year-olds (86.7% and 85.7 %, respectively) indicated that they would give their child the Take-Apart Toy 1 completely unassembled. More caregivers of 2-year-olds preferred to partially (26.3%) or fully (31.6%) assemble the toy before presenting it to their child, while none of the caregivers of 4-year-olds and only one of the caregivers of 3-year-olds would fully assemble the toy before giving it to the child.

Table 31. Caregiver approaches for introducing the Take-Apart Toy 1 to their child					
Question	Child age (yrs)			Total responses	Chi-square (X^2)
How would you present this toy to your child?	2	3	4*		
Completely unassembled, give the parts as they are	8 (42.1%)	13 (86.7%)	12 (85.7%)	*33 (68.8%)*	*13.29, p <.05*
Assembled partially	5 (26.3%)	1 (6.7%)	2 (14.3%)	*8 (16.7%)*	
Assembled fully	6 (31.6%)	1 (6.7%)	0	*7 (14.6%)*	

*One caregiver of a 4-year-olds did not answer this question.

When caregivers were asked whether they would need to show their child how to play with any parts of the toy before allowing them to play independently, there was a significant association across different age groups (χ^2 (4) = 15.62, p<.05). All caregivers of 2-year-olds indicated that they would demonstrate how to assemble parts of the toys before giving them to their child, with 63.2% stating they would completely build one of the vehicles (see Table 32). However, as child age increased, the likelihood of the caregiver completely building one of the vehicles decreased. Only 13.3% of caregivers of 4-year-olds would fully assemble the toy.

Table 32. Caregiver approach for demonstrating the Take-Apart Toy 1 before independent play					
Question	Child age (yrs)			Total responses	Chi-square (X^2)
Would you need to show your child how to play with any parts of the toy before giving it to him or her to play with independently? (Select all that apply)	2	3	4		
No, I would not demonstrate how to use the toy before giving it to my child	0	2 (13.3%)	5 (33.3%)	*7 (14.3%)*	*15.62, p <.05*
Yes, I would show them how to connect some of the larger parts OR Yes, I would show them how to put on the smaller parts	7 (36.8%)	9 (60%)	8 (53.3%)	*24 (49%)*	
Yes, I would build the plane/train/rocket	12 (63.2%)	4 (26.7%)	2 (13.3%)	*18 (36.7%)*	

The manufacturer recommends the Take-Apart Toy 1 for children aged 2+ years. The highest percentage of caregivers thought this toy would be appropriate for children aged 3 years or older (46.9%). Approximately

26.5% of the caregivers thought this toy would be appropriate for children 2+ years, and 46.9% thought it would be appropriate for children aged 3+ years, and 24.5% thought it would be appropriate for children aged 4+ years (see Table 33). There were no significant differences between the age groups.

Table 33. Caregiver opinion of the appropriate child's age for the Take-Apart Toy 1

Question	Child age (yrs)			*Total responses*	*Chi-square (X^2)*
Overall, for what age do you think this toy is best suited?	2	3	4		
1.5+ years	0	0	1 (6.70%)	*1(2.00%)*	*5.75, ns*
2+ years	6 (31.6%)	4 (26.7%)	3 (20%)	*13 (26.5%)*	
3 + years	10 (52.6%)	5 (33.3%)	8 (53.3%)	*23 (46.9%)*	
4+ years	3 (15.3%)	6(40%)	3(20%)	*12 (24.5%)*	

3.2.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 2

There was no association between caregiver intentions to purchase the Take-Apart Toy 1 for their child and fully intended play behavior. Among the caregivers whose child played with the toy as fully intended, 71.4% of caregivers expressed a willingness to purchase the toy (see Table 34). About 50% of caregivers whose child did not fully play with the toy as the manufacturer intended expressed that they would purchase the toy.

Table 34. Association between caregiver purchasing decisions and children engaging in fully intended play with the Take-Apart Toy 1

Fully intended play	Purchasing				
	Maybe*	No	Yes	*Total participants*	*Chi-square (X^2)*
No	1 (2.4%)	20 (47.6%)	21 (50%)	*42*	*1.33, ns*
Yes	0	2 (28.6%)	5 (71.4%)	*7*	

Note: The 'Maybe' option was not provided in the answer list, but one caregiver wrote "Maybe".

There was a significant association (χ^2 (1) = 9.29, p <.05) between the child fully intended play and caregiver opinions of their child possessing the fine motor skills to assemble the pieces (see Table 35). All caregivers whose child fully engaged (100%) with the Take-Apart Toy 1 indicated their child had the motor skills to assemble the pieces. Among caregivers whose child did not fully engage with the toy, 52.4% thought their child would try to assemble the pieces but not succeed, and 47.6% believed their child would assemble the pieces without any problem.

Table 35. Association between caregiver opinions of their child assembling pieces of the Take-Apart Toy 1 and child engaging in fully intended play with the toy

Fully intended play	Able to assemble pieces				
	No	Will try to, but not successfully	Yes	*Total participants*	*Chi-square (X^2)*
No	0	22 (52.4%)	20 (47.6%)	*42*	*9.29, p <.05*
Yes	0	0	7 (100%)	*7*	

There was no significant association between fully intended play and caregiver beliefs about whether their child would assemble any of the vehicle types (see Table 36). Researchers recoded caregiver responses from five levels to three by combining the partially and fully assembled categories, resulting in: "None," "Partially or fully assembled one vehicle," and "Partially or fully assembled two or more vehicles." Caregivers of the seven children who fully engaged with the Take-Apart Toy 1 all indicated that their child would partially or fully assemble one or more vehicle types. That is, 42.9% thought their children would

partially or fully assemble one vehicle type (rocket/train/helicopter), and 57.1% believed their child would partially or fully assemble two or more vehicle types. Among caregivers whose child did not engage in fully intended play with the toy, 42.9% believed their child would partially or fully assemble one vehicle, 42.9% thought their child would partially or fully assemble two or more vehicles, and only 14.3% thought their child would not assemble vehicle types.

Table 36. Association between caregiver opinions of their child assembling one or more vehicles and engaging in fully intended play with the Take-Apart Toy 1

Fully intended play	Assemble vehicles				
	None	Partially or fully assemble one vehicle	Partially or fully assemble two or more vehicles	*Total participants*	*Chi-square (X^2)*
No	6 (14.3%)	18 (42.9%)	18 (42.9%)	*42*	*2.10, ns*
Yes	0	3 (42.9%)	4 (57.1%)	*7*	

There was no significant association between a child's fully intended play and caregiver expectations of their child's ability to take apart the pieces of the toy after the vehicle was assembled (see Table 37). Among caregivers whose child fully engaged with the toy, 85.7% believed their child could take apart the pieces, while 14.3% thought their child could not take the pieces apart. Of caregivers whose child did not fully engage with the toy, 81% believed their child could disassemble an already assembled vehicle, whereas 19% thought their child could not.

Table 37. Association between caregiver opinions of their child disassembling pieces of the toy after it was assembled and engaging in fully intended play with the Take-Apart Toy 1

Fully intended play	Take apart pieces after assembled			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	8 (19%)	34 (81%)	*42*	*0.10, ns*
Yes	1 (14.3%)	6 (85.7%)	*7*	

Caregivers were asked if they would show their child how to play with any parts of the toy before giving it to them to play independently. There were no associations between caregiver responses and their child's fully intended play behavior (χ^2 (3) = 7.27, *ns*). Among the caregivers whose child did not play with the toy as the manufacturer fully intended, 42.9% said they would build all three vehicles before giving the toy to their child, 28.6% would show them how to connect the large pieces, 16.7% would demonstrate how to connect the smaller pieces, and 11.9% would not connect any of the pieces. Approximately 42.9 % of the caregivers whose child played with the toy as fully intended play indicated they would show their child how to connect the large pieces, 28.6% would demonstrate how to connect the small pieces, and another 28.6% would not show their child how to connect the pieces (see Table 38).

Table 38. Association between caregiver demonstrating the toy and child engaging in fully intended play with the Take-Apart Toy 1

Fully intended play	Show how to operate the toy					
	No	Connect large pieces	Connect small pieces	Build all three vehicles	*Total*	*Chi-Square (X^2)*
No	5 (11.9%)	12 (28.6%)	7 (16.7%)	18 (42.9%)	*42*	*7.27, ns*
Yes	2 (28.6%)	3 (42.9%)	2 (28.6%)	0	*7*	

3.2.6 Age Recommendation for Toy 2

Manufacturer's Age Label: 2+ years

Recommended Age Group for the Guidelines: 3+ years

Justification for Recommended Age:

CPSC staff should consider addressing this toy in the 3+ year-old group, which is older than the manufacturer's suggested age label. The success rate for assembling one of the three vehicle types (rocket/train/helicopter) increased with age (χ^2 (2) = 16.22, p<.05). Specifically, 21.1% of the 2-year-olds, 60% of the 3-year-olds, and 86.7% of the 4-year-olds assembled one of the three vehicle options successfully during the trial. While group differences between age and fully intended play were not statistically significant, a clear trend emerged: 26.7% of 4-year-olds demonstrated fully intended play, compared to only 5.3% of 2-year-olds and 13.3% of 3-year-olds.

Over 68% of caregivers of 2-year-olds would buy the toy for their child compared to 53.3% and 33.3% of 3- and 4-year-olds, respectively, which may indicate that at least some caregivers are looking for challenging toys for their child. However, half of the caregivers perceived the toy as challenging for their child, with 18.4% rating it as "too difficult" and 32.7% as "somewhat difficult." Notably, a significantly higher percentage of caregivers of 2-year-olds (36.8%) rated the toy as "too difficult" compared to caregivers of 3- and 4-year-olds (6.7% each). These findings suggest that the toy may be more developmentally appropriate for older children starting at 3+ years.

3.3 Toy 3: Take-Apart Toy 2

3.3.1 Description of Toy 3

Toy 3: Take-Apart Toy 2 is a 25-piece buildable airplane that can be assembled or disassembled. It comes with a toolset that includes a plastic battery-operated drill and three bits. The drill can be operated in the forward direction to assemble the plane and in reverse to disassemble it. The manufacturer's intended age is 3+ years (see Table 39).

Table 39. Product description, manufacturer's stated age, dimensions, and play behaviors for the Take-Apart Toy 2

Name	Product description	Manufacturer's stated age	Dimensions
Take-Apart Toy 2	A 25-piece buildable airplane that can be assembled or disassembled. It comes with a toolset that includes a plastic, battery-operated drill and 3 bits.	3+ years	Length: 9.5 inches; Width: 9.5 inches; Height: 6 inches; Weight: 3.52 ounces. *Note that these dimensions represent the assembled toy.*
	Behaviors demonstrating the manufacturer's intended use		
	a. Matches drill bit shape to shape of different pieces AND b. Moves the forward slide switch on the drill to attach two pieces AND c. Moves the reverse slide switch on the drill to detach two pieces AND d. Able to grip and depress the trigger on the drill AND e. Connects two pieces correctly AND f. Uses drill to disassemble (e.g., take two or more pieces apart) g. Assembles 13–16 pieces (most of the parts of the plane)		

3.3.2 Child Behavior when Interacting with Toy 3

Researchers introduced the toy to each child, demonstrating its various features. For the Take-Apart Toy 2, the researcher showed the child the pieces and explained that they could be assembled into a plane. Next, the researcher demonstrated how to use the drill and drill bit to connect two pieces of the plane. After the demonstration, the child was given one minute to try. The researcher then showed how to take the pieces apart using the drill's reverse button and let the child try again for about one minute. Finally, the child was invited to play on their own with the toy for 15 minutes. Play behaviors were only coded during the free play period.

Twenty-eight out of 49 children (57.1%) played with the toy for the full 15 minutes. This included 66.7% of the 4-year-olds, 53.3% of the 3-year-olds, and 47.4% of the 2-year-olds**.** Table 40 shows the frequencies and percentages of children exhibiting individual behaviors when interacting with the toy within and across age groups (total column).

There were significant differences in several child behaviors across ages. When assembling the airplane, more of the 3-year-olds (93.3%) referenced the instructions or pictures on the box, compared to the 2-year-olds (52.6%) and the 4-year-olds (66.7%) ($\chi^2 = 7.63$, $p < .05$). Similarly, more 3-year-olds (73.3%) and 4-year-olds (60%) slid the switch forward to turn on the drill, compared to 2-year-olds (26.3%) ($\chi^2 = 8.42$, $p < .05$).

In general, most children could grip and depress the trigger on the drill, but there was still a significant difference among age groups ($\chi^2 = 10.45$, $p < .05$). All the 3-year-olds could grip and depress the trigger, compared to 66.7% of the 4-year-olds and 63.2% of the 2-year-olds. The percentage of children who used the drill to disassemble the plane increased with age ($\chi^2 = 9.83$, $p < .05$), from 10.5% (2-year-olds) to 60% (4-year-olds).

There were no significant differences between the child's age and the following individual behaviors: organizing pieces by color, shape, or other characteristics (e.g., grouping pieces), following a sequence of instructions, trying to connect or attach pieces but not successful, matching drill bit shape to shape of different pieces, moving the reverse slide switch on the drill to detach two pieces, connecting/attaching two pieces correctly, completely assembling the plane, using the drill to disassemble, putting toy pieces in mouth, showing frustration with toy, and losing interest in toy.

Table 40. Percentage of children exhibiting individual behaviors with Take-Apart Toy 2 by age group					
Child behavior	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Organizes pieces by color, shape, or other characteristic (aka grouping pieces)	0	0	1 (6.7%)	*1 (2%)*	*2.41, ns*
Looks at the instructions/pictures on the box	10 (52.6%)	14 (93.3%)	10 (66.7%)	*34 (69.4%)*	*7.63, p <.05*
Follows the sequence of instructions	0	0	2 (13.3%)	*2 (4.1%)*	*4.93, ns*
Tries to connect/attach pieces but not successfully	10 (52.6%)	12 (80%)	8 (53.3%)	*30 (61.2%)*	*3.41, ns*
Matches the drill bit shape to the shape of different pieces	2 (10.5%)	6 (40%)	5 (33.3%)	*13 (26.5%)*	*4.62, ns*
Moves the forward slide switch on the drill to attach two pieces	5 (26.3%)	11 (73.3%)	9 (60%)	*25 (51%)*	*8.42, p <.05*
Moves the reverse slide switch on the drill to detach two pieces	5 (26.3%)	9 (60%)	8 (53.3%)	*22 (44.9%)*	*4.60, ns*
Able to grip and depress the trigger on the drill	12 (63.2%)	15 (100%)	10 (66.7%)	*37 (75.5%)*	*10.45, p <.05*
Connects/attaches two pieces correctly	4 (21.1%)	5 (33.3%)	8 (53.3%)	*17 (34.7%)*	*3.88, ns*
Connects/attaches three pieces correctly	2 (10.5%)	2 (13.3%)	5 (33.3%)	*9 (18.4%)*	*3.07, ns*
Completely assembles plane	0	1 (6.7%)	0	*1 (2%)*	*2.41, ns*
If assembles the plane or portion of the plane, uses the drill to disassemble (e.g., take two or more pieces apart)	2 (10.5%)	5 (33.3%)	9 (60%)	*16 (32.7%)*	*9.83, p <.05*
Puts toy pieces in mouth	0	0	0	*0*	
Shows frustration with the toy	4 (21.1%)	6 (40%)	4 (26.7%)	*14 (28.6%)*	*1.49, ns*
Loses interest in the toy	11 (57.9%)	7 (46.7%)	4 (26.7%)	*22 (44.9%)*	*3.43, ns*
Child's response to, "What did you build?"	2 (10.5%)	6 (40%)	9 (60%)	*17 (34.7%)*	*13.59, p <.05*

There was a significant difference between age groups for the number of pieces assembled during the trial ($\chi^2(4) = 11.68$, $p < .05$). Most of the 2-year-olds (89.5%) and 3-year-olds (73.3%) and almost half of the 4-year-olds (46.7%) did not assemble any pieces (see Table 41). Compared to 2-year-olds (10.5%), more 3- (26.7%) and 4-year-olds (33.3%) assembled 1–4 pieces. Only 4-year-olds (20%) assembled 5–8 pieces.

Table 41. Total number of pieces the child assembled					
Number of pieces assembled	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
0	17 (89.5%)	11 (73.3%)	7 (46.7%)	*35 (71.4%)*	*11.68, p <.05*
1–4	2 (10.5%)	4 (26.7%)	5 (33.3%)	*11 (22.4%)*	
5–8	0	0	3 (20%)	*3 (6.1%)*	

When asked what they built after the child finished playing with the toy or the trial reached the 15-minute limit, more 4-year-olds (60%) answered the question accurately, with the percentages decreasing for younger children ($\chi^2(2) = 13.59$, $p < .05$). Only 10.5% of the 2-year-olds answered the question.

3.3.3 Fully Intended Play for Toy 3

Researchers explored whether children within each age group fully engaged with the Take-Apart Toy 2 and interacted with it as the manufacturer intended. A child who engaged in all the following behaviors was considered to have engaged in fully intended play:

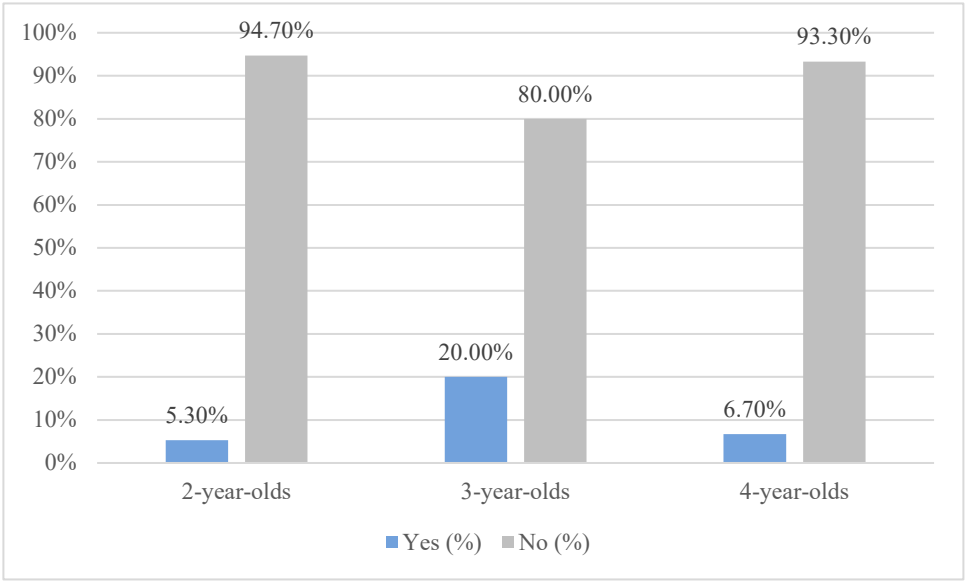
- Matches drill bit shape to shape of different pieces AND
- Moves the forward slide switch on the drill to attach two pieces AND
- Moves the reverse slide switch on the drill to detach two pieces AND
- Grips and depresses the trigger on the drill AND
- Connects/attaches two pieces correctly AND
- Uses the drill to disassemble (e.g., take two or more pieces apart)

No significant association existed between age groups and fully intended play behavior (see Table 42 and Figure 4). Only 5 children engaged in fully intended play: 5.3% of the 2-year-olds (1 child), 20% of the 3-year-olds (3 children), and 6.7% of the 4-year-olds (1 child).

Table 42. Age distribution of fully intended play for the Take-Apart Toy 2

Question	Child age (yrs)			*Total participants*	*Chi-square (X^2)*
Fully intended play	**2**	**3**	**4**		
No	18 (94.7%)	12 (80%)	14 (93.3%)	*44*	*2.10, ns*
Yes	1 (5.3%)	3 (20%)	1 (6.7%)	*5*	

Figure 4. Age distribution of fully intended play for the Take-Apart Toy 2



3.3.4 Caregiver Ratings for Toy 3

Researchers summarized caregiver responses to individual questions for the Take-Apart Toy 2 (see Table 43). Overall, caregiver perceptions of the physical and functional characteristics of the toy were not associated with child age. Almost all caregivers (95.9%) found that the size of the toy was appropriate for

their child, safe to play with (98%), and had an overall appearance that would appeal to their child (100%), with similar rates across child age groups.

Approximately 62.5% of caregivers believed that their child could take apart the toy pieces by unscrewing them with their fingers: 42.1% of caregivers of 2-year-olds, 80% of caregivers of 3-year-olds, and 71.4% of caregivers of 4-year-olds. However, there were no significant differences between the three age groups. Only 36.7% of caregivers thought their child could use the drill in the reverse setting to detach the pieces from each other. Again, there were no significant differences across age groups.

There were significant differences in caregiver perceptions of whether they would need to demonstrate the drill to their child (χ^2 (2) = 10.72, p<.05). Caregivers of 2-year-olds (73.7%) were more likely to believe that they would need to show their child how to use the drill, compared to 26.7% of caregivers of both 3- and 4-year-olds. Caregivers also differed in whether they believed their child would notice the different shapes of the drill bits and know to change the drill bit for the different-shaped toy pieces (χ^2 (2) = 6.83, p<.05). The percentage of caregivers who were believed that their child would notice the differences decreased with age from 71.4% (4-year-olds) to 26.3% (2-year-olds).

Most caregivers thought their child would be frustrated by the toy, including 78.9% of caregivers of the 2-year-olds and 80% of caregivers of the 3- and 4-year-olds. However, there were no significant differences among caregiver opinions of children across age groups.

Table 43. Caregiver opinion on characteristics of the toy and their child's reaction to the Take-Apart Toy 2

Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Are the size of the toy parts appropriate for your child?	17 (89.5%)	15 (100%)	15 (100%)	*47 (95.9%)*	*3.92, ns*
Do you think this toy is safe for your child to play with?	18 (94.7%)	15 (100%)	15 (100%)	*48 (98%)*	*1.93, ns*
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Do you think your child will be frustrated by the toy in any way?	15 (78.9%)	12 (80%)	12 (80%)	*39 (79.6%)*	*0.01, ns*
Does your child need to be shown how to use the drill?	14 (73.7%)	4 (26.7%)	4 (26.7%)	*22 (44.9%)*	*10.72, p<.05*
Do you think your child will notice the different shapes for the various drill bits and know to change the drill bit for the different-shaped toy pieces?	5 (26.3%)	7 (46.7%)	10* (71.4%)	*22 (45.8%)*	*6.83, p<.05*
Assuming the vehicle is assembled, could your child manually take apart the pieces by unscrewing the m with their fingers?	8 (42.1%)	12 (80%)	10* (71.4%)	*30 (62.5%)*	*5.88, ns*
Would your child be able to use the drill in reverse setting on his/her own to effectively separate the pieces?	4 (21.1%)	6 (40%)	8 (53.3%)	*18 (36.7%)*	*3.96, ns*

*One caregiver of a 4-year-old did not answer this question.

A significant difference was also found in caregiver purchasing intention (χ^2 (2) = 13.39, p <.05). Approximately half of the caregivers (53.1%) would purchase this toy for their child (see Table 44). Significantly more caregivers of 3-year-olds (73.3%) and 4-year-olds (73.3%) would consider purchasing the Take-Apart Toy 2 than 21% of caregivers of 2-year-olds (21.1%).

Table 44. Percentage of caregivers who would consider purchasing the Take-Apart Toy 2

Questions	Child age (yrs)				
	2	3	4	*Total*	*Chi-square (X^2)*
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child (at his/her current age)?	4 (21.1%)	11 (73.3%)	11 (73.3%)	*26 (53.1%)*	*13.39, p<.05*

Caregiver ratings on how interested the child would be in the Take-Apart Toy 2 were not significantly associated with child age group (see Table 45). More than half of the caregivers (57.1%) thought the child would play with the Take-Apart Toy 2 for a short time or occasionally, but it would not be their favorite toy. Fewer than 10% of caregivers believed this would be a favorite toy.

Table 45. Caregiver opinions of their child's interest in the Take-Apart Toy 2

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Rate your child's interest in the toy, on a scale of 1–5, with 1 = will not play with this toy and 5 = this toy would be a favorite.	**2**	**3**	**4**		
Will not play with this toy	0	0	0	*0*	
Will play with it for a short time; then, likely will forget about it or disregard it; OR Will play with it here and there, but the toy would not be a favorite	13 (68.4%)	8 (53.3%)	7 (46.7%)	*28 (57.1%)*	*2.07, ns*
Will play with it quite a bit and will come back to	5 (26.3%)	6 (40%)	6 (40%)	*17 (34.7%)*	
This toy would be a favorite	1 (5.3%)	1 (6.7%)	2 (13.3%)	*4 (8.2%)*	

There was a significant difference in how caregivers rated the level of difficulty of this toy ($\chi^2(6)$ = 16.87, p <.05). More than half of the caregivers of 2-year-olds (57.9%) believed that this toy was too difficult for their child (see Table 46). Additionally, 66.7% of caregivers of 3-year-olds and 60% of caregivers of 4-year-olds thought the toy was somewhat difficult. None of the caregivers thought this toy was too easy for their child, and only 14.3% thought it would be manageable, with most being caregivers of 3- and 4-year-olds.

Table 46. Caregiver ratings on the difficulty level of the Take-Apart Toy 2					
Question	Child age (yrs)			Total	Chi-square (X^2)
On a scale of 1–5, with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child? (Select one option)	2	3	4		
Too difficult	11 (57.9%)	1 (6.7%)	1 (6.7%)	*13 (26.5%)*	*16.87, p<.05*
Somewhat difficult	6 (31.6%)	10 (66.7%)	9 (60%)	*25 (51%)*	
Manageable	1 (5.3%)	3 (20%)	3 (20%)	*7 (14.3%)*	
Somewhat easy	1 (5.3%)	1 (6.7%)	2 (13.3%)	*4 (8.2%)*	
Too easy	0	0	0	*0*	

Caregivers were asked for their opinions on whether the number of pieces in this toy set was appropriate for their child (see Table 47). There were no significant differences across the three age groups. And for all age groups, caregivers were, for the most part, evenly split between "just right" and "too many." Overall, 45.8% of caregivers indicated the number of pieces was "just right," while 52.1% felt there were "too many." Only 2.1% felt there were "too few" pieces. Specifically, for caregivers of the 2-year-olds, a slight majority (52.6%) thought the number of pieces was "too many," while 47.4% said it was "just right." For caregivers of the 3-year-olds, 60% thought it was "too many," and 40% thought it was "just right." For caregivers of the 4-year-olds, 50% thought it was "just right," 42.9% said "too many," and 7.4% said "too few."

Table 47. Caregiver opinions on the number of pieces in the Take-Apart Toy 2					
Question	Child age (yrs)			Total	Chi-square (X^2)
For your child, do you think the number of pieces in the set is?	2	3	4*		
Too few	0	0	1 (7.4%)	*1 (2.1%)*	*3.06, ns*
Just right	9 (47.4%)	6 (40%)	7 (50%)	*22 (45.8%)*	
Too many	10 (52.6%)	9 (60%)	6 (42.9%)	*25 (52.1%)*	

*One caregiver of a 4-year-olds did not answer this question.

There was a significant difference ($\chi^2(10) = 15.86$, $p < .05$) in whether caregivers thought their child could assemble the plane without assistance (see Table 48). More than 50% of caregivers of 4-year-olds believed their child could assemble half of the plane, and one caregiver thought their child could assemble the entire plane.

Approximately one-third of the caregivers of 3-year-olds (33.3%) thought their child could put one or two pieces together, another 33.3% believed their child could assemble half of the plane, and only two caregivers thought their child could build most or all of the plane.

Among caregivers of 2-year-olds, 36.8% believed their child could not put the pieces together without assistance, 42.1% thought they could put one or two pieces together, and 21.1% thought their child could assemble half of the plane. None of the caregivers of a 2-year-old thought their child could build most or all of the plane.

Table 48. Caregiver opinions on the child's ability to assemble the Take-Apart Toy 2 independently					
Question	**Child's age (yrs)**			***Total***	***Chi-square (X^2)***
Do you think your child will be able to put the plane pieces together without any help?	**2**	**3**	**4**		
My child would not be able to put the pieces together	7 (36.8%)	3 (20%)	1 (6.7%)	*11 (22.4%)*	*15.86, p <.05*
My child would be able to put 1 or 2 pieces together	8 (42.1%)	5 (33.3%)	2 (13.3%)	*15 (30.6%)*	
My child would be able to assemble half of the plane	4 (21.1%)	5 (33.3%)	8 (53.3%)	*17 (34.7%)*	
My child would be able to build most of the plane	0	1 (6.7%)	3 (20%)	*4 (8.2%)*	
My child would be able to build the entire plane	0	1 (6.7%)	1 (6.7%)	*2 (4.1%)*	

Most caregivers believed their child could hold the drill and pull the trigger (see Table 49). Specifically, 84.2% of caregivers of 2-year-olds, 93.3% of caregivers of 3-year-olds, and 92.9% of caregivers of 4-year-olds believed their child could hold the drill and pull the trigger.

Table 49. Caregiver Opinions on the child's ability to hold and operate the drill					
Question	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
Do you think your child will be able to hold the drill and pull the trigger?	**2**	**3**	**4***		
No	0	0	0	*0*	
Will try to, but not successfully	3 (15.8%)	1 (6.7%)	1 (7.1%)	*5 (10.4%)*	*0.95, ns*
Yes	16 (84.2%)	14 (93.3%)	13 (92.9%)	*43 (89.6%)*	

*One caregiver of a 4-year-olds did not answer this question.

There was a significant difference ($\chi^2(4) = 18.11$, $p < .05$) in caregiver opinions regarding their child having the fine motor skills to hold two or more toy pieces while operating the drill to join the pieces together. More caregivers of 4-year-olds (71.4%) believed their child had the motor skills to perform this task. Whereas 42.1% of caregivers of 2-year-olds thought their child would be unable to hold two or more toy pieces while operating the drill to join the pieces, and 42.1% thought their child would "try, but not successfully." Almost half of the caregivers of 3-year-olds (46.7%) thought their child would "try, but not successfully," and another 46.7% thought their child would be successful (see Table 50).

Table 50. Caregiver opinions on child's fine motor skills for assembling with a drill					
Question	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
Does your child have the fine motor skills needed to hold two or more toy pieces and a screw in place while at the same time operating the drill to join the pieces together?	**2**	**3**	**4***		
No	8 (42.1%)	1 (6.7%)	0	*9 (18.4%)*	*18.11, p <.05*
Will try to, but not successfully	8 (42.1%)	7 (46.7%)	4 (28.6%)	*19 (38.8%)*	
Yes	3 (15.8%)	7 (46.7%)	10 (71.4%)	*20 (41.7%)*	

*One caregiver of a 4-year-olds did not answer this question.

Caregiver opinions on how they would present the toy to their child (completely unassembled, partially assembled, or fully assembled) were significantly different across the three age groups ($\chi^2(4) = 14.03$, $p < .05$). Among caregivers of 4-year-olds, 73.3% preferred giving the toy completely unassembled. Fifty-three-point-three percent of caregivers of 3-year-olds and 21.1% of caregivers of 2-year-olds indicated they would do the same thing. Conversely, 57.9% of caregivers of 2-year-olds preferred to fully assemble the toy before presenting it, although only 6.7% (1 person) of caregivers for 4-year-olds would do so. About 20–26.7% of caregivers in the three age groups indicated they would partially assemble the toy before presenting it to their child (see Table 51).

Table 51. Caregiver approaches for presenting the Take-Apart Toy 2 to their child

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
How would you present this toy to your child?	**2**	**3**	**4**		
Completely unassembled, give the parts as they are	4 (21.1%)	8 (53.3%)	11 (73.3%)	*23 (46.9%)*	*14.03, p <.05*
Assembled partially	4 (21.1%)	4 (26.7%)	3 (20%)	*11 (22.4%)*	
Assembled fully	11 (57.9%)	3 (20%)	1 (6.7%)	*15 (30.6%)*	

Caregivers were asked whether they would show their child how to play with any parts of the toy before giving it to them to play with independently. Table 52 shows a significant association (χ^2 (26) = 40.54, $p < .05$) between age groups and how the caregiver would demonstrate the parts of the toy to their child. Approximately 34.7% of caregivers indicated that they would demonstrate how to hold the drill, how to move the forward and reverse buttons, how to follow the directions for assembling the pieces, how to select the correct drill bit, and how to align the pieces and attach them using the drill before giving the toy to their child and allowing them to play independently. Caregivers of younger children are more likely to explain each of these components compared to those with older children; more specifically, 57.9% of caregivers of 2-year-olds, 26.7% of caregivers of 3-year-olds, and 13.3% of caregivers of 4-year-olds.

Table 52. Caregiver approach for demonstrating how to play with the Take-Apart Toy 2 to their child					
Question	Child age (yrs)			Total	Chi-square (X^2)
Would you need to show your child how to play with any parts of the toy before giving it to him or her to play with independently? (Select all that apply)	2	3	4		
a	2 (10.5%)	2 (10.5%)	5 (33.3%)	*9 (18.4%)*	*40.54, p <.05*
b, c, d, e, f	11 (57.9%)	4 (26.7%)	2 (13.3%)	*17 (34.7%)*	
b, c, e, f	0	0	1 (6.7%)	*1 (2%)*	
b, d, e	1 (5.3%)	0	0	*1 (2%)*	
b, d, e, f	1 (5.3%)	0	0	*1 (2%)*	
b, d	1 (5.3%)	0	0	*1 (2%)*	
c	0	0	1 (6.7%)	*1 (2%)*	
c, d, e	0	1 (6.7%)	0	*1 (2%)*	
c, d, e, f	1 (5.3%)	2 (13.3%)	2 (13.3%)	*5 (10.2%)*	
c, e	0	2 (13.3%)	0	*2 (4.1%)*	
c, e, f	0	2 (13.3%)	1 (6.7%)	*3 (6.1%)*	
d	0	1 (6.7%)	3 (20%)	*4 (8.2%)*	
d, e, f	0	1 (6.7%)	0	*1 (2%)*	
f	2 (10.5%)	0	0	*2 (4.1%)*	

Note: a.) No, I would give the toy to my child and see how they play with it first, b.) I would show them how to hold the drill correctly in a pistol grip with a finger over the activation button, c.) I would show them how to move the forward and reverse button on the top of the drill, d.) I would show them how to follow the directions to select toy pieces to put together, e.) I would show them how to select the right drill bit for differently shaped yellow connector pieces, and f.) I would show how to align the pieces and drill them together.

The manufacturer recommends this toy for children aged 3 years+, yet only roughly 37.5% of caregivers agreed with this recommendation (see Table 53). More than half of the caregivers (60.4%) believed this toy was more suitable for children aged 4+ years. This included 57.9% of caregivers of 2-year-olds, 71.4% of caregivers of 3-year-olds, and 53.3% of caregivers of 4-year-olds. Only one caregiver of a 4-year-old believed this toy would be suitable for children under 3-years-old.

Table 53. Caregiver opinions of the appropriate child's age for the Take-Apart Toy 2					
Question	Child age (yrs)			Total	Chi-square (X^2)
7a. Overall, for what age do you think this toy is best suited?	2	3*	4		
Under 3	0	0	1 (6.7%)	*1 (2.1%)*	*3.19, ns*
3+	8 (42.1%)	4 (28.6%)	6 (40%)	*18 (37.5%)*	
4+	11 (57.9%)	10 (71.4%)	8 (53.3%)	*29 (60.4%)*	

*One caregiver of a 3-year-old did not answer this question.

3.3.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 3

While there were some associations between caregiver purchasing decisions and child fully intended play behavior, these differences were not statistically significant, suggesting no strong association. About 40% of caregivers whose child engaged in fully intended play indicated they would purchase this toy for their child. However, more than half of the caregivers (54.5%) whose child did not engage in fully intended play also indicated that they would purchase the toy (see Table 54).

Table 54.	Association between caregiver purchasing intentions and the child engaging in fully intended play with the Take-Apart Toy 2			
Fully intended play	Purchasing			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	20 (45.5%)	24 (54.5%)	*44*	*0.38, ns*
Yes	3 (60%)	2 (40%)	*5*	

There was no significant association between caregiver opinions about the number of pieces in the toy and their child's fully intended play behavior. For children who did not fully engage, the majority of caregivers were divided between thinking the toy has the right number of pieces (48.8%) or too many pieces (48.8%). For children who did fully engage, most caregivers thought the toy had too many pieces (80%) (see Table 55).

Table 55.	Association between caregiver opinions on the number of pieces in the Take-Apart Toy 2 and child engaging in fully intended play with the toy				
Fully intended play	Number of pieces				
	Too few	Just right	Too many	*Total participants*	*Chi-square (X^2)*
No	1 (2.3%)	21 (48.8%)	21 (48.8%)	*44*	*1.96, ns*
Yes	0	1 (20%)	4 (80%)	*5*	

A significant association was found between caregiver opinions about their child's ability to assemble pieces without help and the child's fully intended play behavior (χ^2 (4) =10.97, p<.05). Specifically, 80% of caregivers whose child fully engaged with the toy believed their child could build half of the toy, while 20% believed their child could build the entire toy. In contrast, among children who did not fully engage with the toy, caregiver beliefs were more varied, with the highest percentages believing their child could either put 1 or 2 pieces together (34.1%) or build half of the toy (29.5%) (see Table 56).

Table 56.	Association between caregiver opinions of their child assembling pieces without help and child engaging in fully intended play with the Take-Apart Toy 2						
Fully intended play	Assemble pieces without help						
	No	Put 1 or 2 pieces together	Build half	Build most	Build entire toy	*Total participants*	*Chi-square (X^2)*
No	11 (25%)	15 (34.1%)	13 (29.5%)	4 (9.1%)	1 (2.3%)	*44*	*10.97, p<.05*
Yes	0	0	4 (80%)	0	1 (20%)	*5*	

There was no association between caregiver beliefs about whether they needed to show their child how to use the drill and the child's fully intended play behavior. Among children who did not fully engage with the toy, caregivers were evenly split between believing they would not need to show how to use the drill (52.3%) and believing they would need to show how to use the drill (47.7%). In contrast, among children who fully engaged with the toy, most caregivers (80%) believed they would not need to show their child how to use the drill (see Table 57).

Table 57.	Association between caregiver opinions about whether they need to show the child how to use the drill and the child engaging in fully intended play with the Take-Apart Toy 2			
Fully intended play	Show how to use the drill			
	No	Build entire toy	*Total participants*	*Chi-square (X^2)*
No	23 (52.3%)	21 (47.7%)	*44*	*1.51, ns*
Yes	4 (80%)	1 (20%)	*5*	

There was no significant association between caregiver beliefs about their child's fine motor skills and fully intended play behavior (see Table 58). Among children who did not fully engage with the toy, caregivers were divided between believing their child would try but not be successful (39.5%) and believing their child could hold two or more pieces and use the drill to attach (39.5%), with a smaller percentage believing their child was not capable of the task (20.9%). In contrast, among children who fully engaged with the toy, 60% of caregivers believed their child could hold two or more pieces and use the drill to attach, while 40% believed their child would try but not be successful.

Table 58.	Association between caregiver opinions about their child holding two or more pieces while using the drill to attach pieces and the child engaging in fully intended play with the Take-Apart Toy 2				
Fully intended play	Holding two or more pieces and use the drill to attach pieces				
	No	Will try, but not successful	Yes	*Total participants*	*Chi-square (X^2)*
No	9 (20.9%)	17 (39.5%)	17 (39.5%)	43*	2.38, ns
Yes	0	2 (40%)	3 (60%)	5	

*One caregiver of a 4-year-old did not answer this question

Caregivers provided their opinions on whether they thought their child would know how to use the reverse setting on the drill to disassemble parts. There was no significant association between caregiver opinions and the child's fully intended play. Among children who did not fully engage with the toy, 61.4% of caregivers believed their child would not use the reverse setting, while 38.6% believed their child could. In contrast, among children who fully engaged with the toy, 80% of caregivers believed their child would not use the reverse setting, while 20% believed their child would (see Table 59).

Table 59.	Association between caregiver opinions about the child using the reverse setting and the child engaging in fully intended play with the Take-Apart Toy 2			
Fully intended play	Using reverse setting			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	27 (61.4%)	17 (38.6%)	*44*	*0.73, ns*
Yes	4 (80%)	1 (20%)	*5*	

An investigation into the association between how caregivers present the toy and the child's fully intended play behavior revealed no significant differences (see Table 60). Among children who did not fully engage with the toy, 47.7% of caregivers would present the toy completely unassembled, 18.2% would present it partially assembled, and 34.1% would present it fully assembled. In contrast, among children who fully engaged with the toy, 40% of caregivers would present the toy completely unassembled, 60% would present it partially assembled, and none would present it fully assembled.

Table 60.	Association between caregiver approach to presenting the toy and the child engaging in fully intended play with the Take-Apart Toy 2				
Fully intended play	Ways to present the toy				
	Completely unassembled	Assemble partially	Assemble fully	*Total participants*	*Chi-square (X^2)*
No	21 (47.7%)	8 (18.2%)	15 (34.1%)	*44*	*5.81, ns*
Yes	2 (40%)	3 (60%)	0	*5*	

3.3.6 Age Recommendation for Toy 3

Manufacturer's Age Label: 3+ years

Recommended Age Group for the Guidelines: 4+ years

Justification for Recommended Age:

Very few children met the criteria for fully intended play, so it is difficult to draw on these numbers to provide guidance for an age recommendation. There was a significant difference in the number of pieces assembled by age group ($\chi^2 = 11.682$, $p < .05$). Most of the 2-year-olds (89.5%) and 3-year-olds (73.3%), and almost half of the 4-year-olds (46.7%) did not assemble any pieces. Compared to 2-year-olds (10.5%), more 3-year-olds (26.7%), and 4-year-olds (33.3%) assembled 1-4 pieces. However, only 4-year-olds (20%) assembled 5-8 pieces. More than half of the caregivers (59.2%) believed this toy was more suitable for children aged 4+ years, and approximately 73.3% of caregivers of 3-year-olds and 4-year-olds indicated that they would consider purchasing this toy. CPSC staff should consider addressing the subject toy under the 4+ years age group, which is consistent with the manufacturer's suggested age label.

3.4 Toy 4: Figurine Toy 1

3.4.1 Description of Toy 4

Toy 4 Figurine Toy 1 is a small doll modeled after different popular children's characters. The dolls and outfits are made of plastic, and they have movable joints at the waist and arms that can be positioned in different poses (e.g., sitting or standing). The outfits are made of two layers and can be changed using a clip-on feature. The manufacturer intended age is 3+ years (see Table 61).

Table 61.	Product description, manufacturer's stated age, dimensions, and play behaviors for the Figurine Toy 1		
Name	Product description	Manufacturer's stated age	Dimensions
Figurine Toy 1	A small doll modeled after different popular children's characters. The dolls and outfits are made of plastic, and they have movable joints at the waist and arms that can be positioned in different poses (e.g., sitting or standing). The outfits are made of two layers and can be changed using a clip-on feature.	3+ years	Height: 3.5 inches; Weight 1.44 ounces. Dimensions may vary by doll.
	Behaviors Demonstrating Manufacturer's Intended Use		
	a. Successfully takes off the princess' bodice or skirt OR b. Successfully puts on the princess' bodice or skirt AND c. Turns Figurine's head OR Moves Figurine's arms OR Makes Figurine Stand d. Engages in pretend play with one or multiple figurines (e.g., creating interactions between figurines, creating dialogue between figurines, speaking for the figurines)		

3.4.2 Child Behavior when Interacting with Toy 4

The researcher introduced the child to the figurines, demonstrating how to move their arms, legs, and head. They also showed how to remove and reattach the princess's clothes by clipping on/off her skirt and bodice. The child was then invited to play with the toy. Thirty seconds before the 3-minute trial ended, the researcher presented the princess' tiara, demonstrated how to fit it on the figurine's head, removed it, handed it to the child and allowed the child approximately 30 seconds more of play. Play behaviors were only coded during the free play period.

Forty-six out of 49 children (93.9%) played with the toy for the full 3 minutes. Three children (6.1%) played with the toy for at least 2 minutes. There was no significant association between duration of play time and child age.

Table 62 shows that there was a significant association between child age and trying to put on the princess' bodice or skirt (χ^2 (2) = 6.16, p <.05). Older children were more likely to try to put the skirt and bodice. Eighty percent of the 4-year-olds, 73.3% of the 3-year-olds, and 42.1% of the 2-year-olds attempted to put the bodice and skirt on the princess. However, there was no significant difference in the success rate.

There was no significant associations were found between child age and the following play behaviors across age groups: holding the figurine(s), holding or playing with both dolls simultaneously, attempting to remove the princess' bodice or skirt (and succeeding), turning the figurine's head, moving the figurine's arm, making the figurine(s) stand, making the figurine(s) walk, run, jump, or perform other movements, putting the figurines in their mouth, showing frustration with the figurines, naming figurines, engaging in pretend play with one or multiple figurines, and playing with one or two figurines.

Towards the end of the trial, researchers demonstrated how to put a tiara on the princess' head and then asked the child to repeat the action. Overall, 87.8% of the children tried to place the tiara on the princess' head, with no significant differences between the three age groups; however, there was a notable difference in the success rate (χ^2 (2) = 14.97, p <.05). More than half of the 4-year-olds (66.7%) successfully placed the tiara on the princess' head, compared to 13.3% of the 3-year-olds and 10.5% of the 2-year-olds, indicating a decreasing success rate with younger aged children.

Table 62. Percentage of children exhibiting individual behaviors with Figurine Toy 1 by age group					
Child behavior	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Holds the figurine(s)	18 (94.7%)	15 (100%)	14 (93.3%)	*47 (95.9%)*	*1.53, ns*
Holds/plays with both the dolls at the same time	4 (21.1%)	7 (46.7%)	7 (46.7%)	*18 (36.7%)*	*3.43, ns*
Tries to take off princess' bodice or skirt	15 (78.9%)	12 (80%)	13 (86.7%)	*40 (81.6%)*	*0.39, ns*
Was child successful at taking off the bodice?	12 (63.2%)	11 (73.3%)	9 (60%)	*32 (65.3%)*	*2.87, ns*
Tries to put on princess' bodice or skirt	8 (42.1%)	11 (73.3%)	12 (80%)	*31 (63.3%)*	*6.16, p<.05*
Was child successful at putting on the bodice or skirt?	0	0	1 (6.7%)	*1 (2%)*	*4.93, ns*
Turns the figurine's head	7 (36.8%)	8 (53.3%)	8 (53.3%)	*23 (46.9%)*	*1.28, ns*
Moves the figurine's arms	10 (52.6%)	9 (60%)	10 (66.7%)	*29 (59.2%)*	*.69, ns*
Makes the figurine stand	2 (10.5%)	0	3 (20%)	*5 (10.2%)*	*4.50, ns*
Makes the figurine walk/run/jump and do other movement	4 (21.1%)	4 (26.7%)	4 (26.7%)	*12 (24.5%)*	*.20, ns*
Tries to put the tiara on the figurine's head	17 (89.5%)	13 (86.7%)	13 (86.7%)	*43 (87.8%)*	*.09, ns*
Was child successful at putting the tiara on figurine's head?	2 (10.5%)	2 (13.3%)	10 (66.7%)	*14 (28.6%)*	*14.97, p<.05*
Puts the figurine in mouth	0	0	0	*0*	
Shows frustration with the figurine	0	2 (13.3%)	1 (6.7%)	*3 (6.1%)*	*3.44, ns*
Names characters	3 (15.8%)	1 (6.7%)	1 (6.7%)	*5 (10.2%)*	*1.02, ns*
Engages in pretend play with one or multiple figurines	2 (10.5%)	3 (20%)	6 (40%)	11 (22.4%)	4.20, ns

Approximately 67.3% of the children played with two of the figurines and 28.6% played with one of the figurines, with the percentage of children playing with one or two figurines being evenly distributed across age groups. There were no significant differences across age groups (see Table 63).

Table 63. Number of figurines played with by age group					
Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Number of figurines	2	3	4		
0	1 (5.3%)	0	1 (6.7%)	*2 (4.1%)*	*1.66, ns*
1	5 (26.3%)	5 (33.3%)	4 (26.7%)	*14 (28.6%)*	
2	13 (68.4%)	10 (66.7%)	10 (66.7%)	*33 (67.3%)*	

3.4.3 Fully Intended Play for Toy 4

The analysis also focused on whether children in each age group demonstrated the full intended play behavior with the toy as designed by the manufacturer. For this figurine toy, fully intended play was defined by the child as exhibiting all the following behaviors:

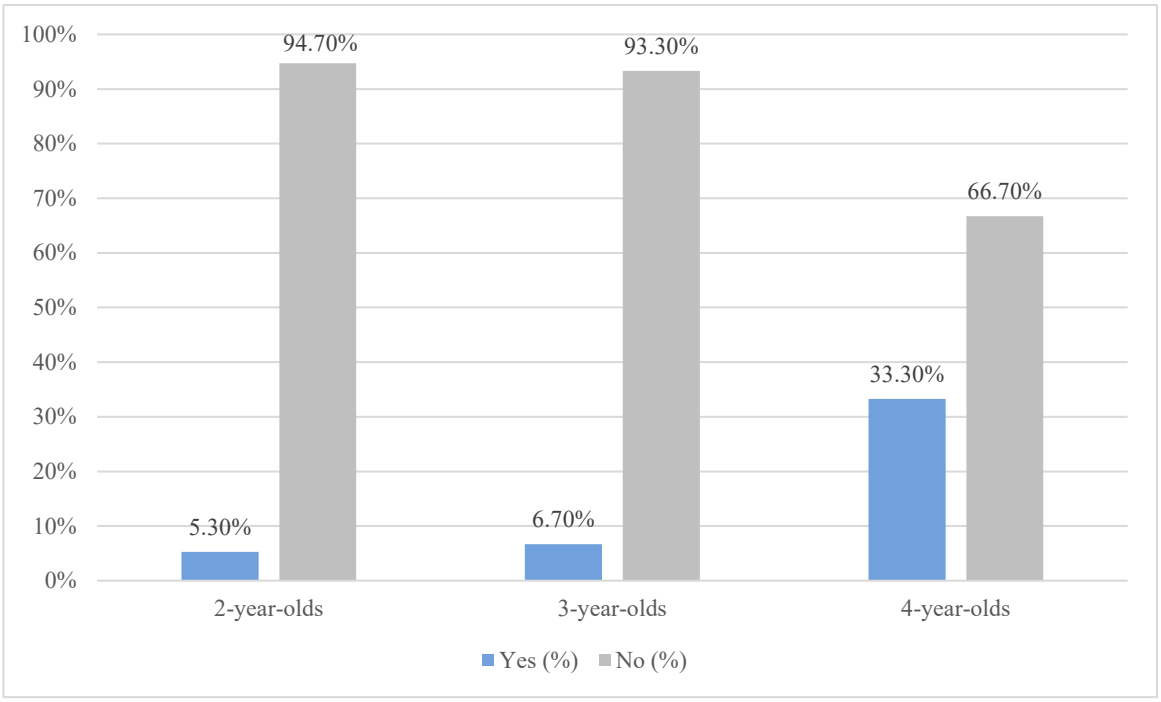
- Successfully took off the princess' bodice or skirt OR successfully put on the princess' bodice or skirt
- Turned the figurine's head OR moved the figurine's arms OR made the figurine stand
- Engaged in pretend play with one or multiple figurines (e.g., created interactions between figurines, created dialogue between figurines, spoke for the figurines)

There was no significant association between the child age and fully intended play behavior. Only seven children (14.3%) played with this toy as the manufacturer intended, and five of seven children were 4-years-old. Over 85% of the children did not exhibit fully intended play behavior with this toy. This included 94.7% of the 2-year-olds, 93.3% of the 3-year-olds, and 66.7% of the 4-year-olds (see Table 64 and Figure 5).

Table 64. Age distribution of fully intended play for the Figurine Toy 1

Fully intended play	Child age (yrs)			*Total participants*	*Chi-square (X^2)*
	2	3	4		
No	18 (94.7%)	14 (93.3%)	10 (66.7%)	*42 (85.7%)*	*5.91, ns*
Yes	1 (5.3%)	1 (6.7%)	5 (33.3%)	*7 (14.3%)*	

Figure 5. Age distribution of fully intended play for Figurine Toy 1



3.4.4 Caregiver Ratings for Toy 4

Caregiver perceptions of some of the physical and functional characteristics of the figurines were associated with child age (see Table 65). Caregivers of 2-, 3-, and 4-year-olds expressed different opinions with respect to toy size (χ^2 (2) = 9.33, p <.05), safety concerns (χ^2 (2) = 8.22, p <.05), and whether they would include the tiara when giving the toy to their child (χ^2 (2) = 15.84, p <.05). Most of the caregivers of 4-year-olds (93.3%) thought the toy size was appropriate for their child, compared to 73.3% for caregivers of 3-year-olds, and 47.4% for caregivers of 2-year-olds.

Safety concerns showed comparable results. Most caregivers of 4-year-olds (86.7%) and 73.3% of caregivers of 3-year-olds believed the toy was safe for their child. However, only 42.1% of caregivers of 2-year-olds thought the toy was safe, indicating a significant safety concern among caregivers of the youngest age group. Caregivers expressed concerns about the size of the tiara. Comments included:

Caregivers for 2-year-olds:

- "Crown is very small"
- "Crown is too small, and parts can easily break"
- "Tiara is small and very soft"
- "Tiara is a bit small for a 2-year-old"
- "Clip parts and tiara are too small"
- "Small parts, choking hazard"

Caregivers of 3-year-olds:

- "Too small"
- "Tiara and dress parts are too small"
- "He would probably break it very quickly"

Caregivers of 4-year- olds:

- "The crown is small and soft"

When asked whether they would include the tiara when giving the toy to their child, 86.7% of caregivers of 4-year-olds stated they would. This percentage dropped to 53.3% for caregivers of 3-year-olds and to 21.1% among caregivers of 2-year-olds.

There were no significant age differences found regarding the toy's appearance, frustration with the toy, ability to move the figurine's arms and body parts, or the ability to make the figurines sit and stand.

Table 65. Opinions of the characteristics of the Figurine Toy 1 and child's reaction to the toy

Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child?	9 (47.4%)	11 (73.3%)	14 (93.3%)	*34 (69.4%)*	*9.33, p<.05*
Do you think this toy is safe for your child to play with?	8 (42.1%)	11 (73.3%)	13 (86.7%)	*32 (65.3%)*	*8.22, p<.05*
When you give your child the toy, would you include the tiara?	4 (21.1%)	8 (53.3%)	13 (86.7%)	*25 (51%)*	*15.84, p<.05*
Does this toy have an overall appearance (color, details, and design) that would appeal to your child?	15 (78.9%)	11 (73.3%)	11 (73.3%)	*37 (75.5%)*	*0.20, ns*
Do you think your child will be frustrated by the toy in any way?	8 (42.1%)	8 (53.3%)	9 (60%)	*25 (51%0*	*1.13, ns*
Do you think your child will be able to move the arms and other body parts of these figurines?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Do you think your child will be able to make the figurines sit and stand?	14 (73.7%)	12 (80%)	11 (73.3%)	*37 (75.5%)*	*0.24, ns*

Caregiver purchasing decisions varied by age (χ^2 (2) = 6.89, p <.05). A greater percentage of caregivers of 4-year-olds (46.7%) would purchase this toy for their child, compared to 13.3% of caregivers of 3-year-olds and 10.5% of caregivers of 2-year-olds (see Table 66).

Table 66. Percentage of caregivers who would consider purchasing the Figurine Toy 1

Question	Child age (yrs)				
	2	3	4	*Total*	*Chi-square (X2)*
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child?	2 (10.5%)	2 (13.3%)	7 (46.7%)	*11 (22.4%)*	*6.89, p<.05*

Table 67 shows that caregiver ratings of their child's interest in the Figurine Toy 1 were not associated with child age. Approximately, 60% of caregivers of 3- and 4-year-olds thought their child would play with the toy for a short period or intermittently, but that it would not be their favorite. A greater percentage of caregivers of 2-year-olds (73.7%) thought their child would play with the figurine for a short period or intermittently. In contrast, few caregivers thought their child would play with the toy quite a bit (12.2%) or that this toy would be their child's favorite (6.1%).

Table 67. Caregiver opinions of child's interest in the Figurines Toy 1

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = will not play with this toy and 5 = this toy would be a favorite? (Select one option)	2	3	4		
Will not play with this toy	3 (15.8%)	3 (20%)	2 (13.3%)	*8 (16.3%)*	*4.94, ns*
Will play with it for a short time; then, likely will forget about it or disregard it; OR Will play with it here and there, but the toy would not be a favorite	14 (73.7%)	9 (60%)	9 (60%)	*32 (65.3%)*	
Will play with it quite a bit; and would come back to	1 (5.3%)	3 (20%)	2 (13.3%)	*6 (12.2%)*	
This toy would be a favorite	1 (5.3%)	0	2 (13.3%)	*3 (6.1%)*	

Similarly, there were no significant age differences in caregiver opinions on the toy's level of difficulty (see Table 68). Caregiver responses were evenly distributed across all five categories, indicating no significant differences between age groups. No caregiver of 4-year-olds thought this toy was too difficult for their child, and 33.3% of caregivers of the 4-year-olds thought the toy was manageable for their child. However, more caregivers of 2-year-olds (31.6%) and 3-year-olds (33.3%) thought the toy would be "somewhat difficult" compared to the other response options.

Table 68. Caregiver ratings on the difficulty level of the Figurine Toy 1					
Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
On a scale of 1–5 with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child? (Select one option)	2	3	4		
Too difficult	1 (5.3%)	3 (20%)	0	*4 (8.2%)*	*9.83, ns*
Somewhat difficult	6 (31.6%)	5 (33.3%)	2 (13.3%)	*13 (26.5%)*	
Manageable	4 (21.1%)	1 (6.7%)	5 (33.3%)	*10 (20.4%)*	
Somewhat easy	3 (15.8%)	2 (13.3%)	4 (26.7%)	*9 (18.4%)*	
Too easy	5 (26.3%)	4 (26.7%)	4 (26.7%)	*13 (26.5%)*	

A high percentage of caregivers across age groups believed their child would play with both figurines (see Table 69). Although the percentage decreased with child age (80% of caregivers of 4-year-olds, 71.4% of caregivers of 3-year-olds, and 57.9% of caregivers of 2-year-olds), there was no significant association between caregiver opinion and child age group.

Table 69. Caregiver expectations of child's pretend play behavior with Figurine Toy 1					
Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Do you think your child will engage in pretend play with one or both figurines?	2	3*	4		
No	7 (36.8%)	3 (21.4%)	1 (6.7%)	*11 (22.9%)*	*9.54, ns*
Yes, only princess	0	1 (7.1%)	2 (13.3%)	*3 (6.3%)*	
Yes, only prince	1 (5.3%)	0	0	*1 (2.1%)*	
Yes, both princess and prince	11 (57.9%)	10 (71.4%)	12 (80%)	*33 (68.8%)*	

*One caregiver of a 3-year-olds did not answer this question.

There was no significant association between caregiver expectations of their child's ability to undress the princess and child age (see Table 70). Approximately 33.3% of caregivers believed their child could remove the bodice, overskirt, and tiara. Additionally, 20.8% of caregivers thought their child would only be able to remove the tiara. Lastly, 22.9% of caregivers believed their child could remove the tiara and overskirt, but not the bodice/dress.

Table 70. Caregiver opinions of child's ability to undress the Figurine Toy 1					
Question	Child age (yrs)			Total	Chi-square (X^2)
Do you think your child will be able to undress the princess by removing the tiara, bodice/dress, and overskirt? (Select all that apply)*	2	3	4		
No	0	2 (13.3%)	0	*2 (4.2%)*	*10.13, ns*
Yes, able to remove the tiara	3 (16.7%)	4 (26.7%)	3 (20%)	*10 (20.8%)*	
Yes, my child will be able to remove the tiara Yes, my child will be able to remove the bodice/dress	3 (16.7%)	2 (13.3%)	1 (6.7%)	*6 (12.5%)*	
Yes, my child will be able to remove the tiara Yes, my child will be able to remove the bodice/dress Yes, my child will be able to remove the overskirt	7 (38.9%)	4 (26.7%)	5 (33.3%)	*16 (33.3%)*	
Yes, my child will be able to remove the tiara Yes, my child will be able to remove the overskirt	4 (22.2%)	3 (20%)	4 (26.7%)	*11 (22.9%)*	
Yes, my child will be able to remove the bodice/dress Yes, my child will be able to remove the overskirt	0	0	1 (6.7%)	*1 (2.1%)*	
Yes, my child will be able to remove the overskirt	1 (5.6%)	0	1 (6.7%)	*2 (4.2%)*	

*One caregiver of a 2-year-old did not answer this question.

There was no significant association between caregiver expectation of their child's ability to dress the princess and child age (see Table 71). Overall, 49% of caregivers thought their child would not be able to put on the tiara, bodice, and overskirt back on the princess. This included 57.9% of caregivers of 2-year-olds, 53.3% of caregivers of 3-year-olds, and 33.3% of caregivers of 4-year-olds. Only 16.3% of the caregivers thought their child could put all the accessories back on the princess.

One caregiver of a 2-year-old (5.3%) and two caregivers of 3-year-olds (13.3%) thought their child could put the tiara and the overskirt back on but not the bodice. One caregiver of a 4-year-old (6.7%) thought their child could put the bodice on but not the tiara and overskirt. Finally, 26.5% of caregivers believed their child could put the tiara back on.

Table 71. Caregiver opinions of child's ability to dress the Figure Toy 1					
Question	Child age (yrs)			Total	Chi-square (X^2)
Do you think your child will be able to put the tiara, bodice/dress, and overskirt on the figure? (Select all that apply)	2	3	4		
No	11 (57.9%)	8 (53.3%)	5 (33.3%)	*24 (49%)*	*8.78, ns*
Yes, put tiara on	4 (21.1%)	4 (26.7%)	5 (33.3%)	*13 (26.5%)*	
Yes, put bodice/dress on	0	0	1 (6.7%)	*1 (2%)*	
Yes, put tiara on Yes, put overskirt on	1 (5.3%)	2 (13.3%)	0	*3 (6.1%)*	
Yes, put the tiara, bodice, and overskirt on	3 (15.8%)	1 (6.7%)	4 (26.7%)	*8 (16.3%)*	

When asked whether caregivers would need to show their child how to play with any of the figurines before using them, 19 of 49 caregivers (38.8%) thought they would not need a demonstration before playing. While there were no significant differences between age groups, a greater percentage of caregivers of 4-year-olds (46.7%) would not need to demonstrate how to play with the figurines, compared to 33.3% of caregivers of 3-year-olds and 36.8% of caregivers of 2-year-olds (see Table 72).

Almost half of the caregivers (42.9%) stated that they would only show their child how to remove and put the accessories back on. Five caregivers of 2-year-olds (26.3%) would demonstrate all three behaviors: how to move the head and arms, pretend play, and how to remove and put back on the accessories. One caregiver of a 3-year-old (6.7%) would show their child how to move the head and arms, as well as how to remove and put the accessories back on. Similarly, one caregiver of a 4-year-old (6.7%) would show their child how to move the figurine's head and arms.

Table 72. Caregiver opinions on showing their child how to operate Figurines Toy 1					
Question	Child age (yrs)			Total	Chi-square (X^2)
Would you need to show your child how to play with any of the figurines before he/she uses them? (Select all that apply)	2	3	4		
No	7 (36.8%)	5 (33.3%)	7 (46.7%)	*19 (38.8%)*	*17.09, ns*
Yes, show how to move head and arms	0	0	1 (6.7%)	*1 (2%)*	
Yes, demonstrate pretend play	0	1 (6.7%)	1 (6.7%)	*2 (4.1%)*	
Yes, show how to remove and put back on the accessories	7 (36.8%)	8 (53.3%)	6 (40%)	*21 (42.9%)*	
Yes, show how to move head and arms. Yes, show how to remove and put back on the accessories	0	1 (6.7%)	0	*1 (2%)*	
Yes, I would show them how to move the head and arms Yes, I would demonstrate pretend play with the figures Yes, I would show them how to remove the accessories and put them back on the figure.	5 (26.3%)	0	0	*5 (10.2%)*	

The manufacturer's recommended age for this toy is 3+ years. As shown in Table 73, 95.9% of caregivers thought this toy was suitable for 3-year-olds and older, with 100% of caregivers of 4-year-olds, 93.3% of caregivers of 3-year-olds, and 94.7% of caregivers of 2-year-olds agreeing.

Table 73. Caregiver opinions of the appropriate child's age for the Figurine Toy 1

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Overall, for what age do you think this toy is best suited?	2	3	4		
Under 3	1 (5.3%)	1 (6.7%)	0	*2 (4.1%)*	*1.53, ns*
3+	18 (94.7%)	14 (93.3%)	15 (100%)	*47 (95.9%)*	

3.4.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 4

There were no significant associations between caregiver intention to purchase the Figurine 1 and whether their child engaged in the fully intended play behaviors (see Table 74). Among caregivers whose child engaged in fully intended play, 42.9% indicated they would purchase the toy, but more than half (57.1%) stated they would not purchase the toy.

Table 74. Association between caregiver purchasing intentions and child engaging in fully intended play with the Figurines Toy 1

Fully intended play	Purchasing			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	34 (81%)	8 (19%)	*42*	*1.73, ns*
Yes	4 (57.1%)	3 (42.9%)	*7*	

Table 75 shows all caregivers (100%) believed that their child could move the figurine's arm and other body parts, regardless of whether the child engaged in fully intended play with the toy.

Table 75. Association between caregiver opinions about child moving figurine's arms/legs/head and child engaging in fully intended play with the Figurines Toy 1

Fully intended play	Moving figurine's arm			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	0	42 (100%)	*42*	
Yes	0	7 (100%)	*7*	

There was no significant association between caregiver beliefs about whether their child would engage in pretend play with one or both figurines and the child's fully intended play behavior (see Table 76). Regardless of the child's fully intended play status, caregivers showed similar opinions. Approximately 85.7% of caregivers whose child fully engaged with the figurines thought their child would pretend play with both figurines. Similarly, 65.9% of caregivers whose child did not engage in fully intended play believed their child would engage in pretend play with both figurines.

Table 76.	Association between caregiver opinions about child engaging in pretend play with one or both figurines and child engaging in fully intended play with the Figurines Toy 2					
Fully intended play	Engage in pretend play					
	No	Only princess	Only prince	Both	*Total participants*	*Chi-square (X^2)*
No	11 (26.8%)	2 (4.9%)	1 (2.4%)	27 (65.9%)	*41**	*4.77, ns*
Yes	0	1 (14.3%)	0	6 (85.7%)	*7*	

*One caregiver whose child did not engage in fully intended play is missing data for this question.

There was no significant association between caregiver beliefs about their child's ability to undress the figurine and the child's fully intended play behavior (see Table 77). Although there are differences in the level of child's engagement, these differences were not strong enough to conclude a significant association between caregiver opinion on child behavior and the child engaging in fully intended play.

Table 77.	Association between caregiver opinions about child undressing the figurine and child engaging in fully intended play with the Figurine Toy 1				
Fully intended play	Undress the figurine				
	No	Undress some parts	Undress all parts	*Total participants*	*Chi-square (X^2)*
No	2 (4.9%)	26 (63.4%)	13 (31.7)	*41**	*0.88, ns*
Yes	0	4 (57.1%)	3 (42.9%)	*7*	

*One caregiver whose child did not performed fully intended play is missing data for this question.

Researchers investigated the association between caregiver opinions about their child's ability to put clothes/accessories on the figurines and the child's fully intended play behavior. No significant associations were found between caregiver opinions and their child's fully intended play behavior (see Table 78).

Approximately 42.9% of caregivers whose child engaged in fully intended play believed their child could put all three accessories on the figurine. Of the caregivers whose child did not engage in fully intended play, 11.9% believed their child could put all the accessories on the figurine.

Table 78.	Association between caregiver opinions about the child putting on clothes/accessories and child engaging in fully intended play with the Figurines Toy 1						
Fully intended play	Put on accessories						
	a. No	b. tiara	c. bodice/ dress	b. tiara; d. overskirt	b. tiara; c. bodice/ dress; d. overskirt	*Total participants*	*Chi-square (X^2)*
No	22 (52.4%)	11 (26.2%)	1 (2.4%)	3 (7.1%)	5 (11.9%)	*42*	*4.68, ns*
Yes	2 (28.6%)	2 (28.6%)	0	0	3 (42.9%)	*7*	

There was no significant association between caregiver beliefs about their child's ability to make the figurine stand and the child's fully intended play behavior (see Table 79). Most caregivers believed their child could make the figurine stand. Approximately 76.2% of caregivers whose child did not engage in fully intended play and 71.4% of caregivers whose child did engage in fully intended play believed their child could make the figurine sit and stand.

Table 79. Association between caregiver opinions about the child making the figurine sit/stand and child engaging in fully intended play with the Figurines Toy 1				
Fully intended play	Making figurine sit and stand			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	10 (23.8%)	32 (76.2%)	*42*	*0.07, ns*
Yes	2 (28.6%)	5 (71.4%)	*7*	

There was no significant association between whether caregivers needed to show their child how to play with the figurines and the child's fully intended play behavior (see Table 80). More than half (57.1%) of caregivers whose child did engage in fully intended play and 35.7% of caregivers whose child did not engage in fully intended play would not show their child how to play with the figurines, Conversely, 28.6% of caregivers whose child performed the fully intended play and 45.2% of caregivers whose child did not perform the fully intended play would show their child how to remove remove/attach the accessories. Additionally, 11.9% of caregivers whose child did not perform the fully intended play indicated they would show their child how to move the figurine's head and arms, demonstrate pretend play, and show them how to remove and reattach the accessories. In contrast, none of the caregivers whose child performed the fully intended play would do the same.

Table 80. Association between caregiver demonstrating the toy and child engaging in fully intended play with the Figurines Toy 1								
Fully intended play	Show operation							
	a	b	c	d	b, c, d	b, d	*Total participants*	*Chi-square (X^2)*
No	15 (35.7%)	1 (2.4%)	2 (4.8%)	19 (45.2%)	5 (11.9%)	0	*42*	*7.43, ns*
Yes	4 (57.1%)	0	0	2 (28.6%)	0	1 (14.3%)	*7*	

Note: Response Option a = No; Response Option b = Yes, I would show them how to move the head and arms; Response Option c = Yes, I would demonstrate pretend play with the figures; Response Option d = Yes, I would show them how to remove the accessories and put them back on the figure.

3.4.6 Age Recommendation for Toy 4

Manufacturer's Age Label: 3+ years

Recommended Age Group for the Guidelines: 4+ years

Justification for Recommended Age:

CPSC staff should consider addressing the subject toy within the 4+ years age group, which is one year older than the manufacturer's suggested age label. Only seven children (14.3%) played with this toy as the manufacturer intended, and five out of seven were 4 years old. Most of the caregivers of 4-year-olds (93.3%) thought the toy size was appropriate for their child, compared to 73.3% for caregivers of 3-year-olds, and 47.4% for caregivers of 2-year-olds. Safety concerns showed comparable results. Most of the caregivers of 4-year-olds (86.7%) and 73.3% of caregivers of 3-year-olds believed the toy was safe for their child.

3.5 Toy 5: Figurine Toy 2

3.5.1 Description of Toy 5

Toy 5, Figurine Toy 2, is a set of 10 vinyl figurines modeled after popular children's television characters. Facial features are simplistic, with painted-on eyes, nose, and mouth. Some of the figurines have poseable arms and moving heads. The manufacturer's stated age is 3+ years (see Table 81).

Table 81.	Product description, manufacturer's stated age, dimensions, and play behaviors for the Figurine Toy 2		
Name	**Product description**	**Manufacturer's stated age**	**Dimensions**
Figurine Toy 2	Vinyl figures modeled after popular children's television characters. Facial features are simplistic, with painted-on eyes, nose, and mouth. Some of the figurines have poseable arms and moving heads.	3+ years	Height: Approximately 2.5 inches; Weight: 8 ounces Dimensions may vary by doll.
	Behaviors Demonstrating Manufacturer's Intended Use		
	a. Turns the figurine's head AND b. Moves the figurine's arms AND c. Engages in pretend play with one or multiple figurines (e.g., creating interactions between figurines, creating dialogue between figurines, speaking for the figurines)		

3.5.2 Child Behavior when Interacting with Toy 5

The researcher introduced the child to the figurines, demonstrating how to move their arms, legs, and head. The child was then invited to play with the toy for 4 minutes. Play behaviors were only coded during the free play period.

Forty-six out of 49 children (93.9%) played with the toy for a full 4 minutes. Of the remaining three children, two 2-year-olds engaged with the toy for 3 minutes, and one 3-year-old played with the toy for about 3 minutes and 40 seconds.

Forty-seven children (95.9%) played with at least one of the figurines. There were no significant associations between child's play behaviors and age group (see Table 82). Typical play behaviors such as turning the figurine's head (73.5%), moving the figurine's arm (73.5%), making the figurine stand (71.4%), and engaging in pretend play with one or multiple figurines (73.5%) were observed at high percentages across all age groups. Fewer children named the characters (32.7%), showed frustration (2%), or expressed interest in the figurines verbally (38.8%). No child mouthed the figurines.

Table 82.	Percentage of children exhibiting individual behaviors with Figurine Toy 2 by age group				
Child behavior	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
	2	**3**	**4**		
	Frequencies (percentage) of "Yes" responses				
Turns the figurine's head	14 (73.7%)	13 (86.7%)	9 (60%)	*36 (73.5%)*	*2.82, ns*
Moves the figurine's arms	12 (63.2%)	12 (80%)	12 (80%)	*36 (73.5%)*	*1.66, ns*
Makes the figurine stand	14 (73.7%)	11 (73.3%)	10 (66.7%)	*35 (71.4%)*	*0.24, ns*
Makes the figurine walk/run/jump and do other movement	9 (47.4%)	10 (66.7%)	7 (46.7%)	*26 (53.1%)*	*1.63, ns*
Puts the figurine in mouth	0	0	0	*0*	
Name characters	6 (31.6%)	4 (26.7%)	6 (40%)	*16 (32.7%)*	*0.62, ns*
Engages in pretend play with one or multiple figurines	13 (68.4%)	12 (80%)	11 (73.3%)	*36 (73.5%)*	*0.59, ns*
Shows frustration with the toy	1 (5.3%)	0	0	*1 (2%)*	*1.93, ns*
Expresses interest in the figurine verbally	7 (36.8%)	7 (46.7%)	5 (33.3%)	*19 (38.8%)*	*0.61, ns*
Plays with 1 figurine, 2 figurines, 3-5 figurines, or 5+ figurines	18 (94.7%)	15 (100%)	14 (93.3%)	*47 (95.9%)*	*1.53, ns*

3.5.3 Fully Intended Play for Toy 5

Fully intended play for the Figurine Toy 2 was defined as:

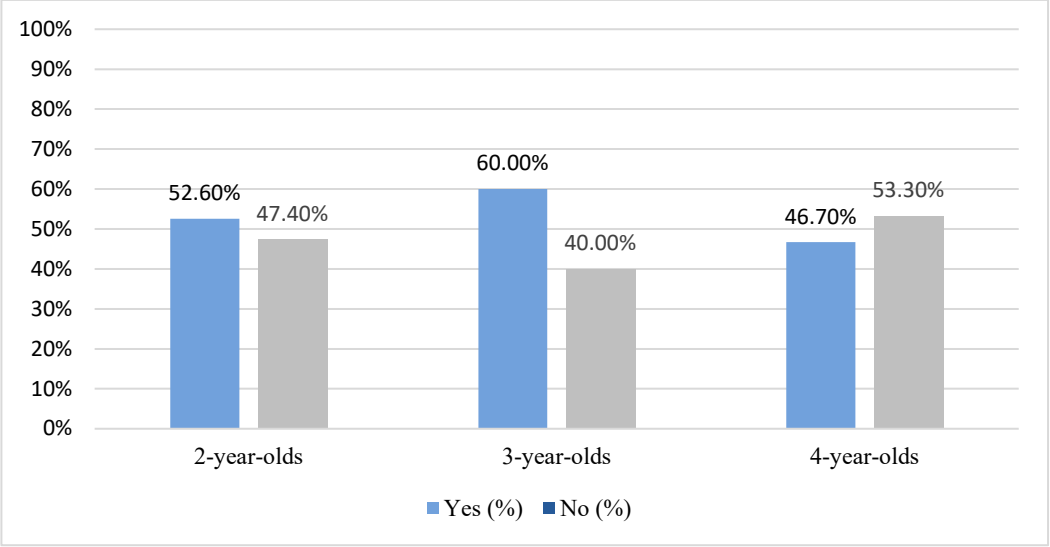
- Turning the figurine's head,
- Moving the figurine's arms, AND
- Engaging in pretend play with one or multiple figurines.

Twenty-six children (53.1%) played with Figurine Toy 2 as the manufacturer intended, moving the figurines' head and arms, and engaging in pretend play with one or more figurines (see Table 83 and Figure 6). Approximately 52.6% of 2-year-olds, 60% of 3-year-olds, and 46.7% of 4-year-olds fully engaged with the figurines; however, there was no significant association between child age and demonstrating fully intended play behaviors.

Table 83. Age distribution of fully intended play with Figurine Toy 2

Fully intended play	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
No	9 (47.4%)	6 (40%)	8 (53.3%)	*23 (46.9%)*	*0.54, ns*
Yes	10 (52.6%)	9 (60%)	7 (46.7%)	*26 (53.1%)*	

Figure 6. Age distribution of fully intended play with Figurine Toy 2



3.5.4 Caregiver Ratings for Toy 5

Overall, there were no significant associations between caregiver ratings on toy size, safety concerns, appearance, child frustration, purchasing decisions, and child age. All caregivers (100%) believed the figurines were the appropriate size and safe for their child to play with, and that their child could move the figurines' arms and heads (see Table 84). All caregivers of 2- and 3-year-olds (100%) thought this toy had an appealing appearance for their child, while slightly fewer caregivers of 4-year-olds felt the same (86.7%). Very few caregivers, 20–33.3%, thought their child would be frustrated by the toy.

There was a significant association between child age group and whether caregivers thought their child would make up stories and scenarios involving these figurines. Specifically, 86.7% of caregivers of 4-year-olds and 93.3% of caregivers of 3-year-olds believed their child would engage in imaginative play,

compared to 57.9% of caregivers of 2-year-olds (χ^2 (2) = 7.20, p<.05). Additionally, 63.2-73.3% of caregivers indicated they would purchase this toy for their child (see Table 85).

Table 84. Caregiver opinion of physical and functional characteristics of the Figurine Toy 2 and their child's reaction to the toy

Questions	Child age (yrs)			Total	Chi-square (X^2)
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Do you think this toy is safe for your child to play with?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	19 (100%)	15 (100%)	13 (86.7%)	*47 (95.9%)*	*4.93, ns*
Do you think your child will be frustrated by the toy in any way?	5 (26.3%)	5 (33.3%)	3 (20%)	*13 (26.5%)*	*0.69, ns*
Do you think your child will be able to move the arms and heads of these figurines?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Do you think your child will make up stories and scenarios involving these figurines?	11 (57.9%)	14 (93.3%)	13 (86.7%)	*38 (77.6%)*	*7.20, p<.05*

Table 85. Percentage of caregivers who would consider purchasing the Figurines Toy 2

Questions	Child age (yrs)			Total	Chi-square (X^2)
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child at his/her current age?	12 (63.2%)	11 (73.3%)	10 (66.7%)	*33 (67.3%)*	*0.40, ns*

Caregiver ratings on how interested the child would be in the figurines and the toy's level of difficulty were not significantly associated with the child's age group (see Tables 86 and 87). A little less than half (42.9%) of the caregivers thought their child would play with the toy for a short time or intermittently. Additionally, 40.8% of caregivers believed their child would play with it "quite a bit and come back to it." Fewer caregivers (14.3%) thought this toy would be their child's favorite. Most of the caregivers thought the toy would either be too easy for their child (55.1%), and conversely, only 2% thought the toy would be too difficult (see Table 87).

Table 86. Caregiver opinions of their child's interest in the Figurines Toy 2					
Question	Child age (yrs)			Total	Chi-square (X^2)
Rate your child's interest in the toy, on a scale of 1–5, with 1 = will not play with this toy and 5 = this toy would be a favorite?	2	3	4		
Will not play with this toy	1 (5.3%)	0	0	*1 (2%)*	*3.95, ns*
Will play with it for a short time; then, likely will forget about it or disregard it; OR Will play with it here and there, but the toy would not be a favorite	8 (42.1%)	6 (40%)	7 (46.7%)	*21 (42.9%)*	
Will play with it quite a bit; and would come back to	6 (31.6%)	7 (46.7%)	7 (46.7%)	*20 (40.8%)*	
This toy would be a favorite	4 (21.1%)	2 (13.3%)	1 (6.7%)	*7 (14.3%)*	

Table 87. Caregiver ratings on the difficulty level of the Figurine Toy 2					
Question	Child age (yrs)			Total	Chi-square (X^2)
On a scale of 1–5 with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child?	2	3	4		
Too difficult	0	1 (6.7%)	0	*1 (2%)*	*3.77, ns*
Somewhat difficult	0	0	0	*0*	
Manageable	2 (10.5%)	2 (13.3%)	3 (20%)	*7 (14.3%)*	
Somewhat easy	6 (31.6%)	5 (33.3%)	3 (20%)	*14 (28.6%)*	
Too easy	11 (57.9%)	7 (46.7%)	9 (60%)	*27 (55.1%)*	

For the questions asking caregivers whether they would need to show their child how to play with the figurine playset, there were no significant differences between the age groups. Table 88 shows 93.3% of caregivers of 3-year-olds and 4-year-olds, and 73.7% of caregivers of 2-year-olds stated that their child would not need any help with the toy set. However, 10.5% of caregivers of 2-year-olds and 6.7% of caregivers of 3-year-olds thought they would need to show their child how to move the figurines' arms and heads. An additional 15.8% of caregivers of 2-year-olds and 6.7% of caregivers of 4-year-olds thought they would need to show their child how to engage in pretend play with the figurines.

Table 88. Caregiver approaches for demonstrating Figurine Toy 2					
Question	Child age (yrs)			Total	Chi-square (X^2)
Would you need to show your child how to play with the figurine playset? (Select all that apply)	2	3	4		
No, my child would not need any help	14 (73.7%)	14 (93.3%)	14 (93.3%)	*42 (85.7%)*	*6.42, ns*
Yes, I would need to show them how to move the head and arms	2 (10.5%)	1 (6.7%)	0	*3 (6.1%)*	
Yes, I would need to show them how to pretend play with the figures	3 (15.8%)	0	1 (6.7%)	*4 (8.2%)*	

The manufacturer recommends this toy for children aged 3+ years. Although there was no significant association between age group and caregiver thoughts on the appropriate age for this toy (χ^2 (2) = 5.78, *ns*),

73.5% of caregivers believed this toy would be suitable for children under 3 years old (see Table 89). Only 13 caregivers (26.5%) thought this toy would be appropriate for children older than 3 years.

Table 89. Caregiver opinions of the appropriate child age for the Figurine Toy 2

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Overall, for what age do you think this toy is best suited?	2	3	4		
Under 3	17 (89.5%)	11 (73.3%)	8 (53.3%)	*36 (73.5%)*	*5.78, ns*
3+	2 (10.5%)	4 (26.7%)	7 (46.7%)	*13 (26.5%)*	

3.5.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 5

Researchers investigated the association between child fully intended play behaviors and various caregiver perceptions. These included the caregiver views on their child's interest level in the toy, the perceived difficulty their child might have with the toy, their purchasing decisions, their thoughts on whether their child could move the figurine's arms and head, and whether their child would create stories or scenarios while playing with the toy.

Table 90 shows there was no association between caregiver intentions to purchase the Figurine Toy 2 and their child's fully intended play behavior. Among caregivers whose child played with the toy as the manufacturer fully intended, 69.6% expressed a willingness to purchase this toy. A similar proportion (65.4%) of caregivers whose child did not play as the manufacturer fully intended also indicated they would purchase the toy for their child.

Table 90. Association between caregiver intentions to purchase the Figurine Toy 2 and children engaging in fully intended play with the toy

Fully intended play	Caregiver purchasing decision			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	7 (30.4%)	16 (69.6%)	*23*	*0.10, ns*
Yes	9 (34.6%)	17 (65.4%)	*26*	

All caregivers of children who fully engaged with the toy believed their child could move the figurines' arms and head. As shown in Table 91, the child's behaviors matched the caregiver expectations fully. In contrast, of the caregivers whose child did not play with the toy as the manufacturer intended, 100% thought their child could also move the arms and head (behaviors demonstrating fully intended play).

Table 91. Association between caregiver opinions about child moving figurine's arms/head and child engaging in fully intended play with Figurine Toy

Fully intended play	Able to move arms and heads			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	0	23 (100%)	*23*	
Yes	0	26 (100%)	*26*	

There was no significant difference between caregiver beliefs and whether their child would make up stories or scenarios with the figurines and their child playing with the toy as fully intended by the manufacturer. Among the caregivers whose child exhibited fully intended play, 76.9% believed their child would create stories with the figurines. Interestingly, 78.3% of caregivers whose child did not fully engage with the toy also believed their child would engage in pretend play (see Table 92).

Table 92.	Association between caregiver opinions about child making up stories with Figurines Toy 2 and child engaging in fully intended play engaging with the toy			
Fully intended play	Make up stories/scenarios			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	5 (21.7%)	18 (78.3%)	*23*	*0.01, ns*
Yes	6 (23.1%)	20 (76.9%)	*26*	

More than 85% of the caregivers expressed that their child would not need any help with the toy. This included twenty-two caregivers (85.7%) whose child fully engaged with the toy (see Table 93).

Table 93.	Association between caregiver opinions about needing to demonstrate how to play to child and child engaging in fully intended play with the Figurine Toy 2					
Fully intended play	Show operation with the figurine playset					
	a. No, my child would not need any help	a and c	b. Yes, I would need to show them how to move the head and arms	c. Yes, I would need to show them how to pretend play with figurines	*Total participants*	*Chi-square (X^2)*
No	20 (87%)	1 (4.3%)	1 (4.3%)	1 (4.3%)	*23*	*1.98, ns*
Yes	22 (85.7%)	0	2 (7.7%)	2 (7.7%)	*26*	

3.5.6 Age Recommendation for Toy 5

Manufacturer's Age Label: 3+ years

Recommended Age Group for the Guidelines: 2+ years

Justification for Recommended Age:

CPSC staff should consider addressing the subject toy within the 2-years-old age group, which is younger than the manufacturer's stated age label. Most children within each age group played with the toy as it was fully intended. Approximately 52.6% of 2-year-olds, 60% of 3-year-olds, and 46.7% of 4-year-olds fully engaged with the figurines; however, there was no significant association between child age and fully intended play behaviors. Compared to caregivers of 2-year-olds (57.9%), a greater percentage of caregivers of 4-year-olds (86.7%) and 3-year-olds (93.3%) believed their child would engage in imaginative play. Additionally, 63.2-73.3% of caregivers indicated they would purchase this toy for their child, and most caregivers (73.5%) thought this toy would be appropriate children under 3 years old.

3.6 Toy 6: Manipulatives

3.6.1 Description of Toy 6

Toy 6, Manipulative-Bubbles, is a no-spill plastic bubble tumbler with a bubble wand and two ounces of nontoxic bubble solution. The manufacturer's intended age is 18+ months (see Table 94).

Table 94. Product description, manufacturer's stated age, dimensions, and play behaviors for the Manipulatives Toy

Name	Product description	Manufacturer's stated age	Dimensions
Manipulative	No spill plastic bubble tumbler with a bubble wand and 2 ounces of nontoxic bubble solution.	18+ months	Length: 4.8 inches; Width: 3.5
	Behaviors Demonstrating Manufacturer's Intended Use		
	a. Holds the bubble tumbler in one hand b. Pulls the wand out of the tumbler c. Blows into the wand to make bubbles d. Dips the wand into the tumbler and tries to blow bubbles		

3.6.2 Child Behavior when Interacting with Toy 6

The researcher introduced the bubbles to the child and demonstrated how to dip the wand in the tumbler and blow bubbles. They then let the child try, allowing the child to try to blow bubbles once or twice before asking for the tumbler back. Next, the researcher demonstrated how to make bubbles by dipping the wand in the bubble tumbler and waving the wand. Then they handed the wand and tumbler to the child, and asked them to try, allowing one or two attempts before letting the child play on their own for 3 minutes. Play behaviors were only coded during the free play period.

Forty children played with the bubble tumbler for the full 3 minutes, including 100% of the 4-year-olds, 66.7% of the 3-year-olds, and 78.9% of the 2-year-olds. Twenty percent of 3-year-olds and 5.3% of the 2-year-olds played with the toy for about 2 minutes.

Table 95 shows the frequencies and percentages of children exhibiting individual behaviors when playing with the bubbles within and across age groups (total column). There were no significant differences between the three age groups in behaviors such as holding the bubble tumbler in one hand, pulling the wand out of the tumbler, mouthing or sucking the wand, inadvertently putting the wand in their mouth when attempting to blow bubbles, showing frustration, or appearing to be afraid of the bubbles.

Overall, 93.9% of children held the bubble tumbler in one hand, and 100% pulled the wand out of the tumbler. Fewer children mouthed/sucked the wand (2%), and inadvertently put the wand in their mouth when trying to blow bubbles (21.1% of the 2-year-olds and 6.7% of the 3-year-olds). When playing with the toy, 12.2% of the children showed frustration, mostly 2-year-olds. No child appeared to be afraid of the bubbles.

Approximately 89.8% of the children tried to blow into the wand to make bubbles, including 100% of the 4-year-olds, 93.3% of the 3-year-olds, and 78.9% of the 2-year-olds. There were no significant differences in this behavior across the three age groups. However, there was a significant difference in success rates ($\chi^2(2) = 18.86$, $p < .05$). The success rate increased with age: 42.1% of 2-year-olds successfully created bubbles, while 73.3% of 3-year-olds and 93.3% of 4-year-olds were successful at creating bubbles.

There was a significant difference among the age groups ($\chi^2(2) = 7.29$, $p < .05$) with respect to trying to create bubbles by waving the wand. More specifically, 86.7% of 3-year-olds and 80% of 4-year-olds attempted this method, with only 47.4% of 2-year-olds trying. There was also a significant difference in

success rates ($\chi^2(2) = 10.98$, $p < .05$). Again, the success rate increased with age: 5.3% of 2-year-olds, 20% of 3-year-olds, and 53.3% of 4-year-olds successfully created bubbles by waving the wand.

All 3- and 4-year-olds (100%) tried to dip the wand in the tumbler and blow bubbles, compared to 78.9% of 2-year-olds ($\chi^2(2) = 8.15$, $p < .05$). There was also a significant difference in the success rates for creating bubbles by waving the wand ($\chi^2(2) = 16.49$, $p < .05$). All 4-year-olds (100%) successfully dipped the wand and blew bubbles, compared to 86.7% of 3-year-olds and 47.4% of 2-year-olds.

Table 95. Percentage of children exhibiting individual behaviors with the Manipulative Toy by age group

Child's behavior	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Holds the bubble tumbler in one hand	18 (94.7%)	13 (86.7%)	15 (100%)	*46 (93.9%)*	*2.96, ns*
Pulls the wand out of the tumbler	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Tries to blow into the wand to make bubbles	15 (78.9%)	14 (93.3%)	15 (100%)	*44 (89.8%)*	*5.39, ns*
Was the child **successful** in making bubbles?	8 (42.1%)	11 (73.3%)	14 (93.3%)	*33 (67.3%)*	*18.86, p<.05*
Tries to create bubbles by waving the wand	9 (47.4%)	13 (86.7%)	12 (80%)	*34 (69.4%)*	*7.29, p<.05*
Was the child **successful** in making bubbles by waving the wand?	1 (5.3%)	3 (20%)	8 (53.3%)	*12 (24.5%)*	*10.98, p<.05*
Dips the wand into the tumbler and **tries** to blow bubbles	15 (78.9%)	15 (100%)	15 (100%)	*45 (91.8%)*	*8.15, p<.05*
Was the child **successful** at dipping the wand into the tumbler when trying to make bubbles?	9 (47.4%)	13 (86.7%)	15 (100%)	*37 (75.5%)*	*16.49, p<.05*
Does the child do this more than 1 time?	8 (42.19%)	12 (80%)	15 (100%)	*35 (71.4%)*	*17.75, p<.05*
Mouths/sucks wand	0	1 (6.7%)	0	*1(2%)*	*2.41, ns*
Inadvertently puts wand in mouth when attempting to blow bubbles	4 (21.1%)	1 (6.7%)	0	*5 (10.2%)*	*5.39, ns*
Shows frustration with the toy	3 (15.8%)	2 (13.3%)	1 (6.7%)	*6 (12.2%)*	*0.73, ns*
Appears to be afraid of the bubbles (i.e., fearful facial expression)	0	0	0	0	

3.6.3 Fully Intended Play for Toy 6

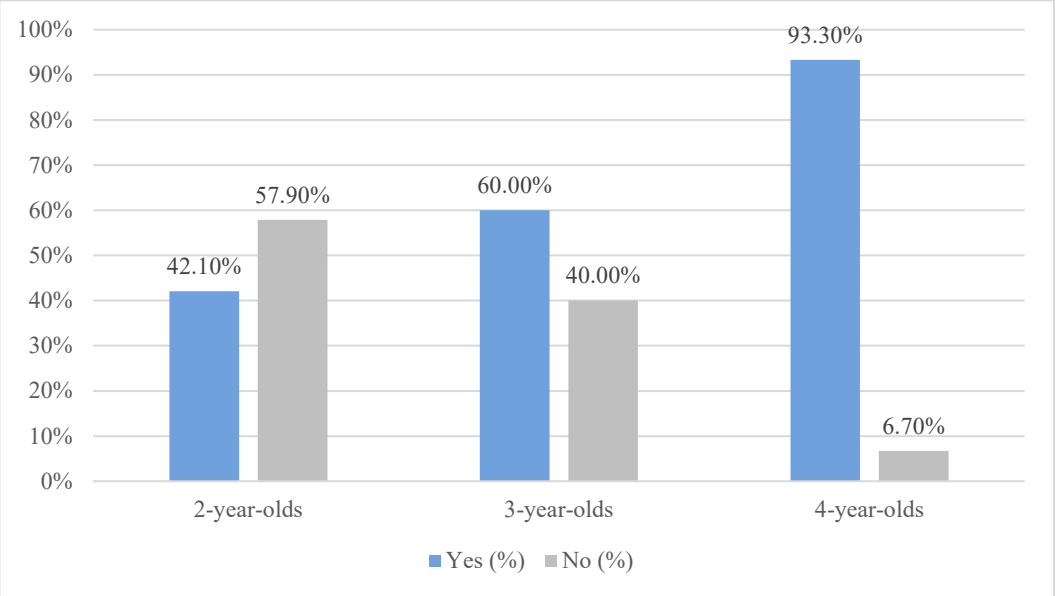
For the bubble toy, fully intended play was defined by whether the child exhibited all the following behaviors:

- Held the bubble tumbler in one hand,
- Pulled the wand out of the tumbler and tried to blow into the wand to make bubbles (successfully)
- Dipped the wand into the tumbler and tried to blow bubbles (successfully)

Table 96 and Figure 7 show a significant difference between fully intended play behavior and child age. Overall, 63.3% of children fully engaged with the toy. The percentage of children fully engaging with the toy as the manufacturer intended significantly increased with age: 42.1% of the 2-year-olds, 60% of the 3-year-olds, and 93.3% of the 4-year-olds (χ^2 (2) = 11.04, $p < .05$). Older children were more likely to exhibit fully intended play behaviors compared to younger children.

Table 96. Age distribution of fully intended play for the Manipulative Toy					
Fully intended play	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
No	11 (57.9%)	6 (40%)	1 (6.7%)	*18 (36.7%)*	*11.04, p <.05*
Yes	8 (42.1%)	9 (60%)	14 (93.3%)	*31 (63.3%)*	

Figure 7. Age distribution of fully intended play for the Manipulative Toy by age group



3.6.4 Caregiver Ratings for Toy 6

Like other toys in the study, caregivers were asked to provide thoughts and opinions on the bubble tumbler regarding size, safety, appearance, frustration potential, purchasing decisions, and whether their child could dip the wand into the bubble solution and successfully blow bubbles on their own. Caregiver ratings of the physical and functional characteristics of the toy were not significantly different across age groups (see Table 97). Specifically, 89.8% of caregivers thought the toy was appropriately sized for their child, and 95.8% believed it was safe, including all caregivers of 3- and 4-year-olds and 88.9% of caregivers of 2-year-olds. Additionally, 93.9% of caregivers felt the toy had an overall appearance that would appeal to their child. This included all caregivers of 2-year-olds, 93.3% of caregivers of 3-year-olds, and 86.7% of caregivers of 4-year-olds.

Approximately 26.5% of caregivers thought their child would be frustrated by the toy, including 26.3% of caregivers of 2-year-olds, 33.3% of caregivers of 3-year-olds, and 20% of caregivers of 4-year-olds. Additionally, 79.6% of caregivers expressed that they would purchase this toy for their child, 84.2% of caregivers of 2-year-olds, 66.7% of caregivers of 3-year-olds, and 86.7% of caregivers of 4-year-olds.

Regarding their child's play behavior, 95.8% of caregivers believed their child could dip the wand in the bubble tumbler, but only 75.5% thought their child would successfully blow bubbles on their own. Over 75% of the caregivers (79.6%) would purchase the toy for their child (see Table 98).

Table 97. Caregiver opinions of physical and functional characteristics of the Manipulative Toy and their child's reaction to the toy					
Questions	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
	2	**3**	**4**		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child to use?	17 (89.5%)	12 (80%)	15 (100%)	*44 (89.8%)*	*4.50, ns*
Do you think this toy is safe for your child to play with?*	16 (88.9%)	15 (100%)	15 (100%)	*46 (95.8%)*	*4.07, ns*
Does this toy have an overall appearance (color, details, and design) that would appeal to your child?	19 (100%)	14 (93.3%)	13 (86.7%)	*46 (93.9%)*	*3.44, ns*
Do you think your child will be frustrated by the toy in any way?	5 (26.3%)	5 (33.3%)	3 (20%)	*13 (26.5%)*	*0.67, ns*
Do you think your child will be able to dip the wand into the bubble solution? **	18 (94.7%)	13 (92.9%)	15 (100%)	*46 (95.8%)*	*1.59, ns*
Do you think your child will be able to successfully blow bubbles using this toy on his or her own?	14 (73.7%)	10 (66.7%)	13 (86.7%)	*37 (75.5%)*	*1.78, ns*

*Missing data for one caregiver of a 2-year-old.

**Missing data for one caregiver of a 3-year-old.

Table 98. Percentage of caregivers who would consider purchasing the Manipulative Toy					
Question	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
	2	**3**	**4**		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child?	16 (84.2%)	10 (66.7%)	13 (86.7%)	*39 (79.6%)*	*2.14, ns*

There were no significant differences in caregiver ratings of their child's interest in the toy or its level of difficulty (see Table 99). All caregivers believed their child would play with the toy. More specifically, 40.8% of caregivers thought their child would play with the toy quite a bit and return to it often, and 38.8% of caregivers thought their child would play with it for a short time or intermittently, but it wouldn't be their favorite. Lastly, 20.4% of caregivers believed this toy would become their child's favorite, with more caregivers of 2-year-olds sharing this opinion (31.6%).

Table 99. Caregiver opinions of their child's interest in the Manipulative Toy					
Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = will not play with this toy and 5 = this toy would be a favorite.	2	3	4		
Will not play with this toy	0	0	0	*0*	
Will play with it for a short time; then, likely will forget about it or disregard it OR Will play with it here and there, but the toy would not be a favorite	6 (31.6%)	7 (46.7%)	6 (40%)	*19 (38.8%)*	*3.58, ns*
Will play with it quite a bit; and would come back to	7 (36.8%)	7 (46.7%)	6 (40%)	*20 (40.8%)*	
This toy would be a favorite	6 (31.6%)	1 (6.7%)	3 (20%)	*10 (20.4%)*	

There were no significant differences with respect to caregiver ratings on the level of difficulty of the toy. No caregiver thought this toy was too difficult for their child (see Table 100). Overall, 44.9% of caregivers considered the toy manageable, including 63.2% of caregivers of 2-year-olds, 40% of caregivers of 4-year-olds, and 26.7% of caregivers of 3-year-olds. Among those who thought the toy was too easy, 33.3% were caregivers of 4-year-olds, 20% were caregivers of 3-year-olds, and 10.5% were caregivers of 2-year-olds.

Table 100. Caregiver ratings on the difficulty level of the Manipulative Toy					
Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
On a scale of 1–5 with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child?	2	3	4		
Too difficult	0	0	0	*0*	
Somewhat difficult	1 (5.3%)	3 (20%)	1 (10.2%)	*5 (10.2%)*	*7.29, ns*
Manageable	12 (63.2%)	4 (26.7%)	6 (40%)	*22 (44.9%)*	
Somewhat easy	4 (21.1%)	5 (33.3%)	3 (20%)	*12 (24.5%)*	
Too easy	2 (10.5%)	3 (20%)	5 (33.3%)	*10 (20.4%)*	

Table 101 shows no significant differences in caregiver opinions about the appropriate age for this toy across age groups. The manufacturer's intended age for the toy is 18+ months. Overall, 91.8% of caregivers believe the toy is suitable for children aged 18 months and older, including all caregivers of 4-year-olds, 86.7% of caregivers of 3-year-olds, and 89.5% of caregivers of 2-year-olds. Only 8.2% of caregivers thought the toy was appropriate for children under 18 months old.

Table 101. Caregiver opinions of the appropriate child's age for the Manipulative Toy					
Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Overall, for what age do you think this toy is best suited?	2	3	4		
Under 18 months	2 (10.5%)	2 (13.3%)	0	*4 (8.2%)*	*3.14, ns*
Over 18+ months	17 (89.5%)	13 (86.7%)	15 (100%)	*45 (91.8%)*	

Table 102 shows that 61.2% of caregivers would give the bubble tumbler and wand to their child to use on their own. This included 73.3% of caregivers of 4-year-olds, 60% of caregivers of 3-year-olds, and 52.6% of

caregivers of 2-year-olds. With respect to how the caregiver would demonstrate using the bubble tumbler to create bubbles, approximately 20% of caregivers across child age groups reported that they would only dip the wand and blow bubbles to show their child how it is done versus physically helping the child dip the wand and blow into the wand to make bubbles.

About 10.2% of caregivers (15.8% of caregivers of 2-year-olds and 13.3% of caregivers of 3-year-olds) said they would demonstrate how to create bubbles by dipping the wand in the tumbler and blowing bubbles, dipping the wand in the tumbler and holding the wand for their child to blow into the wand, and dipping the wand into the tumbler, and giving the wand to their child. Additionally, 4.1% of caregivers would dip the wand in a tumbler and hold the wand for their child while they blow bubbles.

Table 102. Caregiver opinions on demonstrating how to use the Manipulative Toy

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Would you need to help your child use the bubble tumbler?	**2**	**3**	**4**		
Yes, I would dip and blow bubbles to show my child how it is done	4 (21.1%)	3 (20%)	3 (20%)	*10 (20.4%)*	*10.03, ns*
Yes, I would dip and blow bubbles to show my child how it is done. Yes, I would dip the wand in the bubbles and hold the wand for my child while they blow bubbles. Yes, I would dip the wand in bubbles and give the wand to my child.	3 (15.8%)	2 (13.3%)	0	*5 (10.2%)*	
Yes, I would dip and blow bubbles to show my child how it is done. Yes, I would dip the wand in bubbles and give the wand to my child.	0	0	1 (6.7%)	*1 (2%)*	
Yes, I would dip the wand in the bubbles and hold the wand for my child while they blow bubbles.	1 (5.3%)	1 (6.7%)	0	*2 (4.1%)*	
Yes, I would dip the wand in the bubbles and hold the wand for my child while they blow bubbles. Yes, I would dip the wand in bubbles and give the wand to my child.	1 (5.3%)	0	0	*1 (2%)*	
No, I would give the bubble tumbler and wand to my child so they can use it on their own.	10 (52.6%)	9 (60%)	11 (73.3%)	*30 (61.2%)*	

3.6.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 6

There was a significant association between caregiver perceptions of whether their child would be frustrated by the bubble tumbler and the child's actual play behavior ($\chi^2(1) = 4.57$, $p < .05$). Among caregivers whose child engaged fully with the toy, 83.9% believed their child would not exhibit frustration. Conversely, 44.4% of caregivers whose child did not fully engage with the toy believed their child would exhibit frustration (see Table 103).

Table 103. Association between caregiver opinion on child frustration with the Manipulative Toy and engaging in fully intended play				
Fully intended play	Caregiver opinion on child's frustration of the toy			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	10 (55.6%)	8 (44.4%)	18	4.57, p <.05
Yes	26 (83.9%)	5 (16.1%)	31	

There was no significant association between caregiver intentions to purchase the bubble tumbler and their child's play behaviors. Most caregivers whose child played with the bubble tumbler as the manufacturer intended (80.6%) expressed a willingness to purchase the toy for their child, compared to 77.8% of caregivers whose child did not fully engage with the toy but also indicated they would purchase it for their child (see Table 104).

Table 104. Association between caregiver purchasing intentions and child engaging in fully intended play with the Manipulative Toy				
Fully intended play	Purchasing			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	4 (22.2%)	14 (77.8%)	*18*	*0.06, ns*
Yes	6 (19.4%)	25 (80.6%)	*31*	

Table 105 shows a significant association ($\chi^2(1) = 6.35$, $p < .05$) between caregiver expectations about their child's ability to dip the wand in the bubble tumbler and the child's fully intended play behavior. All caregivers (100%) whose child played with the toy as intended believed their child could dip the wand in the tumbler. Among caregivers whose child did not play with the tumbler as the manufacturer intended, 11.1% thought their child could not dip the wand in the bubble solution, whereas 83.3% thought they could dip the wand.

Table 105. Association between caregiver opinions about child dipping the wand in the bubble solution and child engaging in fully intended play behavior with Manipulative Toy				
Fully intended play	Dip the wand in the bubble solution			
	No	Yes	*Total participants**	*Chi-square (X^2)*
No	2 (11.1%)	15 (83.3%)	*17*	*6.35, p <.05*
Yes	0	31 (100%)	*31*	

*Data from one caregiver of a 3-year-old is missing.

There was also a significant association between caregiver beliefs about their child's ability to successfully blow bubbles independently and the child's fully intended play behavior ($\chi^2(1) = 5.98$, $p < .05$). Among caregivers whose child fully engaged with the toy, 87.1% believed their child could blow bubbles on their own. In contrast, 55.6% of caregivers whose child did not fully engage with the toy believed their child could blow bubbles without assistance (see Table 106).

Table 106. Association between caregiver opinions about child blowing bubbles and child engaging in fully intended play with the Manipulative Toy				
Fully intended play	Blow bubble on their own			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	8 (44.4%)	10 (55.6%)	*18*	*5.98, p <.05*
Yes	4 (12.9%)	27 (87.1%)	*31*	

There was no significant association between caregiver expectations of their child's need for help with the bubble tumbler and the child's fully intended play behavior (see Table 107). Among caregivers whose child fully engaged with the toy, 74.2% indicated they would give their child the toy and let them play independently (response option d). In contrast, only 38.9% of caregivers whose child did not fully engage with the toy expressed the same sentiment. Of the children who did not play with the toy as fully intended, 38.9% of caregivers indicated that they would dip the wand and blow bubbles themselves before giving the toy to their child. Also, of the children who did not fully play as intended, 16.7% of caregivers indicated they would demonstrate how to use the wand by dipping it and blowing bubbles, dipping the wand and holding it while their child blows bubbles, or dipping the wand and then handing it to their child.

Table 107. Association between caregiver demonstrating the toy and child engaging in fully intended play with the Manipulative Toy*

Fully intended play	Show operation							
	a	a, b, c	a, c	b	b, c	d	*Total participants*	*Chi-square (X^2)*
No	7 (38.9%)	3 (16.7%)	0	1 (5.6%)	0	7 (38.9%)	*18*	*10.12, ns*
Yes	3 (9.7%)	2 (6.5%)	1 (3.2%)	1 (3.2%)	1 (3.2%)	23 (74.2%)	*31*	

Note: Response option a = Yes, I would dip the wand and blow bubbles to show my child how it is done; Response option b = Yes, I would dip the wand in bubbles and hold the wand for my child while they blow bubbles; Response option c = Yes, I would dip the wand in bubbles and give the wand to my child; and Response option d = No, I would give the bubble tumbler and wand to my child so he/she can use it on their own.

Findings show that caregiver perceptions on whether their child would be frustrated by the toy and their child's ability to dip the wand in the bubble solution and blow bubbles on their own align with whether their child fully engaged with the Bubble Tumbler Toy as the manufacturer intended.

3.6.6 Age Recommendation for Toy 6

Manufacturer's Age Label: 18 + months

Recommended Age Group for the Guidelines: 3+ years

Justification for Recommended Age:

CPSC staff should consider addressing the subject toy within the 3+ years age group, which is slightly older than the manufacturer's suggested age label. Approximately 89.8% of the children tried to blow into the wand to make bubbles, including 100% of the 4-year-olds, 93.3% of the 3-year-olds, and 78.9% of the 2-year-olds. There was no significant difference in this behavior across the three age groups. However, there was a significant difference in the success rates ($\chi^2(2) = 18.86$, $p < .05$), with 93.3% of the 4-year-olds, 73.3% of the 3-year-olds, and 42.1% of the 2-year-olds successfully blowing bubbles. There was also a significant difference in the success rates for creating bubbles by waving the wand ($\chi^2(2) = 10.98$, $p < .05$). More than half of the 4-year-olds (53.3%) successfully dipped the wand and blew bubbles, compared to 20% of 3-year-olds and 5.3% of 2-year-olds. Additionally, 79.6% of caregivers indicated that they would purchase this toy for their child, 84.2% of caregivers of 2-year-olds, 66.7% of caregivers of 3-year-olds, and 86.7% of caregivers of 4-year-olds.

3.7 Toy 7: Musical Instruments

3.7.1 Description of Toy 7

Toy 7, a musical instrument set, is a 7-piece musical set featuring a wooden bucket drum with a natural rawhide head, child-sized drumsticks, and a collection of brightly painted wood instruments, including a

tambourine stick, handled castanet, and mini maracas. The manufacturer intended age is 3+ years (see Table 108).

Table 108. Product description, manufacturer's stated age, dimensions, and play behaviors for the Musical Instrument Set

Name	Product description	Manufacturer's stated age	Dimensions
Musical Instruments	7-piece set of wooden and metal instruments, including a wood bucket drum with natural rawhide drumhead, child size wood drumsticks and a collection of brightly painted wood instruments: a tambourine stick, handled castanet, and mini maracas.	3+ years	*There are various musical instruments each with different dimensions.*
	Behaviors demonstrating manufacturer's intended use		
	a. Bangs the drum with hand, OR drumstick, OR other toy to make a sound (does more than one time) OR b. Strikes drumsticks against each other to make a sound (does more than one time) OR c. Shakes the maracas, castanet, or tambourine to make a sound (does more than one time) OR d. Uses multiple instruments at the same time to make a sound (does more than one time)		

3.7.2 Child Behavior when Interacting with Toy 7

The researcher introduced the musical toys to the child, demonstrating how to make sounds with each instrument, gently hitting the drum with both drumsticks, shaking the maracas, castanet (has a handle), and tambourine. The child was then invited to play with the instruments for 4 minutes. Play behaviors were only coded during the free play period.

Forty-two out of 49 children (85.7%) played with this toy for a full 4 minutes, including all 4-year-olds, 80% of the 3-year-olds, and 78.9% of the 2-year-olds. Table 109 shows the frequencies and percentages of children exhibiting individual behaviors when interacting with the musical instruments within each age group and across all age groups (total column). The observed behaviors for this toy included the children striking drumsticks against each other to make sounds and shaking the maracas, castanet, or tambourines to produce sounds. Researchers defined a behavior as intentional if the child demonstrated it more than one time during the trial. Most children (91.8%) banged the drums with hands, drumsticks, or other toys to make sound, with no significant difference across all age groups. Only a few children (16.3%) sat with the drum between their legs. There was a significant difference in striking drumsticks together to produce sound across the three age groups ($\chi^2(2) = 11.61$, $p < .05$). Specifically, 53.3% of the 4-year-olds exhibited this behavior, compared to 40% of the 3-year-olds and 5.3% of the 2-year-olds. Researchers also identified significant differences in children shaking the maracas, castanet, or the tambourine to make a sound across the three age groups. A higher proportion of the 3-year-olds (100%) and 4-year-olds (100%) were observed engaging in this behavior compared to 78.9% of the 2-year-olds.

Although more 4-year-olds (66.7%) used multiple instruments simultaneously to make sound compared to 2-year-olds (42.1%) and 3-year-olds (53.3%), the difference was not significant. Similarly, dancing while making music and humming or singing while using the toy were observed in only a few children (10.2%). One 4-year-old put the instrument in their mouth, and one 2-year-old and one 4-year-old appeared to be afraid of the toy. No child hit themselves with the musical instruments or showed frustration with this toy.

Table 109. Percentage of children exhibiting individual behaviors with Musical Instruments Set by age group					
Child behavior	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Bangs the drum with hand, drumstick, or other toy to make a sound (does more than one time*)	16 (84.2%)	15 (100%)	14 (93.3%)	*45 (91.8%)*	*3.79, ns*
Strikes drumsticks against each other to make a sound (does more than one time*)	1 (5.3%)	6 (40%)	8 (53.3%)	*15 (30.6%)*	*11.61, p<.05*
Sits with drum between legs	4 (21.1%)	1 (6.7%)	3 (20%)	*8 (16.3%)*	*1.70, ns*
Shakes the maracas, castanet, or tambourine to make a sound (does more than one time*)	15 (78.9%)	15 (100%)	15 (100%)	*45 (91.8%)*	*8.15, p<.05*
Uses multiple instruments at the same time to make a sound (does more than one time*)	8 (42.1%)	8 (53.3%)	10 (66.7%)	*26 (53.1%)*	*2.06, ns*
Hits self with instrument(s) to make a sound (does more than one time*)	0	0	0	*0*	
Puts the instrument(s) in mouth	0	0	1 (6.7%)	*1 (2%)*	*2.41, ns*
Dances while making music	2 (10.5%)	1 (6.7%)	3 (20%)	*6 (12.2%)*	*1.29, ns*
Hums/sings while using the toy	2 (10.5%)	2 (13.3%)	1 (6.7%)	*5 (10.2%)*	*0.38, ns*
Shows frustration with the toy	0	0	0	*0*	
Appears to be afraid of the instruments (i.e., fearful facial expression)	1 (5.3%)	0	1 (6.7%)	*2 (4.1%)*	*1.53, ns*

3.7.3 Fully Intended Play for Toy 7

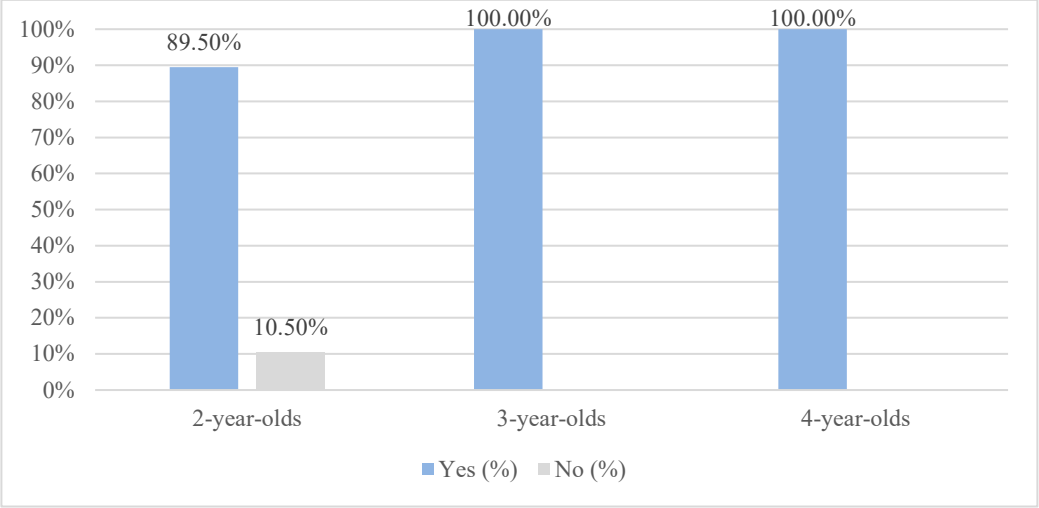
Researchers explored whether children within each group fully engaged with the musical instruments and interacted with them as the manufacturer intended. The fully intended play behavior was defined as the child performing any of the following behaviors with this toy more than once to demonstrate intention:

- Banged the drum with a hand, drumstick, or other toy to make a sound OR
- Struck drumsticks against each other to make a sound OR
- Shook the maracas, castanet, or tambourine to make a sound OR
- Used multiple instruments at the same time to make a sound

Forty-seven children (95.9%) played with the musical instruments as the manufacturer intended, including 89.5% of the 2-year-olds, 100% of the 3-year-olds, and 100% of the 4-year-olds (see Table 110). There was no significant association between a child's age and their play behavior (see Figure 8).

Table 110. Age distribution of fully intended play for the Musical Instruments Set					
Behavior	Child age (yrs)			*Total participants*	*Chi-square (X^2)*
Fully intended play	2	3	4		
No	2 (10.5%)	0	0	*2*	*3.92, ns*
Yes	17 (89.5%)	15 (100%)	15 (100%)	*47*	

Figure 8. Age distribution of full intended play for the Musical Instrument Set



3.7.4 Caregiver Ratings for Toy 7

There was only one significant difference in caregiver responses to questions regarding their perceptions of the physical and functional characteristics of the toy (see Table 111). All the caregivers of 3-year-olds and 4-year-olds believed their child would know how to hit the drum with the drumsticks to produce sound without being shown, compared to 84.2% of caregivers of 2-year-olds. All the caregivers indicated that their child would shake the tambourine and maracas to produce sound, and 87.8% believed their child would shake the castanet to produce sound. While 100% of caregivers of four-year-olds thought their child would know how to shake the castanet, only 86.7% of caregivers of three-year-olds and 78.9% of caregivers of two-year-olds thought so. Given that this result approached significance (p=.05), we interpret this difference to be significant. That is, a significantly greater number of 4-year-olds had caregivers who thought they could shake the castanet as compared to the caregivers of 2- and 3-year-olds.

Caregiver opinions on other physical and functional characteristics of the toy did not significantly differ across the three child age groups. That is, 95.9% of caregivers believed the toy size was appropriate for their child, did not have safety concerns (95.9%), the appearance of the toy would be appealing to their child (95.9%),

Only 6.3% of the caregivers would not allow their child to play with some of the instruments, two caregivers of 2-year-olds and one caregiver of a 3-year-old. One caregiver indicated that their child would be frustrated by the toy and would be scared by any of the sounds.

Table 111. Caregiver opinions on characteristics of the toy and their child's reaction to the Musical Instruments Set					
Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Overall, are the instruments in this set an appropriate size for your child?	18 (94.7%)	15 (100%)	14 (93.3%)	*47 (95.9%)*	*1.53, ns*
Do you think this toy is safe for your child to play with?	18 (94.7%)	15 (100%)	14 (93.3%)	*47 (95.9%)*	*1.53, ns*
Are there any instruments in the set that you would not allow your child to play with?*	2 (10.5%)	1 (6.7%)	0	*3 (6.3%)*	*2.31, ns*
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	19 (100%)	13 (86.7%)	15 (100%)	*47 (95.9%)*	*4.93, ns*
Do you think your child will be frustrated by the toy in any way?	0	1 (6.7%)	0	*1 (2%)*	*2.41, ns*
Do you think your child will be scared by any of the sounds produced by the instruments?	0	1 (6.7%)	0	*1 (2%)*	*2.41, ns*
Do you think your child will shake the tambourine stick to produce a sound without you showing them how to do it?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Do you think your child will shake the mini maracas to produce a sound without you showing them?	19 (100%)	15 (100%)	15 (100%)	*49 (100%)*	
Do you think your child will shake the castanet to produce a sound without you showing them?	15 (78.9%)	13 (86.7%)	15 (100%)	*43 (87.8%)*	*5.10, ns*
Do you think your child will hit the drum with the drumstick(s) to produce a sound without you showing them?	16 (84.2%)	15 (100%)	15 (100%)	*46 (93.9%)*	*5.99, p =.050*

*Missing data for one caregiver of a 4-year-old.

Regarding caregiver purchase decisions, 94.7% of caregivers of 2-year-olds would purchase the musical instruments for their child (see Table 112). Caregivers of 3-year-olds and 4-year-olds were less likely to indicate that they would purchase the toy: 73.3% and 71.4%, respectively. However, the difference among caregiver responses was not significant.

Table 112. Percentage of caregivers who would consider purchasing the Musical Instruments Set					
Questions	Child age (yrs)			*Total*	*Chi-Square (X^2)*
	2	3	4*		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child (at his/her current age)?*	18 (94.7%)	11 (73.3%)	10 (71.4%)	*39 (81.3%)*	*4.34, ns*

*Missing data for one caregiver of a 4-year-old.

No significant differences were found in the caregiver ratings regarding the child's interest in the toy and its difficulty level (see Table 113). All the caregivers believed their child would play with this toy. About 34.7% of caregivers thought their child would play with it for a short time or intermittently—specifically, 53.3% of caregivers of 4-year-olds, 33.3% of caregivers of 3-year-olds, and 21.1% of caregivers of 2-year-olds.

Conversely, 32.7% of caregivers believed their child would play with the toy quite a bit. This highest percentage was caregivers of 3-year-olds (46.7%), and the lowest percentage was caregivers of 4-year-olds (20%). Another 32.7% of caregivers thought this toy would become their child's favorite—more specifically, 47.4% of caregivers of 2-year-olds, 20% of caregivers of 3-year-olds, and 26.7% of caregivers of 4-year-olds.

Table 113. Caregiver opinions of their child's interest in the Musical Instruments Set

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
Rate your child's interest in the toy, on a scale of 1–5, with 1 = will not play with this toy and 5 = this toy would be a favorite? (Select one option)	**2**	**3**	**4**		
Will not play with this toy	0	0	0	*0*	
Will play with it for a short time; then, likely will forget about it or disregard it; OR Will play with it here and there, but the toy would not be a favorite	4 (21.1%)	5 (33.3%)	8 (53.3%)	*17 (34.7%)*	*6.27, ns*
Will play with it quite a bit; and would come back to	6 (31.6%)	7 (46.7%)	3 (20%)	*16 (32.7%)*	
This toy would be a favorite	9 (47.4%)	3 (20%)	4 (26.7%)	*16 (32.7%)*	

Caregivers felt the musical instruments were manageable (30.6%), somewhat easy (38.8%), or too easy for their child (28.6%). More than 50% of caregivers of 2-year-olds thought the toy was manageable (see Table 114). However, 40% of caregivers of 3-year-olds considered it too easy, and 53.3% of caregivers of 4-year-olds found it somewhat easy. Most caregivers (89.8%) thought the number of instruments was appropriate (see Table 115).

Table 114. Caregiver ratings on the difficulty level of the Musical Instruments Set

Question	Child age (yrs)			*Total*	*Chi-square (X^2)*
On a scale of 1–5 with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child? (Select one option)	**2**	**3**	**4**		
Too difficult	0	1 (6.7%)	0	*1 (2%)*	*10.47, ns*
Somewhat difficult	0	0	0	*0*	
Manageable	10 (52.6%)	3 (20%)	2(13.3%)	*15 (30.6%)*	
Somewhat easy	6 (31.6%)	5 (33.3%)	8 (53.3%)	*19 (38.8%)*	
Too easy	3 (15.8%)	6 (40%)	5 (33.3%)	*14 (28.6%)*	

Table 115. Caregiver perceptions of the Musical Instrument Set pieces count					
Question	Child age (yrs)			Total	Chi-square (X^2)
For your child, do you think the number of instruments in the set is?	2	3	4		
Too few	1 (5.3%)	1 (6.7)	*1 (6.7)*	*3 (6.1%)*	*1.56, ns*
Just right	17 (89.5%)	14 (93.3%)	*13 (86.7%)*	*44 (89.8%)*	
Too many	1 (5.3%)	0	*1 (6.7)*	*2 94.1%)*	

Overall, 75.5% of caregivers said they would not show their child how to play any of the instruments before letting them play with them independently (see Table 116). Although there was no significant difference in caregiver response across the three child age groups, the percentage of caregivers who would allow their child to play with the instruments without demonstrating how to use them increased with the child's age (63.2% of caregivers of 2-year-olds, 80% of caregivers of 3-year-olds, and 86.7% of caregivers of 4-year-olds).

One caregiver of a 2-year-old mentioned they would demonstrate how to shake the tambourine stick, maracas, and castanet, and play the drum with a drumstick. Another caregiver of a two-year-old said they would show how to shake the tambourine stick and maracas and play the drum. Additionally, 14.3% of caregivers indicated they would shake the castanet, and 6.1% said they would play the drum with a drumstick before giving it to their child.

Table 116. Caregiver approaches for demonstrating the Musical Instruments Set usage before independent play					
Question	Child age (yrs)			Total	Chi-square (X^2)
Would you need to show your child how to play with any of the instruments before giving it to your child? (Select all that apply)	2	3	4		
No (a)	12 (63.2%)	12 (80%)	13 (86.7%)	*37 (75.5%)*	*7.90, ns*
Yes, I would shake the tambourine stick, maracas, castanet, and play drum with a drumstick (b, c, d, e)	1 (5.3%)	0	0	*1 (2%)*	
Yes, I would shake the tambourine stick, castanet, play drum with a drumstick (b, d, e)	1 (5.3%)	0	0	*1 (2%)*	
Yes, I would shake castanet (d)	3 (15.8%)	3 (20%)	1 (6.7%)	*7 (14.3%)*	
Yes, I would play the drum with a drumstick (e)	2 (10.5%)	0	1 (6.7%)	*3 (6.1%)*	

The manufacturer recommends this toy for children aged 3+ years. Most caregivers (77.6%) believed the musical instruments were suitable for children under 3 years old, while only 22.4% thought they were appropriate for children 3+ years (see Table 117).

Table 117. Caregiver perceptions of the appropriate child's age for the Musical Instruments Set					
Question	Child age (yrs)			Total	Chi-square (X^2)
Overall, for what age do you think this toy is best suited?	2	3	4		
Under 3 years old	16 (84.2%)	12 (80%)	10 (66.7%)	*38 (77.6%)*	*1.51, ns*
3+ years olds	3 (15.8%)	3 (20%)	5 (33.3%)	*11 (22.4%)*	

3.7.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 7

There was no significant association between caregiver intentions to purchase the musical instrument toy and their child's play behavior with respect to fully intended play (see Table 118). Most caregivers (79.6%) indicated that they would purchase this toy for their child. This included 80.4% of caregivers whose child engaged with the toy as the manufacturer intended and all caregivers of a child who did not fully engage with the toy.

Table 118. Association between caregiver intentions to purchase the Musical Instruments Set and children fully engaging with the toy

Fully intended play	Purchasing			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	0	2 (100%)	*2*	*0.94, ns*
Yes	9 (19.6%)	37 (80.4%)	*46**	

*Missing data for one caregiver.

All caregivers believed their child would shake the tambourine and maracas (see Table 119). There was no significant association between caregiver beliefs about whether their child would shake the castanet and the child's play behavior. Interestingly, 12.8% of caregivers whose child fully engaged with the toy believed their child would not be able to shake the castanet. Similarly, there was no association between whether caregivers thought their child could hit the drum to produce sound without being shown how and the child's play behavior.

Table 119. Association between caregiver beliefs on their child playing the Musical Instruments Set and children fully engaging with the toy

Fully intended play	No	Yes	*Total participants*	*Chi-square (X^2)*
Shake Tambourine				
No	0	2 (100%)	*2*	
Yes	0	47 (100%)	*47*	
Shake Maracas				
No	0	2 (100%)	*2*	
Yes	0	47 (100%)	*47*	
Shake Castanet				
No	0	2 (100%)	*2*	*0.53, ns*
Yes	6 (12.8%)	41 (87.2%)	*47*	
Hit Drum				
No	0	2 (100%)	*2*	*0.26, ns*
Yes	3 (6.4%)	44 (93.6%)	*47*	

There was no significant association between whether a caregiver would not allow their child to play with some pieces of the toy and the child's play behavior (see Table 120). About 6.5% of caregivers whose child played with the toy as intended expressed that they would not give their child some pieces of the toy. These caregivers would not allow their child to play with "drumsticks," tambourines, and maracas. All caregivers whose child did not fully play with the toy as the manufacturer intended said they would allow their child to play with all the instruments.

Table 120. Association between caregiver restrictions on Musical Instrument Set play and child's fully intended play behavior				
Fully intended play	Allow child to play with the toy			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	2 (100%)	0	*2*	*0.26, ns*
Yes	43 (93.5%)	3 (6.5%)	*46**	

*Data missing for one caregiver.

Among the caregivers whose child did not fully play with the toy as the manufacturer intended, 50% indicated they would demonstrate one or more of the toy pieces, while the remaining 50% would not. In contrast, 76.6% of caregivers whose child performed the fully intended play reported that they would not demonstrate any of the toy pieces, whereas 23.4% stated they would (see Table 121).

Table 121. Association between caregiver demonstrating the toy and children fully engaging with the Musical Instruments Set				
Fully intended play	Show how to operate			
	No	Yes, demonstrate one or more instrument pieces	*Total participants*	*Chi-square (X^2)*
No	1 (50%)	1 (50%)	*2*	*0.63, ns*
Yes	36 (76.6%)	11 (23.4%)	*47*	

3.7.6 Age Recommendation for Toy 7

Manufacturer's Age Label: 3+ years

Recommended Age Group for the Guidelines: 2+ years

Justification for Recommended Age:

CPSC staff should consider addressing the subject toy as within the 2 + years age group, which is one year younger than the manufacturer's stated age label. Forty-seven children (95.9%) played with the musical instruments as the manufacturer intended, including 89.5% of the 2-year-olds, 100% of the 3-year-olds, and 100% of the 4-year-olds. Additionally, 94.7% of caregivers of 2-year-olds would purchase the musical instruments for their child. Caregivers of 3-year-olds and 4-year-olds were less likely to indicate that they would purchase the toy: 73.3% and 71.4%, respectively.

3.8 Toy 8: Smart Toy 1 Robotic Animal

3.8.1 Description of Toy 8

Toy 8, a smart Toy 1 Robotic Animal, is a hard plastic toy with a plush covering that comes in the shape of different animals. The study used the dinosaur poseable, motion-activated, and interactive dinosaur. When the child interacts with the toy, it can respond with sound-and-motion combinations. The manufacturer's stated age is 4+ years (see Table 122).

Table 122. Product description, manufacturer's stated age, dimensions, and play behaviors for the Smart Toy 1

Name	Product description	Manufacturer's stated age	Dimensions
Smart Toy 1 Robotic Animal	A hard plastic toy with a plush covering that comes in the shape of dinosaur. The toy is poseable, motion activated, and interactive. When the child interacts with the toy, it can respond with sound-and-motion combinations.	4+ years	Length: 12 inches; Width: 6 inches; Height: 14 inches; Weight: 2.2 lbs.
	Behaviors demonstrating manufacturer's intended use		
	a. Pats the top of the animal to make it sit (does more than one time) b. Puts play food in the animal's mouth (does more than one time) c. Waves hand in front of animal's face to make it jump (does more than one time)		

3.8.2 Child Behavior When Interacting with Toy 8

The researcher introduced the toy to the child by showing them how to feed the dinosaur by putting a cookie to the dinosaur's mouth and let the child play for about 20 seconds. Next, the researcher waved their hand in front of the dinosaur's face to make it move and let the child try for about 20 seconds. The researcher then showed how to pat the dinosaur on the top of its head to make it sit and let the child try for 20 seconds. The child was then invited to play with the toy for 5 minutes. Play behaviors were only coded during the free play period.

Forty of the 49 children played with the toy for the full 5 minutes, including 100% of the 4-year-olds, 80% of the 3-year-olds, and 68.4% of the 2-year-olds. There was no significant association between the child age and duration of play. Table 123 shows the frequencies and percentages of children exhibiting individual behaviors when interacting with the robotic animal within and across the different age groups (total column). There was no significant association between child age and observed behaviors, such as sliding the on/off switch more than once, petting/stroking/hugging the dinosaur, patting the top of the dinosaur to make it sit (repeatedly), putting play food in the dinosaur's mouth (repeatedly), putting toy pieces in their mouth, showing frustration with the toy, or appearing to be afraid of the toy.

Although there were no significant differences, a few interesting trends emerged. For example, more than 66.7% of the 3-year-olds and 60% of the 4-year-olds patted the top of the dinosaur repeatedly to make it sit, compared to 36.8% of the 2-year-olds. Similarly, 60% of the 4-year-olds waved their hand repeatedly in front of the dinosaur's face to make it jump, but 3-year-olds (33.3%) and 2-year-olds (21.1%) demonstrated this behavior less frequently. Most of the 3-year-olds (93.3%) and 4-year-olds (93.3%) put the plastic food in the dinosaur's mouth, compared to 78.9% of the 2-year-olds. Additionally, 26.3% of the 2- and 26.7% of the 3-year-olds put their fingers in the dinosaur's mouth, compared to 6.7% of the 4-year-olds.

Table 123. Percentage of children exhibiting individual behaviors with Smart Toy 1 Robotic Animal					
Child behavior	Child's age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Slides on/off switch more than once	8 (42.1%)	8 (53.3%)	5 (33.3%)	21 (42.9%)	1.24, ns
Pets/strokes/hugs the dinosaur	9 (47.4%)	5 (33.3%)	8 (53.3%)	22 (44.9%)	1.31, ns
Pats the top of the dinosaur to make it sit (does more than one time)	7 (36.8%)	10 (66.7%)	9 (60%)	26 (53.1%)	3.45, ns
Puts play food in the dinosaur's mouth (does more than one time)	15 (78.9%)	14 (93.3%)	14 (93.3%)	43 (87.8%)	2.18, ns
Puts their finger in the dinosaur's mouth	5 (26.3%)	4 (26.7%)	1 (6.7%)	10 (20.4%)	2.94, ns
Waves hand in front of dinosaur's face to make it jump (does more than one time)	4 (21.1%)	5 (33.3%)	9 (60%)	18 (36.7%)	5.59, ns
Puts toy pieces in their mouth	3 (15.8%)	1 (6.7%)	2 (13.3%)	6 (12.2%)	0.73, ns
Shows frustration with the toy	0	2 (13.3%)	1 (6.7%)	3 (6.1%)	3.44, ns
Appears to be afraid of the toy (i.e., fearful facial expression)	4 (21.1%)	2 (13.3%)	3 (20%)	9 (18.4%)	0.39, ns

3.8.3 Fully Intended Play for Toy 8

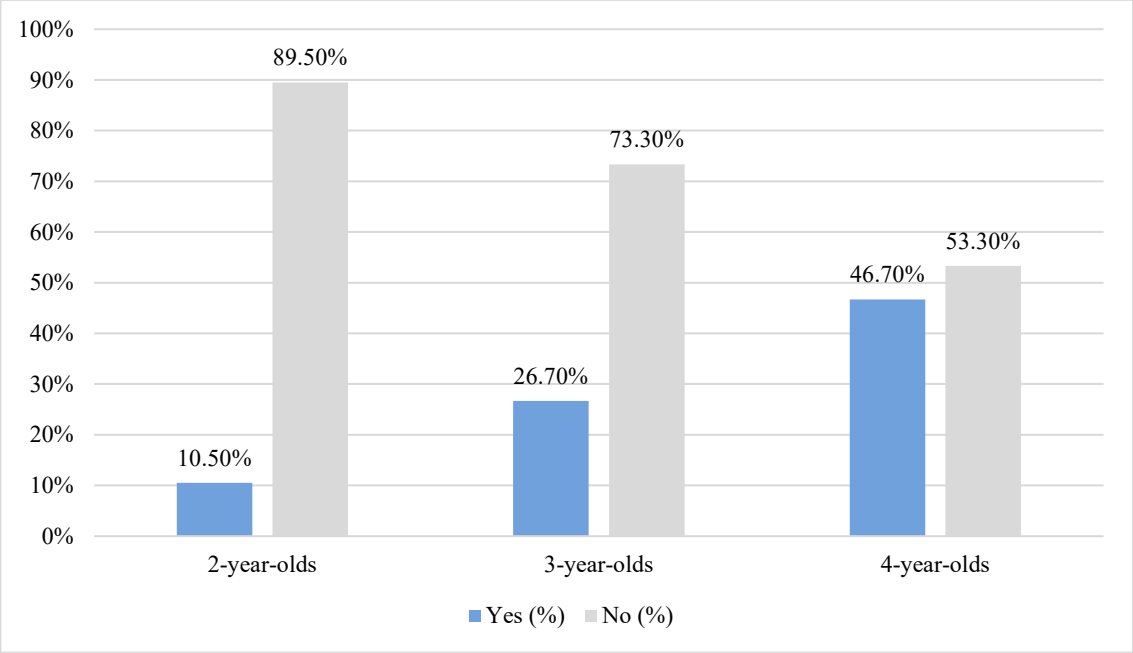
Researchers investigated whether children in each age group fully engaged with the Smart Toy 1 Robotic Animal as the manufacturer intended. For the Smart Toy 1 Robotic Animal, fully intended play is defined as a child performing the following behaviors:

- Pats the top of the toy to make it sit more than once, AND
- Waves hand in front of the toy's head to make it jump, AND
- Puts play food in the toy's mouth more than once

There was no significant association between child age and fully intended play behavior. As shown in Table 124 and Figure 9, 26.5% of the children played with the toy as the manufacturer intended, including 10.5% of the 2-year-olds, 26.7% of the 3-year-olds, and 46.7% of the 4-year-olds.

Table 124. Age distribution of fully intended play for the Smart Toy 1					
Fully intended play	Child age (yrs)			*Total participants*	*Chi-square (X^2)*
	2	3	4		
No	17 (89.5%)	11 (73.3%)	8 (53.3%)	*36(73.5%)*	*5.78, ns*
Yes	2 (10.5%)	4 (26.7%)	7 (46.7%)	*13 (26.5%)*	

Figure 9. Age distribution of fully intended play for the Smart Toy 1 Robotic Animal



3.8.4 Caregiver Ratings for Toy 8

Researchers summarized caregiver responses to individual questions for the Smart Toy 1 Robotic Animal (see Table 125). Overall, caregiver perceptions of the physical and functional characteristics of the toy were not significantly associated with child age, with caregivers of 2-, 3-, and 4-year-olds expressing similar opinions of the toy. Almost all caregivers (98%) thought that the size of the Robotic Animal was appropriate for their child, safe to play with (98%), and had an overall appearance that would appeal to their child (93.9%). One caregiver thought the toy was not the right size and might not be safe, commenting, "It might be too heavy, the base is not super soft, so it wouldn't be a good toy to cuddle or sleep with. The space between the neck and head can crush or hurt fingers. Also, the dinosaur is heavy."

Most caregivers indicated that their child could turn on the toy (77.6%) and "feed" the animal (85.7%). About half of the caregivers (49%) thought their child would figure out the association between waving their hand in front of the animal's head and making it jump, with slightly more than half of the caregivers (52.1%) thinking their child would figure out the association between patting the animals head and making it sit.

The only significant difference ($\chi^2(2) = 6.89$, $p < .05$) found in caregiver ratings was whether caregivers believed their child would be startled by the toy. Approximately 46.7% of caregivers of 3-year-olds thought their child would be scared, compared to 10.5% of caregivers of 2-year-olds and 13.3% of caregivers of 4-year-olds.

Table 125. Caregiver assessment of toy suitability and child interaction with Smart Toy 1					
Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3*	4		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child to use?	19 (100%)	15 (100%)	14 (93.3%)	*48 (98%)*	*2.41, ns*
Do you think this toy is safe for your child to play with?	19 (100%)	15 (100%)	14 (93.3%)	*48 (98%)*	*2.41, ns*
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	19 (100%)	13 (86.7%)	14 (93.3%)	*46 (93.9%)*	*3.44, ns*
Do you think your child will be scared by the toy in any way?	2 (10.5%)	7 (46.7%)	2 (13.3%)	*11 (22.4%)*	*6.89, p<.05*
Do you think your child will be frustrated by the toy in any way?	1 (5.3%)	3 (20%)	2 (13.3%)	*6 (12.2%)*	*1.81, ns*
Do you think your child will try to "feed" the dinosaur?	17 (89.5%)	11 (73.3%)	14 (93.3%)	*42 (85.7%)*	*2.66, ns*
Do you think your child will be able to turn on the toy?	14 (73.7%)	12 (80%)	12 (80%)	*38 (77.6%)*	*0.26, ns*
Do you think your child will figure out that waving their hand in front of the dinosaur's head will cause the dinosaur to jump?	10 (52.6%)	7 (46.7%)	7 (46.7%)	*24 (49%)*	*0.17, ns*
Do you think that your child will figure out that patting the top of the dinosaur's head will cause it to sit?	10 (52.6%)	9 (60%)	6 (40%)	*25 (52.1%)*	*1.73, ns*

*Missing data for one caregiver of a 3-year-old.

Less than half of the caregivers (40.8%) stated that they would purchase the toy for their child (see Table 126). Although the percentage of caregivers willing to purchase the toy decreased with child age, this difference was not significant.

Table 126. Percentage of caregivers who would consider purchasing the Smart Toy 1					
Question	Child age (yrs)			*Total*	*Chi-square (X2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child (at his/her current age)?	9 (47.4%)	6 (40%)	5 (33.3%)	*20 (40.8%)*	*0.69, ns*

About 65.3% of caregivers thought their child would play with the toy for a short time or play with it occasionally, but it would not become a favorite (see Table 127). Compared to caregivers of 2-year-olds (57.9%) and 3-year-olds (66.7%), slightly more caregivers of 4-year-olds (73.3%) thought their child would play with the toy for a short time or occasionally. However, there was no significant association between caregiver ratings of their child's interest in the Smart Toy 1 Robotic Animal and child age.

Table 127. Caregiver perceptions of their child's interest in the Smart Toy 1 Robotic Toy					
Question	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
Rate your child's interest in the toy, on a scale of 1–5, with 1 = will not play with this toy and 5 = this toy would be a favorite. (Select one option)	**2**	**3**	**4**		
Will not play with this toy	1 (5.3%)	2 (13.3%)	0	*3 (6.1%)*	*11.20, ns*
Will play with it for a short time; then, likely will forget about it or disregard it; Will play with it here and there, but the toy would not be a favorite	11 (57.9%)	10 (66.7%)	11 (73.3%)	*32 (65.3%)*	
Will play with it quite a bit; and would come back to	2 (10.5%)	1 (6.7%)	4 (26.7%)	*7 (14.3%)*	
This toy would be a favorite	5 (26.3%)	2 (13.3%)	0	*7 (14.3%)*	

Table 128 shows an association between caregiver ratings of the toy difficulty level and child age. Most caregivers indicated that the Smart Toy 1 Robotic Animal was "somewhat easy" (38.8%) and "manageable" (34.7%). Interestingly, no caregiver of 2-year-olds thought the toy was "too difficult" or "somewhat difficult," with 47.4% considering it "manageable" and 31.6% considering it "somewhat easy." Most caregivers of 3-year-olds (53.3%) thought the toy was "somewhat easy" for their child. Opinions of caregivers of 4-year-olds were more evenly distributed, except none thought the toy would be "too difficult." However, there were no significant differences in caregiver responses across age groups.

Table 128. Caregiver ratings on the difficulty level of the Smart Toy 1					
Question	**Child age (yrs)**			***Total***	***Chi-square (X^2)***
On a scale of 1- 5 with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child? (Select one option)	**2**	**3**	**4**		
Too difficult	0	1 (6.7%)	0	1 (2%)	13.02, ns
Somewhat difficult	0	1 (6.7%)	4 (26.7%)	5 (10.2%)	
Manageable	9 (47.4%)	4 (26.7%)	4 (26.7%)	17 (34.7%)	
Somewhat easy	6 (31.6%)	8 (53.3%)	5 (33.3%)	19 (38.8%)	
Too easy	4 (21.1%)	1 (6.7%)	2 (13.3%)	7 (14.3%)	

Caregivers were asked whether they would show their child how to operate the dinosaur before allowing them to use it independently. Caregivers could select all that applied (see Table 129), resulting in the following information:

- 12.2% of caregivers would not show how to operate the toy.
- 2% would not show their child how to operate it, but they would turn it on for them.
- 6.1% would turn on the toy, put food into the dinosaur's mouth, wave their hand, and pat the dinosaur's head but would not verbally explain to the child how to do it.
- 32.7% would turn on the toy, put food into the dinosaur's mouth, wave their hand, pat the dinosaur's head, and verbally explain what the toy can do.
- 2% would turn on the toy, wave their hand, pat the dinosaur's head, and verbally explain how to use it.

- 4.1% mentioned that they would turn on the toy and only verbally explain the functions instead of showing them.
- 4.1% would show their child by putting food into the dinosaur's mouth.
- 2% would put food into the dinosaur's mouth, wave their hand, and pat the dinosaur.
- 18.4% would only wave their hand and pat the dinosaur.
- 16.3% would only verbally explain what the toy can do.

Table 129. Caregiver thoughts on showing their child how to operate the Smart Toy 1

Question	Child age (yrs)			Total	Chi-square (X^2)
Would you show your child how to operate the dinosaur before giving it to your child to use independently? (Select all that apply)*	2	3	4		
a	2 (10.5%)	1 (6.7%)	3 (20%)	*6 (12.2%)*	*25.03, ns*
a, b	0	1 (6.7%)	0	*1 (2%)*	
b, c, d	1 (5.3%)	2 (13.3%)	0	*3 (6.1%)*	
b, c, d, e	9 (47.4%)	4 (26.7%)	3 (20%)	*16 (32.7%)*	
b, d, e	0	0	1 (6.7%)	*1 (2%)*	
b, e	1 (5.3%)	0	1 (6.7%)	*2 (4.1%)*	
c	0	2 (13.3%)	0	*2 (4.1%)*	
c, d	0	0	1 (6.7%)	*1 (2%)*	
d	4 (21.1%)	4 (26.7%)	1 (6.7%)	*9 (18.4%)*	
e	2 (10.5%)	1 (6.7%)	5 (33.3%)	*8 (16.3%)*	

*a = No; b = Yes, I would turn on the toy; c = Yes, I would put the food into the dinosaur's mouth; d = Yes, I would wave my hands and pat the dinosaur on the head; and e = Yes, I would verbally explain what the toy can do.

The manufacturer's stated age is 4+ years. Overall, 79.6% of caregivers felt this toy was appropriate for children less than the stated age of 4 years old, including 89.5% of caregivers of 2-year-olds, 80% of caregivers of 3-year-olds, and 66.7% of caregivers of 4-year-olds. Only 20.4% of caregivers thought this toy was appropriate for children 4+ years (see Table 130). There were no significant differences in caregiver opinions across age groups.

Table 130. Caregiver perceptions of the appropriate child's age for the Smart Toy 1

Question	Child age (yrs)			Total	Chi-square (X^2)
Overall, for what age do you think this toy is best suited?	2	3	4		
Under 4 years	17 (89.5%)	12 (80%)	10 (66.7%)	*39 (79.6%)*	*2.70, ns*
4+ years	2 (10.5%)	3 (20%)	5 (33.3%)	*10 (20.4%)*	

3.8.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 8

As shown in Table 131, there was no significant association between caregiver intentions to purchase the smart toy and fully intended play behavior. That is, similar percentages of caregivers intended to purchase the toy, believing it to be appropriate for their child whether their child engaged fully with the toy (38.5%) or not (41.7%).

Table 131. Association between caregiver intentions to purchase the Smart Toy 1 and children fully engaging with the toy

Fully intended play	Purchasing			
	No	Yes	*Total*	*Chi-square (X^2)*
No	21 (58.3%)	15 (41.7%)	*36*	*0.04, ns*
Yes	8 (61.5%)	5 (38.5%)	*13*	

There was no significant association between caregiver opinions that their child would feed the toy and exhibit this and other fully intended play behaviors (see Table 132). Among caregivers whose child played with the toy as the manufacturer intended, 92.3% believed their child would "feed" the animal. Similarly, 83.3% of caregivers whose child did not fully engage with the toy also believed their child would feed the toy.

Table 132. Association between caregiver beliefs about feeding the toy and children fully engaging with the Smart Toy 1

Fully intended play	Feed the toy			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	6 (16.7%)	30 (83.3%)	*36*	*0.70, ns*
Yes	1 (7.7%)	12 (92.3%)	*13*	

There was no indication of an association between a child's fully intended play behavior and caregiver belief in their child's ability to turn on the toy (see Table 133).

Table 133. Association between caregiver beliefs about turning on the toy and children fully engaging with the Smart Toy 1

Fully intended play	Turn on the toy			
	No	Yes	*Total*	*Chi-square (X^2)*
No	7 (19.4%)	29 (80.6%)	36	0.67, ns
Yes	4 (30.8%)	9 (72%)	13	

There was no significant association between caregiver belief that their child would figure out that waving a hand in front of the Smart Toy 1 Robotic Animal would make the toy jump and fully intended play behavior (see Table 134). Interestingly, more caregivers whose child did not fully engage with the toy (55.6%) believed in a connection to making the toy jump, compared to 30.8% of caregivers whose child did fully engage with the toy.

Table 134. Association between caregiver beliefs about figuring out wave hand to make the toy jump and children fully engaging with the Smart Toy 1

Fully intended play	Wave hand and make the toy jump			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	16 (44.4%)	20 (55.6%)	*36*	*2.40, ns*
Yes	9(69.2%)	4 (30.8%)	*13*	

There was a significant association between caregiver opinions of whether their child would figure out that patting the top of the toy would make it sit and the child's fully intended play behavior (see Table 135). Approximately 62.9% of caregivers whose child did not fully engage with the toy thought their child would not figure out that patting the top would make the toy sit. In contrast, 23.1% of caregivers whose child did fully engage with the toy believed their child would figure out the connection to make the toy sit.

Table 135. Association between caregiver beliefs about figuring out how to pat the top of the toy and make it sit and children fully engaging with the Smart Toy 1				
Fully intended play	Pat top of the toy and make it sit			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	13 (37.1%)	22 (62.9%)	*35**	*6.23, p<.05*
Yes	10 (76.9%)	3 (23.1%)	*13*	

*Data from one caregiver is missing for this question.

There was no significant association between caregiver perceptions of whether they would show their child how to operate the toy before giving it to them to use independently and their child's ability to demonstrate fully intended play (see Table 136). Approximately 15.4% of caregivers whose child engaged in fully intended play and 11.1% of caregivers whose child did not fully engage with the toy indicated that they would not demonstrate any features of the toy. Additionally, 38.5% of caregivers whose child engaged in the fully intended play and 30.6% of caregivers whose child did not would demonstrate one or more of the toy's features, such as turning it on, putting food into its mouth, or waving and patting it on the head. Similarly, 38.5% of caregivers whose child engaged in the fully intended play and 38.9% of caregivers whose child did not would demonstrate one or more actions and explain what the toy can do. Lastly, 7.7% of caregivers whose child engaged in the fully intended play and 19.4% of caregivers whose child did not would only explain what the toy can do but not demonstrate.

Table 136. Association between caregiver demonstrating the toy and children fully engaging with the Smart Toy 1						
Fully intended play	Show operation before giving to the child					
	No	Demonstrate one or more actions	Demonstrate and explain	Explain only	*Total*	*Chi-square (X^2)*
No	4 (11.1%)	11 (30.6%)	14 (38.9%)	7 (19.4%)	36	1.25, ns
Yes	2 (15.4%)	5 (38.5%)	5 (38.5%)	1 (7.7%)	13	

3.8.6 Age Recommendation for Toy 8

Manufacturer's Age Label: 4+ years

Age Group for the Guidelines: 3+ years

Justification for Age Recommendation:

CPSC staff should consider addressing the subject toy within the 3+ years age group, which is a year younger than the manufacturer's stated age label. While there was no significant association between a child's age and fully intended play behavior, 10.5% of the 2-year-olds, 26.7% of the 3-year-olds, and 46.7% of the 4-year-olds engaged in fully intended play. Additionally, very few caregivers of 3-year-olds thought the toy would be "too difficult" (6.7%) or "somewhat difficult" (6.7%) for their child. Instead, most caregivers for 3-year-olds thought the toy would be "somewhat easy" (53.3%) for their child to operate. Overall, 89.5% of caregivers of 2-year-olds, 80% of caregivers of 3-year-olds, and 66.7% of caregivers of 4-year-olds felt this toy was appropriate for their child. Approximately 40.8% of caregivers stated that they would purchase the toy for their child, with 47.8% of caregivers of 2-year-olds indicating such.

3.9 Toy 9: Smart Toy 2 Programmable Robotic Animal

3.9.1 Description of Toy 9

Toy 9, Smart Toy 2 Programmable Robotic Animal, is a hard plastic toy shaped like an animal. The toy is intended to teach children the basics of programming and coding. The manufacturer's intended age is 3+ years (see Table 137).

Table 137. Product description, manufacturer's stated age, dimensions, and play behaviors for the Smart Toy 2 Programmable Robotic Animal

Name	Product description	Manufacturer's stated age	Dimensions
Smart Toy 2 Programmable Robotic Animal	A hard plastic toy shaped like an animal. The toy is intended to teach children the basics of programming and coding.	3+ years	Length: 16.5 inches; Width: 3.7 inches; Height: 5.5 inches; Weight: 1.63 lbs.
	Behaviors demonstrating manufacturer's intended use		
	a. Slides on/off Switch b. Twists the dials (to choose a direction, music, or sound effect) AND presses the Go button (does more than one time) c. Able to program the robotic animal so that it moves through the course from start to finish line		

3.9.2 Child Behavior when Interacting with Toy 9

The researcher introduced the toy to the child by demonstrating how to turn it on and demonstrating how to make it move in different directions and make sounds by turning the dials to the appropriate option and explaining what the "Go" button does. After each demonstration, the child was allowed 1 minute to try. After the final demonstration, the child was allowed 8 minutes of solo play. Play behaviors were only coded during the free play period. After 8 minutes of solo play, the researcher took the animal from the child and set the dials to a standardized position. The research then asked the child to set the dials to manipulate the dials to make the animal move in a straight line from one line on the floor to another. The child had 2 minutes to get the animal to successfully navigate a straight line.

Thirty-five out of forty-nine children (72.9%) played with this toy for a full 15 minutes. This included 93.3% of 4-year-olds, 64.3% of 3-year-olds, and 63.2% of 2-year-olds. There were no significant differences in playtime between the different age groups. Additionally, there were no significant differences in the following play behaviors between age groups: sliding the on/off switch; twisting the dials (without pressing the "Go" button) to choose a direction, music, or sound effect (repeatedly); pressing the "Go" button (without twisting dials); adjusting the volume switch; watching the animal as it lights up/moves/plays music and reacting positively; pressing the "Go" button in the middle of a sequence resulting in the animal stopping, dancing to the musical jingle that is played when the animal stops, and putting the toy in their mouth.

Although the results were not statistically significant, there were some interesting trends in the associations between play behaviors and child ages (see Table 91). For example, the frequency with which the child slid the on/off switch decreased with age: 36.8% of the 2-year-olds, 33.3% of the 3-year-olds, and 13.3% of the 4-year-olds. Similarly, more 2-year-olds (78.9%) and 3-year-olds (80%) pressed the "Go" button without changing any dials, compared to only 46.7% of the 4-year-olds, who more often switched a dial before pressing "Go."

There were significant associations (χ^2 (2) = 6.66, p <.05) between the frequency with which children twisted the dials (to choose a direction, music, or sound effect) and pressing the "Go" button. Specifically, a

significantly higher number of 4-year-olds (100%) twisted the dials and pressed the "Go" button compared to 2-year-olds (78.9%) and 3-year-olds (73.3%).

There was also a significant difference in whether a child successfully programmed the animal to move through a course (straight line) from start to finish (χ^2 (2) = 19.90, p <.05). Note: Experimenters were instructed to turn all the dials to the same neutral position before asking the child to program the toy. Eighty percent of the 4-year-olds could program the toy successfully and make it cross the finish line, compared to only 13.3% of the three-year-olds and 15.8% of the 2-year-olds who could successfully program the animal. Of the children who did not successfully program the animal to finish the course, 81.3% of the 2-year olds, 76.9% of the 3-year-olds, and 33.3 % of the 4-year-olds did not turn any of the dials to the appropriate directional option, which was straight (see Table 138).

While there were no significant differences across age groups, no 4-year-old appeared to be afraid of the toy, compared to 10.5% of the 2-year-olds and 13.3% of the 3-year-olds (Table 139).

Table 138. Percentage of children exhibiting individual behaviors with Smart Toy 2 Programmable Robotic Animal by age group

Child behavior	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
Slides on/off switch	7 (36.8%)	5 (33.3%)	2 (13.3%)	*14 (28.6%)*	*2.75, ns*
Twists the dials (without pressing Go) to choose a direction, music, or sound effect (does more than one time)	14 (73.7%)	7 (46.7%)	13 (86.7%)	*34 (69.4%)*	*5.96, ns*
Presses the Go Button (without twisting dials)	15 (78.9%)	12 (80%)	7 (46.7%)	*34 (69.4%)*	*5.07, ns*
Repeatedly?	11 (57.9%)	12 (80%)	6 (40%)	*29 (59.2%)*	*5.20, ns*
Twists the dials (to choose a direction, music, or sound effect) AND presses the Go button (does more than one time)	15 (78.9%)	11 (73.3%)	15 (100%)	*41 (83.7%)*	*6.66, p <.05*
Adjusts the volume knob at the front of the animal	0	3 (20%)	1 (6.7%)	*4 (8.2%)*	*5.35, ns*
Watches the animal as it lights up/moves/sings and then reacts positively to the animal's action	14 (73.7%)	8 (53.3%)	13 (86.7%)	*35 (71.4%)*	*4.22, ns*
Child presses go button in the middle of animal sequence resulting in it stopping	11 (57.9%)	9 (60%)	7 (46.7%)	*27 (55.1%)*	*.63, ns*
When the animal stops, child dances to the "code" song	1 (5.3%)	1 (6.7%)	2 (13.3%)	*4 (8.2%)*	*.74, ns*
Child is able to program the animal so that it moves through the course from start to finish line	3 (15.8%)	2 (13.3%)	12 (80%)	*17 (34.7%)*	*19.90, p <.05*
Puts toy in mouth	0	0	0	*0*	
Appears to be afraid of the toy (i.e., fearful facial expression)	2 (10.5%)	2 (13.3%)	0	*4 (8.2%)*	*3.14, ns*
Shows frustration with the toy	2 (10.5%)	2 (13.3%)	0	*4 (8.2%)*	*3.14, ns*

Table 139. Dial settings for Smart Toy 2 Programmable Robotic Animal attempts not reaching the finish line					
Question	Child age (yrs)			Total participants	Chi-square (X^2)
If child did not get the animal across the finish line, how many dials (if any) were turned to the green arrow/straight?	2	3	4		
0	13 (81.3%)	10 (76.9%)	1 (33.3%)	*24 (75%)*	*13.41, ns*
1	0	2 (15.4%)	0	*2 (6.3%)*	
2	1 (6.3%)	0	2 (66.7%)	*3 (9.4%)*	
3	1 (6.3%)	1 (7.7%)	0	*2 (6.3%)*	
4	1 (6.3%)	0	0	*1 (3.1%)*	

3.9.3 Fully Intended Play with Toy 9

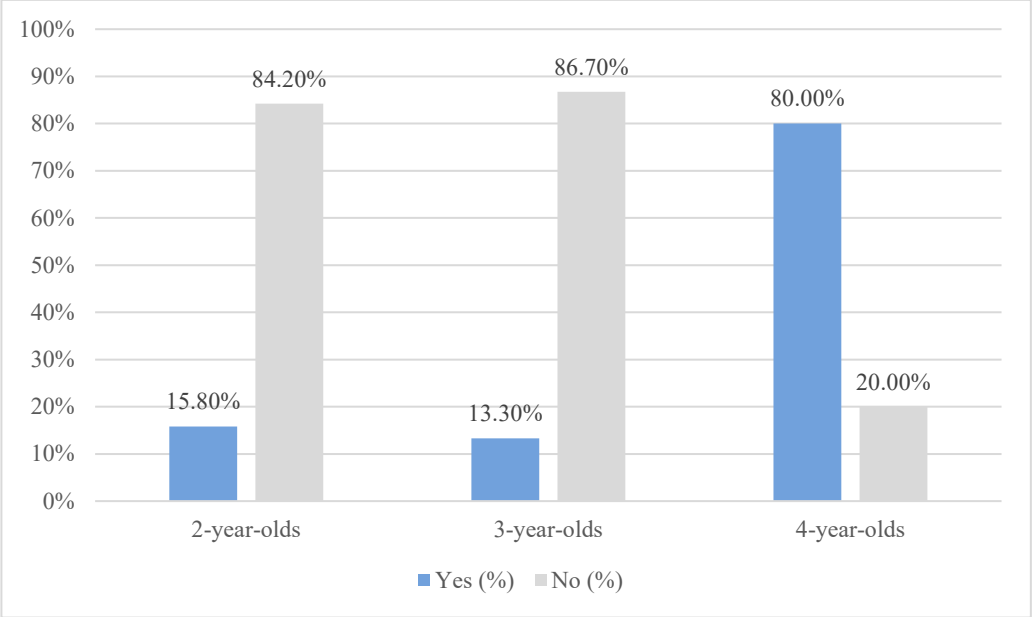
Researchers examined whether children engaged with the Smart Toy 2 Programmable Robotic Animal as the manufacturer intended, specifically observing if they demonstrated the fully intended play behaviors, which includes the following actions:

- Twisted the dials (to choose a direction, music, or sound effect), AND
- Pressed the "Go" button more than one time to demonstrate intention, AND
- Programmed the animal to move through a predefined course from start to finish.

There was a significant association between child age and their ability to engage in fully intended play (χ^2 (2) = 19.90, p <.05). Approximately 80% of 4-year-olds exhibited fully intended play behavior, compared to 13.3% of 3-year-olds and 15.8% of 2-year-olds (see Table 140 and Figure 10).

Table 140. Age distribution of fully intended play for the Smart Toy 2 Programmable Robotic Animal					
Fully intended play	Child age (yrs)			Total participants	Chi-square (X^2)
	2	3	4		
No	16 (84.2%)	13 (86.7%)	3 (20%)	*32 (65.3%)*	*19.90, p <.05*
Yes	3 (15.8%)	2 (13.3%)	12 (80%)	*17 (34.7%)*	

Figure 10. Age distribution of fully intended play for the Smart Toy 2 Programmable Robotic Animal



3.9.4 Caregiver Ratings for Toy 9

Caregiver perceptions of the physical and functional characteristics of the toy were not associated with the age of their child. Almost all caregivers (91.8%) thought that the size of the Programmable Robotic Animal was appropriate for their child, safe to play with (97.9%), and had an overall appearance that would appeal to their child (95.9%), with similar rates across child age. Most of the caregivers (89.8%) thought their child would be physically able to turn the dials, and 63.3% thought their child would figure out that turning the dials causes action by the animal. There was a decreasing trend by child age in caregiver belief that their child would understand that turning the dials causes the animal's actions. Specifically, 86.7% of caregivers of 4-year-olds thought their child would understand, compared to 53.3% of caregivers of 3-year-olds and 52.6% of caregivers of 2-year-olds. Approximately 85.7% of the caregivers indicated that their child would understand the association between pressing the "Go" button and making the toy move.

Very few caregivers thought their child would be scared (8.2%). No caregiver of a 4-year-old thought their child would be scared by the toy, but 5.3% of caregivers of 2-year-olds and 20% of caregivers of 3-year-olds believed their child might be scared. Several caregivers (34.7%) indicated that their child would be frustrated with the toy, including 40% of caregivers of 3-year-olds and 4-year-olds, and 26.3% of caregivers of 2-year-olds (see Table 141).

Table 141. Caregiver perception of characteristics of the Smart Toy 2 Programmable Robotic Animal and their child's reaction to the toy					
Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Is the size of the toy appropriate for your child?	19 (100%)	12 (80%)	14 (93.3%)	*45 (91.8%)*	*5.35, ns*
Do you think this toy is safe for your child to play with?*	19 (100%)	13 (92.9%)	14 (100%)	*46 (97.9%)*	*2.47, ns*
Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?	18 (94.7%)	14 (93.3%)	15 (100%)	*47 (95.9%)*	*1.53, ns*
Do you think your child will be scared by the toy in any way?	1 (5.3%)	3 (20%)	0	*4 (8.2%)*	*4.86, ns*
Do you think your child will be frustrated by the toy in any way?	5 (26.3%)	6 (40%)	6 (40%)	*17 (34.7%)*	*.98, ns*
Do you think your child will understand that he/she needs to press the Go button on front of the animal to make it move?	15 (78.9%)	13 (86.7%)	14 (93.3%)	*42 (85.7%)*	*1.51, ns*
Do you think your child will be physically able to turn/twist the dials on the segments with their fingers to have the animal go in different directions or perform different functions?	16 (84.2%)	13 (86.7%)	15 (100%)	*44 (89.8%)*	*3.94, ns*
Do you think your child will be able to figure out that turning the dials causes and the animal's actions (e.g., turn right or left)?	10 (52.6%)	8 (53.3%)	13 (86.7%)	*31 (63.3%)*	*5.64, ns*
Do you think your child will be able to slide the on/off switch on the underside of the animal?	13 (68.4%)	8 (53.3%)	13 (86.7%)	*34 (69.4%)*	*4.16, ns*

*Missing data for one caregiver of a 3-year-old and one caregiver of a 4-year-old.

Slightly more than half of caregivers (53.1%) expressed a willingness to purchase the toy for their child, including 66.7% of caregivers of 3- and 4-year-olds and 31.6% of caregivers of 2-year-olds (see Table 142).

Table 142. Percentage of caregivers who would consider purchasing the Smart Toy 2 Programmable Robotic Animal					
Questions	Child age (yrs)			*Total*	*Chi-square (X^2)*
	2	3	4		
	Frequencies (percentage) of "Yes" responses				
Would you purchase this toy for your child?	6 (31.6%)	10 (66.7%)	10 (66.7%)	*26 (53.1%)*	*5.86, ns*

Table 143 shows that caregiver ratings of their child's interest in the Smart Toy 2 Programmable Robotic Animal were associated with child age (χ^2 (2) = 15.65, p<.05). Approximately, 53.3% of caregivers of 4-year-olds thought their child would play with the toy for a short period or intermittently, but it would not be their favorite. Fewer caregivers of 3-year-olds (40%) and caregivers of 2-year-olds (31.6%) thought their

child would play with the Programmable Robotic Animal for a short period or intermittently. In contrast, relative to caregivers of 4-year-olds (20%), more caregivers of 2-year-olds (57.9%) and 3-year-olds (53.3%) believed their child would play with the toy quite a bit and would come back to it. Additionally, 26.7% of caregivers of 4-year-olds thought this toy would be their child's favorite, compared to 6.7% of caregivers of 3-year-olds and none of the caregivers of 2-year-olds.

Table 143. Caregiver perceptions of their child's interest in the Smart Toy 2 Programmable Robotic Animal

Question	Child's age (yrs)			Total	Chi-square (X^2)
Rate your child's interest in the toy, on a scale of 1–5, with 1 = will not play with this toy and 5 = this toy would be a favorite. (Select one option)	2	3	4		
Will not play with this toy;	2 (10.5%)	0	0	*2 (4.1%)*	*15.65, p <.05*
Will play with it for a short time; then, likely will forget about it or disregard it; Will play with it here and there, but the toy would not be a favorite;	6 (31.6%)	6 (40%)	8 (53.3%)	*20 (40.8%)*	
Will play with it quite a bit; and would come back to	11 (57.9%)	8 (53.3%)	3 (20%)	*22 (44.9%)*	
This toy would be a favorite	0	1 (6.7%)	4 (26.7%)	*5 (10.2%)*	

There was also a significant difference (χ^2 (8) = 18.86, p <.05) in caregiver opinions on the toy's difficulty level for their child (see Table 144). Caregiver rating of "too difficult" was inversely related to the child's age. That is, 26.3% of caregivers of 2-year-olds thought the toy was too difficult for their child, compared to 13.3% of caregivers of 3-year-olds, and none of the caregivers of 4-year-olds. Similarly, caregiver ratings of "somewhat difficult," decreased for caregivers of 4-year-olds (20%) relative to ratings for caregivers of 2-year-olds (31.6%) and caregivers of three-year-olds (33.3%). Overall, 46.9% of caregivers believed the toy was "manageable" for their child. This included 36.8% of caregivers of 2-year-olds, 26.7% of caregivers of 3-year-olds, and 80% of caregivers of 4-year-olds.

Table 144. Caregiver ratings on the difficulty level of the Smart Toy 2 Programmable Robotic Animal

Question	Child age (yrs)			Total	Chi-square (X^2)
On a scale of 1- 5 with 1 = Too difficult and 5 = Too easy, what do you think about the difficulty level of this toy for your child? (Select one option)	2	3	4		
Too difficult	5 (26.3%)	2 (13.3%)	0	*7 (14.3%)*	*18.86, p <.05*
Somewhat difficult	6 (31.6%)	5 (33.3%)	3 (20%)	*14 (28.6%)*	
Manageable	7 (36.8%)	4 (26.7%)	12 (80%)	*23 (46.9%)*	
Somewhat easy	0	2 (13.3%)	0	*2 (4.1%)*	
Too easy	1 (5.3%)	2 (13.3%)	0	*3 (6.1%)*	

There was no significant difference in whether caregivers would show their child how to operate the Smart Toy 2 Programmable Robotic Animal before letting the child use it on their own (see Table 145). Few caregivers, one person from each age group, would not show their child how to use the toy before letting them play independently. Overall, 79.6% of caregivers said they would turn/twist the dials, press the "Go"

button, and discuss each action. This included 84.2% of caregivers of the 2-year-olds, 86.7% of caregivers of 3-year-olds, and 66.7% of caregivers of the 4-year-olds. Additionally, 26.7% of caregivers of 4-year-olds stated that they would turn/twist the dials and then press the "Go" button but would not discuss how this affects the Smart Toy 2 Programmable Robotic Animal's movement, compared to 5.3% and 6.7% for caregivers of 2-year-olds and 3-year-olds, respectively.

Table 145. Caregiver approaches for demonstrating toy usage before independent play

Question	Child age (yrs)			Total	Chi-square (X^2)
Would you show your child how to operate the animal before giving it to your child to use independently? (Select all that apply)	2	3	4		
No	1 (5.3%)	1 (6.7%)	1 (6.7%)	*3 (6.1%)*	*11.14, ns*
Yes, I would press the "go" button at the front of the animal	1 (5.3%)	0	0	*1 (2%)*	
Yes, I would turn/twist the dials on the segments and then press the "Go" button, but do not discuss how this affects the animal's movement	1 (5.3%)	1 (6.7%)	4 (26.7%)	*6 (12.2%)*	
Yes, I would turn/twist the dials on the segments and then press the "Go" button and I would discuss what each does	16 (84.2%)	13 (86.7%)	10 (66.7%)	*39 (79.6%)*	

The manufacturer recommends this toy for children ages 3+ years. When examining caregiver opinions on the appropriate age for the toy, a significant difference (χ^2 (2) = 7.95, p <.05) was found across the age groups (see Table 146). All caregivers of 4-year-olds thought the toy was appropriate for children aged 3+ years, compared to 66.7% of caregivers of 3-year-olds and 84.2% of caregivers of 2-year-olds. Only 16.3% of caregivers total thought the toy was appropriate for children under 3-years-old.

Table 146. Caregiver perceptions of the appropriate child's age for the Smart Toy 2 Programmable Robotic Animal

Question	Child age (yrs)			Total	Chi-square (X^2)
Overall, for what age do you think this toy is best suited?	2	3	4		
Under 3 years old	3 (15.8%)	5 (33.3%)	0	*8 (16.3%)*	*7.95, p <.05*
3+ years old	16 (84.2%)	10 (66.7%)	15 (100%)	*41 (83.7%)*	

3.9.5 Associations Between Caregiver Ratings and Child Fully Intended Play with Toy 9

As shown in Table 147, there was no significant association between caregiver purchasing intention and their child's fully intended play behavior. Caregivers whose child did not engage in fully intended play were evenly split in their purchasing intentions (50% vs. 50%). Similarly, caregivers whose child did engage in fully intended play were also evenly distributed. However, a slightly higher percentage of caregivers (58.8%) indicated they would purchase this toy for their child.

Table 147. Association between caregiver purchasing decisions and children fully engaging with the Smart Toy 2 Programmable Robotic Animal				
Fully intended play	Purchasing			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	16 (50%)	16 (50%)	*32*	*0.35, ns*
Yes	7 (41.2%)	10 (58.8%)	*17*	

Caregivers were asked whether they believed their child would understand the need to press the "Go" button to make the toy move (see Table 148). There was no significant association between caregiver response and their child's fully intended play behavior. About 94.1% of caregivers whose child fully engaged with the toy believed their child would understand the connection. A slightly lower percentage (81.3%) of caregivers whose child did not fully engage with the toy as intended also thought they would understand. Conversely, 5.9% of caregivers whose child fully engaged with the toy did not think their child would understand the connection, compared to 18.8% of caregivers whose child did not fully engage with the toy.

Table 148. Association between caregiver beliefs about understanding the "Go" button on the toy to make it move and the child's fully intended play behavior				
Fully intended play	Press the Go button to make it move			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	6 (18.8%)	26 (81.3%)	*32*	*1.70, ns*
Yes	1 (5.9%)	16 (94.1%)	*17*	

Similarly, most caregivers believed their child would turn the dials on the toy segments to make it move in different directions or perform various functions, regardless of whether their child engaged in fully intended play (see Table 149). There is no significant association between caregiver beliefs about their child physically turning the dials and the child's fully intended play behavior. Additionally, a slightly higher percentage of caregivers (12.5%) whose child did not engage in fully intended play thought their child would not be able to turn the dials compared to caregivers (5.9%) of children who did not engage in fully intended play who also indicated their child would not be able to turn the dials.

Table 149. Association between caregiver beliefs about child physically turning the dials to select and child's fully intended play behavior				
Fully intended play	Physically turn the dials			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	4 (12.5%)	28 (87.5%)	*32*	*0.58, ns*
Yes	1 (5.9%)	16 (94.1%)	*17*	

There was no significant association between caregiver beliefs about whether their child would understand that turning the dial causes the toy to perform different actions (e.g., change direction) and the child's fully intended play behavior (see Table 150). More caregivers (76.5%) whose child engaged in fully intended play thought their child would understand the connection compared to caregivers (56.3%) of a child who did not engage in fully intended play. About 23.5% of caregivers whose child did engage in fully intended play believed their child would not understand the connection, compared to 43.8% of caregivers whose child did not engage in fully intended play.

Table 150. Association between caregiver beliefs about understanding turning the dial would cause different actions and the child's fully intended play behavior				
Fully intended play	Turning dial cause different actions			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	14 (43.8%)	18 (56.3%)	32	2.03, ns
Yes	4 (23.5%)	13(76.5%)	17	

There was no significant association between caregiver beliefs about whether their child could slide the on/off switch and the child's fully intended play behavior (see Table 151). Interestingly, more caregivers (71.9%) whose child did not engage in fully intended play thought their child could slide the switch, compared to 64.7% of caregivers whose child did engage in fully intended play.

Table 151. Association between caregiver beliefs about sliding the on/off switch and child's fully intended play behavior				
Fully intended play	Sliding on/off switch			
	No	Yes	*Total participants*	*Chi-square (X^2)*
No	9 (28.1%)	23 (71.9%)	*32*	*0.27, ns*
Yes	6 (35.3%)	11 (64.7%)	*17*	

Caregivers were asked whether and how they would demonstrate the toy to their child. The options provided were: As shown in Table 152, there was no significant difference between how the caregiver would demonstrate using the toy and the child's fully intended play behavior. Most caregivers (84.4% for caregivers of children who did not engage in fully intended play and 70.6% for caregivers of children who did engage in fully intended play) would turn the dials, press the "Go" button, and discuss how it affects the toy's actions with their child.

Table 152. Association between the caregiver demonstrating the toy and children fully engaging with the Smart Toy 2 Programmable Robotic Animal						
Fully intended play	Show operation					
	a. No	b. Only press Go button	c. Turn dials, press Go button, N verbal direction	d. Turn dials, press Go button, and verbal direction	*Total participants*	*Chi-square (X^2)*
No	2 (6.3%)	0	3 (9.4%)	27 (84.4%)	*32*	*2.98, ns*
Yes	1 (5.9%)	1 (5.9%)	3 (17.6%)	12 (70.6%)	*17*	

3.9.6 Age Recommendation for Toy 9

Manufacturer's Age Label: 3+ years

Recommended Age Group for the Guidelines: 4+ years

Justification for Recommended Age:

CPSC staff should consider addressing the subject toy within the 4-year-old age group, which is slightly older than the manufacturer's stated age label. There was a significant association between the child's age and their ability to engage in fully intended play (χ^2 (2) = 19.90, p <.05). Approximately 80% of the 4-year-olds exhibited fully intended play behavior, compared to 13.3% of the 3-year-olds and 15.8% of the 2-year-olds. Additionally, 36.8% of caregivers of 2-year-olds, 26.7% of caregivers of 3-year-olds, and 80% of caregivers of 4-year-olds thought the toy was "manageable" for their child. Additionally, slightly more than half of caregivers (53.1%) expressed a willingness to purchase the toy for their child, including 66.7% of caregivers of 3- and 4-year-olds and 31.6% of caregivers of 2-year-olds.

4.0 Discussion

The study observed how children aged 2–4 years interacted with toys from six categories: plush toys with electronic components, take-apart vehicles, figurines, manipulatives, musical instruments, and smart toys. Caregivers were also surveyed about their perceptions of the toys, their expectations for their children's play, how they would present the toys (e.g., out of the box, already assembled, or requiring assembly), and whether they would demonstrate how to play with the toy. The toys selected required a variety of motor and cognitive skills, as well as developmental and socioemotional maturity, to be used as intended by the manufacturer.

Trends Across Toys

Generally, the percentage of children demonstrating fully intended play varied across toys and age groups. The following sections discuss the relationship between the toy characteristics, children's cognitive and physical skills, and how these factors may have influenced their interactions with the toys.

Plush Toy with Electronic Components (Toy 1)

The electronic interactive dog features a hard plastic internal structure covered by soft fur. Children can interact with the dog by pressing buttons on the leash handle, triggering behaviors like walking, tail wagging, and barking. Most children demonstrated the cognitive ability to understand the simple cause-and-effect relationship between pressing the buttons and the dog's actions, as well as the motor skills to hold the leash handle and press the buttons. Although not statistically significant, a higher percentage of younger children (89.5% of 2-year-olds and 93.3% of 3-year-olds) compared to older children (73.3% of 4-year-olds) engaged in fully intended play with the toy. Although interactive toys are typically appealing to 4-year-olds who generally possess the cognitive and physical abilities to interact with this type of toy effectively, the limited range of responses from this toy (e.g., bark, wag, walk) may not sufficiently engage older children. Therefore, the observed lower engagement in this age group might be attributed to a lack of sustained interest rather than a lack of developmental readiness. The findings show that the physical and cognitive skills required for this toy appear to be present in many children as young as 2 years old, despite the manufacturer's age recommendation of 3+ years.

Caregiver perceptions generally aligned with observed child play behaviors. Almost all caregivers thought the electronic interactive dog was appropriately sized, safe, and appealing for their child. However, only half of the caregivers would purchase the toy. A majority believed their child would understand the connection between pressing the buttons and the dog's actions. Most caregiver felt that their child would walk alongside the dog while using the controller buttons. However, caregiver opinions on the likelihood of their child pressing both buttons on the controller varied by age. Specifically, caregivers of 4-year-olds were more likely to indicate that their child would press both buttons. Caregiver perceptions of the difficulty level of the toy depended on their child's age, with caregivers of older children more likely to find the toy "too easy". Most caregivers believed their child would play with the toy occasionally, but it would not be a favorite. Most caregivers thought the toy was more suitable for younger children (1.5 to 2.5+ years).

This study examined how children between 2-4 engaged with this toy. Given the high percentage of 2-year-olds that fully engaged with the toy, researchers might want to examine how younger children (19-23 months) engage with this toy. Additionally, the researchers did not document behaviors that would demonstrate pretend play. By not documenting this type of play, researchers were unable to capture insights into the percentage of children in each group that demonstrated this level of cognitive and social development.

Take-Apart Vehicle 1 (Toy 2)

Take-Apart Toy 1 is a 17-piece plastic building set with interchangeable parts used to create three different vehicle models by interlocking the pieces. The number of pieces included in the set is manageable for children in the younger age groups (2- and 3-year-olds). Children in the youngest age group (2-year-olds) are able to interact with sets that have 20–30 pieces, and the dimensions of these individual pieces are chunky, fitting comfortably in their small hands. Additionally, children in all age groups are capable of representational or symbolic thinking, which contributes to their ability to engage with Take-Apart toys. Only seven children played with the Take-Apart Toy 1 as the manufacturer intended. Although there was no significant association between age and fully intended play behavior, a greater percentage of 3- and 4-year-olds (60% and 86.7%, respectively) assembled one of the three vehicle types compared to 21% of the 2-year-olds. Although most children looked at the pictorial step-by-step directions included with the toy, older children (4+ years) may have the cognitive ability to use the information when assembling parts of toys. Additionally, younger children (2-year-olds) may lack the fine motor skills necessary to align the pieces for assembly. The findings suggest that 2-year-olds may not have the physical and cognitive skills to fully engage with this toy. This toy might be more suitable for children aged 3+ years, which is older than the manufacturer's age label of 2+ years.

In general, caregiver perceptions of the toys seemed to align with observed child play behaviors. The findings indicate that most caregivers believed the toy's size was appropriate and its design would appeal to their child, with all caregivers considering it safe. About half of the caregivers were willing to purchase the toy. A greater percentage of caregivers of 2-year-olds (68%) would buy the toy for their child, compared to caregivers of 3-year-olds and 4-year-olds (53.3% and 33.3%, respectively). Conversely, more caregivers of younger children (2-year-olds) believed the toy would be difficult for their child to assemble, with caregiver expectations of their child's assembly ability increasing with age. Significant differences were noted regarding caregiver opinions of fine motor skills, with older children perceived as more capable. Most caregivers indicated their child might be frustrated by the toy, though perceived frustration decreased with increasing age of the child. Collectively, these findings may suggest that at least some caregivers are seeking challenging toys for their children. All caregivers of 2-year-olds would demonstrate assembly, but this decreased with child age. The highest percentage of caregivers thought the toy was suitable for children aged 3 years or older.

Take-Apart Vehicle 2 (Toy 3)

The Take-Apart Toy 2 is a 25-piece buildable airplane that can be assembled and disassembled using a plastic battery-operated drill with three bits. The drill operates in both forward and reverse directions for assembly and disassembly. The set's number of pieces and the size of the parts are suitable for younger children (2- and 3-year-olds), fitting comfortably in their small hands. Most children could grip and depress the drill's trigger, but older children (3- and 4-year-olds) were more adept at sliding the switch to adjust the functionality of the drill. Although younger children (2-year-olds) can manage simple screwing actions, they often lack the physical coordination needed to fit bolts into holes or attach nuts. Additionally, they may struggle with the cognitive demands of following more complex assembly instructions, making Take-Apart Toys less appropriate for them. Very few children were able to match the drill bit shapes to the corresponding pieces or engage in fully intended play. Most of the 2- and 3-year-olds and nearly half of the 4-year-olds did not assemble any pieces. Compared to 2-year-olds, more 3- and 4-year-olds assembled 1-4 pieces. Only 20% of 4-year-olds assembled 5–8 pieces. This toy might be more suitable for children 4+ years, which is older than the manufacturer's suggested age label of 3+ years.

Again, caregiver perceptions of the toy generally aligned with observed child play behaviors. The findings reveal that almost all caregivers found the toy's size appropriate, considered it safe, and thought its appearance would appeal to their child. Although a higher percentage of caregivers of 3- and 4-year-olds (73.3% for each age group) would consider purchasing the toy compared to caregivers of 2-year-olds, many caregivers thought their child would be frustrated by the toy, with no significant differences across age

groups. Over half of caregivers of 2-year-olds believed the toy would be too difficult for their child, while caregivers of 3- and 4-year-olds believed it would be somewhat difficult for their child. More than half of the caregivers believed their child could take apart the toy pieces by unscrewing them with their fingers, and a majority believed their child could hold the drill and pull the trigger. However, there were significant differences in caregiver opinions on their child's ability to hold two or more toy pieces while operating the drill to join the pieces together. A greater number of caregivers of 4-year-olds believed their child possessed the motor skills to perform this task compared to caregivers of 2-year-olds. Less than half of the caregivers indicated that their child could use the drill in reverse to detach pieces. Caregivers also differed on whether their child would be able to differentiate between drill bit shapes and whether they would demonstrate the drill for their child, with caregivers believing younger children were less likely to notice the different drill bit shapes and would require a demonstration on how to use the drill. More than half of caregivers of 4-year-olds believed their child could assemble half of the plane, with one caregiver thinking their child could assemble the entire plane. A majority of caregivers believed the toy was suitable for children aged 4+ years old.

Figurines (Toy 4)

The two small figurines are modeled after popular children's prince and princess characters. Made of plastic, the figurines have movable joints at the waist and arms, and the princess outfit can be changed using a clip-on feature. However, the tiara poses a potential choking hazard for young children due to its small size and the tendency of young children to mouth objects. The figurine's cartoonish facial features, hair, colorful clothing, and accessories appeal to children of all age groups. Despite this, only seven children played with the toy as fully intended by the manufacturer, with five of them being 4-year-olds. Most children lacked the fine motor dexterity and control needed to use the clip-on feature to dress the figurine after the hard plastic bodice and skirt were removed. Although children in all the age groups tested have the cognitive ability to engage in pretend play, only 11 children did so, with most being 4-year-olds. Additionally, most younger children (2- and 3-year-olds) were unable to place the tiara on the figurine's head successfully. The findings suggest that this toy might be more suitable for children 4+ years, which is older than the manufacturer's age label of 3+ years.

Caregivers expressed different opinions on toy size, safety concerns, and whether to include the tiara when giving the toy to their child. A higher percentage of caregivers of 4-year-olds thought the toy size was appropriate compared to caregivers of 3- and 2-year-olds. Safety concerns followed a similar pattern. However, there were no significant differences in caregiver opinions on the toy's appeal, child's frustration with the toy, or their child's ability to move the figurine's parts. Purchasing decisions varied by age, with more caregivers of 4-year-olds willing to buy the toy, compared to caregivers of 3- and 2-year-olds. Caregiver expectations of their child's ability to undress and dress the princess did not significantly differ by age. Slightly less than half of the caregivers thought their child would not be able to put on the tiara, bodice, and overskirt back on the princess, with more than half of the caregivers of younger children (2- and 3-year-olds) indicating that their child would not be able to complete the task. Significantly less than half of the caregivers thought their child would put all the accessories on the princess. Relative to 3- and 4-year-olds, more caregivers of 2-year-olds would demonstrate how to dress/undress the figurines. In general, these caregiver perceptions seemed to align with child's observed play.

A majority of caregivers expected their child would play with both the prince and princess, and this did not significantly differ by age. Overall, most caregivers thought this toy was suitable for 3-year-olds and older which is in line with the manufacturer's age label but differs from researcher recommendations based on observing children's interactions with the figurines.

Figurines (Toy 5)

The 10 vinyl figures are modeled after popular children's television characters. Their facial features are simplistic, with painted-on eyes, noses, and mouths, which are appealing to younger children

(2-year-olds) who find simple designs more engaging. Some of the figurines have articulated features, including poseable arms and heads. Most children in each age group played with the toy as intended, demonstrating the motor skills to move the figurines' heads and arms. They also showed the cognitive skills to create pretend play scenes with the figurines. Like the Plush Toy with Electronic Components, the finding that fewer 4-year-olds engaged with the toy as the manufacturer intended may be less associated with ability and more so with interest. The physical and cognitive skills required for this toy appear to be present in many children as young as 2 years old, despite the manufacturer's age recommendation of 3+ years.

In general, parent perceptions of the toys seemed to align with observed child play behaviors. Caregivers believed the figurines were the appropriate size, safe for their child to play with, and that their child could move the figurines' arms and heads. All caregivers of 2- and 3-year-olds thought the toy had an appealing appearance, while fewer caregivers of 4-year-olds felt the same. A majority of caregivers indicated they would purchase this toy for their child, but a small percentage of caregivers thought their child would be frustrated by the toy. There was a significant association between child age and whether caregivers thought their child would engage in imaginative play with the figurines. A higher percentage of caregivers of 4- and 3-year-olds believed their child would make up stories and scenarios. Most caregivers of 3- and 4-year-olds, and a majority of caregivers of 2-year-olds, stated that their child would not need help with the toy set. However, some caregivers of 2- and 3-year-olds thought they would need to show their child how to move the figurines' arms and heads, and a few caregivers of 2-year-olds and 4-year-olds thought they would need to demonstrate pretend play.

Overall, most caregivers thought this toy was suitable for 3-year-olds and older which aligns with the manufacturer's age label but differs from researcher recommendations based on observing children's interactions with the figurines.

Manipulatives (Toy 6)

The manipulative toy is a no-spill plastic bubble tumbler with a wand and two ounces of nontoxic bubble solution. Overall, older children exhibited higher rates of fully intended play compared to younger children. While most children attempted to blow into the wand to make bubbles, success rates varied significantly across age groups. Notably, a higher percentage of 4-year-olds (93%) were successful at blowing bubbles compared to 2- and 3-year-olds (42% and 60%, respectively), which aligns with expected developmental trajectories in oral motor skills. There was also a significant difference in the success rates for creating bubbles by waving the wand. All 4-year-olds were able to independently dip the wand and create bubbles by waving the wand, whereas fewer 2- and 3-year-olds were able to achieve this result. Findings show that although younger children understood the task and demonstrated the fine motor skills necessary to pull the wand from the container, they struggled to blow into the wand with the appropriate force to create bubbles. One potential factor affecting the 2-year-olds' bubble-blowing success was the size of the wand and the opening or loop. It is possible that a larger loop would have made bubble production easier for this age group, given their developing fine motor and oral motor coordination. When played with independently, this toy may be more suitable for the 3+ years age group, as opposed to the manufacturer's suggested age label of 18 + months on the box.

Caregiver's ratings of the toy's physical and functional characteristics did not significantly differ across age groups. Specifically, most caregivers thought the toy was appropriately sized, safe, and was physically appealing. A high percentage of caregivers would consider purchasing the toy, and a small percentage thought their child would be frustrated by the toy. Regarding play behavior, most caregivers believed their child could dip the wand in the bubble tumbler, with fewer thinking their child could successfully blow bubbles on their own, which generally aligns with observed child play behaviors. Opinions on the toy's appropriate age did not significantly differ, with most believing it suitable for children aged 18 months and older.

Musical Instruments (Toy 7)

The musical set includes seven rhythm instruments that are appealing to children in all age groups. The instruments have rounded edges and sturdy construction, making them safer for children. They are also small enough to fit comfortably in younger children's (2- and 3-year-olds) hands and are light enough to carry. Most children demonstrated the cognitive ability to understand the cause-and-effect relationship and possess the motor skills needed to play the instruments by striking or shaking them to produce sounds. This includes 89.5% of 2-year-olds and 100% of both 3- and 4-year-olds. Based on the observed interaction of children with the musical instruments, the findings suggest that this toy should be considered within the 2+ years age group, which is one year younger than the manufacturer's stated age label.

Parent perceptions generally aligned with observed child play behaviors. Most caregivers believed the toy size was appropriate, had no safety concerns, and thought the toy's appearance would appeal to their child. All caregivers believed their child would play with the toy, and only a few caregivers would not allow their child to play with some of the instruments. A higher percentage of caregivers of 2-year-olds would buy the toy compared to caregivers of 3- and 4-year-olds. All caregivers of 3- and 4-year-olds believed their child would know how to hit the drum with the drumsticks to produce sound without being shown, compared to a smaller proportion of caregivers of 2-year-olds. Additionally, all caregivers thought their child would shake the tambourine and maracas to produce sound, and most believed their child would shake the castanet. A significantly greater number of caregivers of 4-year-olds thought their child could shake the castanet compared to caregivers of 2- and 3-year-olds.

More than half of caregivers of 2-year-olds thought the toy was manageable, while a smaller proportion of caregivers of 3-year-olds considered it too easy, and a larger proportion of caregivers of 4-year-olds believed the toy would be somewhat easy for their child. Overall, a majority of caregivers said they would not show their child how to play any of the instruments before letting them play independently. The percentage of caregivers who would allow their child to play without demonstrating how to use the instruments increased with the child's age. Most caregivers believed this toy was suitable for children under 3-years-old aligning with the manufacturer's age label. However, this view contrasts with researcher recommendations based on their observations of children's interactions with the musical instruments.

Smart Toy 1 Robotic Animal (Toy 8)

Smart Toy 1 is a hard plastic toy with a plush covering designed in the shape of a dinosaur. It is poseable, motion-activated, and interactive, responding to a child's actions with sound and motion combinations. Many children demonstrated the cognitive ability to understand the simple cause-and-effect relationship between their movements and the toy's responses. They possessed the motor skills to hold the plastic food and place it in the animal's mouth. Most children played with the toy as intended by the manufacturer: 36.8% of 2-year-olds, 66.7% of 3-year-olds, and 53.3% of 4-year-olds. Because 4-year-olds have the cognitive and physical abilities to use the toy as intended, their lower engagement may reflect a lack of interest rather than a lack of ability. While interactive toys still appeal to 4-year-olds, random responses from the toy may help maintain their interest for longer periods. As such, findings suggest the physical and cognitive skills required for this toy appear to be present in many children as young as 3-years-old, despite the manufacturer's age recommendation of 4+ years.

Caregivers of 2-, 3-, and 4-year-olds expressed similar opinions. Almost all caregivers thought the toy's size was appropriate, safe, and appealing. One caregiver raised concerns about the toy's weight as a potential safety issue. Most caregivers believed their child could turn on the toy and "feed" the animal. About half thought their child would understand the toy's interactive features, such as making it jump or sit, which for the most part aligns with the child's observed play. The only significant difference was that caregivers of 3-year-olds were more likely to think their child would be startled by the toy compared to caregivers of 2- and 4-year-olds. Less than half of the caregivers would purchase the toy, with willingness decreasing slightly with child age. Most caregivers thought their child would play with the toy occasionally but not

make it a favorite. Caregivers generally found the toy "somewhat easy" or "manageable," with no significant differences across age groups. The manufacturer recommends the toy for children aged 4+ years, but most caregivers felt it was suitable for younger children.

Smart Toy 2 Programmable Robotic Animal (Toy 9)

The Smart Toy Programmable Robotic Animal is a hard plastic toy shaped like an insect. It has a motorized head and runs on batteries. The intention of the toy is to teach children the basics of coding. This toy is designed to encourage experimentation during play and encourages skills such as problem-solving, planning, and sequencing. The facial features appear simplistic and not mature, with light-up hard plastic eyes and wheels that allow it to move when programmed by the child. Children learn basic programming by turning dials to choose which direction the animal moves, the music it plays, and other sound effects. Younger children, ages 2 and 3 years old, are cognitively and physically capable of interacting with simple smart toys and software programs/applications. These age groups also have the hand-eye coordination and physical dexterity to grasp and turn the larger knobs used to program the smart toy. Additionally, the toy is rich with sensory elements, such as music, movement, blinking lights, and sounds that will hold a child's interest longer. Older children understand how a smart toy should be used and possess a better understanding of cause-and-effect relationships, as well as sequencing, which may contribute to their playing with the toy as the manufacturer fully intended. Approximately 80% of 4-year-olds exhibited fully intended play behavior, compared to 13.3% of 3-year-olds and 15.8% of 2-year-olds. The findings suggest that this toy may be more suitable for the 4+ year age group, which is one year older than the manufacturer's stated age label.

Caregiver perceptions of the Programmable Robotic Animal toy's physical and functional characteristics were not significantly associated with the child's age. Almost all caregivers found the toy's size appropriate, safe, and appealing. Most believed their child could physically turn the dials, though fewer thought their child would understand the connection between turning the dials and the toy's actions, with understanding decreasing with age. A majority thought their child would understand the function of the "Go" button.

Few caregivers thought their child would be scared by the toy, with no caregivers of 4-year-olds expressing this concern. Some caregivers indicated their child might be frustrated, particularly among caregivers of 3- and 4-year-olds. More than half of the caregivers expressed a willingness to buy the toy, with a notable increase in interest among caregivers of older children. Whereas caregivers of younger children were more likely to perceive the toy as too difficult for their child.

There was no significant difference in whether caregivers would show their child how to operate the toy before allowing them to play independently. The manufacturer recommends the toy for children aged 3+ years, but most caregivers felt it was suitable for younger children, with all caregivers of 4-year-olds agreeing it was appropriate for children aged 3+ years.

Overall, the research findings show that five toys require higher cognitive abilities or physical skills than what is suggested by the manufacturer's age label. These toys included the two Take-Apart toys (Toys 2 and 3), the figurine with the clip-on feature (Toy 4), the manipulative (Toy 6), and the programmable smart toy (Toy 9). This is not to suggest that children in the younger age groups cannot engage with other salient features of these toys independently or with adult assistance. To illustrate, while most children in all age groups were unable to use the clip-on feature of Toy 4 (a figurine), they did engage in pretend play with the figurines. Additionally, while younger children may not be able to successfully blow bubbles, chasing and popping the bubbles promotes physical activity and gross motor development and can enhance their fine motor skills and hand-eye coordination. With respect to the Take-Apart toys, caregivers can guide their children in exploring the parts of the toy, helping them to understand how the pieces fit together and come apart. Caregivers can work alongside the child by assembling the more challenging pieces. Alternatively, they could demonstrate how to use the tools (i.e., drill) and assemble and take apart the toys.

Researchers recommend a younger age group than the manufacturer's age label for four of the toys because the data indicates younger children can safely and fully engage with these toys. These toys include the Plush

Toy with Electronic Components (Toy 1), the Figurine set (Toy 2), the Musical Instrument Set (Toy 7), and Smart Toy Robotic Animal (Toy 8). Although most children at the manufacturer's age label for each of these toys have the physical and cognitive skills to fully engage with the toy, the lower engagement may reflect a lack of interest rather than a lack of ability. Younger children, however, may find these toys more stimulating and engaging.

Observed Differences Between Toys in the Same Category

Although toys in the same category may share similar themes or functions, differences in complexity, safety features, engaging qualities, and educational content can result in variations with respect to age-label recommendations within a toy category. Toys in the same category may require different levels of fine motor skills, cognitive abilities, or problem-solving skills. Some toys are designed to be more engaging for older children who have longer attention spans and more advanced cognitive and physical skills. Younger children may not have the cognitive or physical skills to use them as intended and, therefore, might not find these toys as interesting. The following sections discuss differences in selected toys from within the same category.

Take-Apart Vehicles

Both take-apart toys foster the development of fine motor skills, promote creativity, and encourage pretend play, but they differ in complexity with respect to the number and types of pieces included in the toy and the cognitive and physical skills required to assemble the pieces. Toy 2 includes 17 pieces and provides children with the opportunity to assemble three different vehicles from one set of parts. The parts are chunky and easy to handle, making it suitable for younger toddlers. The toy features a simple assembly process where pieces only need to be fitted together. Once assembled, the toy encourages imaginative play as children can switch between different vehicles and create various scenarios. In contrast, Toy 3 includes 25 pieces, focuses on building and taking apart a single plane, and includes a battery-operated toy drill, which adds an element of complexity to the assembly process. Children use a drill and different bits to assemble the chunky pieces, which requires hand-eye coordination and dexterity. To fully engage with this toy, the child must possess fine motor skills. Because assembly includes screws and components, it necessitates higher cognitive and physical abilities, making it more suitable for older children. Overall, findings suggest that while the core concepts of the two toys are similar, the developmental skills required to successfully build and disassemble them differ significantly between the two toys.

Figurines

Playing with figurines promotes imaginative play and storytelling as children create various scenarios and narratives. It also enhances children's understanding of social interactions and relationships. The size and movable parts of the two figurine toys in this study require fine motor skills and hand-eye coordination for the children to manipulate the characters during play. While both figurine toys are intended to promote imaginative play, posing, and storytelling, Toy 4 incorporates additional components (clip-on clothing and accessories) that require more advanced fine motor skills and an understanding of pattern recognition and sequences to dress and undress the figurine using the clip-on feature, suggesting potential differences in the recommended age range for playing with each toy as fully intended.

Smart Toys

With respect to the smart toys, the two selected toys varied significantly in complexity and cognitive skills required for fully intended play. Toy 8 is an interactive, animatronic animal that mimics the behaviors of animals and encourages imaginative play. Fine motor skills and hand-eye coordination are required for the children to interact with the animal's moving parts, such as petting and feeding. Conversely, Toy 9 is an interactive toy designed to introduce children to basic coding concepts through play. Children need to possess problem-solving skills, logical thinking, and sequencing skills to plan and code the animal's actions.

The findings suggest that the cognitive skills required to fully engage with these toys differ and that Toy 9 is more suitable for older children (4+ years), while Toy 8 is designed for younger children (3+ years).

Limitations

Although this study provides valuable insights, it has several limitations. First, the sample size of 49 children, while sufficient for initial exploration, may not be large enough to draw robust and generalizable conclusions. Larger sample sizes would increase the statistical power and enhance the reliability of the findings. Additionally, a larger sample would allow results to be reported in narrower age groupings, to better align with children's rapid developmental progression under age 3 years.—Specifically, breaking down the "Under 3" category into 12-18 months, 19-23 months, and 24-35 months—may allow for richer interpretations of the findings and greater applicability to age grading.

Second, the toys selected for the study are not representative of the entire category, and thus the findings are limited to very similar toys and toy features within the category. The specific toys within each category were chosen purposively, potentially limiting the generalizability of the findings. As such, the study may have missed some variations within the category and may not capture the diverse range of play experiences associated with the range of possible toys within each category. Future studies should investigate a wider range of toys within a category to better inform developmental knowledge for a specific toy category.

Third, the brief observation period may have overlooked how children are likely to interact with the same toys given much longer observation periods, or repeated observations across time. Longitudinal studies that track children's interactions over time are helpful for understanding the more evolving nature of play.

Finally, the laboratory setting and presence of researchers did not account for a range of contextual factors that can significantly influence children's play. These factors may include the child's home environment, parental involvement, cultural background, socio-economic status, and access to a wide range of play resources. These contextual influences can significantly impact how children play with toys.

Conclusions

Observing children at play helps researchers understand which toys are suitable for different developmental stages as well as identify potential safety hazards associated with certain toys for specific age groups. These insights help organizations like the CPSC create guidelines to ensure toys are both safe and beneficial for children's development. Certain age groups may exhibit a stronger preference for toys with specific features, leading to higher utilization rates. To illustrate, younger children are typically more attracted to toys that offer sensory stimulation and only require basic motor skills. In contrast, older children regularly engage more with toys that appeal to their cognitive abilities and creativity. This study offers critical data for some previously under-studied toy categories that needed further research. Future research should build upon these findings by systematically investigating the interplay between toy features and age, ultimately leading to more informed age recommendations and toy design.

Children between ages 1 and 3 years old, regardless of toy category, benefit significantly from toys that require or promote fine motor skills, hand-eye coordination, and cognitive development through problem-solving and cause-and-effect learning. Toys for this age group encourage imaginative play, social skills, and creativity. Understanding these unique qualities and their appeal to different age groups and identifying the developmental skills necessary for children to fully engage with a toy can offer crucial insights for promoting their growth and learning while also ensuring their safety.

The study on the developmental appropriateness of children's toys benefits the *Guidelines* by providing updated insights into how children interact with various toys at different developmental stages. This helps fill in gaps of knowledge for several crucial categories of toys, such as: plush toys with electronic components, take-apart toys, figurines, manipulatives, musical instruments, and smart toys. By incorporating these findings, the CPSC can ensure that their *Guidelines* are more accurate and reflective of current child

development research. Additionally, this research helps manufacturers design more appropriate and safer toys.

Appendix A

Observation Coding Checklist

Appendix A
Observation Coding Check List

Toy 5: Figurine Toy 2

Allotted Playtime: 4 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Turns the figurine's head		
Moves the figurine's arms		
Makes the figurine stand		
Makes the figurine walk/run/jump and do other movement		
Puts the figurine in mouth		
Names characters		
Engages in pretend play with one or multiple figurines (e.g., creating interactions between figurines, creating dialogue between figurines, speaking for the figurines)		
Shows frustration with the toy		
Expresses interest in the figurine verbally		
Plays with 1 figurine, 2 figurines, 3-5 figurines, or 5+ figurines		Circle #: 1 2 3-5 5+

Other Items of Note:

Toy 4: Figurine Toy 1

Allotted Playtime: 3 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Holds the figurine(s)		
Holds/plays with both the prince and princess doll at the same time		
Tries to take off princess' bodice or skirt		Was child successful (circle): Yes No
Tries to put on princess' bodice or skirt		Was child successful (circle): Yes No
Turns the figurine's head		
Moves the figurine's arms		
Makes the figurine stand		
Makes the figurine walk/run/jump and do other movement		
Tries to put the tiara on the figurine's head		Was child successful (circle): Yes No *Tiara stays on and is horizontal = success*
Puts the figurine in mouth		
Shows frustration with the figurine		
Names characters		
Engages in pretend play with one or multiple figurines (e.g., creating interactions between figurines, creating dialogue between figurines, speaking for the figurines)		
Plays with 1 figurine or 2 figurines		Circle #: 1 2

Other Items of Note:

Toy 6: Manipulatives

Allotted Playtime: 3 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Holds the bubble tumbler in one hand		
Pulls the wand out of the tumbler		
Tries to blow into the wand to make bubbles		Was child successful (circle): Yes No
Tries to create bubbles by waving the wand		Was child successful (circle): Yes No
Dips the wand into the tumbler and tries to blow bubbles		Was child successful (circle): Yes No Does the child do this more than 1 time (circle): Yes No
Mouths/sucks wand		
Inadvertently puts wand in mouth when attempting to blow bubbles		
Shows frustration with the toy		
Appears to be afraid of the bubbles (i.e., fearful facial expression)		

Other Items of Note:

Toy 7: Musical Instrument Set

Allotted Playtime: 4 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Bangs the drum with hand, drumstick, or other toy to make a sound (does more than one time*)		
Strikes drumsticks against each other to make a sound (does more than one time*)		
Sits with drum between legs		
Shakes the maracas, castanet, or tambourine to make a sound (does more than one time*)		Which:
Uses multiple instruments at the same time to make a sound (does more than one time*)		Which:
Hits self with instrument(s) to make a sound (does more than one time*)		Which:
Puts the instrument(s) in mouth		Which:
Dances while making music		
Hums/sings along while using the toy		
Shows frustration with the toy		
Appears to be afraid of the instrument(s) (i.e., fearful facial expression)		

Other Items of Note:

Toy 2: Take-Apart Toy 1

Allotted Playtime: Up to 15 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Lays out the pieces		
Organizes pieces by color, shape, or other characteristic		
Looks at the instructions for assembling the different vehicles		
Connects pieces in order shown in the instructions		
Puts 2 pieces together		
Assembles at least one of the intended vehicles		Which:
Assembles more than one of the intended vehicles		Circle #: 2 3 Which:
Can pull two assembled pieces (of intended vehicle) apart		Did the child require help? (circle): Yes No
Puts toy pieces in mouth		
Shows frustration with the toy		
Loses interest in the toy		

Other Items of Note:

Toy 3: Take-Apart Toy 2

Allotted Playtime: Up to 15 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Lays out the pieces		
Organizes pieces by color, shape, or other characteristic		
Plane Assembly 1. Looks at the instructions 2. Follows sequence of instructions 3. Tries to connect/attach pieces but not successfully 4. Matches drill bit shape to shape of different pieces 5. Moves the forward slide switch on the drill to attach two pieces 6. Moves the reverse slide switch on the drill to detach two pieces 7. Able to grip and depress the trigger on the drill 8. Connects/attaches two pieces correctly 9. Connects/attaches three pieces correctly 10. Completely assembles plane	1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10._____	If child can correctly assemble part of the plane, estimate percentage assembled by circling the number of pieces assembled: A: 1 – 4 pieces B: 5 – 8 pieces C: 9 – 12 pieces D: 13 – 16 pieces E: 17 – 20 pieces F" 21 – 24 pieces
If assembles plane or portion of plane, uses drill to disassemble (e.g., take two or more pieces apart)		
Puts toy pieces in mouth		
Shows frustration with the toy		
Loses interest with the toy		

Other Items of Note:

Toy 1: Plush Toy with Electronic Component

Allotted Playtime: 5 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Pets the dog (does more than one time*)		
Walks dog by pulling on the leash without using the buttons		
Walks the dog by pressing the "walk" button on the handle of the green controller (does more than one time*)		
Makes the dog bark and wag tail by pressing the "bark/wag" button on the green controller (does more than one time*)		
Child walks with the dog while pressing on the "walk" button on the green controller		
Puts part of the toy in mouth		Which:
Appears to be afraid of the toy (i.e., fearful facial expression)		
Shows frustration with the toy		

*Performing action more than one time is an attempt to identify intentional behavior versus accidental

Other Items of Note:

Toy 8: Smart Toy 1

Allotted Playtime: 5 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Slides on/off switch more than once?		
Pets/strokes/hugs the dinosaur		
Pats the top of the dinosaur to make it sit (does more than one time*)		
Puts play food in the dinosaur's mouth (does more than one time*)		
Puts their finger in the dinosaur's mouth		
Waves hand in front of dinosaur's face to make it jump (does more than one time*)		
Puts toy pieces in their mouth		
Appears to be afraid of the toy (i.e., fearful facial expression)		
Shows frustration with the toy		

*Performing action more than one time is an attempt to identify intentional behavior versus accidental

Other Items of Note:

Toy 9: Smart Toy 2

Allotted Playtime: Up to 10 minutes Actual Playtime: _____

Behavior	Yes (check if yes)	Notes
Slides on/off switch		
Twists the dials (without pressing Go) to choose a direction, music, or sound effect (does more than one time*)		How Many Dials: 1 2 3 4 5 Which Dials:
Presses the Go Button (without twisting dials)		Repeatedly? (circle): Yes No:
Twists the dials (to choose a direction, music, or sound effect) **AND presses the Go button** (does more than one time*)		How Many Dials: 1 2 3 4 5 Presses Go repeatedly without changing initial sequence they selected (circle): Yes No Changes dials then presses Go again? (circle): Yes No
Adjusts the volume knob at the front of the animal		Repeatedly? (circle): Yes No
Watches the animal as it lights up/moves/sings and then reacts positively to the animal's action		Shows excitement (circle all that apply): Jumps up and down Positive facial expressions Claps hands Walks toward it to animal
When the animal stops, child dances to the "code" song		
Child is able to program the animal so that it moves through the course from start to finish line		
Puts toy in mouth		
Appears to be afraid of the toy (i.e., fearful facial expression)		
Shows frustration with the toy		

*Performing action more than one time is an attempt to identify intentional behavior versus accidental

Other Items of Note:

Appendix B

Caregiver Questionnaire

Appendix B
Draft Caregiver Questionnaire

Introduction

We are trying to understand the types of things you consider when selecting toys for your child. That is, is the toy appropriate for your child, would your child enjoy playing with this toy, and what features would be most/least appealing for your child. We would also like to know where you look for information about the toys when you are thinking about making a purchase, and where you purchase the toys. Understanding the information you use when deciding which toys to buy will inform toy manufacturers', retailers', and child development professionals' decisions with respect to the types of information they make available to consumers and the most effective methods for sharing this information.

The questions focus on 9 selected toys and asks how you think your child is likely to interact with each. You will have some time to actually look at and interact with each of the toys when completing the questions about the toys so you can provide informed responses. During Session 1 you will interact with and complete the questionnaires for 4 toys and during Session 2 you will interact with and complete the questionnaires for 5 toys.

Toy 1: Plush Toy with Electronic Components

1. Is the size of the toy appropriate for your child?
    a. No
        If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?
        _____
    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
        If no, which parts of the toy are not safe? _____
    b. Yes

3. Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be scared by the toy in any way?
    a. No
    b. Yes
        If yes, what features might scare your child? _____

5. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
        If yes, what features might frustrate your child? _____

6. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

7. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

8. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____months/years (circle)

    What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

9. Would you purchase this toy for your child (at his/her current age)?
    a. No
    b. Yes

10. Do you think your child will press the buttons on the green controller?
    a. No
    b. Yes, press one button
    c. Yes, press both buttons

11. Do you think your child will figure out the connection between pressing the different buttons and the dog's response or actions?
    a. No
    b. Yes

12. Will your child walk alongside the dog while using the controller/pressing the button that causes the dog to walk?
    a. No
    b. Probably not
    c. Maybe/Not sure
    d. Probably
    e. Yes

13. Would you show your child how to operate the remote control before giving it to your child to use independently?
    a. No
    b. Yes, I would press both buttons, but not describe the function
    c. Yes, I would press one or both of the buttons and/or describe the function

Toy 2: Take-Apart Toy 1

1. Is the size of the toy appropriate for your child?
    a. No
    If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, too heavy)?
    _____
    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
    If no, which parts of the toy are not safe? _____
    b. Yes

3. Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
    If yes, what features might frustrate your child? _____

5. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

6. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

7. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

    What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

8. Would you purchase this toy for your child (at his/her current age)?
    a. No
    b. Yes

9. For your child, do you think the number of pieces in the set is?
    a. Too few
    b. Just Right
    c. Too Many

10. Do you think your child will have the fine motor skills to put the different pieces together?
    a. No
    b. Will try to, but not successfully
    c. Yes

11. Do you think your child will be able to put together any of the vehicles?
    a. No
    b. Yes, partially assemble 1 vehicle
    c. Yes, fully assemble 1 vehicle
    d. Yes, partially assemble 2 or more vehicles
    e. Yes, fully assemble 2 or more vehicles

12. Once the vehicle is assembled, do you think your child would be able to take apart the pieces?
    a. No, will not be able to disconnect the pieces
    b. Yes

13. Do you think your child would be motivated to take the assembled vehicle apart?
    a. No, will continue using it assembled
    b. Yes

14. How would you present this toy to your child?
    a. Completely unassembled, give the parts as they are
    b. Assembled partially
    c. Assembled fully

15. Would you need to show your child how to play with any parts of the toy before giving it to him or her to play with independently? (Select all that apply)
    a. No, I would not demonstrate how to use the toy before giving it to my child
    b. Yes, I would show them how to connect the some of the larger part
    c. Yes, I would show them how to put on the smaller parts
    d. Yes, I would build the plane/train/rocket

Toy 3: Take-Apart Toy 2

1. Are the size of the toy parts appropriate for your child?
    a. No
       If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?
       _____
    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
       If no, which parts of the toy are not safe? _____
    b. Yes

3. Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
       If yes, what features might frustrate your child? _____

5. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

6. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

7. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

   What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

8. Would you purchase this toy for your child (at his/her current age)?
    a. No
    b. Yes

9. For your child, do you think the number of pieces in the set is?
    a. Too few
    b. Just Right
    c. Too Many

10. Do you think your child will be able to put the plane pieces together *without any help*?
    a. My child would not be able to put the pieces together
    b. My child would be able to put 1 or 2 pieces together
    c. My child would be able to assemble half of the plane
    d. My child would be able to build most of the plane
    e. My child would be able to build the entire plane

11. Do you think your child will be able to hold the drill and pull the trigger?
    a. No
    b. Will try to, but not successfully
    c. Yes

12. Does your child need to be shown how to use the drill?
    a. No
    b. Yes

13. Does your child have the fine motor skills needed to hold 2 or more toy pieces and a screw in place while at the same time operating the drill to join the pieces together?
    a. No
    b. Will try to, but not successfully
    c. Yes

14. Do you think your child will notice the different shapes for the various drill bits and know to change the drill bit for the different-shaped toy pieces?
    a. No
    b. Yes

15. Assuming the vehicle is assembled, would your child be able to manually take apart the pieces by unscrewing them with their fingers?
    a. No
    b. Yes

16. Would your child be able to use the drill in reverse setting on his/her own to effectively separate the pieces?
    a. No
    b. Yes

17. How would you present this toy to your child?
    a. Completely unassembled, give the parts as they are
    b. Assembled partially
    c. Assembled fully

18. Would you need to show your child how to play with any parts of the toy before giving it to him or her to play with independently? (Select all that apply)
    a. No, I would give the toy to my child and see how they play with it first.
    b. I would show how to hold the drill correctly; in a pistol grip with finger over the activation button
    c. I would show how to move the Forward and Reverse button on the top of the drill
    d. I would show how to follow the directions to select toy pieces to put together
    e. I would show how to select the right drill bit for differently shaped yellow connector pieces
    f. I would show how to align the pieces and drill them together

Toy 4: Figurine Toy 1

1. Is the size of the toy appropriate for your child?
    a. No
       If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?
       _____
    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
       If no, which parts of the toy are not safe? _____
    b. Yes

3. When you give your child the toy, would you include the tiara?
    a. No
    b. Yes

4. Does this toy have an overall appearance (color, details, and design) that would appeal to your child?
    a. No
    b. Yes

5. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
       If yes, what features might frustrate your child? _____

6. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

7. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

8. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

   What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

9. Would you purchase this toy for your child (at his/her current age)?
   a. No
   b. Yes

10. Do you think your child will be able to move the arms and other body parts of these figurines?
   a. No
   b. Yes

11. Do you think your child will engage in pretend play with one or both figurines?
   a. No
   b. Yes, only princess
   c. Yes, only prince
   d. Yes, both princess and prince

12. Do you think your child will be able to undress the princess by removing the tiara, bodice/dress, and overskirt? (Select all that apply)
   a. No
   b. Yes, my child will be able to remove the tiara
   c. Yes, my child will be able to remove the bodice/dress
   d. Yes, my child will be able to remove the overskirt

13. Do you think your child will be able to put the tiara, bodice/dress, and overskirt on the figure? (Select all that apply)
   a. No
   b. Yes, my child will be able to put the tiara on the figure's head
   c. Yes, my child will be able to put the bodice/dress (two parts of the skirt) on the figure
   d. Yes, my child will be able to put the overskirt on the figure

14. Do you think your child will be able to make the figurines sit and stand?
   a. No
   b. Yes

15. Would you need to show your child how to play with any of the figurines before he/she uses them? (Select all that apply)
   a. No
   b. Yes, I would show them how to move the head and arms
   c. Yes, I would demonstrate pretend play with the figures
   d. Yes, I would show them how to remove the accessories and put them back on the figure.

Toy 5: Figurine Toy 2

1. Is the size of the toy appropriate for your child?
    a. No
       If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?
       _____
    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
       If no, which parts of the toy are not safe? _____
    b. Yes

3. Does this toy have an overall appearance (color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
       If yes, what features might frustrate your child? _____

5. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

6. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

7. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

   What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

8. Would you purchase this toy for your child (at his/her current age)?
    a. No
    b. Yes

9. Do you think your child will be able to move the arms and heads of these figurines?
    a. No
    b. Yes

10. Do you think your child will make up stories and scenarios involving these figurines?
    a. No
    b. Yes

11. Would you need to show your child how to play with the figurine playset? (Select all that apply)
    a. No, my child would not need any help
    b. Yes, I would need to show them how to move the head and arms
    c. Yes, I would need to show them how to pretend play with the figures

Toy 6: Manipulatives

1. Is the size of the toy (or its parts) appropriate for your child to use?
    a. No

        If no, which parts of the toy are not appropriately sized (wand or tumbler), and why (e.g., too big, or too small, or too heavy)?

        _____

    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No

        If no, which parts of the toy are not safe? _____

    b. Yes

3. Does this toy have an overall appearance (color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes

        If yes, what features might frustrate your child? _____

5. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

6. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy,* what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

7. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____months/years (circle)

    What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

8. Would you purchase this toy for your child (at his/her current age)?
    a. No
    b. Yes

9. Do you think your child will be able to dip the wand into the bubble solution?
    a. No
    b. Yes

10. Do you think your child will be able to successfully blow bubbles using this toy on his or her own?
    a. No
    b. Yes

11. Would you need to help your child use the bubble tumbler? (Select all that apply)
    a. Yes, I would dip the wand and blow bubbles to show my child how it is done
    b. Yes, I would dip the wand in bubbles and hold the wand for my child while they blow bubbles
    c. Yes, I would dip the wand in bubbles and give the wand to my child.
    d. No, I would give the bubble tumbler and wand to my child so he/she can use it on their own.

Toy 7: Musical Instrument Set

1. Overall, are the instruments in this set an appropriate size for your child?
    a. No
    If no, which instruments are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?
    _____
    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
    If no, which parts of the toy are not safe? _____
    b. Yes

3. Are there any instruments in the set that you would not allow your child to play with?
    a. No
    b. Yes
    If yes, which one(s): _____

4. Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?
    a. No
    b. Yes

5. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
    If yes, what features might frustrate your child? _____

6. Do you think your child will be scared by any of the sounds produced by the instruments?
    a. No
    b. Yes
    If yes, what instrument(s) might scare your child? _____

7. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

8. For this entire toy, on a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

9. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

    What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

10. Would you purchase this toy for your child (at his/her current age)?
    a. No
    b. Yes

11. For your child, do you think the number of instruments in the set is?
    a. Too few
    b. Just Right
    c. Too Many

12. Do you think your child will shake the tambourine stick to produce a sound without you showing them how to do it?
    a. No
    b. Yes

13. Do you think your child will shake the mini maracas to produce a sound without you showing them?
    a. No
    b. Yes

14. Do you think your child will shake the castanet to produce a sound without you showing them?
    a. No
    b. Yes

15. Do you think your child will hit the drum with the drum stick(s) to produce a sound without you showing them?
    a. No
    b. Yes

16. Would you need to show your child how to play with any of the instruments before giving it to your child? (Select all that apply)
    a. No
    b. Yes, I would shake the tambourine stick
    c. Yes, I would shake the maracas
    d. Yes, I would shake the castanet
    e. Yes, I would play the drum with a drumstick (or drumsticks)

Toy 8: Smart Toy 1

1. Is the size of the toy appropriate for your child?
    a. No

        If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?

        _____

    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No

        If no, which parts of the toy are not safe? _____

    b. Yes

3. Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be scared by the toy in any way?
    a. No
    b. Yes

    If yes, what features might scare your child? _____

5. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes

        If yes, what features might frustrate your child? _____

6. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

7. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

8. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

   What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

9. Would you purchase this toy for your child (at his/her current age)?
   a. No
   b. Yes

10. Do you think your child will try to "feed" the dinosaur?
    a. No
    b. Yes

11. Do you think your child will be able to turn on the toy?
    a. No
    b. Yes

12. Do you think your child will figure out that waving their hand in front of the dinosaur's head will cause the dinosaur to jump?
    a. No
    b. Yes

13. Do you think that your child will figure out that patting the top of the dinosaur's head will cause it to sit?
    a. No
    b. Yes

14. Would you show your child how to operate the dinosaur before giving it to your child to use independently? (Select all that apply)
    a. No
    b. Yes, I would turn on the toy
    c. Yes, I would put the food into the dinosaur's mouth
    d. Yes, I would wave my hands and pat the dinosaur on top of the head
    e. Yes, I would verbally explain what the toy can do

Toy 9: Smart Toy 2

1. Is the size of the toy appropriate for your child?
    a. No
    If no, which parts of the toy are not appropriately sized, and why (e.g., too big, or too small, or too heavy)?

    _____

    b. Yes

2. Do you think this toy is safe for your child to play with?
    a. No
    If no, which parts of the toy are not safe? _____
    b. Yes

3. Does this toy have an overall appearance (size, color, details, and design) that would appeal to your child?
    a. No
    b. Yes

4. Do you think your child will be scared by the toy in any way?
    a. No
    b. Yes
    If yes, what features might scare your child? _____

5. Do you think your child will be frustrated by the toy in any way?
    a. No
    b. Yes
    If yes, what features might frustrate your child? _____

6. Rate your child's interest in the toy, on a scale of 1 – 5, with 1 = *will not play with this toy* and 5 = *this toy would be a favorite*? (Select one option)
    1. Will not play with this toy
    2. Will play with it for a short time; then, likely will forget about it or disregard it
    3. Will play with it here and there, but the toy would not be a favorite
    4. Will play with it quite a bit; and would come back to play with it over time
    5. This toy would be a favorite, compared to other toys

7. On a scale of 1- 5 with 1 = *Too Difficult* and 5 = *Too Easy*, what do you think about the difficulty level of this toy for your child? (Select one option)
    1. Too Difficult
    2. Somewhat Difficult
    3. Manageable
    4. Somewhat Easy
    5. Too Easy

8. Overall, for what age do you think this toy is best suited? (*open-ended question*) _____ months/years (circle)

   What is it about this toy or its features that makes it appropriate for this age? (*open-ended question*) _____

9. Would you purchase this toy for your child (at his/her current age)?
   a. No
   b. Yes

10. Do you think your child will understand that he/she needs to press the Go button on front of the animal to make it move?
    a. No
    b. Yes

11. Do you think your child will be physically able to turn/twist the dials on the segments with their fingers to have the animal go in different directions or perform different functions?
    a. No
    b. Yes

12. Do you think your child will be able to figure out that turning the dials causes and the animal's actions (e.g., turn right or left)?
    a. No
    b. Yes

13. Do you think your child will be able to slide the on/off switch on the underside of the animal?
    a. No
    b. Yes

14. Would you show your child how to operate the animal before giving it to your child to use independently? (Select all that apply)
    a. No
    b. Yes, I would press the "go" button at the front of the animal
    c. Yes, I would turn/twist the dials on the segments and then press the "Go" button, but do not discuss how this affects the animal's movement
    d. Yes, I would turn/twist the dials on the segments and then press the "Go" button and I would discuss what each does