The European Educational Researcher

http://www.eu-er.com

Same Toy, Different Play: Investigating Adults' Ratings of the Cognitive Benefits of Stereotypically Gendered Toys

Nicola Katharina Kolb

Institut für Didaktik und Ausbildungsforschung in der Medizin, Ludwig-Maximilians-Universität München, Munich, Germany

Frank Niklas

Department of Psychology, Ludwig-Maximilians-Universität München, Munich, Germany

Matthias Stadler

Institut für Didaktik und Ausbildungsforschung in der Medizin, Ludwig-Maximilians-Universität München, Munich, Germany

Abstract: Gender-stereotype toys play a crucial role in early childhood development, offering opportunities for learning and skill-building, in specific cognitive skills. This study examines how adults perceive the cognitive skills promoted by gender-stereotyped toys and explores whether these perceptions align with traditional gender norms. Using an online survey, 176 participants (age from 18 to 94) evaluated toys previously classified as boys', girls', or gender-neutral based on their potential to foster seven cognitive skills: assertiveness, creativity, mathematical skills, spatial reasoning, social behavior, technical skills, and verbal skills. Toys were classified based on previous research and established criteria. The results revealed significant differences in adults' subjective ratings. Boys' toys were associated with assertiveness and technical skills, while girls' toys were linked to creativity, social behavior, and verbal skills. However, no significant differences were found for mathematical skills or spatial reasoning, suggesting potential shifts in gendered perceptions. The study highlights the persistence of gender stereotypes in toy evaluations and emphasizes the importance of providing diverse play opportunities to foster a broad range of cognitive skills in all children. In future studies, the discrepancy between perceptions and actual developmental outcomes should be analyzed in depth, e.g., observing children's interaction with toys.

Keywords: Childhood Play; Cognitive Development; Cognitive Skills; Gender Norms; Gender-stereotyped Toys; Toy Evaluation.

Introduction

The cognitive development of children is a central focus in educational research and social discourse. Caregivers and educators support this development through a variety of activities, including reading, crafts, music, and play. Among these, toys play a particularly important role, serving as tools meant to enable children to engage in exploratory, imaginative, and skill-building activities. Toys have been shown to promote a variety of cognitive skills such as verbal abilities, spatial reasoning, and social behavior (Wachs, 1985; Wolfgang & Stakenas, 1985). However, the very same toy may be used in completely different ways depending on the caregivers' expectations, which may well be influenced by societal norms rather than the toy's mere functionality.

This paper examines adults' perceptions of the role of toys in developing children's cognitive skills. It also explores how these perceptions are shaped by the categorization of toys as either gender-stereotypical or gender-neutral. For example, Batman figures are often considered to be boys' toys, while dolls are considered to be girls' toys (Murnen, 2018). In contrast, toys such as doctor's kits are often considered gender-neutral (Blakemore & Centers, 2005). By analyzing adults' subjective evaluations of gendered, but functionally similar toys, this study aims to shed light on how societal gender norms influence assumptions about toys and their educational value.

Although cognitive abilities can be learned with toys, the ability that can be learned depends primarily on the toy, that is being played with and how it is integrated in play. For example, social behavior might be learned with a doll, whereas the Batman figure tends to demonstrate a play pattern that teaches assertiveness (Murnen, 2018), even though the two toys are functionally very similar. This play pattern is largely modeled by parents based on their assumptions about the toys and the children they interact with (Francis, 2010).

The purpose of this study is to examine how adults assess what can be learned with gender-stereotyped toys that are functionally similar and whether differences between boys' toys and girls' toys can be identified.

Toys as Pedagogical Tools

In order to understand how toys contribute to children's cognitive development and how these contributions may differ based on gender perceptions, it is important to clarify the conceptual underpinnings of 'play' and 'toys' as pedagogical tools. Definitions of 'play' and 'games' vary due to different research perspectives and contexts (Walther, 2003). For the conceptualization of this study, the term 'play' is understood as an activity in childhood that is both individual and personal and is seen as meaningful in shaping one's own reality (Mogel, 2008).

In this context, play arises from the impact of a stimulus from the environment on the child, which may be, for example, a means of play. During play, the child and the environment influence each other, resulting in a unity of action (Mogel, 2008). Through play, experiences are expanded and the repertoire of behavior is increased, which in turn is a prerequisite for further learning processes that can be facilitated by the means of play (Retter, 1979). The term "means of play," was introduced by Mieskes (1974) as an umbrella term for all objects and materials that can be associated with and used for the activity of 'play'. Through the partial term 'means', Mieskes (1974) assigns it to pedagogy and in particular to pedagogical aids (Mehringer & Waburg, 2020).

Retter (1979) distinguishes five groups of means of play comprising toys, regulation games, play materials, occupational materials, and play equipment and ride-on vehicles. In the context of this study, 'toys' and 'regulation games' will be discussed, as they are the main means of play for kindergarten children. Retter (1979) uses the term 'toy' and again divides it into two further sub-groups, in which the toy is either a single object or contains a complete situation. Toys range from single objects, such as dolls and cars, to complex sets, such as dollhouses or farms, and vary widely in appearance, quality, and price (Keppner, 2015).

It is important to remember that toys can also influence the content and form of play, depending on the type of toy (Mogel, 2008). This influence can be managed in a way that promotes children's individual development. According to Mogel (2008) and in order to allow children to develop through play this, care should be taken to ensure that children are not coerced in their choice of toys, but that they can choose which toys they want to play with. A qualitative interview study by Borde (2020) shows that when selecting toys, parents pay attention to the fact that toys are primarily used for learning.

In one interview, a mother described, that learning with a toy should preferably lead to the child engaging with this toy independently and being creative (e.g., puzzles or coloring books). In connection with learning with toys, it is also evident that parents do not attribute the learning effect to specific toys, but rather generalize this effect (Retter, 1973). Consequently, parents are often not concerned with whether a toy is classified as an educational toy, but rather with whether the play value of a toy adds value for the child, and whether the child gains new knowledge.

Gender Differences in Toy Choice

Toys are more than recreational objects; they are tools for cognitive, social, and motor development. The learning opportunities they afford are shaped by societal gender norms, which influence the types of toys children are encouraged to play with and, consequently, the skills they practice and refine. From infancy to around age ten, children tend to prefer toys culturally associated with their gender, such as dolls for girls and construction sets or vehicles for boys (Mogel, 2008; Roopnarine, 1986). While these preferences do not always translate into stark differences in observed play behaviors, they can nonetheless direct children toward specific cognitive domains through repeated engagement.

In this study, gender is defined as encompassing both biological characteristics ("sex") and socially constructed roles and expectations ("gender") (Pryzgoda & Chrisler, 2000). Since the focus here is on social attribution, gender is the primary analytical lens. It is also necessary to distinguish between gender-typical and cross-gender play (Brown et al., 2020). Children internalize gender norms through interactions with family, peers, and the broader cultural environment, using them to negotiate their identities in varied contexts (Tesolin & Lo, 2023). Although the present study adopts a binary framework for analytic clarity, we acknowledge the existence of non-binary identities; however, for the age range relevant to the adult survey, binary role expectations remain predominant (cf. Salinas-Quiroz & Sweder, 2023).

Parents play a particularly important role in how children come to understand their own gender identity, as they have the ability to shape their children's behavior by endorsing certain gender stereotypes (e.g., girls wear pink, and boys play with trucks). A meta-analysis by Todd et al. (2018) found that boys play more with boys' toys (manipulative toys, cars, and action figures), while girls play more with girls' toys (dolls, stuffed animals, and educational activities). Notably, however, there are consistent findings of parallels between monkeys and humans regarding sex differences in toy preferences (e.g., Hassett et al., 2008; Hines & Alexander, 2008), suggesting an influence of hormones on play behavior in addition to societal norms.

Gender-Stereotyped Toys and Cognitive Skills

Building upon the theoretical framework of gendered toy preferences and their potential implications for cognitive development, the present study investigates adults' subjective evaluations of gender-stereotyped toys with regard to their perceived educational value. While differences in toy preferences along gender lines are well established in the

literature, their relevance extends beyond mere recreational behavior, potentially influencing the development of a wide range of cognitive abilities.

Cognitive development is understood here as the age-related, systematic progression of mental processes from infancy through adulthood (Galotti, 2017). Play constitutes a critical medium for fostering cognitive growth, as evidenced by Lai et al. (2018) and Wachs (1985). Halpern (2004) argues that there is no empirical support for the notion that one gender is innately more intelligent than the other. Instead, cognitive competencies can be developed through targeted learning opportunities and meaningful play experiences. In this context, the study focuses on eight key domains of cognitive development defined in the theory of Galotti (2017): perception, attention, memory, knowledge representation, language, reasoning, academic skills, and social cognition. Each domain is examined in relation to the types of toys typically associated with gender stereotypes.

Perception refers to the processing and interpretation of sensory input, including visual and auditory stimuli (Galotti, 2017). Attention denotes the selective allocation of cognitive resources to relevant tasks, while memory encompasses both short- and long-term mechanisms for information encoding, storage, and retrieval. Empirical evidence suggests that toys commonly classified as gender-neutral, such as puzzles and memory games (Blakemore & Centers, 2005), contribute positively to the development of attention and memory in both male and female children (Newman, 1990; Wolfgang & Stakenas, 1985). Additionally, construction toys have been shown to support verbal development, independent of gender (Wolfgang & Stakenas, 1985).

Reasoning abilities, including spatial cognition and creative problem-solving, are essential components of cognitive development. Research has shown that boys tend to perform better on visuospatial tasks, such as mental rotation, from early childhood onward (Halpern, 2004, 2012; Wong & Yeung, 2019). Engagement with construction toys - often perceived as stereotypically masculine - and puzzles has been found to enhance spatial reasoning and mental transformation skills (Casey et al., 2008; Jirout & Newcombe, 2015; Levine et al., 2012). These abilities, in turn, are recognized as important predictors of later achievement in STEM disciplines (Uttal et al., 2013). In contrast, findings regarding the relationship between creativity and toy type are less conclusive. While some studies report that toys traditionally marketed to girls may foster imaginative play and creative thinking, others find no significant association (Blakemore & Centers, 2005; Miller, 1987).

Academic competencies, including proficiency in mathematics, science, and technical subjects, are also shaped by play experiences and often reflect gendered patterns of interest and performance. Although boys tend to demonstrate higher achievement in mathematics and engineering-related tasks, these discrepancies can be addressed through targeted pedagogical strategies and parental involvement (Halpern, 2004; Master et al., 2021). Toys that are not explicitly gendered, such as board games and puzzles, have been identified as effective in promoting mathematical thinking across genders (Liben et al., 2018).

Finally, social cognition encompasses emotional intelligence, empathy, and interpersonal behavior. Gender-stereotyped toys play a significant role in shaping these competencies. Assertiveness, typically associated with boys, is often reinforced through play with action figures and superhero characters, whereas nurturing behaviors, more commonly associated with girls, are fostered through play with dolls and domestic-themed toys (Findlay et al., 2006; Murnen, 2018; Wong & Yeung, 2019). Such toys appear to promote distinct aspects of social-emotional development: dolls, for example, may enhance children's ability to engage in comforting behaviors and emotional perspective-taking (Li & Wong, 2016), while action-oriented toys can encourage the development of self-confidence and leadership skills.

Research Questions

This study explores the intersection of toy use, gender imprinting, and the expected value of toys for the development of specific cognitive skills through a parental survey. Building on previous research that has examined toys as educational tools and their classification as gender-stereotypical or gender-neutral, this study aims to provide new insights, particularly in the area of gender-stereotyped toys. The research focuses on the toy choices of adults, with a central question being whether toys are consciously assigned to specific genders in the selection process, and whether such assignments reflect differentiated expectations regarding the development of cognitive abilities.

A distinctive feature of this study is the use of toys that are clearly gendered yet functionally similar. For example, comparisons are made between a doll and a Batman figure, or between a pink and a blue version of the same puzzle. This design isolates gendered perceptions and assumptions by ensuring that the educational potential of the toys is nearly identical from a functional perspective. The study hypothesizes that the perceived educational value of the toys is influenced more by the adults' assumed gender-specific play patterns rather than by intrinsic differences in the toys themselves.

Using an Internet-based survey, the study examines adults' subjective assessments of how boys' and girls' toys may promote specific cognitive skills. Cognitive attributes considered include assertiveness, creativity, mathematical skills, spatial reasoning, social behavior, technical skills, and verbal skills.

The central research question is: *How do adults perceive the ability of gendered toys to promote cognitive skills, and how are these perceptions influenced by gendered play assumptions?* The following hypotheses are proposed to address this question:

H1: Adults will rate boys' toys as more conducive to the development of:

- Assertiveness (H1.1)
- Mathematical skills (H1.2)
- Spatial reasoning (H1.3)
- Technical skills (H1.4)

H2: Adults will rate girls' toys as more conducive to the development of:

- Creativity (H2.1)
- Social behavior (H2.2)
- Verbal skills (H2.3)

By isolating the functional similarity of toys and focusing on gendered assumptions about play patterns, this study provides a nuanced framework for understanding how gender norms influence perceptions of the educational value of toys.

Method

Sample

The sample included 177 participants, but one was excluded for being under 18 years old, as the prerequisite for this study was to be 18 years and older, resulting in 176 valid responses. They were recruited from family, friends and different WhatsApp groups (e.g., university or youth group). Potential subjects received a link with a short text and a request to forward the text with the link. Participants ranged in age from 18 to 94 years (M= 37.5, SD= 16.9). A total of 128 women (72.7%), 47 men (26.7%), and 1 non-binary respondent (0.6%) completed the questionnaire. All participants were given the same online questionnaire. Within the questionnaire only the order of the picture pairs varied, i.e., which picture of the toy pair was shown first and which later. The data collection was in accordance with the ethical guidelines of the conducting university.

Procedure

Participants accessed the questionnaire (hosted on soscisurvey.com; Leiner, 2019) through a link shared via WhatsApp or email. At the beginning of the questionnaire, participants were informed about the purpose and timeframe of the study. After consenting to the privacy policy, the participants were able to start working on the questionnaire. After collecting demographic data, i.e., gender, age, participants were shown a picture of a toy that was randomly selected from a pair of functionally similar toys, consisting of a boys' toy and a girls' toy. For each toy pair, one of the two toys was randomly assigned to be shown in the first part of the study, while the other toy of the same pair was shown in the second part of the study. Thus, each participant saw both toys from each pair, but in different parts of the study. The toys shown were selected based on the study by Blakemore and Centers (2005) and were appropriate for children between approximately three and seven years of age, based on the toy's age recommendation. In every toy pair, each toy had a similar age recommendation. An example toy pair was a red plush remote control race car as a boys' toy and a red Peppa Pig remote control car as a girls' toy. The images were provided free of charge by the company mytoys.de (the full set of images can be found at https://osf.io/jn2ew/). Below the picture, the question 'What can children learn with this toy?' was posed and the participants were asked to give an assessment of the seven defined cognitive skills (assertiveness, creativity, mathematical skills, spatial reasoning, social behavior, technical skills, and verbal skills, always in alphabetical order in German). The cognitive skills were selected based on the already explained theory of cognitive development by Galotti (2017). This procedure was repeated for ten additional toy pairs.

The order of the toy pairs was randomized for each participant. Across participants, the assignment of toys within each pair to the first versus the second part of the study was counterbalanced, so that each toy appeared equally often in the first and in the second part. Each toy was shown only once per participant per part of the study.

The first block of questions was followed by the second part, in which the second toy of a toy pair was shown. For instance, if in the first block of questions a boys' toy was shown, now the paired girls' toy was shown. This was followed by the question 'For children of which gender is this toy more appropriate?'. Participants were then asked to use a slider to assign the toy shown to a gender (i.e., male, neutral or female). The toy order was randomized. At the end of the study, all participants were shown both toys of the paired toys (girls' and boys' version of the toy) only once, but in a different order to avoid order effects.

Figure 1

Girl's toy of a toy pair

Figure 2

Boy's toy of a toy pair

Meausurments

Cognitive skills. Participants rated seven cognitive skills—assertiveness, creativity, mathematical skills, spatial reasoning, social behavior, technical skills, and verbal skills—for each toy shown in the first part of the study. Below each toy picture, the question "What can children learn with this toy?" was posed, along with the skills listed (in alphabetical order in German). A 5-point Likert scale (1 = "low," 5 = "high") was used to rate how well each skill could be learned with the toy. Each skill was rated for ten different toys, and the responses were aggregated

into two variables: one summarizing ratings for boys' toys and the other for girls' toys, based on the toys randomly assigned to participants.

Manipulation check – gender. In the second part of the study, participants assigned a gender to each toy shown. Below each toy image, the question "For children of which gender is this toy more appropriate?" appeared, along with a slider. The slider allowed participants to rate the toy on a scale from 1 ("male") to 3 ("neutral") to 5 ("female"). This procedure was repeated for ten different toys.

Statistical Analysis

To perform the statistical analyses, the data were prepared using RStudio (RStudio Team, 2021) and the variables to be aggregated were formed. The corresponding calculations were performed using RStudio (RStudio Team, 2021) and Jamovi (The jamovi project, 2019).

Paired t-tests were used to test for perceived differences in the toys (girls' toys and boys' toys) and perceived trained cognitive abilities (assertiveness, creativity, mathematical skills, spatial reasoning, social behavior, technical skills, and verbal skills). If the normal distribution of data was not given, a Wilcoxon rank test was used (Wilcox, 2017). A t-test was also used to test the manipulation regarding the toys. The alpha level was set at 5%.

Results

Descriptive Statistics

Table 1 reports the means, standard deviations, range, and p-value of the Shapiro-Wilk test for all variables relevant to the hypotheses. For the means, it is noticeable that there are higher values for creativity in boys' toys (M = 3.11) and in girls' toys (M = 3.41) than for other cognitive abilities. The variables 'assertiveness' (M = 2.33) and 'technical skills' (M = 2.65) were rated higher for boys' toys than for girls' toys. In contrast, the variables 'creativity' (M = 3.41), 'mathematical skills' (M = 2.14), 'spatial reasoning' (M = 3.02), 'social behavior' (M = 3.33), and 'verbal skills' (M = 3.09) were rated higher in girls' toys compared to boys' toys.

Manipulation Check

To test the manipulation, participants were asked to indicate which toy they would assign to which gender. The results of the descriptive statistics are shown in Table 2. Boys' toys yielded mean scores ranging from 2.44 (toy pair 9: boys' toys) to 3.70 (toy pair 8: boys' toys), whereas girls' toys had mean scores ranging from 2.71 (toy pair 9: girls' toys) to 3.40 (toy pair 8: girls' toys). The corresponding range for all toys was used from 1-5 except for toy pair 8: boys' toy with 2-5.

Table 1

Descriptive Statistics: Cognitive Abilities

Variable	M	SD	Range	$p_{Shapiro-Wilk}$
Assertiveness_B	2.33	0.78	1-4.25	.005
Assertiveness_G	2.22	0.79	1-4.33	< .001
Creativity_B	3.11	0.80	1.20-5	.080
Creativity_G	3.41	0.78	1.25-5	.004
Mathematical Skills_B	2.08	0.72	1-5	< .001
Mathematical Skills_G	2.14	0.74	1-4.5	< .001
Spatial Reasoning_B	2.95	0.83	1-5	.334
Spatial Reasoning_G	3.02	0.82	1-5	.061
Social Behaviour_B	2.94	0.81	1-4.75	.159
Social Behaviour_G	3.33	0.80	1.29-5	.079
Technical Skills_B	2.65	0.80	1-5	.088
Technical Skills_G	2.53	0.77	1-4.5	.032
Verbal Skills_B	2.82	0.89	1-5	.067
Verbal Skills_G	3.09	0.91	1-5	.129

Note. _B = Boys' toys; _G = Girls' toys; M = Mean; SD = Standard deviation

Table 2

Descriptive Statistics: Manipulation Check

Variable	M	SD	Variable	M	SD
Toy Pair 1: Boys‘ toy	2.89	0.89	Toy Pair 6: Boys‘ toy	2.95	1.26
Toy Pair 1: Girls‘ toy	2.99	0.96	Toy Pair 6: Girls‘ toy	2.73	1.44
Toy Pair 2: Boys‘ toy	3.14	1.07	Toy Pair 7: Boys‘ toy	3.37	1.43
Toy Pair 2: Girls' toy	3.12	1.07	Toy Pair 7: Girls‘ toy	3.27	1.32
Toy Pair 3: Boys' toy	3.37	0.79	Toy Pair 8: Boys‘ toy	3.70	0.81
Toy Pair 3: Girls' toy	3.23	0.70	Toy Pair 8: Girls‘ toy	3.40	0.98
Toy Pair 4: Boys‘ toy	3.19	1.21	Toy Pair 9: Boys‘ toy	2.44	0.75
Toy Pair 4: Girls‘ toy	3.28	1.15	Toy Pair 9: Girls‘ toy	2.71	0.95
Toy Pair 5: Boys‘ toy	3.64	1.46	Toy Pair 10: Boys' toy	2.96	1.57
Toy Pair 5: Girls‘ toy	3.35	1.40	Toy Pair 10: Girls' toy	3.18	1.57

Note. M = Mean; SD = Standard deviation

In order to check whether there were differences in the assessment among the toy pairs with regard to the assignment to gender, a T-test was calculated. However, this was not significant for any toy pair. Only toy pair 8 (p = .051) and toy pair 9 (p = .074) were closest to significance. All values can be found in Table 3.

Table 3

T-Test: Manipulation Check

Variable	T-test		
	statistic	p	d
Toy Pair 1	-0.605	.546	-.10
Toy Pair 2	0.0866	.931	.01
Toy Pair 3	1.06	.293	.19
Toy Pair 4	-0.483	.630	-.08
Toy Pair 5	0.459	.647	.07
Toy Pair 6	1.03	.304	.17
Toy Pair 7	0.482	.630	.08
Toy Pair 8	1.97	.051	.34
Toy Pair 9	-1.80	.074	-.31
Toy Pair 10	-0.876	.338	-.14

Results of the Cognitive Abilities

The hypotheses H1.1-H1.4 were tested with a paired t-test or Wilcoxon Rank test dependent on the normal distribution. The Wilcoxon Rank test was used for assertiveness, mathematical skills, and spatial reasoning. We found a significant difference for assertiveness ($p = .003$, $d = .177$) and technical skills ($p < .001$, $d = .147$), while there was no significant difference for mathematical skills and spatial reasoning (see also Table 4).

The hypotheses H2.1-H2.3 were also tested with a paired t-test. Due to the data distribution, the Wilcoxon Rank test was used for verbal skills. Significant results were found for creativity ($p < .001$, $d = .432$), social behavior ($p < .001$, $d = .542$), and verbal skills ($p < .001$, $d = .370$). The largest significant effect was observed for social behavior with a medium effect ($d = .542$). The corresponding values are shown in the following Table 4.

Discussions

The primary goal of this study was to examine whether adults perceive differences in how boys' and girls' toys promote specific cognitive skills. The results show significant differences in adults' subjective ratings of these toys and their associated cognitive abilities. Boys' toys were rated significantly higher concerning assertiveness than girls' toys, with a small effect size difference. This finding is consistent with Murnen's (2018) study, in which assertiveness was primarily associated with action figures. However, the current study extends this association to a wider variety of boys' toys, suggesting that assertiveness is perceived as a trait that is inherently associated with boys' toys in general.

Table 4

Paired T-Test: Cognitive Abilities

Variable	Paired T-Test			
	T	df	p	Effect size
Assertiveness (H1.1)	8119*		.003	.177
Mathematical Skills (H1.2)	5573*		.930	-.103
Spatial Reasoning (H1.3)	6028*		.965	-.105
Technical Skills (H1.4)	1.94	174	.027	.147
Creativity (H2.1)	5.72	174	<.001	.432
Social Behavior (H2.2)	7.17	174	<.001	.542
Verbal Skills (H2.3)	9123*		<.001	.370

Note. df = degrees of freedom; * = use of Wilcoxon rank; effect size = by paired t-Test, it is a cohen's d and by Wilcoxon rank is it a rank-biserial correlation.

In contrast, no significant differences were found between boys' and girls' toys for math skills. This suggests that, contrary to the hypothesis, adults do not perceive boys' toys as more effective in promoting math skills than girls' toys. This finding is consistent with recent trends showing, that girls are closing the math skills gap and that parents are actively supporting their daughters in STEM-related fields (Dorie et al., 2014; Sullivan & Bers, 2019). Similarly, no significant differences were found for spatial reasoning. Only the descriptive statistics showed difference, in specific that girls' toys were rated higher than boys' toys in spatial reasoning. This contradicts earlier findings by Jirout and Newcombe (2015), which suggested boys' toys were more conducive to the development of spatial reasoning. A possible explanation for this discrepancy is that adults perceived both boys' and girls' toys to be equally effective in promoting spatial reasoning, as indicated by the very close mean scores.

For technical skills, significant differences with a small effect were observed, with boys' toys rated higher than girls' toys, supporting the hypothesis. This finding is consistent with studies suggesting that boys' toys, such as cars, are associated with the development of technical and STEM-related skills (Morgenthaler, 2021; Rafat, 2022). These findings reinforce the notion that boys' toys are more effective in promoting technical abilities, reflecting broader societal associations between boys and STEM fields.

The results for creativity showed a significant difference, with girls' toys rated higher than boys' toys. This supports the hypothesis and corroborates findings by Miller's (1987) who indicated, that girls' toys are often perceived as more effective in promoting creativity.

Social behavior also showed significant differences with a medium effect, with adults rating girls' toys higher than boys' toys in this domain. This finding supports the idea that girls' toys such as dolls are associated with nurturing and empathy, as previously suggested by Murnen (2018) and Blakemore and Centers (2005). These findings reflect societal expectations that girls' toys promote social and emotional learning.

For verbal skills, girls' toys were rated significantly higher than boys' toys, with a small effect size difference. This finding supports the hypothesis and is consistent with studies suggesting that girls develop verbal skills earlier than boys, in part through engagement with toys that encourage language use (Hedges & Nowell, 1995). These perceptions are likely to influence adult evaluations, resulting in higher ratings for girls' toys in this category.

The manipulation check revealed no significant differences in gender categorization within most toy pairs. However, certain pairs, such as the Cars puzzle (boys' toy) and the Disney Princess puzzle (girls' toy), showed trends toward neutral classifications. This is consistent with Blakemore and Centers' (2005) findings that puzzles are generally considered gender neutral, although visual elements such as princesses or cars may influence perceptions. Similarly, Play-Doh pairs—such as a burger machine (boys' toy) and an ice cream machine (girls' toy)—were both rated as leaning toward masculine or neutral, reflecting Blakemore and Centers' (2005) classification of Play-Doh as gender-neutral.

Other toy pairs, including cars, dinosaurs, and household appliances, also showed no significant gender differences, further highlighting how traditional gender stereotypes may be shifting. For example, both boys and girls now commonly play with items such as kitchen sets and dinosaurs, as observed by Borde (2020). Lego and Playmobil pairs were also rated as neutral, consistent with Retter's (1973) and Blakemore and Centers' (2005) studies, which rated Lego as suitable for both genders.

In summary, boys' toys were perceived as more conducive to assertiveness and technical skills, while girls' toys were rated higher for creativity, social behavior, and verbal skills. These findings highlight the persistence of gender stereotypes in adults' evaluations of toys, even when the toys are functionally similar. Such perceptions may have practical consequences because they can influence the types of toys adults choose for children, potentially shaping early opportunities to develop specific skill sets.

From an educational perspective, if children are repeatedly steered toward toys that match gender stereotypes, they may receive unequal exposure to key cognitive and socio-emotional learning opportunities. For example, limiting girls' exposure to toys that encourage spatial reasoning and problem-solving could contribute to later gender disparities in STEM participation (Uttal et al., 2013; Levine et al., 2012), while restricting boys' engagement with toys that foster empathy, cooperation, and verbal fluency could reinforce gaps in social-emotional competencies that are important for teamwork, leadership, and mental health. These potential effects are consistent with prior developmental research but were not directly examined in the present study.

To counteract these potential effects, interventions could be implemented across multiple levels. In the home, parents and caregivers can be encouraged to actively offer children a variety of toy types, regardless of gender associations, to ensure balanced cognitive skill development. In educational settings, early childhood curricula can incorporate structured play activities that deliberately blend technical, creative, and social elements, thereby

normalizing skill diversity. For the toy industry, marketing strategies could shift away from binary gender coding toward skill-based labeling (e.g., “builds problem-solving,” “encourages storytelling”) to help adults make choices based on developmental goals rather than stereotypes.

Socially, broadening access to a full spectrum of play experiences could help reduce the reproduction of occupational segregation and skill gaps that persist into adulthood. By challenging early stereotypes, society may foster a generation with more balanced skill sets, better prepared to engage in diverse professional and social roles.

Limitations

Despite the significant findings, several limitations must be considered when interpreting the results. First, no piloting was done during the design process to validate the selection of the toy pictures, which could influence the validity of this study. Instead, toys were selected based on existing studies, such as Blakemore and Centers (2005), and then organized into pairs consisting of a boys’ toy and a girls’ toy. While care was taken to ensure that the toy pairs were functionally similar in promoting cognitive skills, this similarity was assumed rather than empirically verified. Therefore, differences observed at the category level (i.e., boys’ toys vs. girls’ toys) should be interpreted with caution, as they may partly reflect properties of the specific toys rather than stable differences between toy categories. This phenomenon was also observed in Mogel’s (2008) study, where boys and girls exhibited different play behaviors with dolls, despite using the same toys.

Another limitation concerns the potential for toys to evoke pre-existing associations that influence adult evaluations. For example, the Batman figure may carry with it predefined behaviors shaped by media representations, potentially biasing both parents’ assessments and children’s play behaviors (Mogel, 2008). These contextual factors may skew subjective evaluations of the educational value of the toys but represent the reality of toy design. Future studies could attempt to create more homogenous pairs of toys without any media representations.

The participants were not provided with definitions of the cognitive skills beforehand, which could have led to different understandings of the meaning of the cognitive skills. However, the chosen wording can be considered as commonly used. Future research should provide clear definitions to rule out this potential source of variation.

A key methodological issue is the manipulation check which did not produce the expected gender differences for the toy pairs. For some toys, such as puzzles and Play-Doh sets, participants often gave neutral rather than strongly gendered ratings. While Blakemore and Centers (2005) classified such toys as gender-neutral, visual elements such princesses or cars might have been expected to elicit more gendered responses. The lack of differentiation in gender assignment raises questions about the effectiveness of the manipulation and whether participants' responses were influenced by social norms or personal biases.

The study's reliance on subjective measures introduces additional limitations, particularly the risk of social desirability bias. Social desirability occurs when participants respond in ways that conform to societal expectations rather than reflecting their true beliefs. Given current discussions about reducing gender classifications toys, this bias may have influenced participants' ratings, resulting in less pronounced gender differences.

Finally, the sample composition is a limitation, with a disproportionately high percentage of female participants (72% female, 27% male, 1% diverse). This imbalance may have influenced the results, potentially reflecting a female-dominated perspective that may differ from a more gender-balanced sample. Future studies should aim for greater diversity in participant demographics to ensure more representative results.

Conclusion

Despite its inherent limitations, this study sheds light on the ways in which adults associate gender-stereotyped toys with gender-typical cognitive abilities, reinforcing established patterns while revealing deviations in 'mathematical skills' and 'spatial reasoning'. Further research is needed to explore these discrepancies in more depth, including a wider range of gender-neutral toys, differentiating in the perception of different age groups and involving experts such as educators or toy designers to increase the depth of the findings.

To address the discrepancy between perceptions and actual developmental outcomes, studies should integrate subjective ratings with objective measures, such as observing children's interactions with toys. This approach could challenge entrenched stereotypes and promote more inclusive play environments, that allow all children to explore their full potential without the constraints of outdated gender norms. Transformative changes in how toys are perceived and used could ultimately contribute to a more equitable and imaginative future.

References

Blakemore, J. E. O., & Centers, R. E. (2005). Characteristics of boys' and girls' toys. *Sex Roles*, *53*(9-10), 619–633. https://doi.org/10.1007/s11199-005-7729-0

Borde, V. (2020). Das Verhältnis von Spielmitteln und Lernen aus Elternperspektive. In V. Mehringer & W. Waburg (Eds.), *Spielzeug, Spiele und Spielen* (pp.87–102). Springer VS. https://doi.org/10.1007/978-3-658-29933-0_5

Brown, C. S., Biefeld, S. D., & Tam, M. J. (2020). Gender in childhood. *Elements in Child Development*. https://doi.org/10.1017/9781108874281

Casey, B. M., Andrews, N., Schindler, H., Kersh, J. E., Samper, A., & Copley, J. (2008). The development of spatial skills through interventions involving block building activities. *Cognition and Instruction*, *26*(3), 269–309. https://doi.org/10.1080/07370000802177177

Dorie, B., Jones, T., Pollock, M. C., & Cardella, M. (2014). Parents as critical influence: Insights from five different studies. *School of Engineering Education Graduate Student Series*. https://doi.org/10.18260/1-2--22901

Findlay, L. C., Girardi, A., & Coplan, R. J. (2006). Links between empathy, social behavior, and social understanding in early childhood. *Early Childhood Research Quarterly*, *21*(3), 347–359. https://doi.org/10.1016/j.ecresq.2006.07.009

Francis, B. (2010). Gender, toys and learning. *Oxford Review of Education*, *36*(3), 325–344. https://doi.org/10.1080/03054981003732278

Galotti, K. M. (2017). *Cognitive development: Infancy through adolescence* (2.th ed.). Sage.

Halpern, D. F. (2004). A cognitive-process taxonomy for sex differences in cognitive abilities. *Current Directions in Psychological Science*, *13*(4), 135–139. https://doi.org/10.1111/j.0963-7214.2004.00292.x

Halpern, D. F. (2012). *Sex differences in cognitive abilities* (4. ed.). Psychology Press.

Hassett, J. M., Siebert, E. R., & Wallen, K. (2008). Sex differences in rhesus monkey toy preferences parallel those of children. *Hormones and Behavior*, *54*(3), 359–364. https://doi.org/10.1016/j.yhbeh.2008.03.008

Hedges, L. V., & Nowell, A. (1995). Sex differences in mental test scores, variability, and numbers of high-scoring individuals. *Science*, *269*(5220), 41–45. https://doi.org/10.1126/science.7604277

Hines, M., & Alexander, G. M. (2008). Monkeys, girls, boys and toys: A confirmation Letter regarding "Sex differences in toy preferences: Striking parallels between monkeys and humans". *Hormones and Behavior*, *54*(3), 478-479. https://doi.org/10.1016/j.yhbeh.2008.05.012

The jamovi project. (2019). *jamovi. (Version 1.1) [Computer Software]*. Retrieved from https://www.jamovi.org/

Jirout, J. J., & Newcombe, N. S. (2015). Building blocks for developing spatial skills: Evidence from a large, representative U.S. sample. *Psychological Science*, 26(3), 302–310. https://doi.org/10.1177/0956797614563338

Keppner, M. (2015). *Die Spielsache im Spannungsfeld zwischen Spielmittel und Spielware: das kindliche Spiel als Herausforderung im 21. Jahrhundert: eine pädagogische Untersuchung*. *Internationale Hochschulschriften: Vol. 612*. Waxmann.

Lai, N.K., Ang, T. F., Por, L. Y., & Liew, C. S. (2018). The impact of play on child development - a literature review. *European Early Childhood Education Research Journal*, *26*(5), 625–643. https://doi.org/10.1080/1350293X.2018.1522479

Leiner, D. J. (2019). *SoSci Survey (Version 3.2.27) [Computer software]*. Available at https://www.soscisurvey.de

Levine, S. C., Ratliff, K. R., Huttenlocher, J., & Cannon, J. (2012). Early puzzle play: A predictor of preschoolers' spatial transformation skill. *Developmental Psychology*, 48(2), 530–542. https://doi.org/10.1037/a0025913

Li, R. Y. H., & Wong, W.I. (2016). Gender-typed play and social abilities in boys and Girls: Are they related? *Sex Roles,* 74, 399-410. https://doi.org/10.1007/s11199-016-0580-7

Liben, L. S., Schroeder, K. M., Borriello, G. A., & Weisgram, E. S. (2018). Cognitive consequences of gendered toy play. In E. S. Weisgram & L. M. Dinella (Eds.), *Gender typing of children's toys: How early play experiences impact development* (First Edition, pp. 213–255). American Psychological Association. https://doi.org/10.1037/0000077-011

Master, A., Meltzoff, A. N., & Cheryan, S. (2021). Gender stereotypes about interests start early and cause gender disparities in computer science and engineering. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(48). https://doi.org/10.1073/pnas.2100030118

Mehringer, V., & Waburg, W. (2020). Das Projekt SAKEF – Theoretische und konzeptionelle Überlegungen zur Spielzeugbewertung und Spielzeugauswahl. In V. Mehringer & W. Waburg (Eds.), *Spielzeug, Spiele und Spielen: Aktuelle Studien und Konzepte* (pp.15–36). Springer VS. https://doi.org/10.1007/978-3-658-29933-0_2

Mieskes, H. (1974). *Spielmittel recht verstanden, richtig gewählt, gut genutzt: eine Anleitung*. Augsburger Druck- u. Verlagshaus.

Miller, C. L. (1987). Qualitative differences among gender-stereotyped toys: Implications for cognitive and social development in girls and boys. *Sex Roles*, *16*(9-10), 473–487. https://doi.org/10.1007/bf00292482

Mogel, H. (2008). *Psychologie des Kinderspiels: Von den frühesten Spielen bis zum Computerspiel [Psychology of the children's play: From the earliest games to computer games]* (3., aktualisierte und erweiterte Auflage). Springer.

Morgenthaler, S. K. (2021). Science toys. In D. Bergen (Ed.), *The handbook of developmentally appropriate toys* (pp. 139–150). Rowman & Littlefield.

Murnen, S. K. (2018). Fashion or action? Gender-stereotyped toys and social behavior. In E. S. Weisgram & L. M. Dinella (Eds.), *Gender typing of children's toys: How early play experiences impact development* (First Edition, pp. 189–211). American Psychological Association. https://doi.org/10.1037/0000077-010

Newman, L. S. (1990). Intentional and unintentional memory in young children: Remembering vs. Playing. *Journal of Experimental Child Psychology*, *50*(2), 243–258. https://doi.org/10.1016/0022-0965(90)90041-6

Pryzgoda, J., & Chrisler, J. C. (2000). Definitions of gender and sex: The subtleties of meaning. *Sex Roles*, *43*(7/8), 553–569. https://doi.org/10.1023/A:1007123617636

Rafat, M. (2022). Social role theory: Stereotyped expectations of gendered toys and its implications in a society. *American Journal of Gender and Development Studies*, *1*(1), 1–14. https://doi.org/10.58425/ajgds.v1i1.81

Retter, H. (1973). *Spielzeug, Sozialschicht, Erziehung: Elternbefragung über Spielmittel*. *Erziehungswissenschaft und pädagogische Wirklichkeit: Vol. 8*. Finken-Verlag.

Retter, H. (1979). *Spielzeug: Handbuch zur Geschichte und Pädagogik der Spielmittel*. Beltz.

Roopnarine, J. L. (1986). Mothers' and fathers' behaviors toward the toy play of their infant sons and daughters. *Sex Roles*, *14*(1-2), 59–68. https://doi.org/10.1007/BF00287848

RStudio Team. (2021). *RStudio: Integrated Development for R. RStudio, PBC, Boston, MA*. http://www.rstudio.com/

Salinas-Quiroz, F., & Sweder N. (2023). Authentic gender development in non-binary children. *Frontiers in Sociology*, *8*, 1177766. https://doi.org/10.3389/fsoc.2023.1177766

Sullivan, A., & Bers, M. U. (2019). Investigating the use of robotics to increase girls' interest in engineering during early elementary school. *International Journal of Technology and Design Education*, *29*(5), 1033–1051. https://doi.org/10.1007/s10798-018-9483-y

Tesolin, J., & Lo, E. (2023). "Boys Love Boy Toys": A qualitative study exploring the role of fathers in young boys' gendered toy preferences. *Discover Psychology*, *3*(1), 1–15. https://doi.org/10.1007/s44202-023-00097-z

Todd, B. K., Fischer, R. A., Di Costa, S., Roestorf, A., Harbour, K., Hardiman, P., & Barry, J. A. (2018). Sex differences in children's toy preferences: A systematic review, meta-regression, and meta-analysis. *Infant and Child Development*, *27*(2), e2064. https://doi.org/10.1002/icd.2064

Uttal, D. H., Meadow, N. G., Tipton, E., Hand, L. L., Alden, A. R., Warren, C., & Newcombe, N. S. (2013). The malleability of spatial skills: A meta-analysis of training studies. *Psychological Bulletin*, 139(2), 352–402. https://doi.org/10.1037/a0028446

Wachs, T. D. (1985). Toys as an aspect of the physical environment: Constraints and nature of relationship to development. *Topics in Early Childhood Special Education*, *5*(3), 31–46. https://doi.org/10.1177/027112148500500304

Walther, B. K. (2003). Playing and gaming: Reflections and classifications. *The International Journal of Computer Game Research, 3*(1), 1–12.

Wilcox, R. R. (2017). *Introduction to robust estimation and hypothesis testing* (4th edition). *Statistics*. Elsevier Academic Press.

Wolfgang, C. H., & Stakenas, R. G. (1985). An exploration of toy content of preschool children's home environments as a predictor of cognitive development. *Early Child Development and Care*, *19*(4), 291–307. https://doi.org/10.1080/0300443850190403

Wong, W. I. & Yeung, S. P. (2019). Early gender differences in spatial and social skills and their relations to play and parental socialization in children from Hong Kong. *Archives of Sexual Behavior,* 48, 1589-1602. https://doi.org/10.1007/s10508-019-1415-8

Corresponding Author Contact Information:

Author name: Nicola Katharina Kolb

Department: Institut für Didaktik und Ausbildungsforschung in der Medizin

University, Country: Ludwig-Maximilians-Universität München, Munich, Germany

Email: Nicola.Kolb@med.uni-muenchen.de

Please Cite: Kolb, N. K., Niklas, F. & Stadler, M. (2026). Same Toy, Different Play: Investigating Adults' Ratings of the Cognitive Benefits of Stereotypically Gendered Toys. *The European Educational Researcher, 9*(1), 37-54. DOI: https://doi.org/10.31757/euer.913

Conflict of Interest: The authors have no relevant financial or non-financial interests to disclose.

Data Availability Statement: All data will be available after acceptance of the paper on OSF.

Ethics Statement: No ethical approval was required according to the guidelines of the university. All participants gave informed consent.

Funding: The authors did not receive support from any organization for the submitted work.

Author Contributions: Nicola Katharina Kolb and Matthias Stadler contributed to the study conception and design. Material preparation, data collection and analysis were performed by Nicola Katharina Kolb and Matthias Stadler. The first draft of the manuscript was written by Nicola Katharina Kolb and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Received: September 18, 2025 ▪ Accepted: January 27, 2026