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To increase engagement, offer less: The effect of assortment size on children's engagement

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Abstract

In a world that offers children abundant activities from which to choose, understanding how to motivate children to engage longer in productive activities is crucial. This paper examines how the offered assortment size affects children's engagement with their chosen option. In the first study, I show children prefer to choose from a larger set even though they think doing so is more difficult. Then, in Studies 2 and 3, four- to five-year-old children choose from either a small set (two options) or a large set (six or seven options). In study 2, children choose a book to look at and I measure how long they look at it. In Study 3, children choose a game to play with and I measure how long they play. Children spend more time looking at the book and playing with the game they choose from the small versus the large set. By contrast, the size of the choice set does not affect food consumption. Such findings contribute to our understanding of young children's decision-making and have important implications for determining the optimal assortment size to offer children to increase engagement with desirable activities.

Keywords: children, choice behavior, assortment size, engagement, motivation, decision-making

1 Introduction

In a world that offers children abundant activities from which to choose, understanding how to motivate children to engage longer in productive activities is important. Because current engagement can affect future engagement and persistence in such activities, understanding how to increase current engagement in productive activities has important benefits. For example, the more a child interacts with books by being read to, by looking at books, or by reading books from a young age, the more likely she is to read as she grows older, assuming the experience was positive (e.g., Massaro, 2017; Payne, Whitehurst & Angell, 1994). Encouraging children to engage more in such productive activities is especially critical given the increasing use — even by infants — of mobile devices for non-educational purposes (American Academy of Pediatrics, 2013), and the effect using these devices has on children's development of various skills such as self-regulation (Radesky, Schumacher & Zuckerman, 2015).

Past research identified several factors that affect children's engagement and motivation. For example, children are usually less likely to engage when provided external rewards for an otherwise intrinsically motivated behavior (e.g., Boggiano & Ruble, 1979; Greene & Lepper, 1974; Lepper, Greene & Nisbett, 1973). In a classical demonstration, Lepper et al. (1973) showed that preschoolers who were rewarded for coloring, an otherwise intrinsically motivated activity, were less motivated to continue coloring compared to children who were not rewarded. Additionally, presenting engagement in one activity as a means of earning the opportunity to engage in a second activity decreases preschoolers' motivation to engage in the first activity that was presented as the means (e.g., Galloway, Fiorito, Francis & Birch, 2006; Lepper, Sagotsky, Dafoe & Greene, 1982). For example, Lepper et al. (1982) showed that presenting one coloring task as a means to earn the opportunity to engage in another coloring task decreased children's engagement in the coloring task that was presented as the means.

A significant factor that has been shown to increase children's motivation in many contexts is the mere act of offering children a choice (see Katz & Assor, 2007, for a review). For example, Iyengar and Lepper (1999) found that seven- to nine-year-old children were more motivated to work on solving a puzzle after choosing what puzzle to solve compared to those whom the experimenter assigned a puzzle. This effect was stronger among European American children than among Asian American children, who were actually most motivated when they were assigned a puzzle their mother chose. Cordova and Lepper (1996) found that elementary school children were more motivated to play math games af-

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ter choosing the icon representing them on the game board, even though the choice of the icon was incidental to the playing task itself. In more academic settings, elementary school children were more engaged and performed better after choosing what topic to write about compared to children who were assigned a topic, even when including the measured level of interest in the topic in the analysis (Reynolds & Symons, 2001).

The current paper goes beyond looking at how giving children a choice affects their engagement and motivation, and looks at how the number of options in the choice set affects children's level of engagement with their chosen option. I define engagement as the amount of time children interact with the chosen option. Understanding how the size of the assortment from which children are choosing affects their engagement is important because when children make choices, such as which book to read, which game to play, or which toy to ask to purchase, they often choose from assortments that vary in size. Understanding the effect of assortment size on engagement not only contributes to our understanding of young children's decision-making, but also has important practical implications for determining the optimal assortment size to offer children if we want to increase their engagement with desirable activities, such as reading, or decrease their engagement with less desirable activities, such as video games. To that end, this paper studies preschoolers (ages 4-5 years old) in order to understand how to affect their engagement even from a young age.

Ample research has looked at the effect of assortment size on adults' behavior (see Chernev, Böckenholt & Goodman, 2015, for a recent meta-analysis; see also Scheibehenne, Greifender & Todd, 2010, for another meta-analysis finding an overall low effect size of assortment size). The studies that report an effect of assortment size find overall that choosing from a large versus small set can be de-motivating and leads to less satisfaction (Botti & Iyengar, 2004), an increased likelihood of experiencing regret (Inbar, Bottie & Hanko, 2011), and an increased likelihood of deferring choice altogether (Iyengar & Lepper, 2000).

Little research has looked at the effect of assortment size on engagement with the chosen option, that is, individuals' level of engagement with the option they choose from a small versus a large set, as measured by how much time they spend with the chosen option. Related research finds individuals are less creative when they choose from a large rather than small number of options (Sellier & Dahl, 2011), and they perform worse on a writing task after choosing from a large versus small set of topics (Iyengar & Lepper, 2000, Study 2). Specifically, in Iyengar and Lepper's study, participants chose a topic to write an essay about, either from 6 or 30 topics. Those who chose from among the 30 topics performed worse than those who chose from among the 6 topics, as rated by independent judges. Moreover, little research has looked at the effect of assortment size on children's decision-making in general and on engagement in particular (for related research on the decision strategies school-age children use, see Bereby-Meyer, Assor & Katz, 2004; Davidson, 1991; and Gregan-Paxton & John, 1997).

The size of the set children choose from can affect their engagement with the option they choose through several routes. Clearly, choosing from the large set is more difficult compared to choosing from the small set, especially for preschoolers (who are the focus of this paper), given their developing abilities (Chaplin & Norton, 2015; Flavell, 1963; Ginsburg & Opper, 1988) and the type of decision strategies they tend to use (John, 1999). If children indeed exert more resources at the choice stage when choosing from the large set, they are expected to have fewer resources to interact with the option they choose from the large versus the small set when offered the chance to interact with it immediately after making the choice. Therefore, they are expected to engage for a shorter time with the option they choose from the large set.

Additionally, choosing from the large set generates a higher number of counterfactuals to consider. Specifically, when choosing from the large set, the decision maker forgoes a larger number of options, which in turn can lead to greater regret (e.g., Connolly & Zeelenberg, 2002), even among children as young as four years old, who are already capable of imagining counterfactuals and experiencing regret (Beck, Robinson, Carrol & Apperly, 2006; Weisberg & Beck, 2012; although O'Connor, McCormack & Feeney, 2012, who used a different task, found that regret emerges among slightly older kids). As a result, children are expected to engage less with the option they choose from the large set, because they might continue thinking of the other options they had to forego.

At the same time, choosing from the large set can be a more engaging experience, especially for young children, who often rely on the size of objects and other visual cues when making judgments (John, 1999). Specifically, young children favor larger products or assortments even at the expense of choosing a more preferred item. For example, when asked to choose a hypothetical snack for a friend, kindergartners, but not older children, chose the snack that contained the highest number of pieces, even though all of them were of the least favored snack type (22 pieces of licorice), over a snack that contained fewer pieces but of more favorable types (5 pieces chocolate pieces and 5 pieces of caramel; Wartella, Daniel, Scott, Jacob & Allison, 1979). Thus, preference for size can override preference for other features such as preferred type of snack or importance of attributes. (When size was held equal, these kindergarteners did choose the snack of the preferred type, indicating that they do understand what preferences are.)

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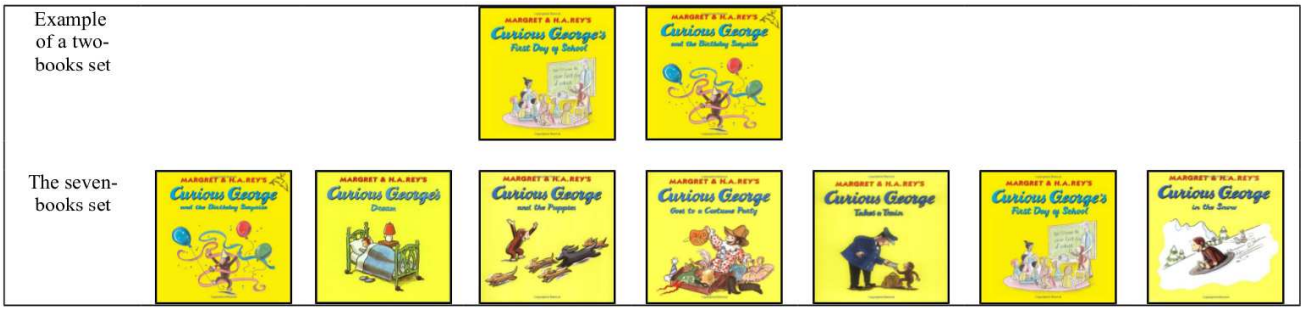

Figure 1: Choice sets used in Study 1 and Study 2.

Given preschoolers' preference for larger items and assortments (which is not necessarily unique to children and can be found even in animals [Hutchinson, 2005]), preschoolers are more likely to prefer choosing from the large set and to find choosing to be a more engaging experience in and of itself, whereas they are more likely to find choosing from the small set to be less engaging. As a result, they will be less likely to satisfy their play needs after choosing from the small set, and will engage longer with the option they choose from the small set.

Finally, when choosing from the large set, children have a higher chance of finding the optimal option, only because more options are available, which increases the likelihood of finding a close match to their preferences (e.g., Baumol & Ide, 1956). As such, this process could actually lead to more engagement with the option they choose from the large set, because this option better matches their preferences.

The studies described next test how four- to five-year-old children perceive small versus large choice sets, and how the size of the choice set affects their engagement with the chosen option. The first study tests whether children indeed perceive the large set as more engaging and fun to choose from, but also more difficult to choose from. Studies 2 and 3 test whether children engage longer with the option they choose from the large or the small set. Study 2 does so in the context of choosing a book to look at, and Study 3 does so in the context of choosing a game to play with. Given that choosing from the large set is more difficult, generates more counterfactuals, and yet represents a more engaging task in and of itself, I expect to find that children will engage less with the option they choose from the large set.

All studies described below were conducted in a preschool and involved individual sessions in which children interacted with an experimenter who was blind to the research hypothesis. In post-study debriefing, the experimenter confirmed she did not guess the research hypothesis. All children in the relevant age group whose parents signed consent forms and were present at the preschool when the study was conducted were invited to participate.

2 Study 1: Children prefer to choose from larger sets

This study tests whether preschoolers think choosing from a large set is more fun than choosing from a small set, and whether they would prefer to choose from a large set, but at the same time think choosing from the large set would be more difficult.

2.1 Method

Forty-three children (mean age = 61 months, STD = 3.5, 42% male) participated individually in the experiment. The experimenter first asked the child to sit at the experiment table, where she and the child played some introductory games, unrelated to the main experiment. She then invited the child to move to another area of the room to complete the main part of the experiment.

There, the experimenter showed the child two sets of books on one table (one set contained two books and the other set contained seven books) and two sets of games on another table (one set contained two games and the other set contained six games). Order of presentation (books first vs. games first) and location of the sets (small set to the left vs. large set to the left) were counterbalanced. I found no order or location effects.

The book sets contained Curious George books of the same length (24 pages) and with a similar appearance, yet each featured a unique picture and subtitle on the cover page (see Figure 1). For the games sets, each game contained building blocks of similar colors that were placed in a clear bag (see Figure 2). Given the fixed size of the bag and the different size of the building blocks of the different games, each bag contained a different number of pieces, ranging between 22 and 40. Most games used red, yellow, green, and blue blocks. One game did not contain green pieces, so purple pieces were used instead, and another game did not contain red pieces, so orange pieces were used instead. See Figure 2 for details on how many blocks and what colors were used for each game.

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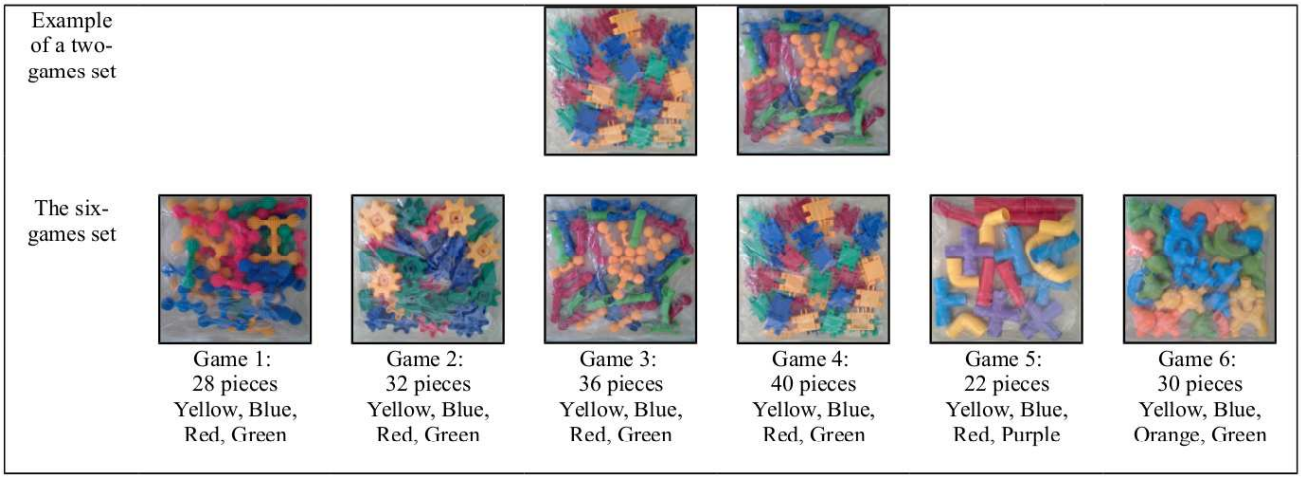

Figure 2: Choice sets used in Study 1 and Study 3.

When presented with the two sets of books, the experimenter first asked the child the following questions: (1) "Do you think it is easier to choose a book from here, or from here?" (2) "Do you think it is more fun to choose from here, or from here?" and (3) "If you could, would you want to choose a book from here, or from here?" The experimenter then repeated the procedure with the two sets of games. In the reverse-order condition, the experimenter first asked about the games and then about the books. Children did not play with any of the games and did not look at any of the books. They just pointed at the set they thought would be easier to choose from (question 1), the set they thought would be more fun to choose from (question 2), and the set they wanted to choose from (question 3).

We recorded the child's answers to all questions. At the end of this task, the experimenter invited the child to go back to sit at the main experiment table, where the child completed some unrelated tasks, received a thank you gift, and then returned to her classroom.

2.2 Results and Discussion

Overall, children thought choosing from the small set would be easier but choosing from the large set would be more fun, and they would have preferred to choose from the large set. Specifically, 67% said choosing from the two-book set would be easier ($p = .016$, one-tailed, binomial tests here and below against 50%), 74% said choosing from the seven-book set would be more fun ($p < .005$, one-tailed), and 77% said they would have preferred to choose from the larger, seven-book set ($p < .001$, one-tailed). Similarly, 67% said they thought choosing from the two-game set would be easier ($p = .016$, one-tailed), 77% said they thought choosing from the six-game set would be more fun ($p < .001$, one-tailed), and 84% said they would have preferred choosing from the six-game set ($p < .001$, one-tailed). Taken together, these results indicate that children find choosing from a large set to be more engaging, even though doing so is more difficult.

3 Study 2: Children look longer at books they choose from a small set

Study 2 tests whether children are more engaged with a book they choose from a small versus large set. Children chose a book to look at either from a small set (two books) or a large set (seven books), and I measured how long they looked at the book they chose.

3.1 Method

Forty-two children (mean age = 63.76 months, STD = 4.73, 48% male) participated individually in the study. As in Study 1, the experimenter asked the child to sit at the experiment table, and played some introductory games, unrelated to the main experiment, with her. She then invited the child to move to another table to choose a book to look at (these children were not reading yet). Children were randomly assigned to one of two conditions: about half the children chose from among seven books, and the remaining chose between two books. Those choosing between two books were randomly assigned to one of the possible 21 pairs created by choosing two of seven options. Because this condition contained 21 children, each pair was assigned to exactly one child. The choice sets contained the same books described in study 1 (see also Figure 1).

In both conditions, the experimenter explained the task to the children: "You see here different books. You can choose one book to look at. You also get to take home the book you choose." After choosing a book, the children could look at it for as long as they wanted. Specifically, the experimenter told the child, "Great; now you can sit here and look at the

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Table 1: Number of children (percentages) choosing each option by condition (Study 2). See Figure 1 for pictures of the books.

	Curious George and the Birthday Surprise	Curious George's Dream	Curious George Goes to a Costume Party	Curious George's First Day of School	Curious George and the Puppies	Curious George Takes a Train	Curious George in the Snow	Total
Small set	2 (9.5%)	0 (0%)	3 (14%)	4(19%)	4 (19%)	3 (14%)	5 (24%)	21
Large set	1 (5%)	2 (9.5%)	5 (24%)	4 (19%)	2 (9.5%)	2 (9.5%)	6 (29%)	21

book you chose. Let me know when you are done." Children could look only at the book they chose, even though the other books remained near them. None of the children asked to look at another book during the time they were looking at the book they had chosen or when they were done looking at it. We recorded how long the child took to choose a book and how long she looked at it.

The child told the experimenter when she was done looking at the book. The experimenter then invited the child to go back to sit at the main experiment table, where the child completed some unrelated tasks, received a thank you gift, and then returned to her classroom. The experimenter then prepared the choice set for the next child.

3.2 Results and Discussion

Given the skewness of the time variable, I use log time throughout the analysis here and in Study 3. In all cases, I obtain similar results when using the raw data. Consistent with my prediction of increased engagement after choosing from the small set, I find children looked longer at the book they chose from the small set compared to the book they chose from the large set (M_{small} = 4.8, STD_{small} = .404, 95% CI [4.63, 4.97]; M_{large} = 4.38, STD_{large} = .67, 95% CI [4.09, 4.66], $t(39)$ = 2.465, p = .018; d = 0.753; log of time in seconds is reported).[1]

This analysis takes into account reading level as rated by the children's teachers. Specifically, I asked the teachers to rate children's reading levels on a 5-point scale (1=*low level*, 5=*high level*). This covariate did not have a significant effect on looking time ($p > .25$). The effect of condition on looking time is significant even without including reading level as a covariate ($t(40) = 2.42$, $p = .020$).

To also take into account the choices children made, I calculated a popularity variable, namely, the number of times each book was chosen across both conditions and across all participants. For example, a child who chose the book "Curious George and the Puppies" received the value "6" for the popularity variable because this book was chosen six times across all children (see Table 1). When I also include the popularity variable in the model, I find it had no effect on looking time ($p > .25$), and the effect of condition on looking time remained significant (t (38) = 2.46, p = .018). Note that overall, children made similar choices across the two conditions (see Table 1).

As a side note, children took longer to choose from the large versus the small set (M_{large} = 2.47, STD_{large} = 1.08, 95% CI [2.00, 2.93]; M_{small} = 1.43, STD_{small} = 0.94; 95% CI [1.03, 1.83]; t (40) = 3.33, $p < .005$, d = 1.03; log of time in seconds is reported).[2] This finding is consistent with the claim that choosing from the large set is possibly a harder task, but also possibly a more engaging task. When also including the popularity variable as defined above in the model, I find it had no effect on choosing time ($p > .25$), and the effect of condition on choosing time remains significant (t (39) = 3.29, $p < .005$). Finally, choosing time and looking time were not correlated ($p > .25$).

4 Study 3: Children play long longer with games they choose from the small set

This study has two goals. First, it attempts to replicate the results of Study 2 in a different context, where children are choosing which game to play with. We presented children with a small set of games (two games) or a large set of games (six games), and they were allowed to choose one game to play with. We measured how long the children played with the games they chose.

Second, this study tests whether the effect of the choice-set size replicates when the dependent variable is not engagement, measured in time, but rather food consumption. Children's motivation to eat is largely affected by how tasty the food is and how hungry they are. Cognitive resources, which could be reduced after choosing from the large set, should not affect how much they eat. Similarly, engagement during the choice stage, which is also affected by the size of

[1] I obtain similar results using the raw means (M_{small} = 131.67, STD_{small} = 54.65, 95% CI [108.29, 155.04]; M_{large} = 95.67, STD_{large} = 51.35, 95% CI [73.70, 117.63]; t (1, 39) = 2.29, p = .027, d = 0.68; time reported in seconds).

[2] I obtain similar results using the raw means (M_{large} = 20.24, STD_{large} = 27.30, 95% CI [8.678, 31.79]; M_{small} = 6.40, STD_{small} = 6.96; 95% CI [3.43, 9.38]; t (40) = 2.25, p = .030, d = 0.69; time reported in seconds).

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the choice set, should not affect the amount they eat. Therefore, the size of the set children are choosing from should not affect how much of their chosen snack they eat. To test this hypothesis, children in this study also chose a snack to eat either from a small set (two types of crackers) or a large set (six types of crackers), and we measured how much of their chosen snack they ate.

4.1 Method

Fifty-nine children (mean age = 56.97 months, STD = 3.94, 56% male) participated individually in the experiment. As in previous studies, the experimenter first asked the child to sit at the experiment table where she played some introductory games, unrelated to the main experiment, with the child. She then invited the child to move to the carpet area to choose a game to play. Children were randomly assigned to one of two conditions: about half the children chose from among six building games, and the remaining chose between two building games. Those choosing between two games were randomly assigned to one of the possible 15 pairs created by choosing two out of six options. Given that there were 28 children in this condition, each pair was assigned to one, two, or three children. In both conditions, the experimenter explained the task to the children: "You see here different games. You can choose one game to play with." The choice set contained the games used in Study 1 (see Figure 2).

After the child chose a game, she could play with it for as long as she wanted. Specifically, the experimenter opened the bag with the game the child chose, gave it the child, and said, "Great; now you can sit here and play with the game, and build whatever you want. Let me know when you are done. You do not need to clean up when you are done — just leave it all here." The bags of the other games were still near the area where the child was sitting, but the child was playing only with the game she had chosen. None of the children asked to play with another game during the time they were playing with the game they had chosen or after they were done playing with it. Note that children in this preschool are used to playing with one toy while having other toys around them. For example, children are sometimes allowed to play in one area, such as the "dramatic play" area, but are not allowed to play in the adjacent play area, such as the "blocks" area, that may be closed for playing at that given time.

We recorded how long the child took to choose a game and how long the child played with the game. When the child was done playing, she told the experimenter she was done. The experimenter then invited the child to go back to sit at the main experiment table, where the child completed some unrelated tasks. Then the experimenter invited the child to move to another table where she offered the child a snack to eat. Children were again randomly assigned to one of two conditions: about half the children chose from among six types of crackers, and the remaining chose between two types of crackers. Those choosing between two types of crackers were randomly assigned to one of the possible 15 pairs created by choosing two out of six options, such that each pair was assigned to one or two children. In both conditions, the experimenter explained the task to the children: "We now have a snack for you to eat. You see here different crackers. You can choose which ones you want to eat." The choice sets contained different types of Goldfish crackers (Xtra Cheddar, Original, Parmesan, Pizza, Pretzel, and Wholegrain), served in bowls, each containing 80 grams of crackers. To identify which crackers were in each bowl, an image of a bag of crackers was placed next to each bowl (see Figure 3). The sample size for the crackers task was smaller (N=44), because some children did not want to eat, some had allergies, and some didn't have enough time to complete this task, because they had to go back to their classroom for pre-scheduled activities, such as swim class.

When the child said she was done eating, she returned to the main experiment table, where she received a thank you gift for participating. She then returned to her classroom. The experimenter then disassembled the construction the child had built, returned the blocks to the bag, prepared the choice set for the next child, measured the weight of the crackers that were left in the bowl in order to calculate how much of the crackers she ate (measured in grams), and prepared the choice set for the next child.

4.2 Results and Discussion

Replicating Study 2's results, children played longer with the game they chose from the small set compared to the game they chose from the large set (M_{small} = 5.94, STD_{small} = .77, 95% CI [5.65, 6.22]; M_{large} = 5.23, STD_{large} = .69, 95% CI [4.99, 5.48]; t (56) = 3.66, $p < .001$, d = 0.97; log of time in seconds is reported).[3] Given that the games differed in how many pieces the bag contained, the analysis using playing time as the dependent variable (both log and raw) also included the number of pieces as a covariate. This covariate had no effect on playing time ($p > .25$). The effect of condition on looking time is significant even without including the number of pieces in the model (t (57) = 3.66, $p < .005$).

To also take into account the choices children made, I calculated a popularity variable as in Study 2, namely, the number of times each game was chosen across both conditions and across all participants. When I also include the popularity in the model, the effect of condition on playing time remains significant (t (56) = 3.45, $p < .001$). The effect of popularity is also significant (t (56) = 2.58, $p = .013$), such

[3] I obtain similar results using the raw means (M_{small} = 485.71, STD_{small} = 327.2, 95% CI [364.51, 606.91]; M_{large} = 229.87, STD_{large} = 138.50, 95% CI [181.11, 278.63]; t (56) = 4.02, $p < .001$, d = 1.04; time reported in seconds).

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Figure 3: Choice sets used in Study 3.

Table 2: Number of children (percentages) choosing each option by condition (Study 2). See Figure 2 for pictures of the games.

	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6	Total
Small set	7 (25%)	2 (7%)	5 (18%)	0 (0%)	5 (18%)	9 (32%)	28
Large set	8 (26%)	2 (6%)	6 (19%)	3 (10%)	8 (26%)	4 (13%)	31

that children played longer with the more popular games.[4] Note that overall, children made similar choices across the two conditions (Table 2).

Also replicating Study 2's results, children took longer to choose from the large versus the small set (M_{large} = 1.52, STD_{large} = 0.67, 95% CI [1.28, 1.76]; M_{small} = .85, STD_{small} = .73, 95% CI [0.58, 1.12]; t (57) = 3.67, p < .005, d = 0.95; log time is reported and analyzed).[5] When also including the popularity variable as defined above in the model, I find it has no effect on choosing time (p > .25), and the effect of condition on choosing time remains significant (t (56) = 3.59, p < .005). Finally, log of choosing time and log of playing time were correlated (r = –.32, p = .014), but this correlation becomes non-significant when controlling for assortment size (r = –.16, p > .2).

When choosing a snack to eat, children again took longer to choose from the large versus the small set (M_{large} = 1.58, STD_{large} = 1.02, 95% CI [1.17, 2.00]; M_{small} = .99, STD_{small} = .46, 95% CI [0.79, 1.19]; t (42) = 2.44, p = .019, d = 0.75; log of time in seconds is reported),[6] thus replicating previous results. However, the size of the choice set had no effect on the amount of crackers children ate (M_{small} = 2.79, STD_{small} = .907, 95% CI [2.40, 3.18]; M_{large} = 2.69, STD_{large} = .85, 95% CI [2.34, 3.04]; p > .25, d = 0.113; log of consumption in grams is reported).[7] When also taking into account the popularity of the snack chosen, as defined previously, this variable had no effect on consumption, and the effect of condition on consumption remained non-significant (p's > .25; see Table 3 for the choices children made across conditions). As a side note, log play time and log amount consumed were not correlated (p > .25).

To further understand the null effect, I compare the Bayes Factor (e.g., Kass & Rafftery, 1995) in this task with the one in the games task, and find the Bayes Factor in the crackers task (0.315) is much lower compared to the games task (51.49), reinforcing the conclusion of a null effect in the crackers task. Moreover, there is very little overlap in the confidence intervals for the effect size of the crackers task (–0.44, 0.64) and for the games task (0.32, 1.08), which is another indication that these tasks are indeed different.

To further understand the null effect of assortment size on consumption, I conducted a follow-up study in which I

[4]Since popularity does affect playing time, a possible concern is that the small set led to choice of less popular games (as the more popular games may have not been available), which in turn might have affected play time. However, this is not the case, as the more popular games were chosen in the small set condition (M = 12.5, STD = 2.74) compared to the large set condition (M = 11.58, STD = 3.86), though this difference is not significant (t (57) = 1.04, p > .25).

[5]I obtain similar results when using the raw means (M_{large} = 5.71, STD_{large} = 3.99, 95% CI [4.304, 7.115]; M_{small} = 3.29, STD_{small} = 3.95, 95% CI [1.82, 4.75]; t (57) = 2.34, p = .023, d = 0.61; time reported in seconds).

[6]I obtain similar results when using raw means (M_{large} = 7.43, STD_{large} = 6.34, 95% CI [4.84, 10.02]; M_{small} = 3.00, STD_{small} = 1.48, 95% CI [2.37, 3.63]; t (42) = 3.12, p < .005, d = 0.96; time reported in seconds).

[7]I obtain similar results when using the raw means (M_{small} = 23.7, STD_{small} = 21.9, 95% CI [14.34, 33.08]; M_{large} = 20.9, STD_{large} = 19.2, 95% CI [13.1, 28.81]; p > .25, d = 0.136; measurements are in grams).

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Table 3: Number of children (percentages) choosing each cracker type by condition (Study 3). See Figure 3 for pictures of the crackers.

	Extra cheddar	Original	Parmesan	Pizza	Pretzel	Whole grain	Total
Small set	5 (24%)	6 (29%)	2 (9.5%)	2 (9.5%)	2 (9.5%)	4 (19%)	21
Large set	3 (13%)	2 (9%)	2 (9%)	7 (30%)	5 (22%)	4 (17%)	23

Figure 4: Choice sets used in the follow-up study.

offered 37 children (4.5–5.5 years old) the opportunity to choose a 180-gram yogurt cup to eat, either from a small set (two flavors) or a large set (seven flavors). The possible flavors were banana, blueberry, cherry, peach, raspberry, strawberry, and vanilla (see Figure 4). The procedure was similar to the one used in the crackers task described above. Replicating the snacks results, I again find no effect of assortment size on consumption (M_{small} = 4.19, STD_{small} = 1.11, 95% CI [3.69, 4.69]; M_{large} = 4.07, STD_{large} = 1.15, 95% CI [3.54, 4.61]; $p > .25$, d = 0.11, Bayes Factor = 0.332; log consumption in grams is reported and analyzed).[8] Taken together, these results suggest the set size affects engagement as measured in play time, but does not seem to affect consumption as measured by how much the child ate.

5 General Discussion

Three studies show preschoolers think choosing from a large versus small set is more fun yet more difficult, but they are more engaged with the options they choose from the small versus large set. Specifically, when choosing from the small set, which contained two options, children spent more time looking at the book they chose and played longer with the game they chose, compared to when they chose from the large set, which contained six or seven options. The size of the choice set did not affect food consumption, as shown in the crackers and yogurt tasks. These results suggest that although giving children choices could be a valuable approach in increasing motivation in general (Katz & Assor, 2007), limiting the choice set to a few options at a time might be beneficial toward increasing the time they spend with the option they choose (see Grant & Schwartz, 2011, for a discussion on how introducing limitations can improve well-being in general). This is not to say that caregivers such as parents or preschool teachers should reduce the total number of educational games or books present; rather, they could facilitate the choice process by narrowing the choice set presented to the child to a smaller set.

Future research can look further at the underlying mechanism of the effect of the choice-set size on engagement. I have argued children are more engaged with the option they choose from the small set due to the increased difficulty in choosing from the large set, the increased number of counterfactuals generated when choosing from the large set, and the increased engagement children experience at the choice stage when choosing from the large set. Although all forces might operate simultaneously, one force might dominate the others under certain circumstances. For example, when the options are extremely similar to one another, such that choosing from among them is even more difficult, choice difficulty and the increased number of counterfactuals might be the factors leading to decreased engagement after choosing from the large set, and not the increased engagement with the choice set itself.

[8] I obtain similar results using the raw means (M_{small} = 95.47, STD_{small} = 56.9, 95% CI [69.88, 121.05]; M_{large} = 86.5, STD_{large} = 55.1, 95% CI [61.04, 111.95]; $p > .25$; d = 0.16; Bayes factor = 0.349; measurements are in grams).

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The current research studied the effect of assortment size on preschoolers' behavior, but how assortment size affects engagement among older children and adults is unclear. For example, an important difference between preschoolers and adults is their overall information-processing methods and memory capabilities (Gathercole, 1998; John, 1999), which could in turn determine at what point a high number of options becomes large enough to impose difficulty at the choice stage. In the studies reported here, the number of options in the large set was six or seven, which is lower than the typical number of options in large sets in studies with adults. Possibly, with an even larger number of options offered to children in the large set, the effects observed in this paper will be stronger as making the choice becomes more difficult yet possibly even more engaging in and of itself.

Finally, this paper looked at the short-term effects of choosing from small versus large sets, by measuring engagement immediately after making the choice. Long-term effects are probably weaker, such that if a time delay exists between the choice and the engagement opportunity, the size of the assortment from which children choose would likely have a smaller effect on engagement. However, the fact that assortment size can have an immediate effect on children's engagement suggests such subtle manipulations can shape young children's habits in the present, which in turn can affect their future behavior and encourage them to engage longer in productive activities such as reading and playing. The potential in being able to affect children's behavior simply by changing the number of options they view cannot be underestimated.

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