

What Almost Happened? Using Close-Counterfactuals to Prime a Simulation Mindset in Children

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Abstract

Counterfactual reasoning, the ability to reason about how events could have turned out differently, helps individuals understand the causes of events and prepare for the future. The simulation mindset hypothesis posits that exposure to counterfactual scenarios stimulates the generation of imaginary alternatives, enhancing planning, problem-solving, and behaviour adjustment. This study investigated whether close-counterfactual scenarios prime a simulation mindset in children leading to better problem-solving abilities. Ninety six- and eight-year-olds were assigned to either a counterfactual condition, with storybooks featuring close-counterfactual events, or a control condition, with storybooks describing factual events. Participants then completed two problem-solving tasks requiring the generation of alternative solutions. Results showed that 8-year-olds exhibited better problem-solving abilities than 6-year-olds. Counterfactual scenarios did not significantly affect older children's problem-solving skills, however they showed benefits for the younger children. These findings provide emerging evidence that engaging in counterfactual reasoning can enhance divergent thinking and problem-solving skills in children.

Keywords: Counterfactual reasoning; Mental simulation; Problem-solving; Cognitive development

Introduction

Counterfactual reasoning involves thinking about “what might or could have been.” By asking “what if” or “only if” questions, counterfactual reasoning allows people to make sense of the world by evaluating alternative possibilities. For example, if someone misses their flight due to traffic delays, they might generate counterfactual thoughts, such as, “I should have left earlier.” Counterfactual reasoning not only enables individuals to contemplate alternative possibilities but also facilitates learning from past experiences, allowing them to adapt their future behaviour or decisions accordingly (Epstude & Roose, 2008). The evaluative aspect, where individuals specify alternatives perceived as either better or worse than reality, underscores its significance as an essential cognitive ability deeply intertwined with goal-oriented thinking. In the example of someone missing their flight, the counterfactual thought “I should have left earlier” not only imagines a better outcome but also functions as a standard of comparison. When we generate an alternative outcome (e.g., a successful on-time arrival), we then compare this imagined

scenario to reality. This prompts an evaluation of one’s actions that can inform future behaviour (Byrne, 2016; Markman & McMullen, 2003), such as deciding to leave earlier the next time they need to catch a flight.

Research with young adults indicates that encouraging people to engage in counterfactual reasoning leads to improved future behaviours. Nasco and Marsh (1999) prompted undergraduate students to think counterfactually about their academic performance on a test. Those who reflected on how their test outcomes could have differed (e.g., “If only I had studied harder, I would’ve received a better grade.”) showed improved performance on a subsequent test one month later. By thinking counterfactually, the participants were able to identify new strategies for future improved behavior.

While much research has explored the implications of counterfactual thinking in adulthood, understanding its role in children’s learning and development is equally essential. Some studies show that 4-year-old children can draw accurate inferences about alternative outcomes, both in pretend play contexts (Buchsbaum et al., 2012) and story-based tasks (German & Nichols, 2003; Harris et al., 1996; Rafetseder et al., 2013). Nyhout and Ganea (2019) showed that 4-year-olds can also answer counterfactual questions about overdetermined physical events, where two causes lead to the same outcome. When asked about the removal of one of the causes, the children consider the effect of the remaining cause in determining the counterfactual outcome, indicating that they keep track of all the variables involved in the causal system. Between 6- and 8-years of age children’s counterfactual reasoning becomes more robust (Kominsky et al., 2021; McCormack et al., 2018) and they can think counterfactually about causal systems where the causes are connected as well as disconnected (Nyhout et al., 2019).

There is also some evidence that among children, counterfactual reasoning is associated with subsequent changes in behaviour. In a study by O’Connor et al. (2014), 6- and 7-year-olds played a game where they chose between two boxes with different numbers of tokens. After their choice, they saw a counterfactual outcome showing that choosing a specific-coloured box would have earned more tokens. The next day, they could exchange their token to play again or keep their original choice. Children who felt regret or sadness after learning the counterfactual outcome were

more likely to switch their choice, showing that even young children use counterfactual reasoning to adapt their decisions.

The mechanism by which counterfactuals influence behaviours or judgments is not fully understood. According to the Functional Theory of Counterfactual Reasoning, counterfactual thinking can influence future behavior through a content-neutral pathway, which operates through broader information processing. Specifically, when counterfactual thoughts are generated, they trigger attentional, cognitive, or motivational processes that alter behavior across different domains. For example, if someone regrets their performance on a math test and experiences thoughts of “I should have studied longer,” they might not only dedicate more time to studying but also adopt strategies in other areas of life, such as practicing time management or seeking extra help. According to Epstude and Roese (2008), in the content-neutral pathway, thoughts about a specific action, such as “I should have eaten an apple,” can lead to unrelated behaviours, like consuming oranges or other fruits, suggesting a broader influence on thinking and behaviour. An example of the content-neutral effect of counterfactuals is the simulation mindset, which is the primary focus of this study.

The simulation mindset, a judgment heuristic, refers to the mind's ability to generate possible alternatives and evaluate the likelihood of an event based on how easily it can be imagined. Importantly, once activated, it heightens the inclination to imagine, pay attention to, and consider other alternative possibilities (Hirt & Markman, 1995). This heuristic involves mentally undoing events by running simulations with alternative circumstances for both oneself and others. By prompting the consideration of alternative possibilities, it serves as a catalyst in disrupting fixation on a single outcome, leading to more balanced and impartial judgments. Indeed, Hirt and Markman (1995) found that prompting individuals to consider alternative outcomes of a football game led to more impartial judgments, with participants who generated multiple explanations reaching unbiased predictions and viewing both teams as equally likely to win.

There is evidence that considering alternative outcomes through the simulation mindset has a broader effect, helping to debias judgments in unrelated areas (Galinsky & Moskowitz, 2000; Hirt et al., 2004). In a study by Galinsky and Moskowitz (2000), participants were primed with the simulation mindset by listening to close-counterfactual scenarios in which a character nearly won or lost a trip to Hawaii. Afterward, they completed the Duncker Candle problem, a task that involves finding a creative solution for attaching a candle to a wall using common household items (e.g., candle, matchbox, and thumbtacks). To solve this problem, individuals must think beyond the typical uses of these objects (Duncker, 1945). Participants exposed to counterfactual scenarios performed better on the task, suggesting that activating the simulation heuristic led them to recognize both the conventional and less typical functions of the objects involved. Thus, when the simulation mindset is activated, its impact extends beyond the immediate

counterfactual thought. It activates broader cognitive mechanisms, aligning with the content-neutral pathway that emphasizes general modes of information processing, making alternative considerations more accessible and prompting individuals to think about alternatives during unrelated tasks.

Present Study

In this study, we examined whether the simulation mindset can be primed in children through close-counterfactual scenarios and whether this affects their problem-solving abilities. We also assessed whether the priming effect depends on the outcome of counterfactual scenarios, specifically whether negative outcomes elicit different priming strengths compared to positive outcomes.

Six- and eight-year-olds were presented with a storybook containing different scenarios. The experimental storybooks presented close-counterfactual scenarios, either with a positive outcome (*Positive Counterfactual* condition) or a negative outcome (*Negative Counterfactual* condition). The *Control* storybooks presented similar stories without the counterfactual aspect. Next, we assessed children's problem-solving abilities using the Functional Fixedness Task (Adapted Duncker Candle Task for children; Gaither et al., 2020, and the Alternative Uses Task (van Dijk et al., 2020).

We predicted that children in the Counterfactual conditions would perform better on the problem-solving tasks than those in the Control condition. Prior research suggests that the simulation mindset universally broadens alternative thinking across contexts (Galinsky & Kray, 2004; Galinsky & Moskowitz, 2000; Kray et al., 2006; Markman et al., 2007). Furthermore, we hypothesized that the activation of the simulation mindset would be moderated by the emotional valence of the stories. Specifically, exposure to negative close-counterfactual scenarios was expected to lead to stronger activation, resulting in better problem-solving performance compared to positive close-counterfactual scenarios. This aligns with previous research showing that individuals generate more unprompted counterfactual statements when exposed to counterfactuals with unfavorable outcomes (Epstude & Roese, 2008; Guajardo et al., 2016; Markman et al., 1993).

Methods

Participants A total of 90 six- and eight-year-olds participated in this study. There were 45 6-year-olds ($M = 6;5$ [years; months]; range = 6;0 – 6;11; 24 females), 45 8-year-olds ($M = 8;6$, range = 8;0 – 8;11; 26 females), with equal numbers of children per age-in-years randomly assigned to each of the three between-subjects conditions.

Participants were recruited and tested in a semiprivate area at a local museum in a large urban area ($n = 11$), in person at our laboratory ($n = 3$), or virtually via Zoom ($n = 76$). Informed consent from parents and/or caregivers was obtained prior to the study and oral assent was obtained from all participants. Participants were mostly White (32.79%),

Chinese (31.15%), or from multiple ethnic backgrounds (21.31%), with smaller groups from South Asian (6.78%), Arab (1.70%), West Asian (1.70%), Indigenous (1.70%), Black (1.70%), and Indo-Caribbean (1.70%) backgrounds. Most parents had a bachelor's degree or higher (79.67%).

Design and Procedure This study received ethics approval from the research ethics board at the affiliated institution. All materials were presented on a laptop computer, via PowerPoint. In this study, participants were presented with a storybook including four separate scenarios featuring a character competing in a race, presenting a school project, baking a birthday cake for a friend, and going to the movies with friends. Book illustrations were created in Canva, and the text were matched closely for word count and complexity.

Children were randomly assigned to one of three conditions. In the Negative Counterfactual condition (NCF), the storybook contained scenarios where characters were close to achieving a positive result but ultimately did not succeed (e.g., nearly winning first place in a race). In the Positive Counterfactual condition (PCF), the storybook contained scenarios where characters were almost prevented from achieving a positive result but ultimately succeeded (e.g., nearly losing a race). In the control condition, there was no indication of an event 'almost happening' in the story, it straightforwardly presented a negative event.

After each narrative, participants were prompted with a comprehension question related to the specific story (e.g., 'Did Alex win the race?'), and in the experimental conditions, an additional question of 'What almost happened?' was prompted. This was done to evaluate whether participants were accurately engaged and had a clear understanding of the story. See Figure 1 for an example story and script.

Participants then completed two problem-solving tasks that required the ability to think hypothetically about alternative possibilities: Functional Fixedness (FF) task and the Alternative Uses (AUT) task.

In the FF task (adapted from Gaither et al., 2020) children saw a cartoon bear standing next to a box of blocks by a tree with a honeycomb on the highest branch. They were instructed to help Mr. Bear reach the honeycomb while being informed that stacking the blocks still will not make Mr. Bear tall enough, and climbing the tree is not an option. To be successful in this task, children must construe the box as having a different function (e.g., the box could also be used as a step stool).

In the AUT (adapted from van Dijk et al., 2020), children were presented with five everyday items (pencil, brick, shoe, newspaper, spoon) selected from a database established by Wilson (1988). They were asked to produce as many new uses as possible for each item. Following each response, children were prompted with "Can you think of anything else?" until they verbally indicated they had no further answers. Similarly, success on the AUT requires the ability to think flexibly and generate unconventional uses distinct from conventional uses. An alternative use is considered valid if it deviated from the objects' typical or conventional

function. For example, using a pencil to colour would not be considered a valid alternative use, whereas using a pencil to create holes could be considered a valid alternative.

Each item was presented individually in PowerPoint. Both the order of item presentation and the task order were counterbalanced. Each testing session was video-recorded or audio-recorded. Children's responses were transcribed and coded offline independently by two blinded coders (interrater reliability, ICC=.98, 95% CI [.93, .99], $p < .001$).

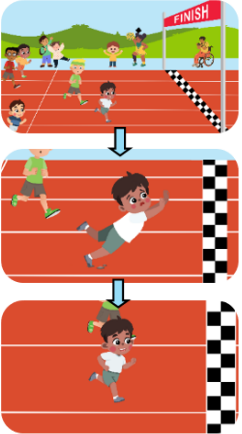


	<p>Alex is in the lead, but another runner is just a few steps behind him. Alex is only a few steps away from the finish line.</p> <p>But, oh no! Alex accidentally trips on a pebble and falls to the ground.</p> <p>He quickly gets up and runs towards the finish line. The runner behind Alex catches up to him.</p>
Negative Counterfactual Condition	
	<p>Alex almost won the race but, in the end, he lost the race</p>
Positive Counterfactual Condition	
	<p>Alex almost lost the race but, in the end, he won the race</p>

Figure 1: Race story stimuli and script for the Negative and Positive Counterfactual condition

Results

Functional Fixedness Task See anonymized data here: https://osf.io/wjbpe/?view_only=b53fb8fd8fd9400ba178573978eb65de

Participants received a score of 1 for providing the correct response (flip the box over and stack the blocks on top) and a score of 0 for providing an incorrect response (e.g., getting more blocks).

We used a Generalized Estimating Equation (GEE) binary model with condition (NCF, PCF, Control) as a between-subjects factor, age in years was entered as a categorical predictor, with consideration of main effects related to Condition and Age, along with potential interactions.

We found a significant main effect of Age, $Wald X^2(1) = 5.987$ $p = .014$, in that 8-year-olds were more likely to

generate a correct response compared to 6-year-olds. There were no significant differences between conditions and interactions, p 's > .319. Additionally, no significant differences were found based on emotional valence between the counterfactual conditions for either age groups p 's > .712. Consequently, results from the counterfactual conditions were combined for comparison with the control condition within each age group.

The analysis revealed no significant differences between the combined counterfactual and control conditions for either age group (p 's > .165). However, there was a trend suggesting that 6-year-olds produced correct responses more often in the counterfactual conditions. Specifically, when combining their scores across the counterfactual conditions, 6-year-olds solved the problem 41% of the time, compared to 20% in the control condition. Although this difference was not statistically significant ($p = .165$), these descriptive statistics suggest a trend toward more accurate responses in the counterfactual conditions among the 6-year-olds (Refer to Table 1 for descriptives and Figure 2).

Table 1: Mean Proportion of Correct Responses (%) on the FF Task by Age & Condition.

Age	Condition	$M_{Correct}(\%)$	$SD_{Correct}(\%)$
6	Counterfactual	41.43	51.04
	Control	20.00	41.40
8	Counterfactual	56.67	50.40
	Control	66.67	48.80

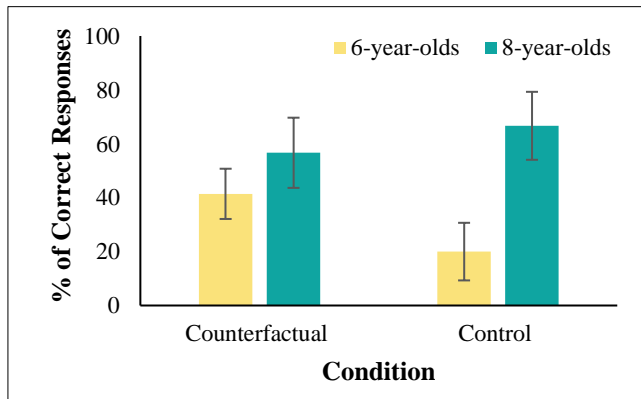


Figure 2: Percentage of correct responses on the FF task by Age & Condition. Error bars represent standard error of the mean.

Alternative Uses Task For each participant, an average fluency score was calculated based on the mean number of valid alternative uses generated across five trials. We used a GEE linear model with condition as a between-subjects factor and age in years as a categorical predictor, with consideration of main effects related to Condition and Age, along with potential interactions.

We found a significant main effect of Age, $Wald X^2(1) = 5.580$, $p = .018$, indicating that, on average, 8-year-olds

generated more alternative uses compared to the 6-year-olds. There were no significant differences in average fluency scores between conditions, $p = .094$. There was a marginally significant Age x Condition interaction, $Wald X^2(2) = 5.760$, $p = .056$ (Refer to Table 2 for descriptive and Figure 3).

To explore this interaction further, we split the responses by age and examined the differences across each condition. Among the 6-year-olds, significant differences were found in the number of alternative uses generated across conditions, $Wald X^2(2) = 14.244$, $p < .001$. More specifically, 6-year-olds generated significantly more alternative uses in the Negative Counterfactual condition than in the control condition ($p < .001$), and they also generated significantly more alternative uses in the Positive Counterfactual condition than in the control condition ($p = .012$). There was no significant difference in the number of alternatives generated between the two counterfactual conditions ($p = .878$).

Among the 8-year-olds, there were no significant differences across conditions, $Wald X^2(2) = 1.112$, $p = .573$. Thus, exposure to near-miss counterfactual scenarios led to the generation of more alternative uses for 6-year-olds but not for 8-year-olds.

Finally, the activation of the simulation mindset was not moderated by the emotional valence of the stories, as both 6-year-olds and 8-year-olds performed similarly between the two counterfactual conditions (p 's > .354).

Table 2: Average AUT Fluency Score by Age & Condition

Age	Condition	$M_{Fluency}$	$SD_{Fluency}$
6	Negative CF	1.61	0.57
	Positive CF	1.48	0.94
	Control	0.87	0.61
8	Negative CF	1.99	1.55
	Positive CF	1.63	0.61
	Control	1.77	0.74

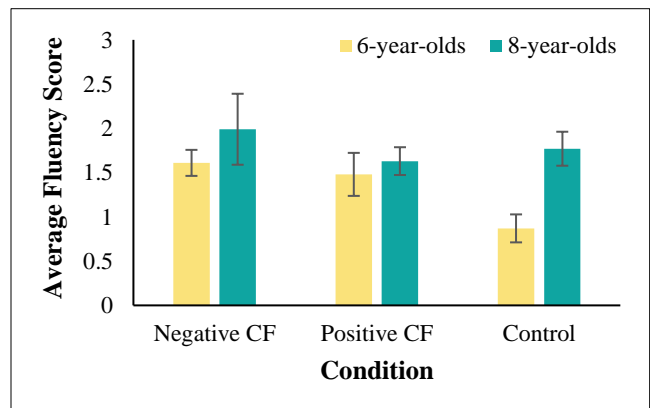


Figure 3: Average AUT fluency score Age & Condition. Error bars represent standard error of the mean.

Categorization of Alternative Uses Responses Since the 6-year-olds were shown to potentially benefit from

counterfactual priming, we looked at their responses more closely. To examine potential problem-solving patterns, we categorized children’s responses on the AUT into five distinct groups: (a) Invalid Alternative Use, (b) Alternative Function Based on Physical Property of the Item, (c) Use of Item in Pretend Play, (d) Item Modification for New Function, and (e) Other. Invalid uses include responses that suggest using the item in a way that is typical or conventional. Physical property are responses that suggest using the item differently based on its physical characteristics. Pretend play are responses that uses the item in pretend play scenarios. Item modification response involve altering or adapting the item to serve a different function. Other responses are those that do not fall into the other categories but are still unconventional.

Among the 6-year-olds, those exposed to counterfactual scenarios generated more responses compared to those in the control condition. The control group not only had a higher prevalence of invalid uses compared to the counterfactual groups but also produced more invalid responses overall than any other response type (51%) (refer to Table 3). This aligns with our main analysis, which showed that 6-year-olds exposed to counterfactual scenarios generated significantly more alternative uses, reflecting a pattern of higher overall response generation and a greater number of valid responses.

Table 3: Distribution of 6-year-olds’ Response Categories by Condition

Response Category	Negative CF	Positive CF	Control
Invalid	40 (25%)	39 (28%)	67 (51%)
Physical Property	28 (18%)	23 (16%)	18 (14%)
Pretend Play	15 (10%)	7 (5%)	5 (4%)
Item Modification	63 (40%)	57 (40%)	32 (24%)
Other Responses	11 (7%)	15 (11%)	9 (7%)
Total	347	311	287

We were also interested in examining the range of response categories generated by the 6-year-olds, specifically whether their responses spanned across multiple distinct categories. If counterfactual priming encourages thinking outside the box, we would expect those exposed to close-counterfactual scenarios to produce responses across a wider range of categories. To investigate this, we summed the total number of different categories (excluding the Invalid Uses category) used by each participant across all five items. We then averaged these totals within each condition for comparison.

The results showed that 6-year-olds in the Negative Counterfactual condition had an average of 5.47 categories, those in the Positive Counterfactual condition had an average of 5.00 categories, and those in the control condition had an average of 3.47 categories. This further supports our findings, indicating that counterfactual priming likely enhanced the 6-

year-olds’ performance by increasing both the number of valid uses and the variety of response categories.

General Discussion

In this study, we examined whether exposing children to close-counterfactual scenarios influenced their problem-solving abilities by priming a simulation mindset. Our results indicated that older children demonstrated better problem-solving abilities overall than younger children. Specifically, 8-year-olds were more likely to provide the correct solution in the Function Fixedness (FF) task and generated more uses on the Alternative Uses task (AUT) on average compared to 6-year-olds. However, only the 6-year-olds showed better performance on both tasks after exposure to close-counterfactual scenarios compared to the control condition. Lastly, children performed similarly across both counterfactual conditions, suggesting that emotional valence did not significantly influence the priming effect for either age group.

Our study utilized two different problem-solving tasks that required participants to think creatively and generate alternative uses for objects to succeed. On the FF task, participants had to recognize that the conventional function of a box (e.g., as a container) was not useful for solving the problem and instead identify an alternative use to creatively achieve the goal. Similarly, the AUT task evaluated their ability to generate a range of novel uses for common objects. Although the FF task focused on finding a specific correct solution and the AUT was more open-ended, both tasks required participants to think outside the box and generate alternative uses for different objects.

Our findings align with previous research indicating that performance on these tasks generally improves with age (Bai et al., 2021; Bijvoet-van Den Berg & Hoicka, 2014). As children mature, they develop more sophisticated information processing strategies, experience improvements in executive functioning, and acquire a broader knowledge of objects through increased experience. It has been shown that generating creative uses for objects relies on executive functioning skills, such as selective attention, inhibition, and cognitive flexibility (Gilhooly et al., 2007). Additionally, a deeper understanding of object properties through increased experience and observation of others using objects innovatively can broaden children’s perspectives (Nielsen et al., 2014).

In this study, we found a potential priming effect among the 6-year-olds. Specifically, the children provided correct answers more frequently on the FF task and generated more alternative uses following exposure to close-counterfactual scenarios. Compared to the older children, the 6-year-olds may have experienced greater cognitive demands while problem-solving, and so, it is possible that counterfactual priming helped alleviate this load. Problem-solving involves several steps, such as forming a mental representation, exploring and planning solutions, breaking the problem into manageable steps, and executing the plan while keeping the goal in mind (Zelazo et al., 1997). Consequently, younger

children may rely on heuristic methods to simplify this process, which can result in omitting some information and a less thorough evaluation of all available solutions (Bereby-Meyer et al., 2004). For example, in our FF task, many 6-year-olds who gave incorrect responses suggested simple yet ineffective solutions, such as getting additional blocks. That is, they overlooked a key constraint to the problem: Mr. Bear has limited materials. Thus, activation of the simulation mindset may reduce the cognitive load for younger children, making it easier to imagine and explore a broader range of possibilities (Hirt & Markham, 1995).

Moreover, counterfactual scenarios may have enhanced younger children's cognitive flexibility. Past research has shown that children who are adept at spontaneously generating counterfactual statements exhibit higher cognitive flexibility (Guajardo et al., 2016). Our analysis of the AUT responses indicated that 6-year-olds in the counterfactual conditions generated responses across more categories compared to those in the control group, suggesting more flexible thinking. While the relationship between counterfactual thinking and cognitive flexibility seems evident, further investigation is necessary to determine the directionality of this link and how it applies to different age groups.

In contrast to the results observed in younger children, 8-year-olds did not show improvement after exposure to counterfactual scenarios, as they performed similarly across all conditions. One possible explanation for this null effect is that the problem-solving tasks were too simple for the 8-year-olds, as they were adapted to be suitable for the younger children in our sample (i.e., 6-year-olds). Unlike the adult version of the FF task, our child-friendly version did not include distractor items. We also modified the AUT by removing time constraints and scoring only fluency, whereas the adult version also includes scores for originality, flexibility, and elaboration (Guilford, 1967; Guilford et al., 1978). Since performance on these tasks generally improves with age, the adaptation for younger children may have unintentionally made the tasks less difficult for the 8-year-olds. Future research should consider using more challenging tasks or different approaches to better capture the range of problem-solving skills across varying ages.

Lastly, we found no significant effect of the emotional valence of the story on children's performance. We hypothesized that emotional valence would moderate the priming effect, based on previous research showing that stories with unfavorable outcomes often lead to more unprompted counterfactual statements (Guajardo et al., 2016). While it is generally the case that people seek explanations to cope with negative events, positive events can also trigger spontaneous counterfactual thinking. Reflecting on how things could have been worse can provide a sense of relief and perspective even when outcomes are positive (Epstude & Rooose, 2008).

Taken together, our findings indicate that close-counterfactual scenarios did not significantly affect older children's problem-solving abilities. However, they may

provide potential benefits for younger children by reducing cognitive load and enhancing cognitive flexibility through a simulation mindset. There are several limitations that should be acknowledged when considering future research. First, this study was limited by a relatively small sample size, which may have reduced the statistical power to detect effects. As a result, our finding that there may be a potential priming effect among younger children should be interpreted with caution. However, data collection is ongoing, and this study represents a subset of a larger sample. Future analyses with the full dataset will allow for more robust conclusions.

Second, there was a procedural difference in the questioning between the experimental and control conditions, which may be viewed as a methodological limitation. Specifically, only participants in the experimental conditions were asked a counterfactual question (e.g., "What almost happened?") to assess their understanding of the near-miss stories. This decision was intentional to avoid inadvertently prompting counterfactual thinking in the control group, as even subtle prompts (e.g., "Think about what happened in the story") have been shown to spontaneously elicit counterfactual responses in children (Guajardo et al., 2016). Nonetheless, this asymmetry should be considered when interpreting comparisons across conditions.

Third, we presented children with four different stories, which may have been particularly challenging for younger children as it required sustained attention. While we aimed to make the stories engaging by incorporating domains of self-esteem important for children (Harter, 2012), the third-person perspective might have made it harder for children to relate and engage with the content, reducing their effectiveness in activating the simulation mindset. Finally, the problem-solving tasks may have been too simple and easy to detect significant effects for the older children. Future studies could enhance participant engagement by using first-person narratives or making stories more relevant to the task (e.g., scenarios where a character uses an object unconventionally). Additionally, to more effectively capture the full spectrum of problem-solving abilities across different age groups, future research could incorporate tasks of increasing complexity.

In summary, this study highlights the potential role of counterfactual thinking in promoting children's problem-solving abilities. Although there was no significant priming effect in older children, the trends observed in 6-year-old children suggest that close-counterfactual scenarios may enhance cognitive flexibility and reduce cognitive load, improving problem-solving performance. These findings contribute to the growing body of research on the development of counterfactual reasoning and highlight the need for further exploration into how counterfactual reasoning might be leveraged to support cognitive growth.

Acknowledgments

This work was supported by a grant to P.A. Ganea from the Social Science and Humanities Research Council of Canada. We would like to thank all the research assistants involved in

data collection and coding. We would also like to thank the many children and families who made this research possible.

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