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Who lies to protect another? Motivational, behavioral, and socio-cognitive predictors of children's interventional deception

The objective of the current study was to examine how the expected rewards, theory of mind, and false praise-telling relate to interventional deception that prevents moral transgression. A sample of 114 children aged 4-7 years participated in the study. The expected rewards ratio was a statistically significant predictor of interventional deception, with the children being most likely to deceive to prevent moral transgressions when the deception involved high personal gain. Overall, children who gave false praise and who passed the hidden emotion task were more likely to deceive than those who told another individual an unpleasant truth and failed the emotion understanding task. The results are discussed with respect to diverse developmental conceptions and studies on prosocial behaviors and sociocognitive and cultural factors involved in deception.

Key words: deception, prosocial, interventional deception, children, false praise, lie

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The acts of deception, for example, their verbal forms – lies, are usually not socially accepted (e.g., Bussey, 1999; Xu et al., 2009). However, prosocial lies, aimed at helping or rescuing others, are rated more positively than antisocial lies (e.g., Lindskold & Walters, 1983; Perkins & Turiel, 2007; Xu et al., 2009). Some specific lies which are told to protect other people from harm or death, for example, lies told to protect Jewish from Nazis during the Second World War, are even admired and perceived as acts of heroism (Talwar & Crossman, 2011). Because any human might become a victim or a witness of violence, it is important to understand what leads people to interventional deception - deception aimed to prevent moral transgressions. To our knowledge, little is known about the motivation and sociocognitive abilities underlying children's propensity to deceive in order to protect another person from being hurt. Therefore, the aims of the current study were to examine the impact of the expected rewards ratio on interventional deception and the sociocognitive (theory of mind) and behavioral (false praise-telling) predictors of interventional deception.

Interventional Deception in Real-Life Situations

A significant number of school-age children are victims or offenders of violence (Olweus, 2012). Even more of them play the role of bystanders who witness another's suffering and must decide whether to intervene or to do nothing (Trach et al., 2010). As Harvey et al. (2018) suggested, in some situations, a child can prevent hurting or harming another by deceiving a potential aggressor. For instance, when one boy (the seeker) is looking for another (the target) to steal his snack, a bystander can baffle the seeker's plans by falsely informing - indicating to the seeker the wrong location of the target. In Harvey et al.'s study, children from the age of 7 were more likely to lie to prevent the target from being a victim of theft than to prevent a positive interaction between the story protagonists (the seeker searching for the target in order to share cookies with him). Moreover, the authors indicated that even younger children tended to lie in order to prevent a particular action if transgression or harm for the target were made salient by emphasizing the seeker's intention to not give back the target's snack after taking it and the target's sadness due to the transgression, respectively. Importantly, in real-life situations, people can deceive not only by giving another false information but also by using a more passive strategy of deception - concealing their knowledge of something, for example, denying that they know where the wanted individual is (Byrne & Whiten, 1990; McCornac et al., 2014). Thus, in the current study, we examined both more active (giving another false information) and more passive (knowledge concealment) interventional deception.

Although in many cases deception might be a useful tool to protect others from violence, bystanders might not be prone to deceive an aggressor even if they want to help a potential victim. The reasons might be at least twofold. First, bystanders might believe that deception is not an appropriate way to save another.

In fact, 4- to 11-year-olds evaluate telling lies more negatively than telling the truth regardless of a situation (Bussey, 1999). They are also taught to be honest by other social agents (Lavoie et al., 2016). Moreover, school-age children believe that lying is categorically wrong and it is not until the age of 10 that they admit that sometimes lies might be told to protect another person (Lavoie et al., 2017). However, Guo and Rochat (2022) indicated that from 4 to 11 years of age children become increasingly inclined to accept lies that benefit their recipients but are costly to those who lie. Second, some children might avoid telling a lie to rescue another because they are afraid of the negative consequences for themselves, for example, the risk of being harmed by the revengeful aggressor, which is in line with Walczyk et al.'s (2014) suggestion that a decision whether to lie or tell the truth in a particular context is highly influenced by a quasi-rational cost-benefit analysis.

The Role of Expected Values of Lie- and Truth-Telling in Interventional Deception

In the vast literature on prosocial behaviors in children, there is a long-standing debate on whether their underlying motivation is of an intrinsic or extrinsic nature (see Warneken & Tomasello, 2008). Some early studies and conceptions (Bar-Tal, 1982; Guttmann et al., 1985) suggested that preschool children can be affected to a great extent in their helping behavior by tangible rewards and tend to explain their helping acts in terms of the expected, concrete rewards. Other research (Warneken & Tomasello, 2007, 2008) showed that prosocial behaviors are initially intrinsically motivated, with external rewards undermining this motivation when introduced. However, in the case of deception, for example, lie-telling, expected values (EVs) of both lie- and truth-telling influence the decision to lie or to tell the truth (Walczyk et al. 2014). Specifically, from the age of 4, children decide to tell a lie if an EV of a lie exceeds an EV of truth-telling (Walczyk & Fargerson, 2019). The more the EV of lie-telling exceeds the EV of truth-telling, the higher motivation to lie is expected (Walczyk et al. 2014). Thus, the main focus of the current study was to establish whether extrinsic gain in the form of expected reward could provide a motive for children to either deceive or tell the truth in a situation where the latter option always implies putting a third party in harm's way. In order to behave prosocially and intervene for the benefit of the third party, the child needs to deceive a transgressor who intends to harm his potential victim. It was suggested that in case of other-oriented lies, an increase of the EV of truth-telling and a decrease of the EV of lying might lead to less motivation to lie (Cassidy, 2019). It was of interest for us to examine whether additional positive external gains to the self might encourage children to deceive interventionally. Because in real life situations children tend to lie for self-serving purposes, an additional benefit for themselves might make them more likely to deceive a potential aggressor (Lavoie et al., 2017; Wilson et al., 2003).

Although to our knowledge, no study thus far has examined how an expected rewards ratio affects children's propensity to deceive to rescue others from a third party's attack, there have been a few studies on different types of lies in which consequences of lie-telling were manipulated. The results of these studies showed that when a lie was costly to them, children told the truth more frequently than without the additional cost. For example, Talwar et al. (2004) indicated that 3- to 11-year-olds were more likely to lie to conceal parental transgression when the likelihood of the child being blamed was low than when the child could have been accused of the transgression instead of the parent. Moreover, Popliger et al. (2011) showed that school-aged children were less likely to compliment the gift they did not like when the consequences of such lie-telling were negative than without additional cost. Children from 10 to 11 years of age were also more likely to lie for the benefit of another person when the negative consequences they would have to face were low than when a lie would be very costly for themselves (Nagar et al., 2020). Together, these results confirm that the more the EV of prosocial lie-telling exceeds the EV of telling the truth, the more likely children are to lie. In the current study, we wanted to find out whether the ratio of EV of lie- and truth-telling would also affect the likelihood of interventional deception.

Interventional Deception as a Prosocial Action

Because interventional deceptions are undertaken to protect another from being hurt, they might be considered prosocial ones. It is suggested that prosocial deceptions confront children with difficult moral dilemmas (Talwar & Crossman, 2011; Williams et al. 2016). In other words, children must solve a conflict between contradictory social norms that oblige individuals to different behaviors. In line with the communicative maxim of quality, speakers are required to share only true information (Grice, 1989). However, people also feel inclined to help and not to hurt others (e.g., Lakoff, 1973; Sweetser, 1987). For example, interventional deceptions require people to decide whether to be honest but not prevent harm to another person or to deceive to save another. In such cases, the harm is rather physical in nature whereas in other instances of prosocial deceptions, for example, regarding false praises, the harm might be psychological. Regardless of the nature of the potential harm, the tension between these contradictory social norms makes the decision of whether to tell the truth or to lie difficult to reach (Jakubowska & Białecka-Pikul, 2020). Whether children solve such conflicts in diverse contexts in a similar way remains an unexplored issue. Specifically, we still do not know whether those children who put emphasis on others' benefit in a politeness context where false praises usually occur would also be more likely to deceive in order to rescue another person from violence. It is possible that some children might deceive interventionally and praise others falsely in politeness settings due to their sensitivity to others' well-being. Conversely, other children might simply follow the principle of honesty and provide true information re-

gardless of the context. Because studies that simultaneously examined more than one type of lie or deception in lab settings are scarce and do not include interventional deception (Talwar et al., 2019, 2021), in the current study, we examined the relation between false praise-telling in a politeness context and interventional deception. To enable a more detailed comparison of the two types of prosocial lies, the main similarities and differences between them are presented in Table 1.

Resolution of the conflict between the desire to help another and aversion toward deception might be affected by children's sociocognitive and emotional understanding. According to the authors of all the current models of the development of deception, theory of mind (ToM) is one of the most important factors to be considered when it comes to children's ability to deceive (Jakubowska & Białecka-Pikul, 2020; Talwar & Crossman, 2011; Talwar & Lee, 2008; Walczyk & Fargerson, 2019). For instance, Jakubowska and Białecka-Pikul (2020) posited that the associations between ToM and deception are bidirectional. In other words, understanding of mental states develops in the context of deception, and deceptive skills improve due to a growing conceptual understanding of mental states. Thus, early deceptions might require only a rudimentary understanding of perceptual access and statistical learning. However, they provide opportunities to reflect on the mental states of others as consequences of children's deceptive actions. Therefore, different types of lies might be associated with various ToM abilities. Existing research is in line with these theoretical claims. For example, false denials are related to knowledge-ignorance understanding (Leduc et al., 2017; Ma et al., 2015), but not to false belief understanding (Evans et al., 2011; Wang et al., 2017). The results of training studies suggest that deceptive pointing during a hide-and-seek game is bidirectionally associated with understanding of mental states, particularly false belief understanding (Ding et al., 2015, 2018). Because associations between ToM and interventional deception remain unstudied, in the current study, we aimed to explore the links between interventional deception

Table 1. *Comparison Between False Praise and Interventional Deception (Based on Harvey et al., 2018; Heyman et al., 2020; Jakubowska et al., 2021)*

	False praise	Interventional deception
Context	politeness; interpersonal	moral transgression; informative
Goal	to not hurt other's feelings; comply with social norms	prevent theft or physical harm
Affected parties	liar directly involved in the outcome	might be costly to the liar
	person lied to is affected	third parties are affected
Prevented harm	psychological	physical
Mode	giving another false information, concealing/not admitting knowledge of something	giving another false information, concealing/not admitting knowledge of something
Conflict	tell the truth or not hurt the recipient's feelings	tell the truth or save the third party from harm

and understanding of various mental states, such as desires, knowledge, beliefs, the process of hiding one's own emotions, and sarcasm. We assumed that especially children's understanding that in some contexts, individuals are motivated to hide the emotion they experience might relate to interventional deception. In fact, hiding emotions might be considered deception because it involves behavior which is not consistent with the individual's internal state. Moreover, in some contexts, that is, in politeness settings, people tend to both hide their emotions and lie (Cole, 1986; Talwar & Lee, 2002). In line with this, Wang et al. (2022) indicated that children with more advanced emotional ToM - hidden emotion understanding and understanding of emotions that follow a false belief - are more likely to praise a gift-giver falsely. Deceiving a potential aggressor children should also control their emotional expression, sometimes even hide their true feelings. That is why we expect that hidden emotion understanding in particular might be related to interventional deception.

The Current Study

The aims of the current study were threefold. First, we aimed to examine how expected rewards influence children's decisions whether to deceive the aggressor who wants to steal another's property or to tell the truth regarding the location of the target (Walczyk & Fargerson, 2019). We suggest that the more positive the rewards ratio is, the more likely the children would be to deceive to prevent moral transgression. Because Harvey et al. (2018) suggested that interventional lie-telling emerges between 5 to 7 years of age or even earlier, we decided to examine 4- to 7-year-olds. Second, we expect telling false praise in order to make another feel better to be related to interventional deception. In other words, we suggest that children who tell false praise would also be more likely to conceal their knowledge and falsely inform the aggressor about the target's location. Third, we also expected that mental state understanding would be associated with interventional deception. Between 4 and 7 years, an intense developmental progression in ToM has been observed (Wellman & Liu, 2004). Moreover, it has been already indicated that prosocial lies are associated with ToM development (Lavoie et al., 2016), but no study so far has assessed the link between interventional deception and different aspects of ToM. We hypothesized that hidden emotion understanding might be of special importance here. As previously mentioned, in real-life situations, individuals might deceive another by both knowledge concealment and by providing misleading information. Therefore, for the purpose of the current study, we designed a procedure in which children might deceive using both strategies which are considered acts of interventional deception.

Method

Participants

We recruited 118 4- to 7-years-olds (55 girls and 63 boys) to participate in the study. Participants were recruited from a few preschools in an urban area of Poland. We excluded one child because of technical problems with recording and three children due to experimenter error. The final sample included 114 children (55 girls and 59 boys, M_{age} = 5.72 years, SD = 0.95). Although the parents of five children refused to state the exact age of their children, we did include those children in the final sample because preliminary analyses revealed no age effect. Children were randomly assigned to three experimental conditions regarding the expected rewards ratio: the low gain condition (n = 39, M_{age} = 5.68 years, SD = 0.95, 20 boys), the control condition (n = 36, M_{age} = 5.73 years, SD = 1.01, 18 boys), or the high gain condition (n = 39, M_{age} = 5.76 years, SD = 0.93, 21 boys). We found no differences between the conditions as regards the children's age, $F(2, 108) = 0.06$, $p = .94$, gender, χ^2 (1, N = 114) = 0.12, $p = .972$, nor false praise-telling, χ^2 (2, N = 114) = 1.31, $p = .520$.

Interventional Deception

We modified a task designed by Harvey et al. (2018) to make the procedure more interactive and to introduce prizes for helping the seeker and the target. The children were presented with a three-dimensional model of a park and told a story about two children (Lego figures): Kamil, the target, and Olek, the seeker[1] who were together in the park. Both Kamil and Olek promised the children some tokens for helping them. The procedure used in all the conditions was identical except for the number of tokens the target and the seeker offered the child. One of the story protagonists, Olek, wanted to steal a snack that belonged to the other one, Kamil. The children had a chance to either help Olek by admitting that they know where the target is and showing him the target's place of hiding (1 of 4 possible locations) or to help Kamil by denying the knowledge of his whereabouts and providing Olek with misleading information in that respect. Depending on the condition, there was a different number of tokens the children could receive from the protagonist they helped. At the end of the story, the seeker (Olek) asked the children two main questions in order to see which protagonist they decided to help: the knowledge concealment question (about the knowledge of the target's location: "Do you know where Kamil is?") followed by the request for the target's location ("Show me where Kamil is"). The children received tokens from the boy they helped. At the end of

1 Here, we describe the procedure used with boys. With girls, we told the same story about two girls: Kamila and Ola. The names of the target and the seeker were counterbalanced between participants.

the session, the tokens were exchanged for small prizes (e.g., stickers). Children's reactions to the questions were analyzed separately. The classifications of children's reactions to each question are provided in the Results section.

The number of tokens offered by the protagonists depended on the experimental condition. In the high gain condition, the seeker offered the children one token and the target offered three tokens for help. In the low gain condition, the seeker offered the children three tokens and the target offered one token. Finally, in the control condition, both characters offered the children just one token.

Theory of Mind

We examined children's mental state understanding using the Polish version of the Theory of Mind Scale (Jakubowska & Białecka-Pikul, 2017; Peterson et al., 2012; see Wellman, 2017 for the full version of the original scale; Wellman & Liu, 2004). The scale includes six tasks that examine the understanding of diverse desires, diverse beliefs, knowledge access, false beliefs, hidden emotion, and sarcasm. The children could receive 0 or 1 point in each task. If the children failed the control question(s) in each task, they were considered to have failed the task. The children passed the diverse desire task if they indicates that the puppet wanted the food that matched her own, not the children's own preference. To pass the diverse beliefs task, the children had to understand that the puppet would look for the cat in the place the puppet believed the cat was hiding, although the children themselves did not believe that. In the knowledge access task, the children had to understand that the puppet who did not look inside the box did not know what was in the box. The false beliefs task required the children to know that their friend who would see the Band-Aids box would say that it contained Band-Aids, although the children themselves knew that the box contained a paperclip. In the hidden emotion task, the children had to understand that a boy tried to have a more positive facial expression compared to how he really felt in order to hide his true feelings. To pass the sarcasm task, the children had to understand that the girl who said that the weather is good for a picnic on a rainy day was being sarcastic or wanted to be funny.

False praise-telling

We used a modified version of the art-rating task (Fu & Lee, 2007; Warneken & Orlins, 2015) to examine false praise-telling in children. We employed a smaller scale stimulus used in Jakubowska et al.'s study (2021). The child sorted a set of drawings into good and bad piles. Afterwards, a puppet owl, which brought her own unsuccessful drawing, appeared, saying that she was sad because she failed to draw a good picture. The experimenter prompted the child to try to cheer the owl up. Then the owl asked the child in which pile she would put her drawing

and left after the child's answer. The children who told the owl that they put her drawing into a good pile were considered false praise-tellers. The experimenter asked which pile contained the good drawings and why the child put the owl's drawing in the given pile.

Results

Interventional Deception

Knowledge Concealment Across Experimental Conditions

First, we analyzed children's responses to the knowledge concealment question ("Do you know where Kamil is?"). Across the experimental conditions, most children (n = 80, 70%) honestly admitted that they knew where the target was. Nearly one-fourth (n = 28) said that they did not know the location of the target child. Almost 6% (n = 6) provided no response to the seeker's question. As the lack of any reaction might be interpreted here in diverse ways, for example, as being caused by shyness or as an expression of a decision to not cooperate with the seeker, we excluded these children from further analysis regarding knowledge concealment. Children who said that they did not know where the target child was were considered as those who concealed their knowledge, whereas those who admitted that they knew the target's location were considered as truth-tellers. We did not find gender differences, χ^2 (1, N = 108) = 0.81, p = .370. Therefore, data of boys and girls were analyzed together. We did not also find any age effect, χ^2 (1, N = 103) = 0.05, p = .829.

False Informing Across Experimental Conditions

Second, we analyzed children's reactions to the seeker's request for information about the target's location ("Show me where Kamil is") to indicate how many children falsely informed the seeker of the target's location. Across conditions, 63% of the children (n = 72) revealed where the target really was hidden. A false location was indicated by 18% of the children (n = 20). A small group of children did not respond to the seeker's request (8%, n = 9). The same number of children refused to give the seeker any information on the target's location. The smallest group (4%, n = 4) said that they did not know where the target was hidden. Because one of the study's aims was to find the predictors of false informing, we created a dichotomous variable in which one group consisted of children who provided false information about the target's location. The second group consisted of children who revealed the true location. We excluded nine children who did not respond to the test question due to the same reasons as in the knowledge concealment analysis. We also excluded the children who refused to give the seeker any information on the target's location, because they neither lied nor pro-

not provide the seeker with false information on the target's location. Therefore, as regards false informing, we analyzed the responses of 92 children. We did not find gender, χ^2 (1, N = 92) = 0.31, p = .580, nor age effects, χ^2 (1, N = 92) = .929, p = .335. The numbers of children who concealed their knowledge and falsely informed the seeker across the experimental conditions are shown in Figure 1. The comparison of children's knowledge concealment and false informing behavior can be found in Table A1 in the Supplementary Materials.

Theory of Mind

Figure 2 presents the results of all ToM tasks. Due to the ceiling effect in diverse desire and knowledge access tasks (passing rates: 98% and 90%, respectively) and the floor effect in the sarcasm task (passing rate: 5%), we decided not to include the results of these tasks in further analyses.

Predictors of Knowledge Concealment

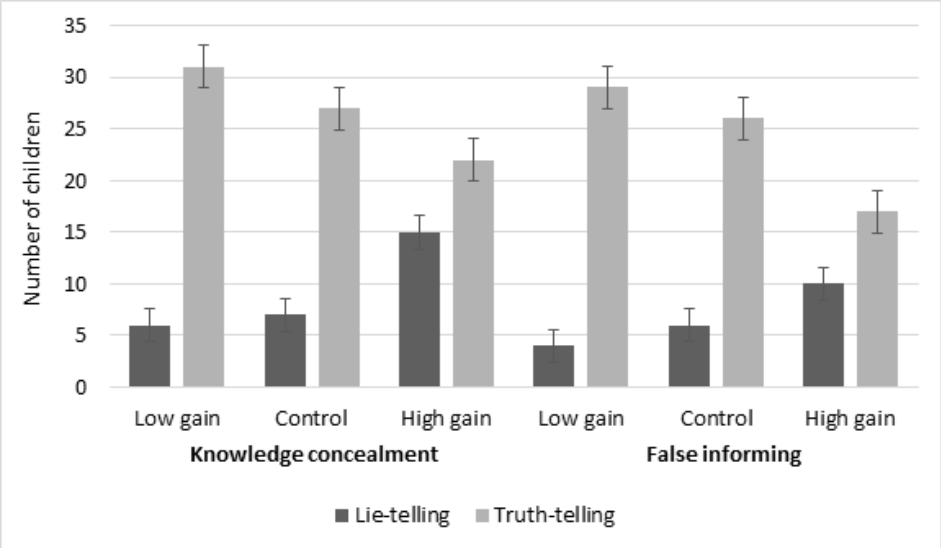
We conducted a hierarchical logistic regression with knowledge concealment as a dependent variable and condition (Step 1), diverse beliefs, false beliefs, and hidden emotion (Step 2), and false praise-telling (Step 3) as predictors to examine which factors are related to knowledge concealment (see Table 2). The first model was statistically significant. Condition significantly predicted knowledge concealment. The simple contrasts revealed that more children concealed their knowledge in the high gain condition than in the low gain condition. No other comparison was statistically significant.

Step 2 was also statistically significant. When ToM scores were added, condition remained a statistically significant predictor. The only statistically significant comparison revealed that more children concealed their knowledge in the high gain condition than in the low gain condition. Understanding of hidden emotion was also a statistically significant predictor. Specifically, children who passed the hidden emotion task were more likely to conceal their knowledge than those who failed. Other ToM abilities did not statistically significantly predict knowledge concealment.

Step 3 was also significant, as well as the whole model, χ^2 (6, N = 108) = 23.44, $p < .001$, $R_{\text{Nagelkerke}} = .29$. The model correctly classified 74% of participants as deceivers or nondeceivers. Condition remained a statistically significant predictor after including false praise. A priori contrasts indicated that more children deceived the protagonist in the high gain condition (41%) than in the low gain condition (16%), and in the high gain condition than in the control condition

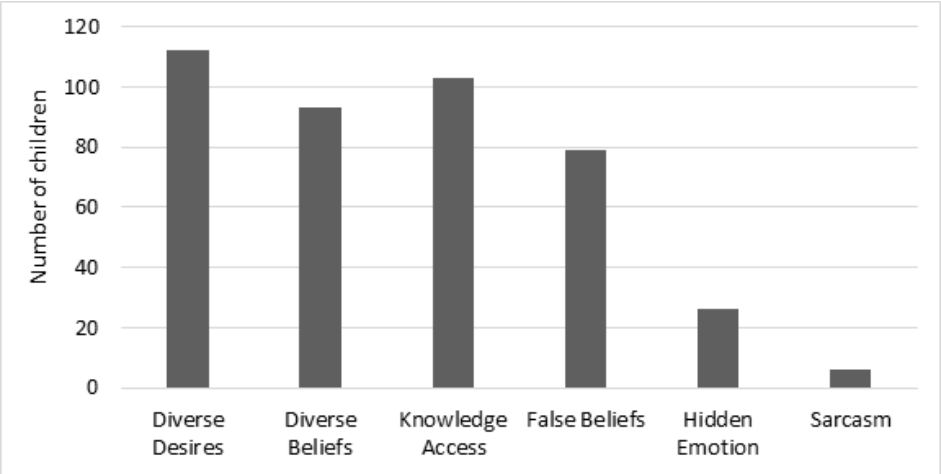
gression analysis would be very close to those reported below in the section Predictors of false informing. In the final step, two predictors were statistically significant: the expected rewards ratio and false praise-telling.

Figure 1. *Numbers of Children Who Concealed Their Knowledge and Informed Another Falsely in Each Experimental Condition*



Note. Error bars show standard errors.

Figure 2. *Numbers of Children who Pass Each Theory of Mind Task (N = 114)*



vided truthful information. Four children who said that they did not know where the target was after the request to show the target's location were also excluded from the analysis[2]. Although these children concealed their knowledge, they did

2 With the four children as providing false information, the results of the logistic re-

Table 2. Hierarchical Logistic Regression Analysis Predicting Knowledge Concealment and False Informing

	Predicting knowledge concealment					Predicting false informing				
	Wald	*p*	*B*	OR	CI	Wald	*p*	*B*	OR	CI
Step 1										
χ^2 (2, *N* = 108) = 6.28, *p* = .043, $R_{Nagelkerke}$ = .08						χ^2 (2, *N* = 92) = 5.49, *p* = .064, $R_{Nagelkerke}$ = .09				
Condition	6.14	.046				5.31	.070			
High gain vs low gain	5.10	.024	1.26	3.52	1.18, 10.51	4.75	.029	1.45	4.27	1.16, 15.73
High gain vs control	3.20	.074	−0.97	0.38	0.13, 1.10	2.41	.121	−0.94	0.39	0.12, 1.28
Low gain vs control	0.23	.635	−0.29	0.75	0.22, 2.49	0.54	.462	−0.52	0.60	0.15, 2.35
Step 2										
χ^2 (3, *N* = 108) = 10.78, *p* = .013, $R_{Nagelkerke}$ = .21						χ^2 (3, *N* = 92) = 6.52, *p* = .210, $R_{Nagelkerke}$ = .16				
Condition	7.93	.019				5.84	.054			
High gain vs low Gain	7.34	.007	1.70	5.50	1.60, 18.85	5.32	.021	0.60	1.82	0.45, 7.48
High gain vs control	3.09	.079	−1.01	0.37	0.12, 1.12	2.66	.103	−1.03	0.36	0.10, 1.23
Low gain vs control	1.09	.298	−0.695	0.50	0.135, 1.85	0.70	.404	−0.60	0.55	0.13. 2.25
Diverse beliefs	3.76	.053	−1.19	0.31	0.09, 1.10	0.67	.415	−.54	0.58	0.16, 2.14
False beliefs	0.602	.438	0.42	1.52	0.52, 4.40	3.53	.060	1.21	3.35	0.95, 11.81
Hidden emotion	7.71	.005	1.55	4.70	1.57, 14.01	0.131	.717	−0.312	0.73	0.135, 3.97
Step 3										
χ^2 (1, *N* = 108) = 6.38, *p* = .012, $R_{Nagelkerke}$ = .29						χ^2 (1, *N* = 92) = 4.78, *p* = .029, $R_{Nagelkerke}$ = .23				
Condition	8.89	.012				6.10	.047			
High gain vs low gain	7.75	.005	1.83	6.22	1.72, 22.53	5.07	.024	1.63	5.09	1.24, 21.00
High gain vs control	4.54	.033	−1.33	0.26	0.08, .90	3.54	.060	−1.26	0.69	0.16, 2.98
Low gain vs control	0.051	.476	0.49	1.63	0.42, 6.37	0.25	.619	−.371	0.69	0.16, 2.98
Diverse beliefs	4.53	.033	−1.35	0.26	0.74, .90	0.45	.503	−0.45	0.64	0.17, 2.39
False beliefs	0.47	.495	0.38	1.46	0.49, 4.34	3.32	.069	1.21	3.34	0.91, 12.22
Hidden emotion	5.53	.019	1.35	3.87	1.25, 11.96	0.91	.34	−0.90	0.41	.06, 2.59
False praise-telling	6.09	.014	1.30	3.66	1.31, 10.25	4.63	.031	1.31	3.69	1.12, 12.14

(21%). There was no difference between the low gain condition and the control condition. Understanding of hidden emotion remained a statistically significant predictor: children who passed the hidden emotion task were more likely to deceive (46%) than those who failed (20%). False belief understanding was not a statistically significant predictor. However, unexpectedly, children who failed the diverse beliefs task were more likely to conceal their knowledge (33%) than those who passed (24%). False praise-telling introduced in this step was also a statistically significant predictor, with children who praised the owl falsely being more likely to deceive the seeker (41%) than those who told the owl the truth (17%). False belief understanding was not a statistically significant predictor of knowledge concealment. Predicted probabilities of knowledge concealment as a function of expected rewards ratio, ToM, and false praise-telling are shown in Figure A1 in the Supplementary Materials.

Predictors of False Informing

A hierarchical logistic regression with false informing as a dependent variable and condition (Step 1), diverse beliefs, false beliefs, and hidden emotion (Step 2), and false praise-telling (Step 3) as predictors was conducted to examine whether these factors are related to false informing (see Table 3). Steps 1 and 2 were not statistically significant. However, Step 3 was statistically significant. The model correctly classified 79% of the children as false or truthful informers. The condition was a statistically significant predictor of false informing. Simple contrasts revealed that more children deceived the protagonist in the high gain condition (37%) than in the low gain condition (12%). The differences between high gain and control and low gain and control were not statistically significant. The number of deceivers among the children who passed diverse beliefs, false beliefs, and hidden emotion tasks were not statistically significantly different from those who failed. False information on the target's whereabouts was provided more frequently by the children who praised the owl falsely (33%) than by those who told her the truth (16%). Predicted probabilities of false informing as a function of expected rewards ratio, ToM, and false praise-telling are presented in Figure A1 in the Supplementary Materials.

Discussion

The current study was the first to investigate the role of motivational, behavioral, and socio-cognitive factors in interventional deception, that is, knowledge concealment and false informing in a sample of 4- to 7-year-olds. First, we examined how the potential consequences of deception affect children's decisions to deceive to prevent moral transgressions. The expected rewards of interventional deception turned out to be statistically significant predictors of knowledge concealment. Specifically, controlling for ToM and false praise-telling, more children

concealed their knowledge of the target's whereabouts when the benefits from deception exceeded the benefits from telling the truth than when the benefits from deception were equal or lower. However, there was no difference in the rate of knowledge concealment only when we compared the conditions in which the benefits from hiding the truth and truth disclosure were equal with the condition in which benefits from telling the truth exceeded the benefits from deception. Together, these results might suggest that potential benefits for oneself motivate children to deceive to help another. In contrast, increasing potential benefits from telling the truth did not influence children's propensity to conceal their knowledge of the victim's whereabouts. The expected rewards also predicted false informing, but only when sociocognitive factors were controlled for. Specifically, controlling for ToM and false praise-telling, more children either provided false information about the target's location when the benefits from deception exceeded the benefits from telling the truth than in the condition where the benefits from deception were higher than those from telling the truth. There were no differences between any other conditions. Thus, the pattern of the results regarding false informing is less clear than those of knowledge concealment. Importantly, in our study, the request to show the target's location followed the knowledge concealment question, so that false informing might have required semantic leakage control. Specifically, children who concealed their knowledge might have been surprised that the aggressor wanted them to show the location of the target because they had already said that they did not know where the target was. Thus, for children with a low level of behavioral control, giving false information about the location of the target might have been difficult. Nevertheless, we can claim that already between the ages of 4 and 7, children seem to consider potential personal gains when deciding to deceive in order to prevent moral transgressions. Thus, the results are in line with both theoretical considerations (Walczyk & Fargerson, 2019; Walczyk et al., 2014) and empirical results (Nagar et al., 2020; Popliger et al., 2011; Talwar et al., 2004), suggesting that the cost-benefits ratio does affect the decisions on lying, and that the more positive it is, the more likely the children are to deceive. In line with this, in real-life situations, a promise of a benefit might be an important factor that motivates children to deceive to prevent moral transgressions.

What our study shows is that when deciding whether to deceive or reveal the truth to the potential aggressor, at least some children seem to consider their own rather than other people's welfare. Importantly, however, even when interventional deception involved a lower gain than telling the truth, some children did decide to deceive to prevent a transgression - 16% concealed their knowledge and 12% falsely informed the seeker. This might suggest that some of the children based their decisions on rather other-oriented motives. Although we are not able to state whether an external reward in the form of tokens in our study could have had a detrimental effect on those children who were potentially already motivated to deceive, we can suspect that it could have had a positive effect on either low motivated or undecided children. On the other hand, we have strong reason

to believe that the intrinsic motivation was high in the small number of children who decided to deceive and therefore lost the chance for a greater concrete reward. One way to further explore the issue would be by designing experiments involving the assessment of children's behavior in the procedure prior to any manipulation regarding the presence and type of rewards.

Compared to some real-life, high-stakes situations, in our study, children were understandably faced with a much lower-stakes scenario. When observing violations in preschool settings, 4-year-olds were shown to be sensitive to and report to adults violations related mainly to property entitlement and physical aggression, although they did it more often when being a victim themselves than on behalf of third parties (Ingram & Bering, 2010). Children aged 4 to 6 years were also shown to be capable of reliably nominating peers for the roles they take in cases of unjustified aggression (such as Aggressor, Victim, or Bystander, Monks et al., 2002). Experimental studies show that already at this age, children judge physical harm as a more severe transgression than theft and expect victims to feel negative emotions, which they justify with references to moral concerns (Arsenio & Kramer, 1992). They also seem to be capable of relying on these differentiations in every day settings when reporting the transgressions against others on the playground (Ingram & Bering, 2010). However, a real-life, high-stakes situation might present itself as an emotionally arousing event requiring management of one's own negative affect experienced in response to a threat to another's health or life. The higher the stakes, the higher might be the emotional arousal in the child faced with the dilemma. It is plausible that decision-making with regard to the costs and benefits it may generate, as well as the regulation of own behavior could both be affected by a highly emotionally arousing situation. Potentially, such a situation could trigger an empathic response including interventional deception irrespective of the costs-benefit ratio. However, when observed in their natural settings, children aged 2 to 4 and 3 to 14 years told mainly instrumental lies or lied to avoid responsibility for transgressions, to falsely accuse siblings, and to gain control over another's behavior, while other-oriented lies were very infrequent (Lavoie et al., 2017; Wilson et al., 2003). Based on all the above-mentioned issues, it is very difficult to predict how children would react in real-life, high-stakes situations.

The second aim of the study was to examine the relation between false praises and interventional deception. As we have expected, children who gave false praise in the art-rating task were more likely to conceal their knowledge of the target's whereabouts from the seeker and misinform the seeker as to the target's location. We believe that this link might stem from the motives that are common for both the phenomena and the consistency of how children reconcile contradictory social norms while demonstrating both types of behaviors in question. First, although motives that underlie prosocial deception might be diverse and intertwined, we claim that the link between interventional deception and false praises observed in our study might indicate that at least one of the motives is common to and/or underlying them both (Martin & Olson, 2013; Warneken & Orlins, 2015).

We suggest that at least some of the children deceived in these two contexts to prevent harm from befalling others. In the case of false praise, the avoided harm is mainly of an emotional nature – a child's withholding the truth or telling a lie should protect others' feelings. In the case of interventional deception, the harm in question is more strictly related to moral transgression, which, however, can result in emotional discomfort or harm if committed. The relation between false praise and interventional deception is also in line with the suggestion that children's prosocial behavior becomes integrated with age (Paulus, 2018). Secondly, in resolving a conflict between contradictory social norms, children might follow the same way of reasoning and behavior regardless of the context. Such an interpretation was recently proposed by Heyman et al. (2020) already for 3 to 5-year-olds' ability to resolve a conflict between the social expectations to always tell the truth versus to refrain from mentioning undesirable aspects of others' appearance. The high selectivity in disclosing information about sensitive topics observed by Heyman et al. seems to prove that even preschool children consider whether and how beneficial to others telling a blunt truth would be. Therefore, both false praise-tellers and children who deceive to prevent moral transgressions might be more sensitive to other people's well-being or understand the potential influence of their behavior on others better than their peers. However, we cannot rule out some potential third factor underlying the observed link between false praise telling and interventional deception, which is not necessarily a sociocognitive one. For instance, both false praise-telling and interventional deception involve not only a simulation of reactions appropriate for the situation, but also suppressing the potentially prepotent, genuine ones, as well as keeping actively in mind the distinction between sincere thoughts and responses that are inconsistent with them. Therefore, both might also rely on, for example, the child's self-monitoring and inhibitory control.

The issue of understanding the influence of one's own actions on others is also related to the third aim of the study, which was to explore the links between deception and understanding of various mental states. With respect to its potential links to ToM, interventional deception was expected to be related mainly to hidden emotion understanding. In line with this anticipation, understanding the process of hiding negative emotions turned out to be associated with interventional deception via withholding information. Children who passed the hidden emotion task were more likely to conceal their knowledge of the target's whereabouts from the seeker. This result is consistent with theoretical models (Jakubowska & Białecka-Pikul, 2020; Talwar & Crossman, 2011; Talwar & Lee, 2008; Walczyk & Fargerson, 2019) and other research pointing to links between particular types of deception and specific ToM abilities (e.g., Ding et al., 2018; 2015; Leduc et al., 2017; Ma et al., 2015). They also contribute to a growing body of research showing that emotional understanding predicts different kinds of behaviors aimed at promoting others' well-being (Eggum et al., 2011; Demedardi et al., 2021) and might play an important role in prosocial lying in older, school-a-

ged children (Heyman et al., 2009; Wang et al., 2022; Xu et al., 2010). The relation between hidden emotion understanding and knowledge concealment might stem from the fact that both involve understanding that internal states cannot be directly perceived by other individuals, so the person who experiences a particular state can deny or mask their feelings or a state of knowledge.

Although we found hidden emotion understanding to be associated with knowledge concealment, we failed to confirm its relation with false informing. Since the relation between the understanding of hidden negative emotion and interventional deception has not been examined in any previous study, the possible issues that might have contributed to this outcome should be treated with caution. One of them regards the potential complexity of reasoning involved in understanding hidden emotions and in false informing. Hypothetically, the number of perspectives one has to coordinate might be larger when providing the seeker with false information ("What can I do so that the seeker thinks that the target is somewhere else than he really is?") than while solving the hidden emotion task ("What can he do so that others think that he's not really sad?"). Such a hypothesis would be consistent with some study results on the links between prosocial deception and interpretative ToM (Cheung et al., 2016; Hsu & Cheung, 2013) and second-order ToM (Broomfield et al., 2002; Vendetti et al., 2019). Finally, false informing can also demand better executive functioning (e.g., inhibitory control), which again has been claimed to be related to understanding different types of lies (Talwar & Crossman, 2011; Williams et al., 2016). Including some measures of more advanced ToM and executive function components in future studies, could shed more light on the issue.

One unexpected result that also needs further investigation in future studies regards the relation between diverse beliefs understanding and knowledge concealment. In our study, children who failed to appreciate that others could have different beliefs than they do turned out to be more likely to conceal the target's location in the lying scenario. Although it has been claimed that deception involves representing beliefs rather than desires (Sai et al., 2021), the results of studies on the links between ToM components and deception vary, depending on, for example, the children's age, study design, additional factors controlled for in the analyses, or types of deceptive behavior assessed. After controlling for age and verbal ability, diverse belief understanding was found to be positively correlated with competitive game but not transgression concealment lying in 3-year-olds (Sai et al., 2020), yet it did not predict the development of lying as measured in a hide-and-seek task in children progressing from 3 to 4 years (Zhao et al., 2021). Also, it was not statistically significantly related to false denials in children between 2 and 3 years of age (Leduc et al., 2017). It is possible that at different developmental stages, different forms of deception may relate in different ways to given mental state abilities.

Another matter that merits attention is the overall rate of interventional deception in our study, at first glance rather modest when compared to the rates

reported by Harvey et al. (2018). In our study, 70% of children told the truth in response to the knowledge concealment question and 63% of them sincerely informed the seeker about the target's location. In the original task, more than half of the participants deceived the potential aggressor. One important difference between our version of the task and the original procedure is that children in Harvey et al.'s study were told that the seeker would not get to know who the false location came from whereas our participants had to mis/inform the seeker directly. If such a situation were to occur in real life, it is very probable that the deception or lie, when discovered, would have led to some unpleasant consequences (e.g., revenge) for the liar. Thus, the costs and benefits considered by the children in our study when making the decision could have been extended also to the potential consequences of lying to be incurred. Consequently, the costs--benefit analysis could have become more complex and cognitively demanding: apart from the number of tokens and the consequences of one's own behavior for the target, they could have additionally included the aggressor's reaction in their decision-making process. However, the potential revenge-related risk was not a factor manipulated in our study. Also, reducing any of the perceived negative consequences of truth-telling was found to significantly increase children's willingness to truthfully disclose transgressions (Talwar et al., 2015). The reassurance that the seeker will not know who misled him, used in the original task, could have acted as a similar kind of incentive, only in this case - reducing the potential negative consequences of deception. The modest rate of interventional deception in our study might also be affected by cultural aspects. According to some authors (Wierzbicka, 1994; Szarota et al., 2015), Polish culture is rather preoccupied with sincerity and emotional frankness. A study with adult participants (Szarota & Cantarero, 2019) showed that Polish people judge individuals who lied to help a friend as being less respectable and worse friends than unhelpful truth-tellers. Therefore, as the authors put it, in a culture where the norms regarding deceit are more rigid, lying might not be socially desirable. However, given that our study is the first one to explore the issue of interventional deception among Polish children and that the expected cultural differences in prosocial deception are not always confirmed (Guo & Rochat, 2022), more studies are needed to enable any firm conclusions. Finally, our version of the task, although made more interactive, did involve several questions, rules, and manipulations which at times could have made it difficult for children to keep track of all the protagonist's perspectives, intentions, and offers (cf. Rubio-Fernandez & Geurts, 2013). One challenge for future studies is to try to develop a somewhat simplified version of the procedure.

Limitations and Future Directions

One limitation of the current study is that it remains unclear which and how many of the factors precisely did the children take into account while contemplating their decisions. In other words, we cannot say whether the potential tra-

de-off was between costs-benefits for oneself only, or between those for oneself and for the target. Although we revealed that the rewards ratio does play a role in interventional deception, the nature and number of specific costs and benefits in real-life situations need to be further explored in future research. In the current study, we manipulated only the expected rewards ratio for the children participating in the study, whereas the costs and benefits for the story characters were equal across experimental conditions. The role of the cost-benefit ratio for the target and the seeker should be taken into account in further research to provide a more detailed picture of the factors that affect children's decisions.

Second, our operationalization of interventional deception as knowledge concealment focused mainly on explicit denial of the knowledge about the target's whereabouts treated as a manifestation of the child's understanding that the possessed information is relevant to the seeker's actions. In some studies, a verbalized refusal to inform ("I won't tell you!") was coded as passive concealment, indicative of conscious premeditation (Peskin, 1992). Withholding information is also interpreted as perspective withholding – an indication of ignorance understanding, as opposed to providing a novel, nonfactual perspective – an indication of false belief understanding, manifested in the provision of false information (Heinrich & Liszkowski, 2021). Children as young as 3 years old are able not only to withhold information but also to misinform by pointing to erroneous locations to prevent a competitive puppet from stealing a sticker from a friend puppet (Heinrich & Liszkowski, 2021). They manage to verbally report such planned misinformation in response to hypothetical questions about their future behavior, although their explicit skills are less pronounced than the practical ones. In our study, six children who remained silent when asked about the knowledge of the target's whereabouts were excluded from further analyses regarding knowledge concealment as their lack of reaction was difficult to interpret (see the Results section). Importantly, almost all of them did not provide any answer nor react in any other way also when asked about the target's location. Apart from already mentioned interpretational issues, such behavior might also result from difficulties in cognitive processing (holding in memory the truth, suppressing its' sharing with the seeker, and planning an untrue alternative), perspective coordination and manipulation, or resolving the conflict between the need to help others and aversion toward lying (cf. Talwar & Crossman, 2011). Different as it is from passive concealment, we cannot fully exclude the possibility that the silence was a conscious and premeditated choice by the few children who, instead of denying their knowledge and misinforming, decided not to share any kind of information with the seeker. Future studies, involving larger groups of children and a broader range of situations potentially inducing different kinds of lies preventing transgressions could help us determine whether silence could be treated as a consistent strategy employed by children across different scenarios.

Another limitation is that older children were not included in the research. In our study, age did not affect interventional lie telling, and the effect of age some-

times is (Talwar et al., 2007; Williams et al., 2013) and other times is not (Aydin, 2021; Talwar & Lee, 2002;) observed concerning different kinds of prosocial deception. However, the issue of children's age range is important for other reasons. First, in Harvey et al.'s (2018) study, only 7- and 8-year-olds, not 5- and 6-year-olds, were more willing to lie to prevent a transgression compared with lying to prevent a positive interaction. Second, in studies involving the issue of high/low cost of, or benefit from prosocial lies, the age range of children is often wider or encompasses older ages, and other-oriented lies that are costly to oneself are usually reported in children aged 7 and older (e.g., Guo & Rochat, 2022; Nagar et al., 2020; Popliger et al., 2011). A wider age range of children could have been more informative with respect to potential age differences, and associations between all the variables, and could have revealed a higher percentage of liars.

Future research on interventional deception should also include children's wider socioemotional competencies and their social experience often enumerated in other studies on prosocial deception. As recently demonstrated in an experimental study by Aydin (2021), false praises were told more frequently by preschoolers who were previously helped and participated in cooperation. Also, the experience of empathy turned out to be related to children's prosocial deception, however, only when the personal cost of lying was low (Nagar et al., 2020). Overall, children's lying was found to be predicted by their cognitive empathy as measured by a scale of a parent-reported measure, over and above the induced empathy.

Conclusions

Our study is the first to investigate the role of rewards ratio, false praise-telling, and ToM abilities with respect to interventional deception in 4- to 7-years-old children. We indicated that children are more likely to deceive to prevent moral transgression when it is beneficial not only for the target but also for themselves. Understanding hidden emotions and the propensity to tell false praise are also associated with deceiving to prevent moral transgression. As such, the results broaden our knowledge on the significance of potential benefits in children's propensity to deceive or to be honest in particular contexts, as well as on the developmental links between specific types of deception and other motivational and socio-cognitive factors in preschool children.

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Conflict of Interest Disclosure

The Authors declare no conflicts of interest.

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Research Ethics Statement

The current study was approved by The Research Ethics Board at the Institute of Psychology at the Jagiellonian University in Kraków, KE/01/012019. Because, all the participants were children from 4 to 7 years of age we obtained consents from children and their parents. Parental written consent was obtained for each child and the child's verbal consent was required to start the experimental session.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author, J.P., upon a reasonable request.

Authorship Details

Joanna Płotnikowska: research concept and design, collection and/or assembly of data, data analysis and interpretation, writing the article, critical revision of the article, final approval of the article. Anna Filip: writing the article, critical revision of the article.

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Supplementary Materials

Description of the Modified Interventional Lie-Telling Task (Harvey et al., 2018)

At the beginning of the task, the experimenter familiarized the child with tokens that the child could get for helping one of the story characters during the procedure. The experimenter explained that the child would receive one prize for each token. Then she ensured that the child understood the rule by asking how many prizes the child would get for one, and three tokens. If the child did not answer correctly for both questions the experimenter explained the rule again. After the child finally answered both questions correctly, the experimenter moved to the next part of the task. The child was presented with the three-dimensional model of a park and told a story about two children (Lego figures): Kamil, the target, and Olek, the seeker, who were together in the park. The names of the seeker and the target were counterbalanced between participants. Examining the girls, we told the same story about two girls, Kamila and Ola. Here, we describe the procedure for boys. At the beginning of the story, both Kamil and Olek promised the child some tokens for helping them. The number of tokens depended on the experimental condition:

- Low gain condition: the target offered the child one token and the seeker offered three tokens,
- Control condition: both characters offered the child just one token,
- High gain condition: the target offered the child three tokens and the seeker offered one token.

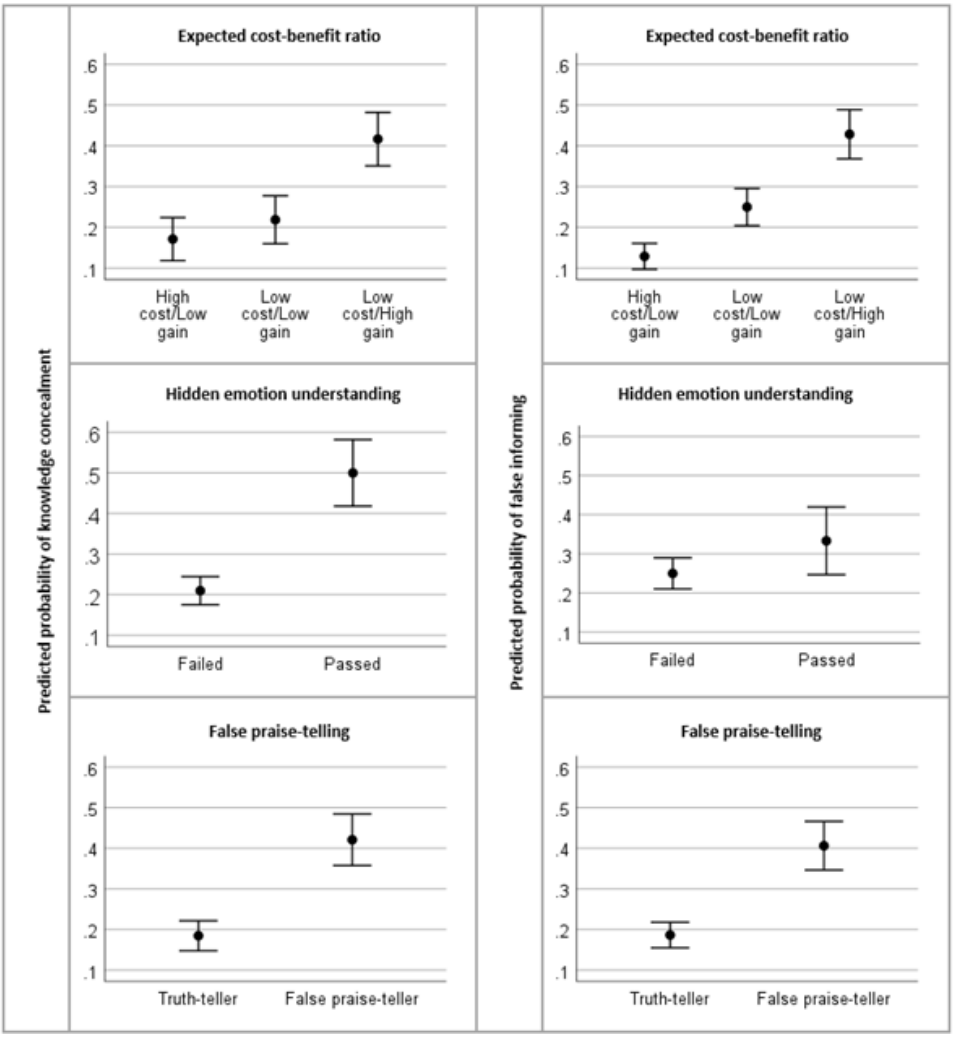
The experimenter told the child that they could get the tokens from one of the boys only. Then she ensured that the child remembered how many prizes they would get for each number of tokens. The experimenter reminded the child of the rule if needed. Then she demonstrated the main parts of the story, asking comprehension questions, correcting the child's answers if needed, and asking a particular question again. The procedure used in all of the conditions was identical except for the number of tokens the target and the seeker offered the child. Here, as an example, the story and the questions in the low gain condition were as follows: Kamil and Olek get tasty croissants. Kamil wants to eat his croissant later. Olek eats his croissant immediately and wants some more. Olek wants to steal Kamil's croissant. Kamil will be very sad if Olek steals his croissant. What face will Kamil have if Olek steals his croissant? (correct answer: a sad face). Olek turns away from Kamil and is staring at the airplane in the sky. Olek is not looking at Kamil. Does Olek see what Kamil is doing? (a correct answer: no). Now, Kamil hides himself behind the fence. Does Olek see Kamil hiding behind a fence? (correct answer: no). Now, Olek turns around and sees that Kamil is not there. Tell me where is Kamil? (correct answer: behind the fence) Does Olek know that Kamil is

behind the fence? (correct answer: no). Now, Olek wants to find Kamil and steal his croissant. Now, Kamil wants to remind you of something: "If you help me and Olek will not find me, I will give you one token". Now, Olek wants to remind you of something: "If you help me and I will find Kamil, I will give you three tokens." Who promised you one token? (correct answer: Kamil). Who promised you three tokens? (correct answer: Olek). Remember: if Olek finds Kamil, Olek will steal Kamil's croissant. Now, Olek wants to ask you something: "Do you know where Kamil is?" (knowledge concealment question: yes - truth; no - lie). Regardless of the child's answer Olek requests the child: "Show me where Kamil is" (request for the target's location: behind the fence - truth; any other location - false). Then the experimenter asked the child why he did or did not show Olek where Kamil was. The child received tokens from the boy he helped. At the end of the session, the tokens were exchanged for small prizes (e.g., stickers). Children's answers to knowledge concealment questions and reactions to the request for the target's location were analyzed separately (see the Results section).

Table A1. *Children's (N = 114) Answers to the Seeker's Question on the Location of the Target and Responses on the Seeker's Order to Show The Location of the Target*

		Reaction to the seeker's order: "Show me where Kamil is"				
		True informing	False informing			
		True location	False location	I do not know	No response[2]	Refusal to show any location[2]
Answer to the Seeker's question: "Do you know where Kamil is?"	Yes	67	6	0	2	5
	No	5	14	3	2	4
	No response[1]	0	0	1	5	0

Figure A1. *Predicted Probabilities of Knowledge Concealment and False Informing as a Function of Expected Cost-Benefit Ratio, Theory of Mind, and False Praise-Telling*



Note. Error bars represent 95% confidence intervals.