Your wish is my command! Influence of symbolic modelling on preschool children's delay of gratification

Sahlia Kumst, Damian Scarf

Children's ability to delay gratification is correlated with a range of positive outcomes in adulthood, showing the potential impact of helping young children increase their competence in this area. This study investigated the influence of symbolic models on 3-year-old children's self-control. Eighty-three children were randomly assigned to one of three modelling conditions: personal story-telling, impersonal story-telling, and control. Children were tested on the delay-of-gratification maintenance paradigm both before and after being exposed to a symbolic model or control condition. Repeated measures ANOVA revealed no significant differences between the two story-telling groups and the control group, indicating that the symbolic models did not influence children's ability to delay gratification. A serendipitous finding showed a positive relationship between children's ability to wait and their production and accurate use of temporal terms, which was more pronounced in girls than boys. This finding may be an indication that a higher temporal vocabulary is linked to a continuous representation of the self in time, facilitating children's representation of the future-self receiving a larger reward than what the present-self could receive.

2   Your wish is my command! Influence of Symbolic Modelling on Preschool Children's Delay of Gratification.

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18 **Abstract**

19 Children's ability to delay gratification is correlated with a range of positive outcomes in adulthood. The current study

20 investigated whether symbolic models could be used to improve 3-year-old children's performance on the delay-of-

21 gratification maintenance paradigm. Eighty-three children were randomly assigned to one of three modelling conditions:

22 personal story-telling, impersonal story-telling, and control. Children were tested on the delay-of-gratification maintenance

23 paradigm both before and after being exposed to either a symbolic model or control condition. Repeated measures ANOVA

24 revealed no significant differences between the two story-telling groups and the control group, indicating that the symbolic

25 models did not influence children's ability to delay gratification. However, we did find a positive relationship between

26 children's ability to wait and their production and accurate use of temporal terms, which was more pronounced in girls than

27 boys. This finding may be an indication that a higher temporal vocabulary is related to children's ability to form continuous

28 representation of the self in time, facilitating children's representation of the future-self receiving a larger reward than what

29 the present-self could receive.

30 **Keywords**: Delay of gratification, Maintenance paradigm, Symbolic modelling, Story books, Pre-school children

31

Introduction

32

33   The ability to forgo an immediate reward and wait for a larger reward, delayed in time, is known as *delay of*

34   *gratification* (Mischel & Underwood 1974). In pre-school children, delay of gratification provides a simple measure of self-

35   control and self-regulation. Interestingly, pre-school children's ability to delay gratification is predictive of a range of life

36   outcomes that extend well beyond the pre-school years. For example, pre-school children that are better able to cope with a

37   delay cope better in stressful and frustrating situations during adolescence (Mischel et al. 1988; Shoda et al. 1990). Further,

38   Casey and colleagues (2011) demonstrated that children who have difficulty delaying gratification at age 4 have difficulty

39   resisting temptations and displaying cognitive control in adulthood. With respect to life outcomes, difficulty in delaying

40   gratification in childhood is correlated with poorer cardiovascular, respiratory, dental and sexual health (Moffitt et al. 2011),

41   a higher body mass index (Schlam et al. 2013), increased aggression (Ayduk et al. 2007), criminal offenses (Moffitt et al.

42   2011), substance abuse (Madden et al. 1997), and lower self-esteem, academic achievement (Li-Grining 2007; Mischel et

43   al. 1989; Wulfert et al. 2002) and social skills (McIntyre et al. 2006) in adulthood. Given its predictive nature, improving

44   children's ability to delay gratification has a number of potential benefits.

45   Metcalfe and Mischel (1999) proposed a theoretical framework to explain why some children are capable of

46   delaying gratification while others are not. In this framework, two distinct but interacting systems underlie children's ability

47   to delay. The "cool" or cognitive system is responsible for thought and reflection. This system allows the individual to

48   reflect on the options at hand and select the one that best serves their *long-term* interests. The "hot" or emotional system is

49   characterized by quick emotional processing and satisfying immediate needs. For example, in the delay-of-gratification

50   maintenance paradigm (Mischel et al. 1989), the child is presented with an object they desire (e.g., a marshmallow), which

51   is highly salient and activates the "hot" system, pushing children toward the immediately gratifying response of grabbing

52   the marshmallow. On the other hand, the "cool" system allows children to reflect on the fact that, if they want to gain an

53   even more desirable outcome (e.g., two marshmallows), they must wait. The balance between the "hot" and "cool" systems

54   is thought to be an intrinsic trait, responsible for children's differential performance on the delay-of-gratification tasks

55   (Metcalfe & Mischel 1999).

56   Importantly, however, numerous external factors can be used to either increase or decrease children's ability to

57   delay gratification. For example, increasing a child's attention to the salient attributes of the immediate reward, such as

58   looking directly at the reward or talking about it, results in shorter wait times (Mauro & Harris 2000; Mischel &

59   Underwood 1974; Putnam et al. 2002), while distraction techniques such as covering up the reward or thinking of the

60   reward in a non-consummatory fashion results in longer waiting times (Sethi et al. 2000). In addition to salience and

61   attentional strategies, parental style and attachment also predict delay behaviour. Children of parents with an authoritarian

62   style tend to delay gratification while those with permissive parents do not (Mauro & Harris 2000). Maternal regulatory

63   strategies, such as distraction, reasoning, bargaining, indirect and direct commands, also impact children's performance,

64   with distraction being the most effective strategy (Putnam et al. 2002).

65   Empirical research on the strategies and parenting styles that contribute to delay of gratification has been used to

66   propose guidelines to improve self-control in childhood (Strayhorn Jr 2002). One of these guidelines suggests *modelling*

67   *and fantasy rehearsal*. Bandura and McClelland's (1977) social learning theory posits that behaviour is learnt from the

68   environment through observation. Models (e.g., parents) explicitly convey how tasks should be performed and, as a result,

69   shorten how long it takes children to learn a task or skill. The model may be a live individual demonstrating a behaviour, a

70   verbal description or explanation of a behaviour, or symbolic (i.e., the behaviour is modelled in a book, on television, or

71   other media) (Bandura & McClelland 1977). A number of factors contribute to the influence of models on children's

72   behaviour. For example, the more the child identifies with the model, the more likely they are to reproduce the behaviour

73   (Bandura & McClelland 1977).

74   Bandura and Mischel (1965) demonstrate the influence models have on 4- and 5-year-old children's performance

75   on the delay-of-gratification task. After being tested on the task, children either observed an adult enact the *opposite*

76   decision to what the child had just made or listened to a verbal description of the behaviour. For example, if the child chose

77   to wait the adult did not wait. Following this manipulation, children were immediately re-tested and again after a 4- to 5-

78   week delay. Tellingly, children who at first delayed gratification shifted to choosing the immediate reward and children

79   who initially chose the immediate reward tended to favour waiting for the delayed reward. Of note is the fact that the live

80   model and the verbal model had a comparable impact on the immediate test, but only the live model influenced children's

81   behaviour at the 4- or 5-week follow-up.

82   An attribute of symbolic models is that they can take the form of a story, which is attractive for young children

83   who regularly have story books read to them. Illustrated stories are particularly effective with preschool children because

84   they are visually interesting and easily memorized (Strayhorn Jr 1988). Picture books have the potential to provide children

85   with information about the world, allowing them to acquire additional knowledge to what they learn by personal experience

86   (Heath et al. 2014). For example, picture books influence children's healthy eating behaviour (de Droog et al. 2014; Heath

87   et al. 2014) and facilitate the acquisition of novel words and their extension to real objects, especially when these objects

88   are realistically depicted in the picture book (Ganea et al. 2008; Tare et al. 2010). Further, 18- to 30-month-old children can

89   learn simple novel actions through picture book readings (Simcock & DeLoache 2006).

90   In addition to the pictures displayed, the behaviour of characters or the comments they make can also be used to

91   show children how to achieve specific goals or acquire coping strategies (Strayhorn Jr 1988). Narrations in story books may

92   provide information about resolving problems successfully and indicate the personal qualities and behaviours that are

93   associated with the achievement of a goal. Therefore, story books may foster messages coming directly from caregivers

94   about which beliefs and behaviours are fundamental for success (Suprawati et al. 2014). Through repeating the story, as

95   children often like to do, the child is free to imaginatively experience the behaviour or cognitive pattern of the model and

96   rehearses it. Repetition may also help with abstraction, aiding children's ability to transfer the behaviour to situations

97   beyond those conveyed in the story (Strayhorn Jr 1988). It is known that the effectiveness of modelling can be promoted by

98   presenting a model who encounters similar difficulties to the child, and who models how to overcome these difficulties

99   through self-directed instruction (Meichenbaum 1971). Children who have trouble in activities similar to those the model

100   experiences are more likely to imitate the model than children who are successful in those activities (Gelfand 1962) and

101 models whose behaviour is rewarded are more likely to be imitated than models whose behaviour is punished (Bandura
102 1965).

103   Although the potential influence of symbolic models has been discussed extensively in the literature, few studies
104 have actually investigated the potential impact of symbolic models on children's ability to delay gratification. In one of the
105 few studies, Lee, Lan, Wang, and Chiu (2008) investigated whether preschool children's ability to delay gratification could
106 be influenced by either explicitly labelling the children as being very patient individuals, saying that they had heard they
107 were able to concentrate well and do boring things for a long period of time, or by reading a story to them, in which an
108 impulsive child received only one gift whereas a patient child received two gifts. The children who were labelled as patient
109 delayed significantly longer than children in the control group, demonstrating the power of self-perception and priming.
110 However, no statistically significant differences were found between the story-telling group and the control group, although
111 they did delay one minute longer on average than controls (Lee et al. 2008). The limited effect of story-telling in this study
112 could be due to the fact that the story was only read once, and to a full classroom. It is an open question as to whether
113 reading the story to children individually, and on multiple occasions, would produce more promising results.

114   The current study was designed to examine the effects of both personal and impersonal story-telling on 3-year- old
115 children's ability to delay gratification. Children were given story books to take home, that included either a personal or
116 impersonal story, and parents were asked to read the story books to their children for approximately 1 week. Critically,
117 children's ability to delay gratification was assessed both *before* and *after* the story book intervention. We hypothesized that
118 that children in the personal and impersonal story-telling conditions would delay gratification longer than those in the
119 control condition, because in the story, models demonstrated that waiting will be rewarded with a large gift and being
120 impatient leads to a small gift. Further, it was predicted that children in the personal story-telling condition, whose names
121 were included in the story, would wait longer than children in the impersonal story-telling condition. This second prediction
122 was based on previous findings demonstrating that perceiving oneself as similar to the model enhances reproduction of the
123 modelled behaviour and that observing similar others succeed reinforces one's belief in one's own capabilities (Bandura &
124 McClelland 1977; Schunk 1987).

125   **Method**

126 **Participants**

127   A total of 83 (37 boys and 50 girls) 3-year-old children participated in the present study (Mean age: 34 months 20
128 days, Range: 30 months 17 days to 39 months 27 days). Three additional parents withdrew their children from the study
129 after participating in the pre-test due to family reasons. One child was excluded from the sample because their post-
130 intervention test took place one month after the pre-intervention test, due to unforeseen delays. All children were recruited
131 from the Early Learning Project database of parents who had expressed interest in taking part in research at the University
132 of Otago and participated with written consent from their parents. At the end of the experimental session, children received

133 a small gift and parents received a patrol voucher to compensate them for their travel costs to and from the laboratory. This

134 study was approved by the Human Ethics Committee at the University of Otago (Approval Number: 11/106).

135 **Materials**

136   The experimental room contained a sofa and a child's table with four different coloured chairs. Parents were asked

137 to remain seated on the sofa behind the child, who sat at the table facing away from them. On the table in front of the child

138 were two closed gift boxes of different sizes: the small gift box measured 8cm in width and 6 cm in height and the large gift

139 box 16cm in width and 13cm in height. Each gift box could be opened by lifting the lid, to which an ornamental ribbon was

140 attached. Gift boxes were chosen over wrapped gifts because taking a peak under a lid is easier than unwrapping a gift,

141 presumably making it more tempting for children. The small gift box contained five stickers and the large gift box

142 contained either a male or female Playmobil® figure.

143   Six versions of the picture book were created. The images in the picture book were the same for all conditions,

144 except that girls saw princesses and fairy godmothers, while boys saw princes and wizards. Only the content of the story

145 changed from one condition to the next. In the *control* story, two princes or princesses go for a walk in the forest, where

146 they meet a benevolent magical figure (wizard or fairy godmother). One child is a bit hungry and is given a lollipop, while

147 the other child receives a toy that they had supposedly lost in the forest and which the magical figure had found. In contrast

148 to the control story, the *personal*- and *impersonal modelling* stories deliberately model a delay-of-gratification scenario. In

149 these stories, the princes or princesses come across the magical figure and are offered a choice between receiving a small

150 gift immediately or a larger gift later. One child is impatient while the other is willing to wait. The impatient child only

151 receives a lollipop while the patient child receives a teddy bear (girls) or toy car (boys) after waiting for the magical figure

152 to return with more 'present potion' or 'magic present dust'. The only difference between the *personal*- and *impersonal*

153 *modelling* stories was that the patient prince or princess was named after the participant in the personal condition. All

154 parents were asked to read the assigned story book to their child, every night before bedtime, for 1 week.

155 **Procedure**

156   Families were contacted by telephone and were given a description of the experiment. When parents agreed for

157 their child to participate in the study, the child was randomly assigned to one of three conditions: personal story-telling ($n =$

158 27), impersonal story-telling ($n = 27$) and control story-telling ($n = 29$).

159 *Behavioural measures.*

160   *Pre-intervention assessment*. In the initial phase of the experiment the children's ability to delay gratification was

161 assessed using the maintenance paradigm (Mischel 2014; Mischel et al. 1989). This paradigm consists of a single trial

162 where the total amount of time that the child is willing to wait for a reward is measured.

163   Children were tested individually in a quiet room by a female experimenter. The experimenter brought the

164 participant to the laboratory where the child was given 5 minutes to get accustomed to the room and its decorations. During

165 this time the parent read and signed the consent form and completed a questionnaire. The experimenter then seated the child

166 at the table, facing away from their parent. Children's behaviour was filmed by a camera that was set up in the room.

167 Parents stayed in the room with the child during the experiment and were asked not to distract the child by asking questions,

168 directing the child's attention to things in the environment, or making comments concerning the task.

169 The children were shown both gift boxes, and were told that if they did not peek into the little gift box until the

170 experimenter came back into the room (15 minutes) that they could keep what was in the little gift and would additionally

171 receive what was in the larger gift box. The time started when the experimenter left the room, taking the larger gift with

172 them. The dependent measure was the number of minutes between the moment the experimenter closed the door and the

173 moment the child opened the lid of the gift box or the end of the specified 15 minute period. Upon completion of the task,

174 the children were given their assigned story book and parents received instructions to read the book to their children once a

175 day for 1 week.

176 *Post-intervention assessment*. One week later, all children returned to the laboratory for a second test of their

177 ability to delay gratification. The same procedure was used as in the pre-intervention.

178 *Cognitive measures*.

179 Parents filled out a questionnaire created by Busby Grant and Suddendorf (2011) assessing children's production

180 and accurate use of temporal terms. The questionnaire is composed of a list of 18 temporal terms and phrases. Parents are

181 asked to indicate whether their child uses these terms by answering with yes or no, and to rate how frequently and

182 accurately their child uses these terms on a five-point Likert scale (1= 'never', 2 = 'occasionally', 3 = 'sometimes', 4 =

183 'often', 5 = 'always'). Parents completed the questionnaire prior to children being assessed.

184 **Results**

185 The performance of children in each condition is shown in Table 1. Across the three groups, 30/83 children

186 (Personal story: 8/27, Impersonal story: 10/27, Control: 12/29) waited the full 15 minutes at pre-test. With these children

187 included, the average time children were willing to wait at pre-test was 7.81 minutes (Personal story: 7.94 min., Impersonal

188 story: 7.18 min, Control: 8.29 min.). Importantly, the average time children were willing to wait did not differ across the

189 three conditions at pre-test, $F(2,80) = .218, p = .804$.

190 To assess the potential impact of symbolic modelling, we conducted a repeated-measures Analysis of Variance

191 (ANOVA) with Condition (2: Personal story-telling vs. Impersonal story-telling vs. Control) and Gender (2: Girls vs. Boys)

192 as factors. The analysis revealed no significant effect of Session, $F(1,76)= .890, p = .348$, suggesting the length of time

193 children were willing to wait did not differ between the pre- and post-intervention phases. Further, there was no Session by

194 Condition interaction, $F(2, 76) = .316, p = .730$, suggesting the absence of any change between pre- and post-intervention

195 was true for all three conditions. Finally, there was no Session by Condition by Gender interaction, $F(2, 76) = .104, p =$

196 .902, suggesting the absence of any change between pre- and post-intervention, for any condition, was true for both boys

197   and girls. Overall, this shows that the modelled behaviour in the fairy tales did not lead to a statistically significant
198   improvement in children's self-control.

199   **TABLE 1 ABOUT HERE**

200   The absence of any change between the pre- and post-intervention sessions could be due to a ceiling effect as 30
201   (36%) children waited the 15 minutes at pre-test and consequently could not further improve at post-test. Therefore, a
202   second repeated-measures ANOVA was conducted with these children excluded. A significant effect of Session was found,
203    $F(1, 47) = 4.29$, $p =.044$, suggesting a change in the length of time children were willing to wait between pre- and post-
204   intervention, but no interaction was found between Session and Condition, $F(2, 47) = .686$, $p =.509$, indicating that this
205   change between pre- and post-intervention was present in all conditions. Finally, no Session by Gender by Condition
206   interaction was found, $F(2, 47) = 13.64$, $p = .452$, suggesting the change between pre- and post-intervention was observed
207   in all conditions, for both girls and boys. The fact that children were willing to wait longer during the post-intervention test
208   may be due to the children being more comfortable with the experimenter and the context of the experiment. Since this
209   improvement in waiting time was observed across all conditions we can once again conclude that symbolic modelling did
210   not influence children's ability to delay gratification (Table 2).

211   **TABLE 2 ABOUT HERE**

212   Out of exploratory interest we investigated whether children's use of temporal terms was related to their ability to
213   delay gratification. We correlated children's mean waiting time (across pre- and post-intervention tests) with scores
214   obtained on the three questions in the temporal questionnaire. The number of temporal terms used by children was
215   significantly correlated with their ability to delay gratification, $n = 83$, $r = .259$, $p = .018$. Further, the frequency with which
216   children used these terms, $n = 83$, $r = .303$, $p = .005$, and how accurately they used them, $n = 83$, $r = .335$, $p = .002$, also
217   correlated with their waiting time. Importantly, these effects held when Age was partialed out (use of temporal terms, $n =$
218   83, $r = .242$, $p =.029$, frequency, $n = 83$, $r =.287$, $p =.009$, and accuracy, $n = 83$, $r = .322$, $p = .003$) suggesting this effect is
219   not simply due to the fact that older children likely use these terms more frequently and have longer waiting times.

220   With respect to gender, there was a significant effect of gender on the time children were willing to wait, $F(1,76) =$
221   4.825, $p = .031$, but no Gender by Time interaction, $F(1,76) = .355$, $p = .553$, suggesting this effect was consistent across
222   the pre- and post-intervention tests (Table 1). On average, pre-intervention girls waited 8.94 minutes and boys waited 6.42
223   minutes, with a similar difference post-intervention, where girls waited 9.60 minutes and boys waited 6.15 minutes. To
224   investigate whether this difference was related to children's use of temporal terms, we conducted a series of independent-
225   sample t-tests comparing boys and girls across the three time questionnaire measures. Interestingly, compared to boys, girls
226   used significantly more temporal terms, $t(81) = 2.912$, $p = .005$, $d = .63$, and used them both more frequently, $t(81) = 2.636$,
227    $p = .010$, $d = .58$, and more accurately, $t(81) = 2.243$, $p = .028$, $d = .49$ (Figure 1).

228   **FIGURE 1 ABOUT HERE**

229   **Discussion**

230   The aim of the current study was to investigate whether 3-year-olds' self-control could be improved by exposing
231   them to a symbolic model demonstrating self-control. It was hypothesised that children would assimilate the behaviour of
232   the patient child in the story book and, as a result, be willing to wait longer for a large reward. Further, it was hypothesised
233   that naming the symbolic model after the child (*personal story-telling* condition) would have a greater influence on
234   children's wait times than a symbolic model with an unrelated name (*impersonal story-telling* condition). In contrast to our
235   predictions, neither children in the personal- nor impersonal story-telling condition waited longer at the post-intervention
236   test, and the wait times of children in these two conditions were no different to those of children in the control group. When
237   children who waited the full 15 minutes at the pre-intervention test were excluded, a significant difference was found
238   between pre- and post-intervention tests but this difference was not influenced by condition. It must be acknowledged,
239   however, that excluding the children who waited the 15 minutes at pre-test reduces the statistical power of the analysis and
240   thus we must interpret the absence of an effect of condition with caution. The improvement between the pre- and post-
241   intervention tests may be due to a practice effect, with the presentation of the same task at pre- and post-intervention phases
242   resulting in the child being more familiar with the procedure and the task, and thereby enhancing his or her performance
243   (Schmidt & Teti 2006). Also, during the post-intervention phase children may have (correctly) assumed that the content of
244   the gift box sitting in front of them was the same as during the pre-test session, perhaps making it less tempting to open.

245   With respect to symbolic models, our story books may not have influenced children's self-control because, being
246   between 2 and 3 years of age, the children in the current study may not yet have developed the conceptual understanding
247   required to assimilate the models' behaviour. That is, although children in the current study could likely understand the
248   story, they may not have understood that the story demonstrated the concept of patience and therefore did not apply this
249   concept to their own behaviour. Sloutsky (2003) suggests that children learn concepts through both perceptual and
250   attentional mechanisms, detecting similarities or discrepancies in the environment and creating categories based on the
251   correspondences they observe. Presenting examples of the concept and contrasting examples helps children detect the
252   important features and facilitates categorization. Concrete concepts (e.g. book, animal, tree) are learnt more easily than
253   abstract concepts (e.g. patience, fairness), because perceptual similarities facilitate the categorization of these objects. Little
254   is known about the development of abstract concepts (Baddeley 1999; Sloutsky 2003). It is possible that young children
255   must be exposed to abstract concepts multiple times in varying contexts to fully understand the meaning of these concepts
256   and to apply them in their everyday life. Further, Simcock and DeLoache (2006) showed that the understanding of the
257   relation between a symbol and what it stands for is in its early stages at 2.5 years, supporting the statement that children in
258   our study may not have benefited from our picture-book, due to their still developing conceptual understanding.

259   Separate from the concept of patience, our results suggest that children's knowledge of the benefits of waiting (i.e.,
260   receiving a bigger present) was not sufficient to keep them from opening the present before the 15 minutes elapsed. This
261   discrepancy between knowledge and behaviour has also been demonstrated on card-sorting tasks where children must
262   switch between sorting rules. Zelazo, Frye, and Rapus (1996) presented children with a set of cards that had coloured
263   shapes on them and had children sort them according to a single rule (e.g., by colour). After learning the first rule, children
264   were taught a new rule and were asked again to sort the cards by this new rule. Interestingly, 3-year-old children expressed
265   knowledge of the new rule, but continued to use the old rule, whereas 4-year-old children displayed no difficulty switching

266 between the two rules. Zelazo et al.'s (1996) findings demonstrate that, for children aged 3 years and younger, knowledge is
267 not always sufficient to influence actions. In the current study, it is possible children's knowledge of the benefits of waiting
268 was not sufficient to overcome their prepotent response to open the gift. It is possible that children aged four and older may
269 benefit more from symbolic models in story books than younger children.

270 In our story-book, both the non-patient and the patient child received a gift from the magical figure, the first
271 receiving a lollipop and the second receiving a toy. Social learning theory suggests that the rewards associated with the
272 modelled behaviour influence the likelihood of the behaviour being imitated (Bandura & McClelland 1977). It is possible
273 that some children perceived the lollipop as more desirable than the toy and, consequently, displayed similar non-patient
274 behaviour on our laboratory task. To exclude this possibility, it would be interesting to vary the magnitude (e.g., size),
275 rather than the type, of the reward the child receives if they wait. Bandura and McClelland's (1977) theory also recognizes
276 the importance of perceived similarity between the model and the learner, which may have been lacking in our story-book
277 due the stories being more fantasy-based. Placing pictures of actual children in the story book would improve the similarity
278 between the book and the real world and may increase children's self-efficacy (Dowrick 2000).

279 A serendipitous finding of the current study was the relationship between children's production and accurate use of
280 temporal terms and their ability to wait for the larger reward. That is, the more temporal terms children used and the more
281 accurately they used them, the longer they were willing to wait. This effect held when age was partialed out, suggesting it
282 was not simply due to older children having both a better vocabulary and longer waiting times. Previous studies have shown
283 that children's use of temporal terms begins at around the age of 2 and rapidly grows thereafter. Busby Grant and
284 Suddendorf (2011) suggested that 3-year-olds often and accurately use terms representing the present and broad temporal
285 terms such as 'soon' or 'later'. Specific terms related to the future or the past (e.g. yesterday, tomorrow) are learnt later than
286 general terms (e.g. when I was little), between the age of 3 and 5 years. In our study, girls had a larger temporal vocabulary
287 than boys, and interestingly, also waited longer than boys. Surprisingly, Busby Grant and Suddendorf (2011) did not find
288 gender differences in the use or accuracy of temporal terms.

289 Consistent with our findings, a recent meta-analysis reported that girls delay gratification for longer periods of time
290 (Silverman 2003). Speculatively, our finding suggests this link may be due to the girls' ability to use temporal terms and
291 that their use of temporal terms may reflect a clearer understanding of the past and future. It is possible that children with a
292 larger temporal vocabulary are better able to project themselves into the future, and are willing to delay gratification to give
293 their future-self a larger reward than what the present-self would receive. It is through conversations about the self in
294 noncurrent situations that children learn about their extended self in time (Moore and Lemmon 2001; Nelson 2001).
295 Between the ages of 2 and 5 children acquire the sense of self as continuous in time, with increasing capacity to talk about
296 different experiences (Nelson 2001), and it is also between these years that children's ability to delay gratification slightly
297 increases (Lemmon & Moore 2007). To our knowledge, no studies have analysed the relation between knowledge of
298 temporal terms and the ability to sacrifice an immediate reward in favour of a future larger reward. It is possible that the
299 more specific temporal terms children understand and use, the better their understanding of time and the better their
300 representation of the self in time.

301   In our study, we did not measure children's general language competence which may also relate to children's
302   ability to delay of gratification. Language impairments are known to correlate with maladaptive outcomes, such as ADHD
303   (Bruce et al. 2006; Cohen et al. 2000), aggressive behaviours (Dionne et al. 2003; Estrem 2005) and poor problem solving
304   (Baldo et al. 2005; Cohen et al. 1998), which are all linked to low self-control. Language skills are thought to enhance
305   children's self-regulatory competence by enabling them to express themselves verbally instead of emotionally, reflect on
306   their behaviour, and occupy themselves in the presence of emotional circumstances (Cole et al. 2010). For example,
307   language may allow children to reflect on rules and shift their attention, rather than focusing on items that they cannot have
308   (Roben et al. 2013). To our knowledge, very few studies have analysed the link between language and self-control. Beaver,
309   DeLisi, Vaughn, Wright, and Boutwell (2008) conducted a longitudinal study from the beginning of kindergarten to the end
310   of first grade over four time points. They discovered that language skills significantly correlated with self-control at the
311   beginning of kindergarten, and this result held over years, showing that higher language competences are associated with
312   higher self-control. In their longitudinal study following children from 18 to 48 months of age over four time points, Cole et
313   al. (2010) analysed how early language development influenced anger expressions and the use of regulatory strategies. They
314   found that language skills and the rate of language growth at 24 and 36 months were a strong predictor of anger expressions
315   at 48 months, with higher language skills being associated with lower anger expressions. Higher language skills were also
316   associated with children's initiation of seeking mothers support at 36 and 48 months, which lead to less angry expressions.
317   Children's language skills were also associated with their ability to distract themselves at 36 and 48 months of age,
318   indicating higher language skills are associated with a higher frustration threshold. These two studies show a significant link
319   between self-control and language competence. Therefore, in the future it would be of interest to study the relationship
320   between children's general language competences, their understanding of time and their ability to delay gratification, to
321   identify how each one contributes to variations in self-control.

322   With respect to limitations, in the present study we did not assess children's understanding of the theme or
323   message of the story book. Although it is important to note that the book was short, had a simple story line, and was read to
324   children on multiple occasions. It would be beneficial in future studies to assess children's understanding of the book,
325   perhaps by using the story book as a prop and asking children to show and tell the experimenter what happens in the book.
326   Previous studies have demonstrated that this show and tell technique is effective with young children (Hayne & Imuta 2011;
327   Scarf et al. 2013). A second limitation is that parents, and often siblings, were in the experimental room during the delay-of-
328   gratification task. This may have influenced the children's behaviour, by distracting them or by giving implicit signals to
329   not open the present (e.g. movements of the head, moving when the child reached for the gift) (Bandura 1992; Putnam et al.
330   2002). Finally, parents may have coached their child between the pre- and post-intervention tests. For example, one parent
331   noted they tried to train their child on a delay-of- gratification task at home and thoroughly discussed the behaviours
332   described in the book.

333   In summary, the present suggests 3-year-old children do not assimilate a behaviour modelled in a story-book into
334   their own behaviour. Between pre-school and primary school, children's language ability and conceptual understanding
335   increases dramatically and, therefore, symbolic models may be more effective for children slightly older than those used in
336   the present experiment. The positive relationship observed between children's temporal vocabulary and their ability to delay

337 gratification suggests a larger temporal vocabulary may be linked to children's understanding of the future and the past and

338 this may make it easier for children to envisage the self in the future receiving the large reward, making the small reward

339 less tempting. Future studies may look to investigate the possible relationship between the ability to delay gratification and

340 children's perception of the extended self in time.

341 **Ethical Standards**

342 This study was reviewed and approved by the Human Ethics Committee at the University of Otago. All caregivers

343 of participants gave their informed consent before the children were included in the study.

344 **Conflict of Interest**

345 There is no conflict of interest.

346

348   **References**

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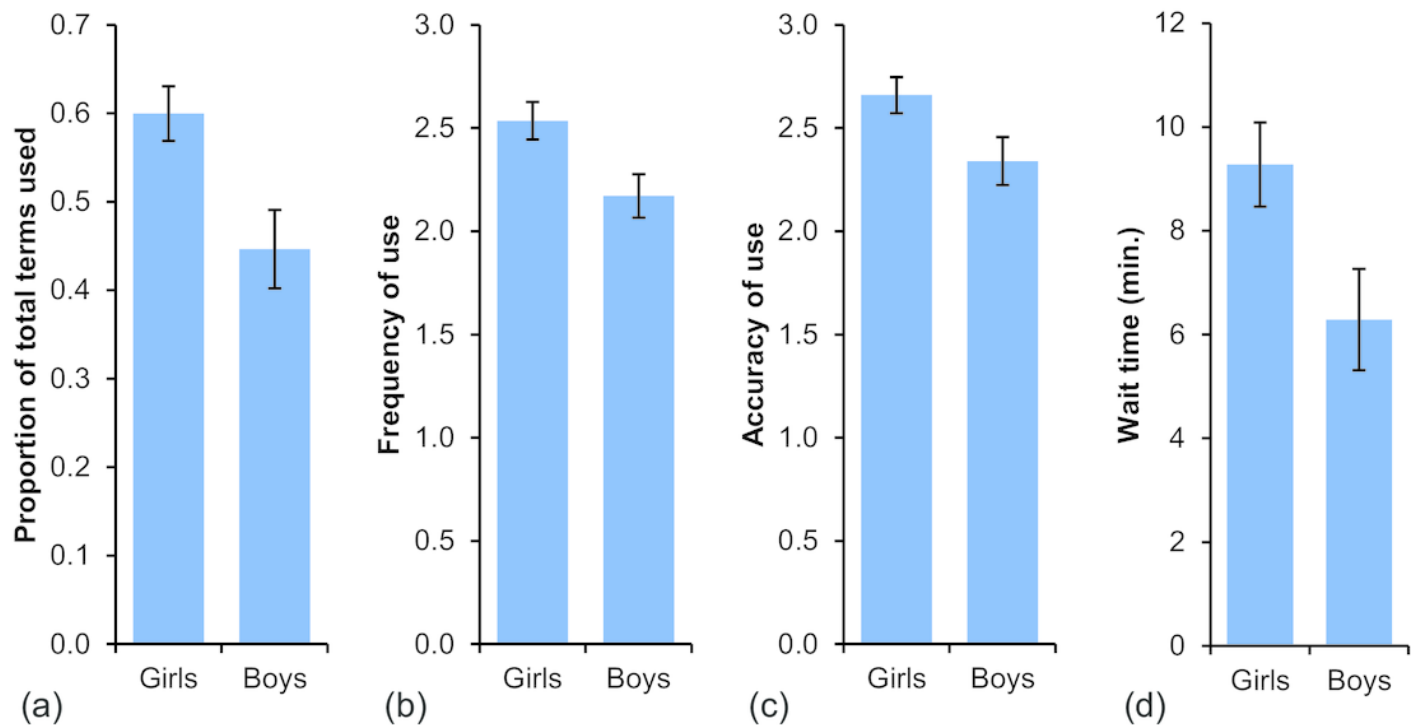
455

Questionair and behavoural measures

Differences between girls and boys in (a) the use of temporal terms; (b) the frequency with which they use temporal terms; (c) the accuracy of use of temporal terms; (d) the amount of time they were willing to wait across pre- and post-intervention. The error bars represent the standard error of the mean.

The performance of all children on the delay-of-gratification task.

The performance of all children in the personal story, simple story, and control story conditions.

Group	Personal	Impersonal	Control	Boys	Girls
Pre-test					
Mean	7.94	7.18	8.29	6.42	8.94
SD	5.94	6.78	6.39	5.93	6.46
N (boy/girl)	27 (12/15)	27 (12/15)	29 (13/16)	37	46
Post-test					
Mean	8.21	8.03	7.96	6.15	9.60
SD	6.64	6.94	6.71	6.71	6.32
N (boy/girl)	27 (12/15)	27 (12/15)	29 (13/16)	37	46

The performance of children that did not wait the full 15 minutes pre-intervention

The performance of children in the personal story, simple story, and control story condtions that did not wait the full 15 minutes at the pre-intervention test.

Group	Personal	Impersonal	Control	Boys	Girls
Pre-test					
Mean	4.97	2.58	3.55	4.05	3.38
SD	4.42	3.76	3.74	4.28	3.81
N (boy/girl)	19 (10/9)	17 (9/8)	17 (10/7)	29	24
Post-test					
Mean	6.11	5.42	4.29	4.15	6.70
SD	6.16	6.74	5.86	5.79	6.47
N (boy/girl)	19 (10/9)	17 (9/8)	17 (10/7)	29	24