Infant Behavior and Development 50 (2018) 12–21

Contents lists available at ScienceDirect

Infant Behavior and Development

journal homepage: www.elsevier.com/locate/inbede

Waiting for a treat. Studying behaviors related to self-regulation in 18- and 24-month-olds

Marta Białecka-Pikul*, Karolina Byczewska-Konieczny, Magdalena Kosno, Arkadiusz Białek, Małgorzata Stępień-Nycz

Institute of Psychology, Jagiellonian University, ul. Ingardena 6, 30 - 060 Krakow, Poland

ARTICLE INFO

Keywords:
Delay of gratification
Sets of behaviors
Inductive method
Early childhood

ABSTRACT

The ability to delay gratification – conceived as an early expression of self-regulation – develops in the second half of the second year of life. We used inductive methodology to identify different behaviors and set of behaviors performed by children while waiting for a treat. We asked which sets are more effective when it comes to successfully delaying gratification and how all observed sets change during toddler age. 130 children were tested twice – at 18 and at 24 months – using a Snack Delay Task. We observed 20 different behaviors and distinguished 4 sets of behaviors. The most important and effective set for delaying gratification in 18 and in 24 month olds was the set called Attention and Movements. We concluded that growth in the ability to delay gratification resulted from increased ability to overcome temptation by using an active strategy mainly based on attention.

The experiencing of discrepancies between our own desires or aims and the restrictions imposed by a situation play an inevitable role in our individual and social functioning. This forces us to learn self-regulation skills, i.e. to adapt our emotions and behaviors to conform to situational and social standards. Children must learn to monitor and modulate their cognition, emotions and behavior in order to accomplish their own objectives and/or adapt to the cognitive and social demands of any situation (Berger, Kofman, Livneh, & Henik, 2007). Research on self-regulation in infancy and childhood, including research on the first signs of this process, should not overlook the two main distinguishing features of self-regulation − the target of the regulation (behavior or internal states) and the extent to which the self-regulation is spontaneous, as opposed to voluntary (Spinrad, Eisenberg, & Gaertner, 2007). We choose to emphasize that in childhood self-regulatory processes are spontaneous and behavioral in two senses. First, they may be viewed as targeted behavior and second, they are expressed on a behavioral level, for example as the first signs of effortful control in the second year of life (Rothbart & Bates, 1998). We therefore decided to concentrate on observing children's behaviors during a potentially tempting situation. Kochanska and Knaack (2003) highlighted waiting for a reward or pleasant event, which is one of the five components of effortful control, is an important ability that could be measured by means of the delay of gratification paradigm. Using this paradigm, we asked 1) if the ability to delay gratification – believed to be an early expression of self-regulation develops in the second half of the second year of life and 2) what such young children do while waiting for a treat, i.e. how they behave in this situation. Moreover, we used an inductive methodology (Babbie, 2004) to observe all the behaviors performed by children during this task and asked if 1) sets of behaviors are distinguishable and 2) how are they related to effective delay of gratification.

Mischel et al. (Mischel, 1974; Mischel & Baker, 1975; Shoda, Mischel & Peake, 1990) first developed the classic delay task in which children are told that if they wait for the experimenter to return they will receive a larger treat (e.g. more food) than if they do

* Corresponding author.
E-mail addresses: marta.bialecka-pikul@uj.edu.pl (M. Białecka-Pikul), k.byczewska@gmail.com (K. Byczewska-Konieczny), kosno.magdalena@gmail.com (M. Kosno), a.bialek@uj.edu.pl (A. Białek), m.stepien@uj.edu.pl (M. Stępień-Nycz).

http://dx.doi.org/10.1016/j.infbeh.2017.10.004
Received 15 July 2016; Received in revised form 23 June 2017; Accepted 20 October 2017
Available online 07 November 2017
0163-6383/

not wait, in which case they are given a smaller treat. It was also Mischel et al. (Ayduk et al., 2000; Casey et al., 2011; Mischel, Shoda, & Peake, 1988; Shoda et al., 1990) who not only proved that intensive development of self-regulation takes place in preschool years but also that it is related to academic and cognitive competence in adolescence or even in adulthood (for a review of Marshmallow studies see: Zelazo et al., 2013; for the predictive power of this task, see: Duckworth, Tsukayama, & Kirby, 2013). Certainly, we may acknowledge the importance of research on behaviors related to the first signs of self-regulatory abilities, which can be observed during tasks in which not only preschoolers but even toddlers have to postpone immediate gratification even if no internal conflict exists between the larger and smaller reward (Duckworth & Steinberg, 2015).

Kochanska, Murray, and Harlan (2000) used a Snack Delay Task and a Wrapped Gift Task to study the development of effortful regulation in children as young as 22–33 months. In the first task, the child was meant to wait to eat an M & M placed under a transparent cup until he/she heard the sound of a bell (10–30 s). In the second task, the child was supposed to avoid looking while the tester was packing a present (60 s) and wait until the tester returned before opening it (180 s). The research revealed a correlation between improvement in the level of task completion and increased age (e.g. extended time of delay or increased number of delayers, i.e. children who wait until the end of the task). The delay of gratification paradigm is an important measure of self-regulatory abilities in children of toddler age (see: Kochanska, Coy, & Murray, 2001; Spinrad et al., 2007; Vaughn, Kopp, & Krakow, 1984), especially as it also allows the observation of sets of behaviors or, as many authors have proposed, “strategies” used by children during the waiting time.

Such coping strategies were first indirectly proposed by Mischel, Ebbesen, Raskoff, & Zeiss, (1972); Metcalfe & Mischel, 1999; Shoda et al., 1990), who differentiated between high-temptation focus children, who directed their attention toward the reward, and their low-temptation counterparts, who use other strategies that turned out to be more effective, such as obscuring the treat or distraction. Moreover, in the research undertaken by Grolnick, Bridges, and Connell (1996), different child behaviors were observed during the Gift Delay Task and Food Delay Task. These strategies were labelled as the follows: active engagement with a substitute toy (e.g. active play), passive use of objects and exploration (e.g. exploring the room), symbolic self-soothing (e.g. self-directed statements), physical self-soothing (e.g. thumb sucking), other-directed (e.g. touching the parent) and focusing on the object causing a delay in gratification (e.g. asking about the object). The most frequently employed strategy was active engagement with substitute items. It was observed that 2-year-olds are capable of diverting their attention toward other nearby objects. Similarly, Steelandt, Thierry, Broihanne, and Dufour (2012) demonstrated that even 2-year-old children were able to apply strategies to shift their attention from the rewards (e.g. looking elsewhere, talking with the parent, playing alone). The use of “non-treat-focused” strategies was associated with a longer delay in gratification. On the basis of these strategies, we can hypothesize that the effectiveness of self-regulatory skills measured by means of the delay of gratification paradigm is related to particular sets of behaviors presented by children during the delay period or the increased effectiveness of these sets of behaviors, i.e. their positive relation to a longer time of delay or successful delaying. This enables us to label these sets with the term: “strategies”.

Research clearly indicates that the ability to deploy attention flexibility is a key competence required for effective waiting (Mischel et al., 1988; Sethi, Mischel, Aber, Shoda, & Rodriguez, 2000). Johansson, Marciszko, Gredebäck, Nyström, and Bohlin (2015) emphasize that self-regulatory constructs are related to executive functioning and effortful control. Other researchers have also shown that attention processes constitute a developmental foundation for self-regulatory functions, executive functioning and effortful control (Diamond, 2013; Garon, Bryson, & Smith, 2008; Johansson et al., 2015; Rothbart, Derryberry, & Posner, 1994). Garon et al. (2008), in particular, emphasized that attention processes are not only related to executive functioning, but that attention in infancy seems to constitute a developmental foundation for these functions. Johansson et al. (2015) showed that sustained attention at the age of 1 year was a predictor of individual differences in 2-year-olds’ self-regulation measured using an eye-tracking version of the A-not-B task and parental ratings of effortful control. Cole et al. (2011) have also shown that the ability to shift attention away from the desired object develops between 18 and 48 months. In comparison to 36- and 48-month-olds, 18- and 24-month-olds are less able to shift their attention and anger more easily (or faster) when they have to wait for the desired object. When faced with the presence of treats during a waiting period, long-delaying children divert their attention away from the treats. In contrast, children who fix their attention on the treats during the delay period are most likely to terminate the wait early (Calkins & Johnson, 1998; Cole et al., 2011; Peake, Hebl, & Mischel, 2002). Kochanska, Murray, and Harlan (2000) found that focused attention, coded as the extent to which toys are looked at and manipulated, predicted, at 9 months of age, effortful control at 22 months. Self-initiated shifting of attention away from a desired but restricted object involves effortful control of attention, which is viewed as central to self-regulation (Calkins, 2007; Eisenberg, Smith, & Spinrad, 2011; Posner & Rothbart, 2000; Rueda, Posner, & Rothbart, 2011; Sheese, Rothbart, Posner, White, & Fraundorf, 2008). Rothbart, Sheese, Rueda, and Posner (2011) concluded that evidence for regulation by the anterior attention network does not begin to appear until the age of 18–20 months. The second half of the second year of life seems to be a crucial period when attentional strategies important for the development of self-regulation in the delay of gratification paradigm could be observed. On a behavioral level, this means that in the delay of gratification paradigm, we could observe many behaviors in children aged 18 months and 2 –years, and some of them—especially those related to attention—would probably serve as effective coping strategies, enabling a child to be more effective in delaying or waiting for a treat.

To sum up, it is worth mentioning the strong emphasis placed in previous research on describing self-regulatory, especially attentional, strategies defined as indices of voluntary or at least effortful behaviors. However, we would like to stress that more suited to this kind of research is an approach involving the analysis of toddler behaviors using a broader atheoretical strategy with no interpretation at the entrance stage. We decided to use an inductive strategy (Babbie, 2004) with a bottom-up approach and derived sets of behaviors based on all observed behaviors in the delay of gratification paradigm. As we are interested in the development of self-regulation, we collected data longitudinally to ask if children in the second half of the second year of life are able to delay gratification and whether this ability increases in that period. We hypothesized a positive response to both these questions. Our third

Table 1
Demographic characteristics of study group.

Characteristics of study group		
% of parents with a degree	At least one parent	78.60
	Both parents	52.70
% of participants from a big city		74.80

research question was: What behaviors can be observed during a delay of gratification situation in toddlers? As we based our study on inductive methodology, we recorded all behaviors and then categorized them into sets. The fourth and most important research question was whether these sets of behaviors are positively related to the effectiveness of self-regulation in 18- and 24-month-old children. We expected that not all the sets of behavior are related in the same way to the effectiveness of the delay in gratification and that the most effective sets might be called strategies. Moreover, we expected that those sets based on regulation of attention (Gerardi-Caulton, 2000; Rothbart & Rueda, 2005; Rueda et al., 2011) would turn out to be more effective.

1. Method

1.1. Participants

The data presented is this study were collected within the longitudinal project "The birth and development of mentalizing abilities" which took place at the Early Child Development Psychology Laboratory at the Jagiellonian University, Krakow. The study received clearance from the relevant institutional ethical board. The caregivers and infants were recruited via personal advertisements. All caregivers provided their informed consent before their first visit to the lab. Participation in the study was voluntary, and the infants received a small gift after each meeting. The children were tested every half year. At the starting point, there were 358 children (mean age = 52 weeks; SD = 1.73).

The study described below utilizes data from second and third visits to the lab. In this study, the data for 130 children (71 boys and 59 girls) were analysed. The children were tested twice: at the age of 18 months (average age in weeks = 80.02, SD = 1.79; range 75–83) and at 24 months (average age in weeks = 104.27, SD = 1.70; range 101–109). The demographic data of the sample are presented in Table 1.

1.2. Procedure

Children participated in two sessions – at 18 months (Time 1) and at 24 months (Time 2). Each session was preceded by free play, during which the child had the opportunity to get to know the setting and the experimenter. The children then performed a series of tasks during each session and the Snack Delay task was presented at the beginning of the session at T1 (as the fourth task) and at the beginning or in the middle of the session at T2.[1] As in all longitudinal studies, not all the children participated in both sessions (N at Time 1 = 222; N at Time 2 = 159).[2] During T1 and T2, some children were excluded from the group because: 1) their parents, who were asked to remain passive during the task (see: Section 1.3 for instruction), initiated contact with the child (e.g. talked to the child, repeated the experimenter's instruction, maintained eye contact, or smiled when the child initiated contact). These behaviors actively attracted children's attention away from the treat (n_1 = 45; n_2 = 20).[3] 2) Some children were not interested in the treat at the end of the task and so did not eat it (n_1 = 60, n_2 = 0). 3) The experimenter made a mistake when giving instructions or failed to record the session (n_1 = 18; n_2 = 2).[4] We decided to analyze only the complete data for children who participated in the Snack Delay tasks at Time 1 and at Time 2. The final sample size was 130 children.

1.3. Materials

1.3.1. Delayed gratification

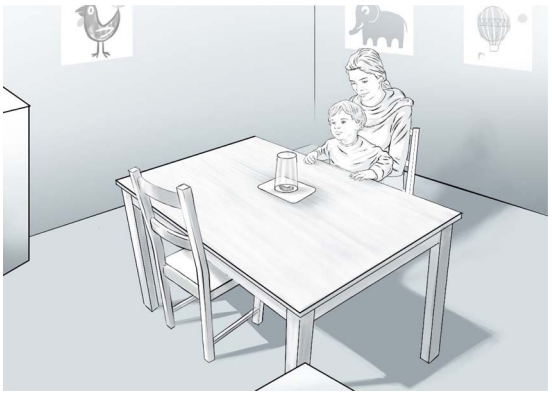
To assess ability to delay gratification we used a task based on the Snack Delay procedure devised by Kochanska et al. (2000). The procedure took place in a small room (approximately 2 × 2 m) equipped with a table, chair, pouf, two small cupboards and four posters hanging on the walls (used in other tasks). At the beginning of the session, parents were instructed to not respond to their child's attempt to initiate an interaction, especially during tasks (e.g. talking to a parent) and to not initiate contact with the child during the whole session, as only a child's spontaneous answers to the tasks are valid observations. The child sat on his/her

[1] There were no statistically significant differences between children who were tested using the Snack Delay task as the 7th task and those who were tested with this task as the 17th task (Mann Whitney U = 2060.00, n_7 = 66, n_{17} = 64, p = 0.80, r = 0.02).

[2] There were no statistically significant differences in the waiting time at 18 months between children who participated in both sessions (Times 1 and 2) and those who were present only during Time 1 (Mann Whitney U = 4224.50, n_1 = 159, n_2 = 63, p = 0.07, r = 0.12).

[3] In Poland, it is not acceptable to separate a child up to 3 years of age from the caregiver in a new or strange place, so children participated in all tasks with their parents, sitting on their knees.

[4] These criteria are not mutually exclusive



Picture 1. The Snack Delay procedure.

caregiver's knee at a table opposite the female experimenter, who held the snack. At the beginning of the task the experimenter placed a snack on a tray, and then covered it with a transparent cup. When performing these actions, the experimenter asked if the child liked snacks. If the child gave an affirmative answer,[5] the experimenter continued with the instruction: 'Now you'll have to wait a moment for this treat. I have to go to the other room for a moment. You'll get the puff when I come back.' After giving the instruction, the experimenter pushed the tray with the snack on it towards the child (there were no other objects on the table) and then went to the other room (see Picture 1). Upon the experimenter's return, the child received the snack, unless she had already eaten it.

1.3.1.1. Time 1. The snack that we used at the age of 18 months was a corn puff. This snack is very popular among Polish toddlers and all the parents confirmed before the experiment that their children liked eating them. Since we were interested in the behaviors that children present while waiting for a treat, we decided to extend the waiting time (compared to the maximum 30 s allowed in Kochanska's task). The children had to wait for 60 s (as in: Mulder, Hoofs, Verhagen, van der Veen, & Leseman, 2014).

1.3.1.2. Time 2. Before the meetings at the age of 24 months, we asked the caregivers to indicate whether their children still regarded a corn puff as a treat. Since they declared in many cases that their children were no longer interested in eating them, corn puffs were no longer regarded as appropriate target stimuli. Parents were requested to bring a treat that their child liked enough to present a temptation. Usually, parents brought chocolates, jelly babies or sweets and passed them to the experimenter in such a manner as to ensure that the child did not see them before the beginning of the task. Additionally, the time of delay was extended to 90 s. This change was made after the preliminary observation that most children in the pilot study had no problem waiting for 60 s for the snack. In this pilot study, 94% of the children (N = 16, M_{age} = 26 months) waited for 60 s or longer (time range 60–90 s, average 63 s). The extension of the time period allowed more accurate measurement of individual differences.

1.3.2. Coding of delayed gratification

The primary variable that we assessed was the ability to delay gratification. We used two indicators to measure this. The first was categorical: we recorded whether or not the child waited until the end of the task. The second was the time of delay: this started when the experimenter moved the tray towards the child and stopped giving instructions, and ended at the point when the time allotted for the task elapsed or the child ate the snack.

As we were interested in the behaviors that children perform while they were waiting for a treat, we used an inductive approach: all the children's recorded behaviors were analysed by independent coders in order to select all the behaviors that could be observed. The preparation procedure of the coding schema was as follows:

1.3.2.1. Phase 1: coding events. To identify behaviors performed by children, we adopted an inductive strategy with an ad libitum sampling method (Hinde, 1983). We coded behaviors continuously: each instance of each behavior was registered. Additionally, using Martin and Bateson's (1986) distinction for events and states, we decided to code events, i.e. register the occurrences of behaviors of a relatively short duration. Two coders watched recordings of 30 randomly chosen 18-month-old children and listed all the observed behaviors that each child exhibited while waiting for the treat. These two lists of behaviors subsequently were compared and all behaviors were precisely descriptively defined.

1.3.2.2. Phase 2: supplementing the list of behaviors. The same coders watched recordings of all the 18-month-old children and coded their behaviors using the list of behaviors prepared in the previous phase. During this phase, the list was supplemented with additional behaviors that had not previously been observed. We then completed the final list of behaviors. The obtained categories of

[5] We treated the following behaviors as an 'affirmative' answer: saying 'yes', nodding, smiling, reaching for or pointing to the snack.

Table 2
List of behaviors performed by children while waiting for a treat.

Observed behaviors	Description
Looking at the treat	Child only looks at the corn puff (e.g. without touching it) for longer than 2 s
Pointing to the treat	Child points index finger at corn puff/cup/tray
Reaching toward the treat	Child starts to reach toward corn puff/tray/cup, but withdraws hand before touching
Touching the treat	Child touches tray, cupor puff
Removing the cup	Child takes cup from the tray
Holding the cup/tray	Child holds or manipulates cup/tray in hand (e.g. taps it)
Picking up the treat	Child picks up the corn puff
Playing with the treat	Child plays with the corn puff (e.g. puts the corn puff in cup and shakes it)
Putting the treat in the mouth	Child puts corn puff in his/her mouth but does not eat it
Looking at objects	Child looks at other objects in the room for longer than 2 s. (e.g. a cupboard)
Looking around	Child looks around without looking at corn puff for longer than 2 s
Glancing at the treat	Child glances at the corn puff (for no longer than 2 s) then changes the direction of his/her gaze
Reaching for objects	Child points at or reaches for other objects (e.g. a cupboard)
Touching the body	Child touches part of his/her body
Touching the caregiver	Child touches caregiver's body without making eye contact
Moving hands	Child moves her/his hands (without reaching for any object)
Fidgeting	Child fidgets or tries to gets down from the chair
Vocalizing	Child babbles or says something incomprehensible
Talking about the treat	Child talks about the corn puff (e.g. repeats that it cannot be eaten)
Talking about objects	Child talks about other objects (e.g. names room equipment)

Due to difficulty differentiating looking/glancing events, we decided to introduce a limit of 2 s to distinguish 3 behaviors: looking at the treat/objects (for longer than 2 s), glancing at the treat (for no longer than 2 s), and looking around (i.e. looking at other objects for longer than 2 s, without looking at the treat)

behaviors were discussed and more precisely described.

1.3.2.3. Phase 3: coding sequences of behaviors. We coded the occurrence of each single behavior. The behaviors were sometimes observed as a sequence (e.g. removing the cup, picking up the treat and putting the treat in the mouth). Our coding schema is based on parsimony, i.e. behaviors are coded in relation to their consequences for the situation. Therefore, when behaviors constituted a sequence which was related to the final result (see the example above), only the final behavior, i.e. the result, was coded (i.e. putting the treat in the mouth). The behaviors which led to this final result were not coded (i.e. removing the cup). However, when behaviors were not functionally related to the final behavior and therefore not constitute a coherent sequence (e.g. the child picked up the treat and then looked around), all the behaviors that occurred were coded. Describing behavior in terms of its consequence is a more economical approach in observational research (Martin & Bateson, 1986) and allowed us to avoid coding behaviors which were functionally interrelated.

1.3.2.4. Phase 4: assessing reliability of coding system. Three coders (two of whom were the same as in the previous phases) coded the behaviors of 30 randomly chosen 18-month-old children using the previously completed list. Points of agreement among coders were assessed. The gamma coefficient for pairs of coders varied between 0.61 and 1 for single behaviors. The two categories in which the gamma coefficient was low (≈ 0.60) were discussed and more precisely described. A final list of coded behaviors was prepared (see Table 2).

1.3.2.5. Phase 5: final coding schema. Two coders recoded the behaviors of all 18-month-old children using the final list of observational categories. The coding schema of the behaviors of the 18-month-old children was also applied to the 24-month-olds. No additional behaviors were identified at this age. Agreement among coders was satisfactory (mean gamma coefficient 0.81), thus proving the reliability of our coding schema.

1.4. Analysis

First of all, we tried to ascertain whether children during their second year of life are able to delay gratification. We examined contingency tables to check if the percentage of children able to delay gratification increased during the second year of life. We controlled language comprehension using a vocabulary test to exclude the possibility that it was playing a potential role in the failure of the Snack Delay task. We then provided descriptive statistics for all the behaviors we had recorded during the time of delay (raw scores, i.e. frequencies of behaviors and proportions of these frequencies to the task's duration). After this, we conducted a Principal Component Analysis (PCA) to reduce data and extract sets of behavior observed during the time of waiting for a treat. For every child, we calculated the number of behaviors corresponding to each set that were performed during the time of waiting for a treat and we carried out a paired *t*-test to check if the intensity of these behavioral sets changes between 18 and 24 months. In order to ascertain whether the sets of behaviors that children performed during the delay of gratification are related to success in the Snack Delay task, we conducted a regression analysis with the sets of behaviors that act as predictors. We also compared results from two groups of children: those who at 18 and 24 months failed in the Snack Delay task (Stagnation group) and those who failed at 18 months, but at

Table 3
Percentage of children who at the age of 18 and 24 months were able to delay gratification.

	Delayers at 24 months	Non-delayers at 24 months	SUM
Delayers at 18 months	20 (15%)	10 (8%)	30 (23%)
Non-delayers at 18 months	52 (40%)	48 (37%)	100 (77%)
SUM	72 (55%)	58 (45%)	130 (100%)

24 months waited until the end of the task (Developmental group). For each child, we calculated any changes in the frequency of behaviors corresponding to each set and we conducted *t*-tests to compare these two groups and find out if it was really the case that between 18 and 24 months more effective sets increased and less effective sets decreased.

2. Results

Our first objective was to ascertain whether children during their second year of life are able to delay gratification. Table 3 shows how many 18-month-old and 24-month-old children were able to wait until the end of the Snack Delay task. At 18 months and also at 24 months, there were no differences in language comprehension between the group of delayers and non-delayers ($t = 1.21$, $p = 0.23$, $d = 0.24$; $t = 1.71$, $p = 0.10$, $d = 0.33$ respectively).[6] At 18 months, the mean time of delay of gratification was 27.53 s ($SD = 21.06$; time range: 0–60 s); at 24 months it was 64.60 s ($SD = 34.06$; time range: 0.93-90.00 s). The difference between the mean proportions (i.e. the raw number of occurrences of a behavior within a task's duration) between 18 and 24 months was significant (0.46 in 18 month olds vs 0.72 in 24 month olds; $t = 6.19$, $df = 129$, $p < 0.001$, $d = 0.59$). The percentage of delayers at 24 months was significantly higher than at 18 months (p for McNemar's Test < 0.001; $OR = 1.85$).

Our second objective was to look at behaviors that were performed by children during the Snack Delay task. Table 4 presents descriptive statistics for all behaviors that were observed during the delay of gratification by children at 18 and 24 months (raw data and proportions) as well as correlations between raw data and waiting time.

To answer the third research question, i.e. whether we can categorize the observed behaviors into exhaustive and exclusive categories – a Principal Component Analysis (PCA) with Varimax rotation was carried out on standardized variables.[7] Its legitimacy was confirmed by Bartlett's sphericity test ($U = 1118.11$; $df = 190$; $p < 0.001$) and the KMO value (0.66). Four factors with eigenvalue higher than 1 were distinguished. Each factor is loaded by at least 3 observed behaviors and only strong loadings (over 0.50) are presented in Table 5 (see: Osborne & Costello, 2009). The four factors together explained 55.59% of variances.

Factor 1 (F1) includes behaviors relating to attention (e.g.: looking at objects, looking around, glancing at the corn puff) and movements (e.g. touching, reaching toward the corn puff). Factor 2 (F2) represents communicational behaviors (talking and pointing) as a form of non-verbal communication. Factor 3 (F3) includes behaviors relating to the treat (e.g. removing the cup, picking up the corn puff, putting it in the mouth). Factor 4 (F4) is the least specific and includes the following behaviors: touching caregivers, fidgeting and vocalizing. Table 6 shows how often children performed behaviors from each category.

Our third aim was also to ascertain if these sets of behaviors performed by children during delay of gratification are predictors of success in the Snack Delay task. Tables 7 and 8 present the results of a (stepwise method) regression analysis.

Our last objective was to ascertain if the frequency of behaviors from each set of behaviors changed between 18 and 24 months in relation to children's ability to delay gratification. Therefore in the last analysis, we focused on two groups of children: (1) those who at 18 and 24 months failed at the Snack Delay task (Stagnation group, $N = 48$) and (2) those who failed at the Snack Delay task at 18 months, but achieved success at 24 months (Developmental group, $N = 52$). We compared changes in the frequency of behaviors corresponding to each set of behaviors in these two groups.[8] The results are presented in Table 9.

3. Discussion

As opposed to most previous research on self-regulation in toddlers, our study concentrated on observed behaviors and sets of behaviors presented while waiting for a treat in the delay of gratification paradigm. Our longitudinal study allowed us to discover that there is a real developmental progression in self-regulatory skills. This is evident from the fact that 2 year olds wait longer for the treat than 18 month olds, and more 2 year olds are able to delay gratification in comparison to 18 month olds. We therefore successfully replicated the results obtained in the previous studies (i.e. Kochanska et al., 2000) with younger children. However, the main aim of our study was to complement these previous results as we focused on discovering what behaviors and sets of behaviors are presented during the waiting time and how these sets of behaviors are related to the effectiveness of self- regulation.

The inductive method enabled us to identify 20 different behaviors which can be observed in children while waiting for a treat. This result shows that even such young children are able to demonstrate a wide range of behaviors during the delay of gratification.

[6] Language comprehension was assessed at Time 2. We used Haman and Fronczyk's Picture Vocabulary Test – Comprehension (OTSR) (2012), which is constructed in the form of a Polish version of the Peabody Picture Vocabulary Test (Dunn & Dunn, 1997).

[7] The PCA was carried out on data from the observation of 18-month-old children.

[8] Changes in frequency (F_{change}) were calculated for each category of behavior according to the formula: $F_{change} = F_{24} - F_{18}$, where: F_{24} = the number of behaviors performed at 24 months in proportion to 90 s, F_{18} = the number of behaviors performed at 18 months in proportion to 60 s.

Table 4
Descriptive statistics of behaviors observed during the delay of gratification: raw data and proportion to the task's duration; Spearman correlation coefficients for raw data and waiting time. .

	18 months							24 months						
	Raw data				Proportions			Raw data				proportions		
Observed behaviors	Range	*M*	*SD*	Correlation with waiting time	Range	*M*	*SD*	Range	*M*	*SD*	Correlation with waiting time	Range	*M*	*SD*
Looking at the treat	0–6	1.40	1.35	0.66***	0–0.10	0.02	0.02	0–9	3.42	2.33	0.58***	0–0.10	0.04	0.03
Pointing to the treat	0–3	0.90	0.38	0.23**	0–0.05	0.001	0.01	0–5	0.43	0.98	0.30**	0–0.06	0.01	0.01
Reaching toward the treat	0–2	0.10	0.36	0.23**	0–0.03	0.001	0.01	0–2	0.10	0.32	0.19*	0–0.02	0.001	0.004
Touching the treat	0–4	0.45	0.72	0.29**	0–0	0.01	0.01	0–6	0.86	1.21	0.34**	0–0	0.01	0.01
Removing the cup	0–3	0.67	0.60	0.20*	0–0.05	0.01	0.01	0–3	0.49	0.64	−0.22*	0–0.03	0.01	0.01
Holding the cup/ tray	0–4	0.95	0.89	0.14	0–0.05	0.01	0.01	0–12	1.14	1.89	0.11	0–0.13	0.01	0.02
Picking up the treat	0–3	0.44	0.73	0.30**	0–0.05	0.01	0.01	0–5	0.71	1.14	−0.14	0–0.06	0.01	0.01
Playing with the treat	0–2	0.13	0.38	0.35***	0–0.03	0.002	0.01	0–3	0.21	0.61	0.10	0–0.03	0.002	0.01
Putting the treat in the mouth	0–2	0.21	0.46	0.29**	0–0.03	0.003	0.01	0–3	0.15	0.52	0.03	0–0.03	0.002	0.01
Looking at objects	0–7	1.10	1.66	0.76***	0–0.12	0.02	0.03	0–18	4.75	4.17	0.70***	0–0.20	0.05	0.05
Looking around	0–7	0.93	1.69	0.72***	0–0.12	0.02	0.03	0–16	4.77	4.57	0.68***	0–0.18	0.05	0.05
Glancing at the treat	0–7	1.27	1.82	0.78***	0–0.12	0.02	0.03	0–11	3.74	2.66	0.68***	0–0.12	0.04	0.03
Reaching for objects	0–6	0.37	0.95	0.48***	0–0.10	0.01	0.02	0–9	0.84	1.62	0.44***	0–0.10	0.01	0.02
Touching the body	0–3	0.36	0.70	0.42***	0–0.05	0.01	0.01	0–7	1.32	1.70	0.53***	0–0.08	0.01	0.02
Touching the caregiver	0–4	0.12	0.54	0.29**	0–0.07	0.002	0.01	0–8	0.26	0.87	0.22*	0–0.09	0.002	0.01
Moving hands	0–3	0.17	0.47	0.41***	0–0.05	0.003	0.01	0–6	0.82	1.30	0.44***	0–0.07	0.01	0.01
Fidgeting	0–3	0.21	0.51	0.20*	0–0	0.001	0.01	0–5	0.75	1.18	0.44***	0–0.06	0.01	0.01
Vocalizing	0–13	0.78	1.90	0.39***	0–0.22	0.01	0.03	0–8	1.25	1.76	0.32***	0–0.09	0.01	0.02
Talking about the treat	0–8	0.18	0.80	0.21*	0–0.13	0.003	0.01	0–11	0.61	1.40	0.36***	0–0.19	0.02	0.04
Talking about objects	0–7	0.31	1.03	0.14	0–0.12	0.01	0.02	0–17	1.98	3.28	0.28**	0–0.12	0.01	0.02

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

Table 5
Results of the Principal Component Analysis.

	Factor 1	Factor 2	Factor 3	Factor 4
Eigenvalue	4.49	2.57	2.21	1.85
% of variance	22.43	12.83	11.06	9.27
Factor loadings	Factor 1	Factor 2	Factor 3	Factor 4
Looking at the treat	0.77			
Pointing to the treat		0.71		
Reaching toward the treat	0.56			
Touching the treat				
Removing the cup			0.66	
Holding the cup/tray			0.60	
Picking up the treat			0.71	
Playing with the treat			0.61	
Putting the treat in the mouth			0.77	
Looking at objects	0.80			
Looking around	0.73			
Glancing at the treat	0.80			
Reaching for objects				
Touching the body	0.67			
Touching the caregiver				0.67
Moving hands	0.58			
Fidgeting				0.72
Vocalizing				0.77
Talking about the treat		0.86		
Talking about objects		0.81		

Table 6
Descriptive statistics of observed sets of behaviors (proportions to the task's duration) performed by children during the delay of gratification.

	18 month olds			24 month olds					
Sets of behaviors	Range	*M*	*SD*	Range	*M*	*SD*	*t*	*P*	*d*
F1 – Attention and Movements	0–.45	0.09	0.10	0–.61	0.21	0.15	8.01	< 0.001	0.74
F2 –Communication	0–.30	0.01	0.03	0–.23	0.03	0.05	4.74	< 0.001	0.33
F3 – Focusing on the Treat	0–.13	0.03	0.03	0–.21	0.03	0.04	0.77	0.45	0.03
F4–Nonspecific	0–.28	0.02	0.04	0–.12	0.03	0.04	2.10	0.04	0.19

Table 7
Sets of behaviors performed by 18-month-old children during the delay of gratification as predictors of waiting time.

Predictors	18 months				
	B	ΔR^2	*t*	ΔF	*P*
F1 – Attention and Movements	2.80	0.70	17.16	294.46	< 0.001
F3 – Focusing on the Treat	3.64	0.10	7.31	53.41	< 0.001
F2–Communication	0.92	0.01	2.01	4.04	0.04

Table 8
Sets of behaviors performed by 24-month-old children during the delay of gratification as predictors of waiting time.

Predictors	24 months				
	B	ΔR^2	*t*	ΔF	*P*
F1 – Attention and Movements	1.97	0.61	14.12	199.32	< 0.001
F4–Nonspecific	2.18	0.02	2.00	7.08	0.01
F3 – Focusing on the Treat	1.20	0.02	2.34	5.48	0.02

Table 9
A comparison of changes presented when performing different sets of behaviors during the delay of gratification between the Stagnation group and Developmental group.

Sets of behaviors	Stagnation group		Developmental group		*t*	*df*	*p*	*d*
	M	*SD*	*M*	*SD*				
F1– Attention and Movements	0.05	0.12	0.25	0.12	8.36	98	< 0.001	1.69
F2 –Communication	0.01	0.06	0.04	0.05	3.15	98	< 0.001	0.64
F3 – Focusing on Treat	0.00	0.04	0.01	0.06	0.13	98	0.90	0.03
F4 – Nonspecific	0.00	0.02	0.03	0.05	3.21	98	< 0.001	0.65

Interestingly, at the age of 18 months almost all behaviors (18 out of 20) are positively related to waiting time. In older children, most behaviors which were related to the treat are no longer related to the waiting time. One may suggest that longer (i.e. 90 s) waiting time would have made it possible to observe more behaviors; however, this result might indirectly suggest that older children present less behaviors related to the treat and more behaviors such as looking around or looking at other objects. Moreover, looking around or at other objects or just glancing at the treat were the most common behaviors observed in 24 and in 18- month children and all of these categories of behaviors would be interpreted by other authors as the redirecting of attention (Grolnick et al., 1996; Mischel et al., 1972; Shoda et al., 1990; Steelandt et al., 2012). The increase in these kinds of behavior with age is in line with this interpretation, as well as with our later analysis.

It appeared that these behaviors can not only be grouped into high or low-temptation strategies, as Mischel et al. (Mischel et al., 1972; Metcalfe & Mischel, 1999; Shoda et al., 1990) suggested for preschool children, but we also can distinguish four different sets of behaviors: Attention and Movements, Communication, Focusing on the Treat and Non-specific. Moreover, we found that between the age of 18 months and 2 years, there is a significant increase in the frequency with which these kinds of behavior i.e. those related to attention and movements, communication and non-specific, are employed. At the same time, we observed a decreased tendency to focus on the treat. This pattern of results is in line with previous studies with older children (Grolnick et al., 1996; Steelandt et al., 2012). This result proves that at 18 and 24 months, children probably actively cope with the delay of a reward and are not passive participants in the research procedure. Moreover, they apply behaviors of varying degrees of effectiveness.

Here we have to admit that looking at the treat was a very frequent behavior in both age groups that also correlated strongly and positively with waiting time. Even when we take into account that on the grounds of parsimony this behavior was registered to a

lower degree than it would be if it were always coded when it was observed, it is still also a behavior that comprises the Attention and Movements set. Moreover, this set best predicts success in the task in both age groups. Therefore, we might speculate that when toddlers were looking at the treat, they used a pre-strategy that does not contradict Mischel et al.'s (1972) observation that a more effective preschooler strategy is to divert attention away from the treat. However it should be noted that high frequency of looking at the treat might also have been related to the high frequency of diverting attention from it as we coded the occurrence of behaviors and not their duration. Therefore, many looks at the treat had to be intertwined with other behaviors that might serve as a tools for diverting attention from the treat. On the other hand, as all looking behaviors comprise a coherent set, they might be related to a more general characteristic of toddlers' behavior, or might even be an observed temperamental quality. Below we comment more on this idea.

Our most interesting question relates to the effectiveness of the observed sets of behaviors. We found that the best predictor of success for 18 month olds and 2 year olds in the delay of gratification procedure was the set of behaviors labelled Attention and Movements. Glancing, looking around, or at other objects, or touching their own bodies turned out to be the set of behaviors that most helped children to succeed while waiting. This set of behaviors explained 61–70% of variance in the time of delay. The same attentional and movement behaviors made it possible to differentiate two groups composed of children who i) had not yet developed the ability to delay gratification, even at the age of 2 years and ii) were non-delayers at 18 months, but at 2 years are able to delay gratification. The effect size for these differences was strong ($d = 1.62$) according to Cohen's (1988) benchmarks. Also, communication behaviors were higher in the Developmental group, but the effect size was small ($d = 0.64$) and almost the same as for the non-specific behavioural set ($d = 0.65$). As previously indicated, according to Johansson et al. (2015), attention processes are important for self-regulation, being associated with the development of both executive functioning and effortful control. Again these results are in line with the idea that the ability to shift attention from the treat is not only a set of behaviors but could be called an effective coping strategy or pre-strategy for self-regulation in young children (Calkins & Johnson, 1998; Cole et al., 2011; Peake et al., 2002); more importantly, this develops during the second half of the second year of life. Overall, we proved that even such young children use attentional pre-strategy when faced with a longer waiting time and that this increases the likelihood that they will wait until the end of the delay. In other words, diverting their attention helps children to resist temptation.

Previous studies take it for granted that behaviors presented by children while waiting for gratification are coping strategies. Rather than making any prior assumptions, we used an inductive methodology that allowed us to distinguish sets of behaviors and then proved which sets are effective in terms of bringing success in the self-regulation task. Overall, it would be important in further studies to compare inductive and deductive methodologies to help us discover strategies or pre-strategies of better predictive utility.[9] Nevertheless, thanks to our research, it can be supposed that the increase in the ability to delay gratification was due to overcoming temptation by using an active strategy mainly based on the first signs of effortful attention. This result confirms the importance of such a set of behaviors for effectively delaying gratification.

Clearly, there are three elements worth distinguishing that highlight the limitations of our study. Firstly, we only controlled for parental behaviors by not analyzing the results obtained if the parents interrupted (i.e. help children not to focus at the treat). In further research, the role of parental behaviors during the delay of gratification procedure should be analysed in depth. Secondly, we only control for a child's motivation by not counting children who did not eat the corn puff, or using the preferred snack when children where 24 months old. We should probably use other indices of child's motivation, for example asking parents not to provide children with snacks for an hour before testing, and/or observationally measuring if the treat is really a temptation (e.g. measuring emotions on the child's face). Thirdly, we did not control for the children's temperament as an important factor influencing self-regulation. This is especially important when we focus in depth on all behaviors that comprise a more effective attentional pre-strategy, as the observed Attention and Movement set of behaviors may be related to temperamental effortful control (Rothbart & Bates, 1998; Rothbart & Rueda, 2005). This point should also be taken under consideration in further studies.

Nevertheless, it is worth emphasizing that based on our results, we can state that during the second half of the second year of age, children efficiently use different sets of behaviors, including an attentional pre-strategy, to self-regulate their behavior, even in such a problematic situation as the delaying of gratification.

Acknowledgements

This work was supported by the Polish National Science Centre (grant number 2011/01/B/HS6/00453 and 2015/19/B/HS6/01252). We are very grateful to the anonymous reviewers for their helpful comments.

References

Ayduk, O., Mendoza-Denton, R., Mischel, W., Downey, G., Peake, P. K., & Rodriguez, M. (2000). Regulating the interpersonal self: Strategic self-regulation for coping with rejection sensitivity. *Journal of Personality and Social Psychology, 79*(5), 776–792. http://dx.doi.org/10.1037/0022-3514.79.5.776.

Babbie, E. (2004). *Badania społeczne w praktyce. The Practice of Social Research.* Warszawa: PWN.

Berger, A., Kofman, O., Livneh, U., & Henik, A. (2007). Multidisciplinary perspectives on attention and the development of self-regulation. *Progress in Neurobiology, 82*, 256–286. http://dx.doi.org/10.1016/j.pneurobio.2007.06.004.

Calkins, S. D., & Johnson, M. C. (1998). Toddler regulation of distress to frustrating events: Temperamental and maternal correlates. *Infant Behavior and Development, 21*(3), 379–395. http://dx.doi.org/10.1016/S0163-6383(98)90015-7.

Calkins, S. D. (2007). The emergence of self-regulation: Biological and behavioral control mechanisms supporting toddler competencies. In C. A. Brownell, & C. B.

[9] We are grateful for the anonymous reviewer for this suggestion.

Kopp (Eds.). *Socio-emotional development in the toddler years: Transitions and transformations* (pp. 261–284). New York: Guilford.
Casey, B. J., Somerville, L. H., Gotlib, I. H., Ayduk, O., Franklin, N. T., Askren, M. K., et al. (2011). Behavioral and neural correlates of delay of gratification 40 years later. *Proceedings of the National Academy of Sciences, 108*(36), 14998–15003.
Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale. NJ: Erlbaum.
Cole, P. M., Tan, P. Z., Hall, S. E., Zhang, Y., Crnic, K. A., Blair, C. B., et al. (2011). Developmental changes in anger expression and attention focus: Learning to wait. *Developmental Psychology, 47*(4), 1078–1089. http://dx.doi.org/10.1037/a0023813.
Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135–168. http://dx.doi.org/10.1146/annurev-psych-113011-143750.
Duckworth, A. L., & Steinberg, L. (2015). Unpacking self-control. *Child Development Perspectives, 9*(1), 32–37. http://dx.doi.org/10.1111/cdep.12107.
Duckworth, A. L., Tsukayama, E., & Kirby, T. A. (2013). Is it really self-control? Examining the predictive power of the delay of gratification task. *Personality and Social Psychology Bulletin, 39*, 843–855. http://dx.doi.org/10.1177/0146167213482589.
Dunn, L. M., & Dunn, L. M. (1997). *Peabody picture vocabulary testCircle pines* (3rd. ed.). MN: American Guidance Service.
Eisenberg, N., Smith, C. L., & Spinrad, T. L. (2011). Effortful Control. Relations with Emotion Regulation. Adjustment and Socialization in Childhood. In K. D. Vohs, & R. F. Baumeister (Eds.). *Handbook of self-regulation. research. theory and applications* (pp. 263–284). (2nd ed.). New York: Giuldford Press.
Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin, 134*(1), 31–60. http://dx.doi.org/10.1037/0033-2909.134.1.31.
Gerardi-Caulton, G. (2000). Sensitivity to spatial conflict and the development of self-regulation in children 24–36 months of age. *Developmental Science, 3*(4), 397–404. http://dx.doi.org/10.1111/1467-7687.00134.
Grolnick, W., Bridges, L., & Connell, J. (1996). Emotion regulation in two-year-olds: Strategies and emotional expression in four contexts. *Child Development, 67*, 928–941. http://dx.doi.org/10.1111/j.1467-8624.1996.tb01774.x.
Haman, E., & Fronczyk, K. (2012). *Obrazkowy Test Słownikowy –Rozumienie. Picture Vocabulary Test -Comprehension.* Gdańsk: Pracownia Testów Psychologicznych i Pedagogicznych.
Hinde, R. A. (1983). Ethology and child development. In P. H. Mussen, M. M. Haith, & J. J. Campos (Eds.). *Handbook od child psychology –vol. II: Infancy and developmental psychobiology* (pp. 27–94). New York: John Wiley and Sons.
Johansson, M., Marciszko, C., Gredebäck, G., Nyström, P., & Bohlin, G. (2015). Sustained attention in infancy as a longitudinal predictor of self-regulatory functions. *Infant Behavior and Development, 41*, 1–11. http://dx.doi.org/10.1016/j.infbeh.2015.07.001.
Kochanska, G., & Knaack, A. (2003). Effortful control as a personality characteristic of young children: Antecedents, correlates and consequences. *Journal of Personality, 71*(6), 1087–1112. http://dx.doi.org/10.1111/1467-6494.7106008.
Kochanska, G., Murray, K. T., & Harlan, E. (2000). Effortful control in early childhood: Continuity and change, antecedents and implications for social development. *Developmental Psychology, 36*, 220–232. http://dx.doi.org/10.1037/0012-1649.36.2.220.
Kochanska, G., Coy, K. C., & Murray, K. T. (2001). The development of self-regulation in the first four years of life. *Child Development, 72*, 1091–1111. http://dx.doi.org/10.1111/1467-8624.00336.
Martin, P., & Bateson, P. (1986). *Measuring behaviour. An introductory guide.* New York: Cambridge University Press.
Metcalfe, J., & Mischel, W. (1999). A hot/cool system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106*, 3–19. http://dx.doi.org/10.1037/0033-295X.106.1.3.
Mischel, W., & Baker, N. (1975). Cognitive appraisals and transformations in delay behavior. *Journal of Personality and Social Psychology, 31*(2), 254–261. http://dx.doi.org/10.1037/h0076272.
Mischel, W., Ebbesen, E. B., & Raskoff Zeiss, A. (1972). Cognitive and attentional mechanisms in delay of gratification. *Journal of Personality and Social Psychology, 21*, 204–218. http://dx.doi.org/10.1037/h0032198.
Mischel, W., Shoda, Y., & Peake, P. K. (1988). The nature of adolescent competencies predicted by preschool delay of gratification. *Journal of Personality and Social Psychology, 54*(4), 687–696. http://dx.doi.org/10.1037/0022-3514.54.4.687.
Mischel, W. (1974). Processes in delay of gratification. *Advances in Experimental Social Psychology, 7*, 249–292. http://dx.doi.org/10.1016/S0065-2601(08)60039-8.
Mulder, H., Hoofs, H., Verhagen, J., van der Veen, I., & Leseman, P. P. (2014). Psychometric properties and convergent and predictive validity of an executive function test battery for two-year-olds. *Frontiers in Developmental Psychology, 5*, 733. http://dx.doi.org/10.3389/fpsyg.2014.00733.
Osborne, J. W., & Costello, A. B. (2009). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Pan-Pacific Management Review, 12*(2), 131–146.
Peake, P. K., Hebl, M., & Mischel, W. (2002). Strategic attention deployment for delay of gratification in working and waiting situations. *Developmental Psychology, 38*(2), 313–326. http://dx.doi.org/10.1037/0012-1649.38.2.313.
Posner, M. I., & Rothbart, M. K. (2000). Developing mechanisms of self-regulation. *Development and Psychopathology, 12*(03), 427–441.
Rothbart, M. K., & Bates, J. E. (1998). Temperament. In W. Damon, & N. Eisenberg (Eds.). *Handbook of child psychology: vol. 3. Social, emotional and personality development* (pp. 105–176). (5th ed.). New York: Wiley.
Rothbart, M. K., & Rueda, M. R. (2005). The development of effortful control. In U. Mayr, E. Awh, & S. Keele (Eds.). *Developing individuality in the human brain: A tribute to Michael I. Posner* (pp. 167–188). Washington.D.C: American Psychological Association.
Rothbart, M. K., Derryberry, D., & Posner, M. I. (1994). A psychobiological approach to the development of temperament. In J. E. Bates, & T. D. Wachs (Eds.). *Temperament: Individual differences at the interface of biology and behavior* (pp. 83–116). Washington. DC: American Psychological Association.
Rothbart, M. K., Sheese, B. E., Rueda, M. R., & Posner, M. I. (2011). Developing mechanisms of self-regulation in early life. *Emotion Review, 3*, 207–213. http://dx.doi.org/10.1177/1754073910387943.
Rueda, M. R., Posner, M. I., & Rothbart, M. K. (2011). Attentional control and self-Regulation. In K. D. Vohs, & R. F. Baumeister (Eds.). *Handbook of self-regulation. Research, theory and applications* (pp. 284–300). (2nd ed.). New York: Giuldford Press.
Sethi, A., Mischel, W., Aber, J. L., Shoda, Y., & Rodriguez, M. L. (2000). The role of strategic attention deployment in development of self-regulation: Predicting preschoolers' delay of gratification from mother–toddler interactions. *Developmental Psychology, 6*, 767–777. http://dx.doi.org/10.1037/0012-1649.36.6.767.
Sheese, B. E., Rothbart, M. K., Posner, M. I., White, L. K., & Fraundorf, S. H. (2008). Executive attention and self-regulation in infancy. *Infant Behavior and Development, 31*(3), 501–510. http://dx.doi.org/10.1016/j.infbeh.2008.02.001.
Shoda, Y., Mischel, W., & Peake, P. K. (1990). Predicting adolescent cognitive and self-regulatory competencies from preschool delay of gratification: Identifying diagnostic conditions. *Developmental Psychology, 26*, 978–986.
Spinrad, T. L., Eisenberg, N., & Gaertner, B. M. (2007). Measures of effortful regulation for young children. *Infant Mental Health Journal, 28*(6), 606–626. http://dx.doi.org/10.1002/imhj.20156.
Steelandt, S., Thierry, B., Broihanne, M. H., & Dufour, V. (2012). The ability of children to delay gratification in an exchange task. *Cognition, 122*, 416–425. http://dx.doi.org/10.1016/j.cognition.2011.11.009.
Vaughn, B. E., Kopp, C. B., & Krakow, J. B. (1984). The emergence and consolidation of self-control from eighteen to thirty months of age: Normative trends and individual differences. *Child Development, 55*, 990–1004. http://dx.doi.org/10.2307/1130151.
Zelazo, P. D., Anderson, J. E., Richler, J., Wallner-Allen, K., Beaumont, J. L., & Weintraub, S. (2013). II. NIH toolbox cognition battery (CB): Measuring executive function and attention. *Monographs of the Society for Research in Child Development, 4*, 16–33. http://dx.doi.org/10.1111/mono.12032.