What supports the development of children's prospective memory? Examining the relation between children's prospective memory, memory strategy use, and parent scaffolding

Journal:	*Journal of Cognition and Development*
Manuscript ID	HJCD-2020-1913.R1
Manuscript Type:	Empirical Article
Keywords:	prospective memory, scaffolding, memory strategies, children

Abstract

Remembering to carry out intended actions in the future, known as prospective memory (PM), is an important cognitive ability. In daily life, individuals remember to perform future tasks that might rely on effortful processes (monitoring) but also habitual tasks that might rely on more automatic processes. The development of PM across childhood in laboratory contexts is well understood, but little is known about the social context in which children develop their PM skills in everyday life. In the current study, three hundred and one parents reported on their 3-to 11-year-old child's PM, child's strategy use, and on their own scaffolding of their child's PM using the Children's Everyday Memory Questionnaire (CEMQ; adapted from the Prospective Memory Questionnaire; Hannon et al., 1995). Preliminary analyses showed the PM items on the CEMQ were reliable and composed of two components (a PM and a PM strategy use subscale). Our results showed that children's PM and use of memory strategies, as reported by their parents, increased with age. Further, more frequent parent scaffolding was related to better PM in children. These relations were also explored separately for older and younger children. Notably, parents of younger, 3-to 6-year-olds reported scaffolding them more frequently with age, while parents of older, 7-to 11-year-olds reported scaffolding them less frequently with age. Open-ended responses revealed that parents used verbal reminders and children used external aids most frequently. Overall, parent scaffolding appears to impact children's PM, but future research is needed to identify the causal direction of these relations.

Keywords: prospective memory; scaffolding; memory strategies; children

What supports the development of children's prospective memory? Examining the relation between children's prospective memory, memory strategy use, and parent scaffolding

In daily life, adults and children alike experience instances when they must remember to carry out future intentions — whether it is remembering to return a library book or remembering to meet your friend at 3 p.m. — these examples reflect a critical cognitive ability known as prospective memory (PM; Einstein & McDaniel, 1990). Given that PM failures can be detrimental to one's success and well-being, understanding the early development of PM is vital. Recent research suggests that PM abilities increase from childhood to early adulthood, where children as young as 2 years old are capable of carrying out some future intentions, albeit with low success rates (e.g., Kliegel & Jäger, 2007). As children get older, their developing PM ability may help support their independence and autonomy (Meacham & Colombo, 1980) to remember to carry out *some* future intentions on their own (e.g., remembering to feed their pet goldfish). Although children's everyday PM is often supported by external reminders, internal cues (e.g., mental rehearsal) are likely critical for successfully bringing future intentions to mind in the absence of external reminders. Thus, an important gap in the literature is that little work has identified how children independently use internal and external strategies to aid their PM across different types of everyday PM tasks and how children's PM is supported by parents, particularly in early childhood when children might struggle to carry out their future intentions without external support.

Children's PM has predominantly been studied in the laboratory using behavioural measures of two main types of PM: event-based PM and time-based PM (Einstein & McDaniel, 1990). In event-based PM tasks, the PM cue is a specific event (e.g., seeing a friend cueing a child's intention to tell them something), whereas time-based PM tasks involve carrying out the action at a specific point in time or after a certain amount of time has passed (e.g., the arrival of 1 p.m. or 30 minutes passing prompting a child to meet their friend outside to play; Mahy, Moses, & Kliegel, 2014).

Beyond event and time-based PM distinctions, PM can also be categorized according to the regularity with which tasks are performed and whether they are performed almost immediately or much later in the future. Tasks such as remembering to brush one's teeth before bed each night are routine, recurring PM tasks ("habitual" PM tasks; Graf & Uttl, 2001), that often have a shorter delay between intention formation and carrying out the prospective action (e.g., several hours). In contrast, remembering to give a birthday invitation to a friend when you see them next is a rather unique PM task performed on an infrequent basis ("episodic" PM tasks; Graf & Uttl, 2001), often with a longer delay between intention formation and carrying out the prospective action (e.g., several days or weeks). Thus, PM tasks may shift from episodic to habitual when they must be performed repeatedly (e.g., Meacham & Lieman, 1982).

In laboratory contexts, the Virtual Week task (Rendell & Craik, 2000) has been used with older children and adults (e.g., Henry et al., 2014) to investigate performance on everyday routine (e.g., taking medication) and irregular PM tasks (e.g., phoning a plumber). Routine tasks are generally carried out with greater success compared to irregular PM tasks (Henry et al., 2014; Rendell & Craik, 2000; Rose et al., 2010; Yang et al., 2011). Research on the effect of delay between intention formation and intention execution generally shows that PM is worse after longer delays in children (e.g., Somerville et al. 1983) and adults (Meier et al., 2006). Notably, the cognitive processes underpinning routine and episodic PM tasks have been described by two dominant PM theories.

According to the Preparatory Attentional and Memory Processes (PAM; Smith, 2003) theory, retrieval of prospective intentions always requires effortful attentional processes (e.g., strategic monitoring). The PAM theory is supported by research showing that when working memory resources are limited, children and adults PM performance deteriorates (e.g., Cheie et al., 2017; Kliegel & Jager, 2006a). In contrast, McDaniel and Einstein's (2000) Multiprocess Theory suggests that retrieval of prospective intentions requires strategic attentional resources in some cases but can rely on automatic processes under other conditions (i.e., high cue salience, easy ongoing task, and focal cues; Kliegel et al., 2013; Rose et al., 2010). For example, an intention "popping into the mind" constitutes a spontaneous retrieval experience (e.g., Anderson et al., 2017) that might occur with habitual PM tasks that become part of one's routine. The Multiprocess Theory has been supported by research using the Virtual Week with adults that shows that irregular PM task performance was related to working memory, but repeated/regular PM task performance was not, suggesting that repeated tasks might be supported by spontaneous retrieval processes (e.g., Rose et al., 2010). Further, in contrast to habitual PM tasks with a fairly short delay between intention formation and acting on the intention, episodic PM tasks that involve a longer delay rely on controlled processes to be actively maintained in working memory (e.g., Kliegel & Jager, 2006b; Voigt et al., 2014).

Although much PM research has focused on episodic and habitual PM tasks that often rely on external cues (e.g., remembering to hand in school work upon seeing the teacher in the Virtual Week game; Yang et al., 2011), internally cued PM tasks (e.g., intending to remember to retrieve something from another room) that rely on internal strategies (e.g., mental rehearsal) are also an important aspect of PM. Specifically, Hannon et al. (2005) identified internally cued PM tasks as those involving the retrieval of an intention in the absence of a noticeable external cue.

Many PM tasks in children's daily life seem to fall into this internally cued category; tasks such as remembering to finish their drawing or packing homework in their backpack must be accomplished without a salient external cue. The current study considers habitual, episodic, and internally cued PM important PM tasks required of children in daily life.

Generally, age-related improvements are found across a variety PM tasks during childhood. For example, on event-based tasks (e.g., card sort tasks where children must perform a novel action when the PM cue appears on the card) PM substantially improves in younger (e.g., 3 to 6 years; Atance & Jackson, 2009; Kliegel & Jäger, 2007; Mahy & Moses, 2011) and older children (7 to 12 years; Kliegel et al., 2013; Maylor & Logie, 2010). On naturalistic laboratory PM measures where children had to stop at a certain store on a pretend shopping trip (Walsh et al., 2014), ask for a candy when they saw the experimenter (Ślusarczyk & Niedźwieńska, 2013), or carry out routine tasks, like pack their homework for school (e.g., Perone et al., 2020), children's capacity to carry out these PM intentions also improves across the preschool years. Studies have also compared children's performance on routine and irregular PM tasks. For instance, Henry et al. (2014) used an adapted version of the Virtual Week board game and found that 8-to 12-year-olds tended to perform PM tasks more frequently when they were regular versus irregular in nature. In sum, there is substantial development in PM in early and middle childhood.

Beyond behavioural measures of children's PM in the laboratory, parent reports have also been helpful in understanding the development of children's PM, particularly as it is demonstrated in everyday life and in a variety of contexts (e.g., home, school, extracurricular activities). Several parent reports have been used to evaluate children's PM including: the Prospective and Retrospective Memory Questionnaire (PRMQ; Kliegel & Jäger, 2007), which includes a PM and retrospective memory subscale, and the Children's Future Thinking Questionnaire (CFTQ; Mazachowsky & Mahy, 2020), which includes five subscales measuring different future thinking abilities, including PM. Using the PRMQ, Kliegel and Jäger (2007) found that preschool children experience fewer PM failures with increasing age. Further, the PM scale of the PRMQ showed validity in that it predicted children's performance on a lab-based card-sort PM task. The CFTQ has also been found to detect age-related increases in 3- to 7-year-old children's PM (Mazachowsky & Mahy, 2020). A limitation of these parent questionnaire measures is that children's PM is measured using a single subscale and thus does not distinguish among the various dimensions of PM tasks that children may perform in daily life (see Hannon et al.,1995 for PM scale with adults that included these subscales assessing various PM dimensions). For example, parent reports may offer unique insight on children's performance on day-to-day PM tasks, such as habitual (versus episodic) and internally (versus externally) cued PM tasks, which are more difficult to capture and largely overlooked in laboratory environments (see Henry et al., 2014). Further, beyond capturing development of children's general PM ability, these past parent reports offer little opportunity to understand the strategies children use to remember to fulfil their intentions during PM development. Overall, parent reports can provide valuable and accurate insight in regard to children's PM development, especially in understudied aspects of PM, such as the development of PM in naturalistic contexts where PM intentions are regularly carried out.

One important avenue of research that is made possible by parent reports is understanding the parent's role in supporting children's developing PM abilities in daily life, which has received little attention in the literature to date. Wood et al. (1976) used the term scaffolding to describe when an expert, such as a parent, supports a child to perform a task, through verbal or physical interaction, that is beyond their current capabilities to perform alone. Thus, most effective learning takes place during this period, called the "zone of proximal development" (Pratt et al., 1988). Recent research indicates that parent scaffolding can improve children's abilities in areas such as executive functioning (e.g., Hammond, et al., 2011) and memory (e.g., Reese et al., 1993).

Several studies have shown that parent scaffolding can help to improve children's developing memory abilities. For example, Reese et al. (1993) examined mother's conversations about novel, past shared events with their preschool children and found that mothers became more elaborative over time as children's conversational abilities improved, and children of high elaborative mothers (versus low elaborative mothers) contributed more new information to the conversation about the past event. Similarly, Wang et al. (2019) found that children whose mothers were trained in child-centered conversation techniques (such as focusing conversations of past events on children's thoughts and feelings) used more episodic details when describing past and future events than children in a control group. Together, these studies suggest high-quality parent-child conversations, where the mother prompts the child to elaborate on their past experiences, help to scaffold and facilitate the development of children's episodic memory.

A few studies have investigated how younger and older children's PM abilities may be facilitated by adult support. One such study found that experimenter led scaffolding of conversations about the near future resulted in improvements in 3-to 5-year-old's ability to remember to ask the experimenter to give them a gift (Chernyak et al., 2017). Supporting these findings, Leech et al. (2019) also concluded that encouraging 4-and 5-year-old children to self-project during story book reading and discussion with an adult about the future (versus the present) resulted in PM improvements on a similar naturalistic PM task. Therefore, children's PM performance seems particularly aided by scaffolded shared conversations about the future.

As children get older, they may rely less on their parents to scaffold their memory and begin to use these strategies independently to remember to carry out their intentions. For example, a child might begin to put their bag at the door so they remember to take it to school, the way their parent did when they were a younger child. It is thought that memory strategies may first emerge during the preschool years (Wellman, 1988). Young children may use simple strategies (e.g., verbally naming items) spontaneously or when prompted to use provided strategies (e.g., during training), and generally outperform children who do not use such strategies on memory recall tasks (e.g., Henry & Norman, 1996; Schwenck et al., 2009; Wellman et al., 1975). By around 6 years old, when memory strategies are developing most rapidly, children begin to use more memory strategies, particularly advanced, active strategies (e.g., cumulative rehearsal), and use memory strategies more effectively to aid in storage and retrieval (e.g., Lehmann & Hasselhorn, 2007; Schwenck et al., 2009).

Research examining PM specifically has shown that children are capable of producing or using strategies in lab-based and more naturalistic paradigms that help them successfully remember to carry out their future intentions (e.g., Kreutzer et al., 1975; Perone et al., 2020). In a classic interview study, Kreutzer et al. (1975) found that school-aged children generated a wide range of strategies that they could use to remember to bring a pair of ice skates to school the next day including putting their skates in their school bag, tying a string around their finger, or asking another person to help them remember. Interestingly, older children produced a greater number of goal-oriented and planful strategies (e.g., reporting a specific time they planned to put their skates in their school bag or providing a specific reason for doing so) than younger children.

Relatedly, Perone et al. (2020) found that 6-to 10-year-old's attention to visual aids (i.e., longer looking times) predicted their accuracy in carrying out routine tasks in a laboratory setting such as preparing for school by packing a lunch. Thus, children who made use of the visual aid as a strategy better remembered what items were needed in the future. Other researchers have also suggested that strategies like time monitoring (e.g., Voigt et al., 2014) or active strategies, such as rehearsal of the PM cue (versus passive strategies, such as recognizing PM cues; Cottini et al., 2019) relate to or result in better PM performance.

Notably, some of the strategies generated by children in Kreutzer et al.'s (1975) interview study (e.g., tying a string around your finger) would constitute different types of reminders that can aid PM in a variety of ways. For example, external aids, such as verbal reminders provided by adults, may enhance PM by reinforcing the retrospective memory component of PM (e.g., helping children recall what they have to do when a cue appears) or encourage active monitoring for the appearance of the PM cue (Mahy et al., 2018), while other external cues, like a ribbon around your finger, might encourage the refreshing of the intention prior to carrying it out (McDaniel & Einstein, 2007). Across a number of studies, specific visual reminders have been shown to improve 3-to 8-year-old children's PM performance (e.g., Kliegel & Jäger, 2007; Mecham & Colombo, 1980). For example, Kliegel and Jager (2007) found that 2- to 6-year-olds who were given a visual cue-action reminder had better PM compared to children who did not receive a reminder (but also see Guajardo & Best, 2000 for no effect of visual reminder on PM performance). Verbal reminders have also been shown to benefit children's PM in some instances, but largely have not been found to effectively aid children's PM. Mahy et al. (2018) found that only preschoolers with better executive abilities were better able to take advantage of an executive reminder (e.g., reminder to pay attention and keep watching) to aid their PM.

Generally, then, reminders may aid children's PM, but effectiveness may vary based on the modality of the reminder as well as individual differences of the child (e.g., age, executive functioning ability; Mahy et al., 2018).

The few studies that have examined the spontaneous use of reminder strategies to aid PM have been primarily in adult samples (e.g., but see Kreutzer et al., 1975). In a diary study, Kim and Mayhorn (2008) found that young adults most frequently reported no use of external memory aids (e.g., simply remembering), followed by use of alarm clocks to help them complete PM tasks in daily life. Penningroth and Scott (2013) similarly showed that adults were more likely to report use of external strategies to remind themselves (e.g., use of a note, timer, or calendar), than internal strategies (e.g., mental rehearsal). Examining strategy use in children (7- to 10-year-olds), adolescents, and adults, Ward and colleagues (2005) reported that all age groups most frequently reported that they remembered to carry out the PM intention (i.e., press a key) only when they saw the PM cue (i.e., italicized letters in words). However, compared to children and adults, adolescents more frequently reported that they continuously thought about the PM cues and actively looked for the italicized letters. It is possible that children, whose PM abilities are still developing, may also make use of strategies, like external reminders, to independently remember to carry out their intentions, but may be more effectively evaluated in naturalistic contexts using observer reports (e.g., parent-report). Taken together, strategy use may help children to better remember to carry out their future intentions and that older children may be more apt to independently recruit PM strategies more frequently compared with younger children.

The Current Study

The primary goal of this study was to examine how children's ability in three PM task dimensions (episodic, habitual, and internally cued), which have been argued to differ in their reliance on controlled and automatic processes (e.g., Smith, 2003; McDaniel & Einstein, 2000), were related to parent scaffolding of children's PM and children's use of PM strategies. Our secondary goal was to examine developmental change across a broad age range (i.e., children 3 to 11 years old) in children's PM, children's strategy use, and parent scaffolding. Little is known about children's ability to spontaneously use strategies to avoid PM failures in daily life and the role that parent scaffolding may play in supporting children's PM during development. Thus, these two avenues were worthy of investigation. To this end, we modified the unpublished Prospective Memory Questionnaire- Child (Baysinger et al., 2005; previously adapted from the Prospective Memory Questionnaire; Hannon et al., 1995) to measure children's PM (across three PM task dimensions that constituted separate subscales: long-term episodic, short-term habitual, internally cued), child technique use, and parent scaffolding. Given that this was the first time this questionnaire had been administered to parents as a way of measuring children's PM, we were also interested in confirming the reliability and factor structure of the measure. Corresponding to our primary and secondary goals, we formulated several hypotheses and expected:

(1a) Children with better PM would also use memory strategies more frequently (positive relation between children's PM and child PM strategy use as reported by a parent);

(1b) Parents who reported that their child had poorer PM would also report greater use of scaffolding (negative relation between children's PM and parent's use of scaffolding as reported by a parent);

(2a) Age-related increases in parent-reported child strategy use (i.e., older children will have more frequent strategy use than younger children);

(2b) Age-related decreases in parent scaffolding (i.e., parents will report less frequent scaffolding as children get older);

(3) Independent of age, as the frequency of children's strategy use increases, parent frequency of scaffolding will decrease.

We were also interested in examining several exploratory research questions, for which we did not formulate specific hypotheses. First, we explored the relation among the different PM dimensions (e.g., short-term habitual, long-term episodic, internally cued subscales) and compared children's PM on each of the three PM subscales. We expected all the PM subscales would be interrelated and that children to be more successful in carrying out short-term habitual PM tasks compared to long-term episodic and internally cued PM tasks. Second, we were interested in whether the relation between children's PM (and separately for the three PM subscales), children's strategy use, and parent scaffolding would differ for younger (3 to 6 years old) and older age groups (7 to 11 years old). Third, we examined whether children's strategy use or parent scaffolding related most strongly to one of the PM subscales evaluated on the parent-report measure. Finally, we explored differences between younger and older age groups on open-ended questions about typical strategy use of children and parent scaffolding techniques.

Method

Participants

Three-hundred and two parents (258 mothers, 43 fathers, and one guardian) from the United Kingdom participated. One parent was removed for only providing demographic information and thus, the final sample consisted of 301 parents who answered the questionnaire about their child. Children ranged in age from 3 to 11 years old (36 3-year-olds, 26 4-year-olds, 38 5-year-olds, 37 6-year-olds, 41 7-year-olds, 28 8-year-olds, 42 9-year-olds, 25 10-year-olds, 28 11-year-olds; M_{age} = 6.88 years, *SD* = 2.49; 52% female). The majority of parents were from middle-class backgrounds (M_{income}= $45,842, *SD* = 22,687) and 74% of parents had Advanced Levels or higher education (equivalent to a year beyond a grade 12 education).

Children's Everyday Memory Questionnaire

The CEMQ is parent-report that measures children's PM ability and various practices involved in remembering to carry out children's future intentions. The CEMQ is comprised of four main sections. The first section includes demographic questions about the parent (e.g., age, employment status, occupation, family income, etc.) and their child (e.g., age, sex, schooling, etc.). The second section includes more specific questions about the child's background (e.g., number of siblings, handedness, extracurricular activity involvement, and developmental milestones). The third, PM section is a modified version of the unpublished Prospective Memory Questionnaire- Child (Baysinger et al., 2005) adapted from the adult self-report, the Prospective Memory Questionnaire (PMQ; Hannon et al., 1995).

The PM section of the CEMQ includes 43 items (see Appendix A). Items pertained to children's PM in everyday life on four subscales: (1) long-term episodic PM items measured children's ability to remember to perform irregularly scheduled intentions in response to a cue some hours or days in the future (8 items; e.g., "Forgets to give you a party invitation from a friend"), (2) short-term habitual PM measured children's ability to remember to carry out more routine intentions (15 items; e.g., "Forgets to flush the toilet"), (3) internally cued PM items measured children's ability to remember to carry out intentions with no obvious external cue (10 items; e.g., "Comes into a room and forgets what they came in for") and (4) PM strategy use items measured children's use of strategies to aid in their ability to carry out future intentions (10 items; e.g., "Repeats things out loud to remind themselves to do them"). Parents answered each item on a 5-point Likert scale using the scale points: *Never*, *Sometimes*, *Often*, *Very often*, and *Always* (a *Not Applicable* option was also provided) where a higher score indicated worse PM (i.e., a child always forgetting) for the long-term episodic, short-term habitual, and internally cued PM subscales. A higher score on the PM strategy use subscale indicated better performance showing more frequent use of relevant memory strategies. Finally, parents could provide an open-ended response detailing other techniques their child uses to remember (i.e., "Do you use any other techniques to help your child to remember things that they need to do? If yes, please describe").

Finally, section four included questions (see Appendix A) related to how often parents assisted their child in prospective remembering in everyday life (e.g., "Put things they need to take with them by the door?"). These four parent scaffolding questions were also answered on a 5-point Likert scale using the scale points*: Never*, *Sometimes*, *Often*, *Very often*, and *Always* (a *Not Applicable* option was also provided). A higher score on the parent scaffolding items indicated more frequent parent scaffolding. Parents were asked to also provide an open-ended response detailing other techniques they use to help their child remember (i.e., "Does your child use any other techniques to help them remember things they need to remember? If yes, please describe").

Coding of Open-ended Responses

Coding categories were determined post data collection with the goal of using parent responses to determine common themes, which guided the formation of coding categories. Responses were coded into categories by two independent raters. Some responses listed multiple techniques; thus, some responses were assigned to multiple categories. See Appendix B for examples of responses and the corresponding coding categories.

Child Strategies

Parent responses regarding their child's use of strategies to help themselves remember to carry out their intentions were assigned to one (or more) of the following five categories (adapted from Intons-Peterson & Fournier, 1986; Penningroth & Scott, 2013): (1) 'external aids' included children's use of another person to remember or remind them, writing notes or using organizers, putting things in a specific spot, or using other external aids such as a tying a ribbon around their finger, (2) 'internal aids' included children's use of mnemonics (e.g., story, rhyme), mental rehearsal, repetition, or saying things out loud (e.g., telling another person or yourself), (3) 'conjunction aids' (i.e., internal strategies with a link to an external event) included children using other life events or rearranging their schedule to help remember the intention (e.g., completing tasks at the same time each day), (4) 'other' included any strategies children use that were not internal, external, or conjunction aids, and (5) 'not applicable' included parent responses that did not apply, were too vague, or provided summary information about the child's PM that was unrelated to the child's technique use (e.g., child does not have things to remember). Agreement was almost perfect for child strategies ($\kappa = .89$).

Parent Scaffolding Strategies

Parent responses regarding their use of strategies to help their child remember to carry out their intentions were assigned to one (or more) of the following six main categories: (1) 'verbal reminders' included parents use of repetition (e.g., nagging, telling child to carry out intention) or discussion to help child remember (e.g., jogging child's memory), (2) 'visual reminders' included parents use of a written or pictorial organizer (e.g., calendar, picture charts), alarm clocks, or putting things in a specific spot (e.g., placing item in school bag the night before), (3) 'structural reminders' included parents use of routine (e.g., completing tasks at the same time each day), (4) 'rewards' included parents use of extrinsic motivation (e.g., money, praise, sticker charts), (5) 'other' included strategies parents reported that did not fit into the other categories because they were not reminders, nor reward types, such as use of mnemonics (e.g., singing instructions to children), or negative reinforcement (e.g., letting child experience negative consequences of forgetting), and (6) 'not applicable' included parent responses that did not apply, were too vague, or provided summary information about the child's PM that was unrelated to the parents technique use (e.g., sibling reminded the child). Agreement was almost perfect for parent (κ = .96) scaffolding strategies.

Procedure

Parents completed a paper-pencil version of the CEMQ about their child via their school (n = 158) or they completed an online version via e-mail (n =131) or an online forum/chatroom (n = 13). All procedures received ethics approval from X University originally and Y University in order to analyze the collected data.

Results

For all PM and scaffolding items, missing data (i.e., truly missing and "Not applicable" responses) was replaced using Estimation Maximization procedure in SPSS. Across the entire sample, percentage of missing data by subscale was similar for the three PM subscales (long-term episodic: 10%; short-term: habitual: 11%; internally cued: 5%) and also similar for the child strategy use and parent scaffolding items (2% and 0.60%, respectively). Across all 47 items (43 PM items from section 1 and four parent scaffolding items from section 3), parents of younger children had the highest percentage of missing data (47% of missing data was from parents of 3-

year-olds, 16% from parents of 4-year-olds, 12% from parents of 5-year-olds, 7% from parents of 6-year-olds).

Reliability and factor structure of the CEMQ

Prior to addressing our hypotheses, we first examined the reliability of the CEMQ. The four PM subscales of the CEMQ showed acceptable reliability (long-term episodic PM: α = .82; short-term habitual PM: α = .90; internally cued PM: α = .86; PM strategy use: α = .73) in line with previous research examining the reliability of the scale in adult samples (e.g., Hannon et al., 1995; Buchanan et al., 2005). The full PM scale also showed high reliability (α = .93). The four parent strategy items also showed acceptable reliability (α = .70).

Next, we examined the factor structure of the PM items (i.e., section 3 of the CEMQ) that had been adapted from the PMQ (Hannon et al., 1995). A principal components analysis with Varimax rotation was performed to confirm the four-factor structure of the scale as originally reported by Hannon et al. (1995) for the adult version of the questionnaire. First, we extracted a four-factor solution. Items from the long-term episodic, short-term habitual, and internally cued PM subscales loaded most highly on the first component (14.51% of the variance explained after rotation), with no clear clusters of loadings by subscale on the remaining components. The PM strategy use items loaded moderately on the fourth factor (8.02% of the variance explained; all strategy items had component loadings of .46 of greater except for one strategy item that had a loading of .25). Although some of the PM strategy use items loaded on the first three components these loadings were low or negative. Based on the finding that that PM strategy use items seemed to load on one component and the other three PM subscales did not load on separate components corresponding to the subscales, we then extracted a two-factor solution. After Varimax rotation, the first component accounted for 28.12% of the variance and the second component accounted for 8.64% of the variance. Consistent with Buchanan et al. (2005), the rotated, two-factor solution produced a clear pattern; items from the long-term episodic, short-term habitual, and internally cued PM subscales loaded mostly on the first component (32 out of 33 items with factor loadings > .40 on the first component; seven items loaded negatively and 13 loaded weakly with loadings .13 - .33 on the second component) while all PM strategy use items loaded on the second component with factor loadings > .30 (only two strategy use items loaded on the first component with loadings .11 and .14, respectively).

Correlational analyses

For correlational analyses pertaining to our main hypotheses, children's PM was measured using a composite of the three PM subscales of the CEMQ (i.e., long-term episodic PM, short-term habitual PM, internally cued PM subscales) given that theses subscales loaded onto the same component in the factor analysis. For our exploratory research questions, we also examined each PM subscale individually. Items from the three PM subscales (long-term episodic PM, short-term habitual PM, and internally cued PM) were reverse coded so that a higher score corresponded to better PM ability. For the PM child strategy use and parent scaffolding items, a higher score indicated more frequent use of PM strategies by the child or more frequent parent scaffolding. For all analyses, children's age was measured in years.

Since the PM composite was not normally distributed, a Kruskal-Wallis H Test was used to determine if there were any differences in children's PM by method of questionnaire administration (i.e., school, e-mail, chatroom/forum). Children's PM did not differ by administration type, $\chi^2(2) = 1.78$, $p = .41$, so all analyses were conducted on the full sample collapsing across the three methods of administration. All parent scaffolding items were significantly interrelated, $rs(299) = .21 - .46$, $ps < .001$.

Relations between PM, strategy use, and parent scaffolding

Table 1 shows means and standard deviations for children's PM, PM strategy use, and parent scaffolding. First, we explored relations among children's PM (composite score comprised of long-term episodic, short-term habitual, and internally cued PM subscales where a higher score indicated better PM), strategy use, and parent scaffolding (see Table 2). Supporting our hypothesis, we found that children who were rated by their parents as more forgetful in carrying out their future intentions were more frequently scaffolded by their parents, $r(299) = -.26$, $p < .01$. Children's strategy use and parent scaffolding were unrelated, $r(299) = .07$, $p = .24$ and children's PM was unrelated to their strategy use, $r(299) = .08$, $p = .16$.

We also explored relations among the three PM subscales, finding that all three were highly and positively related, $rs(299) = .69$ - $.76$, $ps < .001$ and remained significantly correlated after controlling for child's age, providing further support for a single factor model of PM (see Table 2). Next, using a repeated-measures ANOVA, we found that the PM subscale means significantly differed, $F(2, 600) = 60.54$, $p < .001$. Post hoc tests using Bonferroni correction showed that children were rated significantly higher on long-term episodic ($M = 4.29$, $SE = .03$) and internally cued ($M = 4.17$, $SE = .03$) PM tasks, on average, compared to short-term habitual PM tasks ($M = 3.97$, $SE = .03$). Long-term episodic and internally cued subscale means did not significantly differ ($p = .73$).

Children's PM, strategy use, and parent scaffolding in relation to age

We also examined whether children's age was related to children's PM performance, strategy use, or scaffolding by the parent. Children's PM significantly increased with age, $r(299) = .24$, $p < .001$. As predicted, children's use of strategies was also significantly related to age, such that older children used strategies more frequently, $r(299) = .39$, $p < .001$. In contrast to our prediction, there was no significant relation between children's age and parent scaffolding, *r*(299) = -.09, *p* = .12.

Although children's strategy use and parent scaffolding were unrelated, we were interested in whether these variables would be related independent of children's age. We found that after controlling for age, more frequent parent scaffolding was significantly related to more frequent strategy use in children, *pr*(298) = .11, *p* = .049.

Next, we explored the relations between children's PM ability, PM strategy use, and parent scaffolding separately for younger (3-to 6-year-olds) and older (7-to 11-year-olds) children to see if the relations among variables differed between these age groups.

For younger children (aged 3 to 6 years), age was significantly positively related to children's PM, PM strategy use, and parent scaffolding, *rs*(135) = .23 - .32, *ps* <.01 Most interestingly, as children got older, parents used scaffolding *more* frequently. PM strategy use and parent scaffolding was also significantly positively related, such that children who used strategies more frequently also had parents who scaffolded them more frequently, *r*(135) = .21, *p* = .01. No other relations were significant.

For older children (aged 7 to 11 years), age was significantly positively related to children's PM strategy use, *r*(162) = .21, *p* = .01, and negatively related to parent scaffolding, *r*(162) = -.23, *p* = .003. Notably, in contrast to the relation with younger children, as children got older, parents used scaffolding *less* frequently. Also in contrast with younger children, PM and parent scaffolding were negatively associated in this older age group, *r*(162) = -.37, *p* <.001, such that parents scaffolded less frequently for children with better PM ability. No other relations were significant.

For our exploratory analyses, we examined the relation between age and each of the three PM subscales separately for older and younger children. For younger children, age was significantly and positively related to all three PM subscales, *rs*(135) = .26 - .31, $p < .003$. For older children, age was only significantly positively related to the short-term habitual PM subscale, *r*(162) = .20, $p = .01$.

Relations between children's strategy use and parent scaffolding and PM subscales

Finally, we explored whether children's strategy use or parent scaffolding were differentially related to the three PM subscales (i.e., long-term episodic, short-term habitual, and internally cued). Children's strategy use was unrelated to all three PM subscales (see Table 2). Parent scaffolding was significantly, negatively related to all PM subscales, *rs*(299) = -.22 to -.26, $ps < .001$, and remained significant after controlling for children's age. Thus, the pattern of results did not differ across the three PM subscales for children's strategy use and parent scaffolding.

Open-ended questions

Child Strategies. Fifty-two parents (21 parents of younger children; 50% female) provided an open-ended response describing their child's use of strategies to support their PM. Parents reported that their child used external aids (52.8%) to remember to carry out their intentions most frequently, followed by internal aids (18.9%), while few parents reported their child's use of conjunction aids (3.8%). No parents reported 'other' strategies. Almost one quarter of parents' responses (24.5%) did not include any strategy. Using a Fisher's Exact Test, category frequencies did not differ between the younger and older age groups, $p = .34$.

Parent Scaffolding Strategies. Seventy parents (40 parents of younger children; 49% female) provided an open-ended response describing their use of scaffolding strategies to support their child's PM. Parents reported that they utilized verbal reminders (25.6%) most frequently, followed by use of visual reminders (18.6%) and rewards (18.6%). Fewer parents reported use of structural reminders (10.5%) or other strategies (3.5%). Almost one quarter (23.3%) of parents' responses fell into the 'not applicable' category. Similar to child strategies, using a Fisher's Exact Test, category frequencies did not differ by age group, $p = .47$.

Discussion

Investigating how often children use strategies to carry out their future intentions and how frequently parents scaffold children's developing PM in everyday life is a worthy pursuit that has received little attention in the literature. The CEMQ captures these important factors and measures PM broadly across different types of PM task dimensions (i.e., long-term episodic, short-term habitual, and internally cued), which are thought to vary in their reliance on controlled and automatic cognitive processes (e.g., Smith, 2003; McDaniel & Einstein, 2000). Although reliance on controlled and automatic processes has been suggested to primarily distinguish between episodic and habitual PM tasks, it seems likely that internally cued tasks (as presented on the CEMQ subscale) require effortful processes to bring the PM intention to mind and thus, align more closely with episodic than habitual PM tasks. This idea is supported by our finding that parents rated their children's PM similarly on the episodic and internally cued subscales, compared to the habitual subscale. Using the CEMQ, we also found that poorer PM ability was related to more frequent scaffolding by parents and that children's age was positively related to children's PM and use of strategies, but not frequency of parent scaffolding. Interestingly, a different pattern of results emerged for younger and older age groups in relation to age and scaffolding. For younger children aged 3 to 6 years, parents reported scaffolding them *more* often with age, while for older children aged 7 to 11 years, parents reported scaffolding them *less* often with age, which could explain why we did not find an overall relation between age and parent scaffolding. In contrast with our prediction, after controlling for age, parents reported that children who used strategies more frequently also tended to receive more frequent scaffolding from parents. Finally, open-ended responses showed that parents reported more frequent scaffolding of their child's PM using verbal reminders and reported that their children most frequently used external aids to assist their PM performance.

One important contribution of the current study is the adaptation of the PMQ (Hannon et al., 1995) into a parent-report instrument that is, to our knowledge, the first manuscript to investigate children's PM abilities across different types of PM tasks (i.e., long-term episodic, short-term habitual, and internally cued). Previously, the PMQ had only been used as a self-report in adult samples, which found the measure to be valid (i.e., relating to adults' performance on short-term PM tasks; Hannon et al., 1995) and successful in detecting differences in PM between control participants and patients with brain damage (Hannon et al., 1995), for example. Importantly, the CEMQ overall showed high reliability as has been found with adult samples using the self-report version of the PMQ (e.g., Buchanan et al., 2005; Hannon et al., 1995).

Although the PMQ scale was originally proposed by Hannon et al. (1995) to be composed of four independent subscales (i.e., long-term episodic, short-term habitual, internally cued, and strategy use), our factor analysis suggested two main components (a PM scale and a PM strategy use scale), which was also found using the self-report version with adults (Buchanan et al., 2005). The differing factor structure of the measure in child and some adult samples (e.g., Hannon et al., 1995) could be due to developmental changes in PM abilities. Similar developmental patterns in factor structure are found in measures of executive function, with a three-factor structure fitting the data of older children and adults, while often a single factor, unitary structure is commonly reported in young children (e.g., Hughes et al., 2009; Wiebe et al., 2011). Thus, as children's PM abilities emerge and become more refined during adulthood, the various types of PM might become more differentiated and reflected as such in the factor structure of the CEMQ. Generally, parent-report measures (e.g., Kliegel and Jäger, 2007; Mazachowsky & Mahy, 2020) may be an especially important method for studying children's PM that occurs more naturalistically or is not as easily measured in the laboratory (e.g., parent scaffolding). The CEMQ is especially valuable since it offers the advantage of measuring multiple aspects of PM across routine (e.g., brushing teeth) to more long-term tasks (e.g., returning an item borrowed from a friend). Children's ability to carry out habitual PM tasks, particularly in young children, has received little attention in past literature, especially in comparison to other PM tasks (long-term episodic, internally cued; but see the virtual week paradigm, Henry et al., 2014). This is notable especially since our findings suggest that children perform more poorly on these habitual, short-term PM tasks.

The primary goal of the current study was to explore how children's PM related to parent's use of scaffolding and children's use of strategies to remember to carry out their future objectives. First, the relation between children's PM and parent scaffolding suggested that parents do support their children to carry out their PM intentions and this occurs more frequently when parents perceive their child PM as poor. Further, parents' responses on the open-ended question provided novel insight regarding what types of scaffolding parents use. Our results suggest that parent tend to scaffold most frequently using verbal reminders, followed by visual reminders and rewards. Together, these finding supports the scaffolding and memory literature showing that parent scaffolding, through shared conversations about past events for example, is associated with memory development in children (e.g., episodic memory; Wang et al., 2019).

Notably, however, the negative relation between children's PM and parent scaffolding seemed to be driven by parent responses for older children, since PM and parent scaffolding was unrelated in the younger age group (i.e., 3- to 6-year-olds). One possibility is that parents might scaffold their younger children regardless of their PM abilities, perhaps to help their young child to avoid the negative consequences associated with PM errors (e.g., forgetting to return an important permission slip to school). It is also possible that the scaffolding techniques parents use most frequently are not effective in aiding their young children's prospective remembering. For example, laboratory research generally does not find verbal reminders improve children's PM (Mahy et al., 2018), but visual reminders (Kliegel & Jager, 2007) and extrinsic rewards (e.g., Sheppard et al., 2015) have been shown to improve children's PM performance. Alternately, perhaps parents do not consider scaffolding younger children's PM because they have lower expectations for their performance, or they might simply perform the intention on their child's behalf. For older children, less frequent scaffolding was related to better PM, but given the correlational nature of the study, it is not possible to determine whether parents more frequently scaffold older children with poorer PM abilities, or whether children's poor PM abilities are a result of a lack of parental scaffolding. Future work could take an experimental or longitudinal approach to determine whether more frequent scaffolding results in children's PM improvements as well as the duration of scaffolding necessary for such improvements to occur.

Unexpectedly, we found that children's strategy use was unrelated to all of the PM subscales individually and children's PM overall. It is possible that we did not find a relation between children's PM and strategy use due to the lack of variability in parents' responses; in general, parents reported children as using strategies infrequently (i.e., average of 1.48 on a scale of 1 = *never* to 5 = *always*). Parent reports of infrequent spontaneous strategy use in this age range is perhaps not surprising given that children begin to use memory strategies independently starting in the school years (e.g., Lehmann & Hasselhorn, 2007; Schwenck, Bjorklund, & Schneider, 2009). It could also be the case that children are experiencing a *utilization deficiency* (e.g., Bjorklund et al., 1997) where they are able to produce a limited number of PM strategies, but receive little benefit from its use during daily PM tasks. Our results suggested that children are largely utilizing external aids to remember their intentions, such as asking another person to remind them, or writing notes or using calendars. Despite the effectiveness of intention offloading, this strategy might only be helpful in aiding children's PM if provided by the parent or utilized by the child, and at the appropriate time, which relies on children's metacognitive awareness of when to utilize these types of reminders (e.g., Redshaw et al., 2018). Nevertheless, research pertaining to strategy use and PM has shown that children use strategies to help them remember their intentions spontaneously (e.g., Cottini et al., 2019; Kreutzer et al., 1975) and children can use reminders when provided with them in laboratory contexts (e.g., Kliegel & Jäger, 2007). Our study extends these findings by suggesting that parents observe their children spontaneously using some PM strategies in daily life, albeit we could not show that this contributes to better PM. Future work will be important in determining whether parent have difficultly identifying children's use of internal strategies (e.g., rehearsal of the PM intention) versus external strategies (e.g., leaving an item by the door to remember to take it with them) to remember to carry out their future intentions. Our open-ended responses showed that parents could identify their child's use of both types of strategies.

For our second main aim, we examined developmental change in children's PM, strategy use, and parental scaffolding and found that PM ability improved as children got older. Notably, age-related improvements in PM were driven by the significant relation between age and PM for

3-to 6-year-olds, since there was no relation between age and PM in the older age group (7-to 11-year-olds). Surprisingly, for older children, age was only related to short-term habitual PM, suggesting that despite the reliance of habitual PM tasks on more automatic processes (e.g., Rose et al., 2010), these tasks might continue to become more refined into older childhood. Generally, all children were rated lower on short-term habitual PM compared to long-term episodic or internally cued PM, which is at odds with research with adults and older children using laboratory tasks, such as the Virtual Week, where performance tended to be better on habitual compared to irregular PM tasks (e.g., Henry et al., 2014; Rose et al., 2010). Since habitual tasks are performed more regularly, it might be the case that parents have more opportunities to observe their children forgetting to perform these PM tasks and thus, might be more aware of their children's habitual PM failures (compared to episodic and internally cued PM failures). In general then, parent-reported PM might not be sensitive to the underlying automatic versus controlled processes that contribute to children's behavioural PM development. Overall, our results in line with the literature, which shows that children's PM develops rapidly in childhood (e.g., Kliegel & Jäger, 2007; Mahy & Moses, 2011), as children become responsible for carrying out more future intentions on their own. The current results suggest that there may be subtle differences in the developmental trajectories of children's PM across the various task types, which could be further explored with the CEMQ. Thus, using the CEMQ, parents generally detected developmental change in their children's PM abilities but are perhaps less sensitive to the more subtle changes in PM that occur in later childhood (compared to early childhood).

Evidence for age-related increases in PM strategy use and parent scaffolding was also found. Older children more frequently used strategies, which corresponds to literature showing that children spontaneously use more memory strategies and use these strategies more effectively as they get older (e.g., Coyle & Bjorklund, 1997; Schwenck et al., 2009). This positive association was present in both younger and older children. Interestingly, parent scaffolding and age was differentially related in younger and older age groups. For younger children (3 to 6 year olds), parents reported scaffolding their children more frequently with age, while the reverse was true for older children (7 to 11 year olds). Overall, results with age, scaffolding, and technique use support the U-shaped trajectory of PM development. One possible interpretation of our finding is that with rapid PM development during the preschool age scaffolding becomes more important, then as children become more independent and use their own strategies to remember more frequently, scaffolding becomes less frequent adjusting for children's better overall PM.

Despite the contribution of parent reports to our understanding of child development that occurs in naturalistic, everyday environments there are several limitations associated with this method. First, parents reported on their children's PM and strategy use, as well as their own scaffolding so these measures are not independent of one another. The current findings could be a result of a reporting bias, with parents responding to all questions in a way that is consistent with their own impression of their child's PM. However, given that many of our hypotheses were confirmed and supported by previous literature, we can be more confident that our findings were unlikely a result of a reporting bias. Nevertheless, future research should adapt the current measure to allow for multiple respondents, such as teacher-reports or self-reports for older children to avoid this measurement issue. Second, a novel finding of the current work was the analysis of parent's open-ended responses; however, because less than half of our sample responded to these questions it is not known whether parents who did not report any strategies do not use other strategies or simply did not report any. A third shortcoming of the current work is that behavioural measures of children's PM were not included and thus, it is unknown how parent scaffolding or child's technique use might relate to PM in the laboratory versus daily life. Some PM parent-report scales like the PRMQ, find an association between parent's ratings and children's performance on a PM card sorting task (Kliegel & Jäger, 2007). Yet, other scales, such as the CFTQ, only found relations between parent's ratings and children's performance on more naturalistic lab-based PM tasks (and only when children who forgot the PM intention due to a retrospective memory failure were included in the analysis; Mazachowsky & Mahy, 2020). Thus, determining whether the current CEMQ relates to behavioural PM measures (laboratory-based and naturalistic) is an important next step.

In conclusion, this study explored links between the social context, primarily parent scaffolding, and children's ability to spontaneously use strategies to mitigate their prospective failures on three main PM tasks dimensions that have been suggested to differ on their reliance on controlled and automatic processes. The findings highlight that parents play an important role in fostering children's PM using techniques like verbal and visual reminders, and rewards to scaffold their child's PM. Our findings also suggest that parents may modify their level of support offered to their child based on the child's age and PM ability, until they are able to better utilize PM techniques, such as external and internal aids, to remember future intentions independently. The CEMQ is unique in its usefulness for investigating how children perform and remember to perform different types of PM tasks in naturalistic contexts and how parents scaffold children's PM. Important directions for future research include examining how children utilize the PM techniques they frequently recruit and whether these techniques are learned from initial parent scaffolding.

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Table 1

Means and standard deviations for younger (3- to 6-year-olds) and older (7- to 11-year-olds) age groups and all children

	Younger children	*Older children*	*All children*
Measures	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Prospective memory (PM) composite score	4.02 (0.53)	4.18 (0.41)	4.10 (0.48)
Long-term episodic subscale	4.14 (0.52)	4.24 (0.47)	4.19 (0.50)
Short-term habitual subscale	3.88 (0.63)	4.04 (0.50)	3.97 (0.57)
Internally cued subscale	4.04 (0.57)	4.27 (0.44)	4.17 (0.51)
PM strategy use	1.35 (0.28)	1.58 (0.41)	1.48 (0.37)
Parent scaffolding	3.23 (0.98)	3.07 (0.90)	3.14 (0.94)

Note. PM = prospective memory. All PM subscales were on a scale of 1 to 5 with higher scores indicating better PM. Child PM strategy use and parent scaffolding were on a scale of 1 to 5 with higher scores indicating more frequent use of strategies or scaffolding.

Table 2

Correlations between age, children's PM, PM strategy use, and parent scaffolding

Measure	1	2	3	4	5	6	7
1. Age	—						
2. PM composite	.24**	—					
3. Long-term episodic subscale	.15**	.89** (.89**)	—				
4. Short-term habitual subscale	.24**	.93** (.92**)	.73** (.72**)	—			
5. Internally cued subscale	.26**	.90** (.90*)	.69** (.69**)	.76** (.75**)	—		
6. PM strategy use	.39**	.08 (-.02)	.08 (.02)	.07 (-.02)	.07 (-.04)	—	
7. Parent scaffolding	−.09	-.26** (-.24**)	-.22** (-.21**)	-.26** (-.24**)	-.22** (-.20**)	.07 (.11*)	—

Note. $N = 301$. Correlations controlling for age in parentheses. PM = prospective memory.
* indicates $p < .05$. ** indicates $p < .01$.

Appendix A: Children's Everyday Memory Questionnaire

Section 3

PM subscales (items 1 through 43) were completed by the parent based on their *child's behaviour*. Parents answered these items on a 5-point Likert scale using the scale points: *Never*, *Sometimes*, *Often*, *Very often*, and *Always* (a *Not Applicable* option was also provided).

Long-term episodic subscale (8 items)

1. Forgets to return a reading book to school
2. Forgets to give you letters or forms from school
3. Forgets to give you a party invitation from a friend
4. Forgets it's going to be another family member's birthday
5. Forgets to give you a message
6. Forgets to pass on a message to one of their friends
7. Forgets to give a message or note to their teacher
8. Forgets to return something they borrowed from a friend or relative

Short-term habitual subscale (15 items)

9. Forgets to fasten (button or zip) some part of their clothes
10. Forgets to comb/brush their hair in the morning
11. Forgets to flush the toilet
12. Forgets to brush their teeth
13. Forgets to write their name on a piece of schoolwork or a drawing
14. Forgets to bring/hand in their dinner money
15. Forgets to wash their hands after using the toilet
16. Forgets to do their homework
17. Forgets to do jobs/chores they have been asked to do
18. Forgets to pick up their toys after playing with them
19. Forgets to say please and thank you
20. Forgets to wash their hands before eating
21. Forgets to take their homework to school
22. Forgets to take something to school/nursery/relative's house that they wanted to show
23. Forgets what they are supposed to do for homework

Internally cued subscale (10 items)

24. Forgets what they want to say in the middle of a sentence
25. Comes into a room and forgets what they came in for
26. Forgets to bring something they need with them when they leave the house

27. Get part way through a job and forget to finish it
28. Forget to finish telling someone a story about their day
29. Forget to ask you for something they need i.e. for school/nursery
30. Start writing or drawing something and forget what they were trying to write/draw
31. Forget to tell you that they've used the last of something (e.g. crisps, drinks, toilet roll)
32. Forget to tell you something important that happened
33. Forget to finish an activity (e.g. puzzle, jigsaw, drawing)

Child strategies subscale (10 items)

34. Make lists of things they need to do
35. Write notes to help them remember to do something
36. Repeat things out loud to remind themselves to do them
37. Say things in their head over and over so that they won't forget them (please ask your child)
38. Put things they need to take with them by the door so that they won't forget them
39. Make notes and put them around the house to remind them to do things
40. Lay in bed and think of things they need to do the next day (please ask your child)
41. Put notes on things they need to remember to take somewhere
42. Write things on their hand that they need to remember
43. Try to do things at the same time each day so they will remember to do them

Section 4

Parents answered the four parent scaffolding items based on their *own behaviour*. Parents answered these items on a 5-point Likert scale using the scale points: *Never*, *Sometimes*, *Often*, *Very often*, and *Always* (a *Not Applicable* option was also provided).

Parent scaffolding

1. Check your child's bag for letters etc. from school?
2. Make lists for your child of things they need to do?
3. Put things they need to take with them by the door?
4. Remind your child to do routine things (i.e. brush teeth, flush toilet, wash hands)?

Appendix B: Open-ended Responses Coding Categories and Examples

Example explanations and corresponding coding categories for parent scaffolding and child strategies open-ended responses

Response	Coding category
Parent scaffolding strategies	
"I ask him if there's anything else he needs for school and that prompts him if no note has been sent"	*Verbal reminder*
"Put things in key places for her"	*Visual reminder*
"Have a regular routine in the morning e.g. clothes on, face wash, teeth clean, shoes on, coat on, bags, leave for school…"	*Structural Reminder*
"Rewarding technique - stickers if he remembers to do something I have asked him to do"	*Reward*
"Give them songs to sing in their head whilst washing hands and cleaning teeth to remember how long they should be doing it for"	*Other*
"Due to his age (4) we tend to not expect him to have the responsibility to remember much"	*Not applicable*
Child strategies	
"Asks mum and dad to remind"	*External aid*
"Making up rhymes to remember things"	*Internal aid*
"My child has few things to remember. We do the same things every day, together, so his need to remember things is limited."	*Conjunction aid*
"He remembers things well anyway"	*Not applicable*