British Journal of Psychology (2010), 101, 719–737

The British Psychological Society

www.bpsjournals.co.uk

Parent–child relationship quality and infantile amnesia in adults

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The first years of life are typically shrouded by infantile amnesia, but there is enormous variability between adults in how early and how much they can remember from this period. This study examined one possible factor affecting this variability: whether the perceived quality of parent–child relationships is associated with the number of early memories young adults can retrieve, and their age at the time of their first memory. We found such associations but they were qualified by parent gender. Mother–child relationships that were more affectively intense (greater social support but also more negative interchanges) were associated with recalling more early memories, although paternal companionship was most associated with how early an individual's first memory was. Affective tone of retrieved memories was also assessed, and a greater proportion of affectively positive memories (as well as fewer affectively neutral memories for males) was associated with high parental involvement in children's lives.

People's memories of their past not only help provide them with a sense of their past but also are important contributors to their sense of identity and feelings of coherence in their lives (Habermas & Bluck, 2000; McAdams, 2001, 2006). They are also an integral aspect of personality itself (McAdams *et al.*, 2006). Furthermore, people who have better autobiographical memory have been found to have better social skills (Pohl, Bender, & Lachmann, 2005). Notably, individuals differ in their ability to access memories of life-events, and this is especially true for memories of one's early life. The early years are formative for many aspects of cognitive and socio-emotional development and can have long-reaching effects (see reviews in Damon & Lerner, 2006). Yet explicit memories of events from that period of life are typically shrouded by infantile amnesia, defined as the absence or scarcity of memories about very early life-events. Typically, people from Western European backgrounds cannot recall any memories of events happening prior to when they were about 3.5 years of age and they have fewer memories than statistically expected until about age 7 (see reviews in Bauer, 2007; Peterson, 2002; Rubin, 2000). But there is considerable variation in how well individuals can access memories of their past, and recently it has become

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DOI:10.1348/000712609X482948

increasingly clear that such access is affected by sociocultural variables. The purpose of the present study is to explore a variable that so far has received little attention, namely the perceived quality of relationships between young adults and their parents. Other variables explored here are gender and birth order.

The social cultural developmental theory

Recently, Nelson and Fivush (2004) have described a theory of autobiographical memory development that attempts to explain the emergence of autobiographical memory as well as identify various factors that influence that emergence and subsequent development. One important mechanism is the individual's linguistic environment, and in particular, parent–child interaction (Davis, 1999; Mullen, 1994; Nelson & Fivush, 2004; Wang, 2003). Specifically, the amount of time parents and children spend reminiscing about past events as well as the type of reminiscing they engage in are seen as key influences on children's ability to remember their past. These aspects of children's linguistic environment have been shown to be associated with factors such as child gender (Fivush, Haden, & Reese, 2006), birth order (Lewis & Kreitzberg, 1979), and culture (Wang, 2003, 2006). Nelson and Fivush's theory predicts that factors associated with children's linguistic environment should also be associated with memory, including one's ability to recall events from early life. Indeed, such associations between these sociocultural factors and memory have been documented.

In terms of gender, women tend to recall more early memories, report younger ages of earliest memories, and access memories faster than do males (Davis, 1999; Mullen, 1994). They also seem to recall more detailed and emotion-filled memories (Davis, 1999; MacDonald, Uesiliana, & Hayne, 2000; Wang, Conway, & Hou, 2004). Gender differences have also been found cross-culturally (MacDonald *et al.*, 2000; Mullen, 1994; Wang *et al.*, 2004) although they are not always found (Hayne & MacDonald, 2003; Peterson, Noel, Kippenhuck, Harmundal, & Vincent, 2009a). Birth order may also be associated with infantile amnesia. Mullen (1994) found a linear relationship between it and the age of earliest memory, with first-borns having the earliest memories. Another factor is culture. Chinese adults have a later age of first memory and recall fewer early memories than do Europeans or North Americans (MacDonald *et al.*, 2000; Mullen, 1994; Wang *et al.*, 2004).

But there are other aspects of parent–child relationships that may also be related to memory for earlier life-events and to infantile amnesia, and in particular the *quality* of those relationships. Surprisingly, this factor has received almost no attention so far in investigations of infantile amnesia in *adults*, despite the growing literature showing that various aspects of the parent–child relationship influence *children's* ability to recall their personal past. We next turn to concurrent associations between parent–child relationships and children's autobiographical memory.

Parent–child relationships and memory in children

There is a substantial body of research showing that the linguistic environment in which parents and children are embedded is related to children's memory for earlier life-events (see review in Fivush *et al.*, 2006). For example, preschoolers and primary school-aged children have better recall of past events if parents routinely engage in memory talk, especially if it is elaborative (Reese & Newcombe, 2007). This relationship is so robust that if parents are trained to talk to their children using an elaborative reminiscing style,

children's memory recall is better (Boland, Haden, & Ornstein, 2003; Peterson, Jesso, & McCabe, 1999; Peterson & McCabe, 2004). But there are other qualities of parent–child relationships that have also been shown to be related to children's autobiographical memory. Mothers who provide autonomy support have children who are more interested in reminiscing for its own sake (Cleveland & Reese, 2005; Leyva, Reese, Grolnick, & Price, 2008), and such memory rehearsal is likely to reinforce children's memory of events. Another important relationship quality is attachment security: securely attached children and their mothers engage in richer, more detailed reminiscing about past events, particularly those that were emotional (Etzion-Carasso & Oppenheim, 2000; Laible & Thompson, 2000; Reese & Farrant, 2003) and also demonstrate better autobiographical memory (Alexander, Quas, & Goodman, 2002; Fivush & Vasudeva, 2002; McCabe, Peterson, & Connors, 2006; Newcombe & Reese, 2004).

To summarize, researchers have found an association between a number of aspects of the parent–child relationship and children's memory. Importantly, almost all of the literature on parental influences on children's memory focuses on children's memory for relatively recent events that occurred months or possibly a few years earlier, rather than specifically on earliest memories and infantile amnesia, although potential implications for infantile amnesia in adults are frequently discussed. An exception is a study by Jack, MacDonald, Reese, and Hayne (2009), who found that mothers' elaborative reminiscing style when children were between 2 and 4 years of age was related to 12- to 13-year-olds having earlier recollection of autobiographical events. Thus, although suggestive, it is an open question whether the associations found so far between parent–child relationships and child memory are directly applicable to understanding infantile amnesia in adults, particularly since many of the events recalled by children in extant studies will likely later become shrouded by infantile amnesia (Bauer, 2007).

Parent–child relationships and memory in adults

Although there is an abundant literature regarding the association between *children's* memories and some aspects of parent–child relationships, there is little research regarding this association in *adults*. An exception is attachment: adults classified as having secure attachment representations have earlier access to childhood memories (Main, Kaplan, & Cassidy, 1985) while those with avoidant attachment have poorer memory of emotional events (Fraley, Garner, & Shaver, 2000). Furthermore, young adults rating themselves as securely attached provide more early memories than do those who rate themselves as having a dismissing or preoccupied attachment style (Wang & Conway, 2006). This was found cross-culturally in samples from the USA, England, Russia, and China.

Two other features of parent–child relationships that may also be associated with memory recall in adults but have been seldom examined are the *quality* of parent–child relationships (Burger & Miller, 1999; Farrar, Fasig, & Welch-Ross, 1997; Hodges, Finnegan, & Perry, 1999) and the amount of *parental involvement* in the child's life (Stattin & Kerr, 2000). These two features are seen as valuable characteristics of a healthy family (Russell, Mize, & Bissaker, 2002) and are associated with positive family communication (Jackson, Bijstra, Oostra, & Bosma, 1998). Since parent–child talk increases children's communication skills and autobiographical memory recall, it is plausible that the quality of parent–child relationships and the amount of parental

involvement may be associated with memory in adults, including adults' ability to recall their very earliest years.

Only one study has investigated the association between adults' early memories and these two parent–child relationship variables. Peterson, Smorti, and Tani (2008) asked Italian university students to write down as many preschool memories involving their parents as they could in 3 min, and to identify their earliest memory. To measure their perceived quality of parent–child relationships and parental involvement, the Network of Relationships Inventory and the Adolescent Parental Monitoring Scale were given. Men recalled more memories when their parents were warmer and more involved in their lives, and women with warmer relationships with mothers had an earlier age of first memory. However, participants were directed to *only* recall memories that involved their parents and it is not clear how much this limitation affected the results, especially since the majority of early memories do not involve parents (Peterson, Wang, & Hou, 2009). Nevertheless, these preliminary results suggest that quality of parent–child relationships and parental involvement may be significant factors influencing adults' memory for their early years.

To our knowledge, no research has directly investigated the quality of parent–child relationships when participants were children and then returned after they became adults to assess early memory; rather, the limited research investigating parent–child relationships and memory in adults has asked participants to retrospectively assess the nature of parent–child relationships (Main *et al.*, 1985; Peterson *et al.*, 2008). However, attachment theorists have long argued that adults' *perceptions* of their interactions with their parents and the quality of those relationships when they were children or adolescents is nevertheless important (Main *et al.*, 1985; Thompson, 2006). Thus, one's perceptions of the sort of relationship one had with parents can influence the sorts of memories one retains, such as those that confirm one's assessment of relationship quality.

Emotion and memory

A number of researchers have found that the memories most likely to be retained over time are emotional in tone. This is true for those from the earliest years of life (Howes, Siegel, & Brown, 1993; Mullen, 1994; Saunders & Norcross, 1988) as well as memories of adulthood (Kensinger, 2009; Kensinger, Krendl, & Corkin, 2006). Emotional tone can be either positive or negative, and both sorts of memories are retained better than those for neutral events. Thus, in the present study, the emotional tone of memories is assessed.

Gender and parent–child relationships

Over the years, there have been many suggestions that the gender of the parent interacts with the gender of the child, and in particular that same-sex dyads are especially likely to have closer or more cohesive relationships (Lytton & Romney, 1991). In terms of language use, memory talk is especially strong among same-sex dyads when children are preschool-aged (Reese, Haden, & Fivush, 1996). Furthermore, there is evidence of particularly strong language ties between mothers and daughters at older ages. Mothers and their 8- to 13-year-old daughters have a highly concordant narrative style when recalling past events whereas other dyad pairings between parents and children do not (Peterson & Roberts, 2003). As well, although adolescents

from ages 10 to 18 spend less time with their families in group activities as they get older, they spend more-or-less similar amounts of time individually with each parent over time. However, daughters and mothers spend increasing amounts of time talking with each other and the content of that talk becomes increasingly focused on interpersonal issues (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996). In contrast, fathers and sons are more likely to talk about individual accomplishments and autonomy (Buckner & Fivush, 1998; de Vries, Blando, & Walker, 1995; Stapley & Haviland, 1989; Thorne, 1995).

In terms of adolescents' reports about the quality of their relationship with their parents, adolescents of both genders seem to have different relationships with mothers than fathers (Holmbeck, Paikoff, & Brooks-Gunn, 1995). Both daughters and sons typically report a closer relationship with mothers (Mayseless, Wiseman, & Hai, 1998; Steinberg & Silk, 2002). These relationships are also typically characterized as more intense, with not only greater closeness but also more frequent and emotionally charged conflict. Relationships with fathers are more likely to be distant and the father–daughter relationship seems to be especially distant and affectively bland, with considerably less interaction. In contrast, there is considerably more interaction between fathers and sons, and sons turn to their fathers for advice and support more frequently than girls do (Steinberg & Silk, 2002). Thus, family interactions seem to be gendered, both in terms of the gender of the child and of the parent. In the present research, we investigate whether different patterns of parent–child relationship are related to memory.

Measuring early memory

A range of tasks have been used to assess infantile amnesia and early memory. One method is to ask for one's age at the time of the earliest memory, but recently there have been calls for research to expand beyond this task. An alternative is to assess the *accessibility* of a range of early memories by providing participants with a limited amount of retrieval time (such as 4 min) to recall as many memories as possible from their earliest years. Such a task (termed a 'memory fluency' task, Wang *et al.*, 2004) has been validated cross-culturally since the cultural differences in people's single earliest memory were mirrored in memory fluency tasks: Chinese adults both had a later age of first memory and recalled fewer early memories than did British or American participants. This task has been used by successfully with both adults and children (Peterson *et al.*, 2008, 2009a, 2009b; Wang *et al.*, 2004).

The present study

The current study uses the memory fluency task in young adults to examine whether their perceived quality of parent–child relationships and amount of parental involvement when they were younger (specifically, adolescents) are associated with memory fluency and the age of earliest memory. Participants were asked to list as many memories from before kindergarten as possible in 4 min and describe their earliest memory. It is hypothesized that participants with more positive parent–child relationships will recall more memories and an earlier first memory than those with less positive relationships. Similarly, those with actively involved parents will display greater memory fluency and an earlier onset of memories. In addition, we expect women to generate more and earlier memories than men.

Method

Participants

A total of 149 university students participated (68 males and 81 females, mean age = 21.1 years, *SD* = 2.5 years, range = 17–35 years). According to Statistics Canada, 97% of residents of the sampled geographical area are Caucasian of Western European descent, predominantly English or Irish. They were from mixed socio-economic backgrounds.

Measures

Demographic Questionnaire

A Demographic Questionnaire collected descriptive information including gender, date of birth, number of parents living with while growing up, primary caregiver, siblings (including dates of birth), and parents' education.

Memory fluency

To obtain memories from before kindergarten, participants were interviewed separately by one of five female interviewers. School entry was chosen as a cut-off point because it is an important landmark (Mullen, 1994; Peterson *et al.*, 2009b). Participants were instructed to recall as many memories as possible, and for each memory, provide a brief sentence or phase for the interviewer to write down to remind them later. They were timed for 4 min. Afterwards, the interviewer reviewed each memory with participants, asking about their age when it occurred and their emotion at the time. To help participants narrow down their age, they were provided with prompts such as recalling where they lived, whether the memory occurred around a holiday or birthday, the season of the year, and so on.

Age of earliest memory

Participants were then asked to report their earliest memory, and their age at the time and their emotion.

Questionnaires on parent–child relationships

Two measures were administered: a revised version of the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985) and the Adolescents' Report of Parental Monitoring scale (ARPM; Capaldi & Patterson, 1989). The NRI was designed to measure the participants' quality of relationships with parents, siblings, and several others, which we revised to include only parents. Then 30 items evaluated 10 relationship qualities for each parent, including: (1) antagonism, (2) nurturance, (3) admiration, (4) reliable alliance, (5) instrumental aid, (6) companionship, (7) affection, (8) intimacy, (9) conflict, and (10) relative power. There were three items relevant to each relationship quality, and they were averaged to obtain the subscale score for that quality. Two global scores were then calculated: the social support global score represents the positive aspects of parent–child relationships and is the average of scores from the subscales companionship, instrumental aid, intimacy, nurturance, affection, admiration, and reliable alliance. The negative interchanges global score represents the negative aspect of parent–child relationships and is the average of scores from the subscales conflict and antagonism. The subscale 'relative power' was not included in the calculation of either global score. The NRI has good internal consistency;

Furman and Buhrmester (1985) reported Cronbach's $\alpha = .80$ for the scale scores, and Tani and Guarnieri (as cited in Peterson *et al.*, 2008) reported Cronbach's $\alpha = .81 - .82$ for social support and .90 – .92 for negative interchanges for both parents.

The ARPM scale (Capaldi & Patterson, 1989) measures the amount of parental involvement, specifically the degree to which adolescents kept their parents informed about activities and social relationships (Caprara, Pastorelli, Regalia, Scabini, & Bandura, 2005). It consists of seven items (e.g., 'Did you inform your parents about activities you were doing or intended to do?') placed on a five-point Likert scale, ranging from 1 (Never) to 5 (Always). The total score of the ARPM is the sum of the seven items (range = 7 – 35). Caprara *et al.* (2005) reported alpha reliability = .84.

Procedure

University undergraduates were recruited during classes; after providing informed consent, participants were separately interviewed for the memory fluency and earliest memory tasks and then completed questionnaires (Demographic Questionnaire, NRI, and Parental Monitoring Scale) which were presented in random order. They were asked to complete the parent–child scales as if they were in high school because for many, that was when they were last living together. Participants could enter a draw for $100. All aspects of the research were approved by the Interdisciplinary Committee on Ethics in Human Research at Memorial University of Newfoundland.

Coding

Number of memories and age at first memory

The number of memories provided during the memory fluency task was counted and the memory that was earliest according to the ages given by participants was selected as their first memory. For 13 participants, this was one of memories provided during the memory fluency task rather than the one they identified as first.

Age at the time of each memory

For each memory, participants were prompted to narrow their age to a particular month, as much as possible. Often their identified age spanned several months. For example, if the event happened in the summer while age 3 and the participant was born in early February, she was between 3 years 4 months and 3 years 7 months. The mid-point for that range was selected as the participant's age. If the participant could only identify her age in years (e.g., 'I was 2'), then the mid-point (2 years 6 months) was selected as the age.

Affect

The emotion attached to each memory was classified into one of the mutually exclusive categories of positive, negative, neutral, or mixed (containing both positive and negative affect). If a participant recalled no attached emotion, it was classified as neutral.

Reliability

One coder rated the memories of all participants, and a second coder randomly selected 20% for coding. Cohen's kappa for affect was .84.

Results

Descriptive statistics, including means and standard deviations, are presented first. (The occasional missing responses are replaced by the mean for the respective missing item.) Next, separate one-way ANOVAs compared genders for the age of earliest memory, memory fluency, and perceived parent–child relationship quality. Then correlation analyses between the memory outcome variables and the predictor variables are presented, followed by hierarchical stepwise regressions on each of the memory measures.

Descriptive information

On average participants recalled 9.2 early memories (see Table 1), but variability was high ($SD = 4.6$, range = 1–22). The most frequent emotion attached to memories was positive (48.4%). The average age of earliest memory was 32.8 months ($SD = 10.2$ months, range = 6–64 months). There was no gender difference in the age of earliest memory, although females ($M = 9.89$) tended to recall more memories than males ($M = 8.46$), $F(1, 147) = 3.69$, $p = .057$. There were no gender differences in the proportion of memories that were positive, negative, or mixed in affect, but males recalled more memories with neutral affect, $F(1, 147) = 5.61$, $p = .019$ (Ms = 11.00 and 6.12% for males and females, respectively). In terms of the quality of parent–child relationships, females reported greater levels of maternal social support than did males, $F(1, 147) = 5.35$, $p < .05$; (Ms = 3.48 vs. 3.21, respectively). But there were no gender differences in the level of maternal negative interchanges, paternal social support, or paternal negative interchanges. However, females reported greater parental involvement than males, $F(1, 147) = 4.23$, $p < .05$ (Ms = 27.69 and 26.16, respectively).

Table 1. Descriptive statistics for age of earliest memory (in months), number of memories (memory fluency), and proportional emotional valence (% positive, negative, mixed, or neutral) of memories

	Males ($N = 68$)		Females ($N = 81$)		Total ($N = 149$)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Age of earliest memory	33.32	11.53	32.36	8.99	32.80	10.20
Memory fluency	8.46	4.28	9.89	4.74	9.23	4.58
% Positive emotion	48.16	22.96	48.51	19.72	48.35	21.19
% Negative emotion	26.29	17.44	30.44	18.02	28.55	17.81
% Mixed emotion	14.50	13.26	13.86	12.14	14.15	12.62
% Neutral emotion	11.00	16.04	6.12	8.51	8.35	12.71

Parent–child relationship quality and memory

Correlations (Pearson's r) were computed to examine relationships between the memory measures (age of earliest memory, memory fluency, and memory affect) and the overall quality of parent–child relationships, specifically the global scores for social support and negative interchanges as well as the amount of parental involvement (see Table 2). Because of the number of correlations, significance for p values was set at $p < .01$. In terms of the age of earliest memory, there was a tendency for social support from fathers to be related to having an earlier age of first memory, and in terms of the total number of early memories recalled (memory fluency), there was a tendency for social support from both mothers and fathers to be related to recalling more memories.

Table 2. Correlations between memory measures and quality of parent–child relationships and amount of parental involvement

	Social support		Negative interchanges		
Memory measures	Mother	Father	Mother	Father	Involvement
Earliest memory	−.054	−.159*	−.097	−.028	−.145
Memory fluency	.168*	.168*	.118	−.038	.051
% Positive	.006	.027	.065	−.129	.206**
% Negative	.092	.014	.002	.061	−.107
% Mixed	−.004	.002	.094	.104	−.048
% Neutral	−.149*	−.087	.000	.023	−.173*

Note. *$p < .05$; **$p < .01$; (one-tailed).

However, social support from both parents was highly correlated ($r = .501$, $p < .001$). In addition, a higher proportion of early memories were positive if there was high parental involvement in children's lives. None of the parental variables were related to the proportion of memories that were negative or mixed in affect, but there was a tendency for maternal social support and high parental involvement to be related to fewer affectively neutral memories.

Correlations were also computed between the age of earliest memory and memory fluency, and the individual subscales of the NRI (see Table 3). Having an earlier first memory was significantly related to higher levels of paternal companionship, and there was also a tendency for an earlier first memory to be

Table 3. Correlations between the age of earliest memory, memory fluency, and subscales of the Network of Relationships Inventory (NRI) for each parent

Parent	NRI subscale	Earliest memory	Memory fluency
Father	Companionship	−.244**	.159*
	Instrumental aid	−.137*	.195**
	Intimacy	−.149*	.128
	Nurturance	−.029	.088
	Affection	−.143*	.175*
	Admiration	−.123	.120
	Reliable alliance	−.087	.078
	Conflict	.031	−.030
	Antagonism	.022	−.044
	Relative power	−.040	.029
Mother	Companionship	−.051	.105
	Instrumental aid	−.076	.216**
	Intimacy	−.067	.127
	Nurturance	−.005	−.031
	Affection	−.075	.155*
	Admiration	−.012	.097
	Reliable alliance	.012	.096
	Conflict	−.109	.124
	Antagonism	−.076	.100
	Relative power	.180	.072

Note. *$p < .05$; **$p < .01$; (one-tailed).

related to greater paternal instrumental aid, paternal intimacy, and paternal affection. That is, several aspects of the father–child relationship seemed to be related to having an earlier first memory. Notably, there were no significant correlations between any maternal measure and the age of earliest memory. In terms of the total number of early memories recalled, instrumental aid from both mothers and fathers was significantly related to memory fluency, and this measure was also highly correlated between mothers and fathers ($r = .443$, $p < .001$). As well, there was a tendency for affection from both mothers and fathers to be related to recalling more early memories – and again, this measure was highly correlated between parents ($r = .731$, $p < .001$). In addition, there was a tendency for paternal companionship to be associated with more early memories.

Finally, two sets of hierarchical stepwise regressions were computed. In one set, gender and birth order were entered first (simultaneously), and the global scores for maternal social support, paternal social support, maternal negative interchanges, paternal negative interchanges, and amount of parental involvement were simultaneously entered next. Finally, the interactions between gender and each of these global scores were simultaneously entered. None of the global relationship measures was predictive of the age of earliest memory. However, there were two models predicting memory fluency: the first model identified maternal social support as a significant predictor, $F(1, 147) = 4.28$, $p = .040$, $R^2 = .028$, Standardized $\beta = 0.168$, and the second model included maternal social support, Final Standardized $\beta = 0.248$, and maternal negative interchanges, $F^{\text{change}}(1, 146) = 5.97$, $p = .016$, $R^2 = .066$, $R^{2\,\text{change}} = .038$, Standardized $\beta = 0.211$. That is, both positive social support and negative interactions were related to individuals recalling more memories from their early years. In terms of the model predicting the proportion of memories that were affectively positive, there was only one significant predictor: the amount of parental involvement, $F(1, 147) = 6.49$, $p = .012$, $R^2 = .042$, Standardized $\beta = 0.206$. Finally, there were two models predicting the proportion of memories that were affectively neutral: the first model identified gender as a predictor, $F(1, 147) = 5.61$, $p = .019$, $R^2 = .037$, Standardized $\beta = 0.192$. The second model identified both gender (Final Standardized $\beta = 0.483$) and the interaction between gender and involvement as significant predictors, $F^{\text{change}}(1, 146) = 4.29$, $p = .040$, $R^2 = .064$, $R^{2\,\text{change}} = .027$, Standardized $\beta = -0.355$. Males had more affectively neutral memories than did females, but they had proportionately fewer if there was high parental involvement.

In the other set of hierarchical stepwise regressions, gender and birth order were simultaneously entered first, each of the individual subscales of the NRI for each parent was simultaneously entered next, and finally the interaction between gender and each of these subscale scores was simultaneously entered. The model that predicted the age of earliest memory had paternal companionship as the sole predictor, $F(1, 147) = 9.28$, $p = .003$, $R^2 = .059$, Standardized $\beta = -0.244$. That is, individuals who had higher paternal companionship had an earlier age for their first memory. There were two significant models predicting memory fluency. The first model identified maternal instrumental aid as a significant predictor, $F(1, 147) = 7.18$, $p = .008$, $R^2 = .047$, Standardized $\beta = 0.216$. The second model identified both maternal instrumental aid (Final Standardized $\beta = 0.253$) and maternal conflict, $F^{\text{change}}(1, 146) = 4.74$, $p = .031$, $R^2 = .077$, $R^{2\,\text{change}} = .030$, Standardized $\beta = 0.177$. Thus, both the positive maternal quality of instrumentally helping her children as well as the negative maternal quality of having conflict with them predicted having more memories of events occurring in the

early years of life. In terms of the affective quality of memories, there were two significant models predicting the proportion of memories that were affectively neutral. The first model identified gender as a predictor, $F(1, 147) = 5.61$, $p = .019$, $R^2 = .037$, Standardized $\beta = 0.192$. The second model identified both gender (Final Standardized $\beta = 0.539$) and the interaction between gender and maternal affection as significant predictors, $F^{\text{change}}(1, 146) = 4.01$, $p = .047$, $R^2 = .0637$, $R^{2\,\text{change}} = .026$, Standardized $\beta = -0.382$. Again, males had more affectively neutral memories, but they had proportionately fewer if their mothers were high in affection.

Summary

There were no significant gender differences in the age of earliest memory or memory fluency. Nor were there significant gender differences in the proportion of affectively positive or negative early memories, although males recalled more affectively neutral ones. The only measure that was associated with having an earlier age of first memory was companionship with their fathers. In terms of the number of early memories that people recalled, it was relationships with their mother that were significant, and interestingly, both positive and negative aspects: the global measures of social support and negative interchanges, and the specific aspects of instrumental aid and conflict. Having a higher proportion of affectively positive memories was related to having parents who had greater involvement in their lives, and a higher proportion of memories that were affectively neutral was found in males although this was mitigated for them by having highly involved parents as well as mothers who were high in affection. Birth order was not related to any of the memory measures.

Discussion

Considerable research has documented large individual differences in the ability of adults to recall autobiographical events in their lives as well as in the associated inability of people to access memories of their very earliest years – the phenomenon of infantile amnesia. Furthermore, sociocultural variables seem to play a role in accounting for this individual variation. However, an important source of social influence is yet largely unexplored: the quality of individuals' relationships with their parents. Parent–child relationships affect many aspects of both child and adult functioning, and they also affect young *children's* memory for relatively recent autobiographical events. In the current exploratory study in this largely uncharted area, the primary question was whether the perceived quality of parent–child relationships also affects *adult* memory, and in particular, their ability to recall events from when they were very young – i.e., infantile amnesia.

Quality of parent–child relationships and memory

We had hypothesized that young adults with more positive parent–child relationships would recall more memories from their preschool years and would have an earlier first memory than would adults with less positive relationships. Our findings were consistent with these hypotheses, but the gender of the parent as well as the memory measure mattered. As well, the relations were modest.

For the number of memories from early life that participants were able to recall in a memory fluency task, correlational analyses showed that those individuals who perceived both their mothers and fathers as providing more social support had more memories. However, the amount of social support provided by mothers versus fathers was highly correlated such that when a regression analysis was done, only maternal social support was a predictor. As well, having more negative interchanges with mothers was also predictive of greater memory fluency. (In contrast to the similarity between parents in the amount of social support, there was little similarity between mothers and fathers in terms of negative interchanges.) When individual subscales of the NRI were assessed, correlational analysis identified a number of positive aspects of parent–child relationships with both parents that were related to memory fluency, specifically instrumental aid and affection from both parents as well as paternal companionship. All of these, however, were strongly intercorrelated (ps $< .001$). When regression analyses were run on the subscale variables of the NRI, the positive maternal quality of providing greater instrumental aid to children was identified as the most important predictor of memory fluency. However, the negative quality of maternal conflict was identified as predictive as well.

Thus, correlational analyses and regression analyses both are consistent with the notion that positive relationships with parents are related to an individual's ability to recall the very early years of life. Other research has shown that parents and children who have positive relationships typically spend more time in positive communicative interactions (Jackson *et al.*, 1998), and such verbal interactions include talking about prior events that have occurred in one's life. In fact, such memory talk is relatively frequent in emotionally positive interactions within families (Burger & Miller, 1999; Coppola, Vaughn, Cassibba, & Costantini, 2006; Miller, 1994; Vaughn *et al.*, 2006, 2007). These memory conversations about past events, in turn, have been shown to foster more numerous as well as more elaborated memories in children (Fivush *et al.*, 2006; Nelson & Fivush, 2004). Thus, it is plausible that positive communicative interactions that have taken place throughout childhood foster even an adult's ability to retrieve memories of their early life. Alternatively, it is also possible that having denser memories allows adults to retrieve more information about their relationship with their parents, and this in turn could facilitate higher perceived relationship quality.

Findings from the regression analyses are also consistent with the suggestion that relationships with mothers may be particularly associated with an individual's ability to easily recall multiple early memories. Relationships between children and mothers have typically been described as more intense than those with fathers, and this intensity includes both greater closeness as well as more emotionally charged conflict, whether the children are male or female (Holmbeck *et al.*, 1995; Mayseless *et al.*, 1998; Steinberg & Silk, 2002). The fact that both social support and negative interchanges, as well as both maternal instrumental aid and conflict, were predictive of adults recalling more memories of their early childhood suggests that having an intense relationship with mothers, including both very positive as well as some negative aspects, might foster adults' greater ability to retrieve memories from those distant years. But again, the alternative is also possible: that having more memories of their mothers influences ratings of relationship quality that are made after reaching adulthood.

In the present study, we used two measures of how well individuals can access their earliest memories, or stated another way, two measures that have been used to assess infantile amnesia. These two measures are correlated, both in the present study ($r = -.246$, $p < .001$) as well as in others (Peterson *et al.*, 2009b; Wang *et al.*, 2004),

but they are not identical. One measures how far back in time one can recall – the most commonly used measure of infantile amnesia – while the other measures the density of one's memories during the early years prior to beginning school. Counter-intuitively, the predictors of memory fluency versus the age of earliest memory were different. Specifically, a number of aspects of children's relationships with their fathers were related to their age of earliest memory: in the correlational analysis, the global measure of paternal social support was related to having an earlier first memory, as were the NRI subscales of paternal companionship, instrumental aid, intimacy, and affection. Regression analysis identified paternal companionship as the key predictor. In contrast, none of the aspects of individuals' relationships with their mothers were related to how early their first memory was.

It is unclear why relationships with mothers in particular should be predictive of the number of memories one can retrieve from one's early life but relationships with fathers are predictive of how early one's first memory is. Part of the reason that relationships with mothers may be particularly likely to be associated with the ability to access more numerous memories is that children spend considerably more time with their mothers than fathers (Larson *et al.*, 1996) as well as have more intimate relationships with them. Thus, it is mothers who are the ones most likely to engage in memory talk with their children at all ages, which other research has shown to be the sort of conversational interaction that fosters the reinforcement and elaboration of event memories (see review in Fivush *et al.*, 2006). Thus, it makes sense that mother–child relationships are particularly important in terms of being able to retrieve multiple memories from long ago. But it is more difficult to account for the relation between fathers and the age of earliest memory. Fathers typically spend less time with their children as well as less time engaged in memory talk; however, there are suggestions of differences in how they talk with their children when they do engage in memory talk (Buckner & Fivush, 2000; Reese *et al.*, 1996). For example, they engage in more evaluation, confirmation, and correction of children's memory reports than do mothers. Perhaps because of the lesser amount of time spent with fathers compared to mothers, Reese *et al.* (1996) have suggested that father–child reminiscing may be more special and potentially more influential in some ways. Clearly, more research is needed to clarify gender-differentiated associations between parents and adult memory.

The findings of this study in some ways were consistent with the other extant investigation of parent–child relationship quality and early memory in young adults (Peterson *et al.*, 2008), and in some ways they were not. Most importantly, both studies support the premise that positive parent–child relationship quality is related to adults' ability to recall their earliest years; furthermore, this relation was found in both a Canadian and an Italian sample. But there was a major difference between the studies: Peterson *et al.* (2008) asked young adults to *only* retrieve memories of their parents – but the majority of early memories do not involve parents unless participants are requested to restrict their memory search this way and thus, it is unclear how this methodological divergence impacts findings but it may explain the differences. In Peterson *et al.* (2008), for *daughters* there was little relationship between parent–child relationship quality and the number of memories about parents that were readily retrieved (although there was for how early the first memory was); in contrast, *sons* who had warm relationships with fathers recalled more early memories involving their parents.

The second measure we used to assess parent–child relationship quality asked participants to describe how involved they perceived their parents to have been in their

lives. (This measure did not differentiate between mothers and fathers.) And a second hypothesis was that young adults who perceived their parents as more actively involved would have greater memory fluency and earlier first memories. Although perceived parental involvement was not related to either measure, greater involvement was associated with a higher proportion of memories that were affectively positive. In addition, the interaction between involvement and gender predicted the proportion of memories that had neutral affect. Males were twice as likely as females to have affectively neutral memories, but this was mitigated when they also had highly involved parents. Thus, parental involvement seemed to be associated with the emotional tone of early memories rather than their frequency or how early they were. Presumably, when parents were highly involved in their children's lives, they jointly engaged in more activities and events that were enjoyable, and such events are the stuff of affectively positive memories.

Gender and memory

We hypothesized that women would have greater memory fluency and an earlier age of first memory than men, but our results did not support this. The current findings are in contrast to some others in the literature suggesting that females recall significantly earlier and more memories than males (Davis, 1999; Mullen, 1994; Wang *et al.*, 2004). Not all studies, however, have found these gender differences (Hayne & MacDonald, 2003). In fact, whether or not one finds a gender difference may be related to the culture of the participants (MacDonald *et al.*, 2000), or to methodology. For example, Peterson *et al.* (2009a) gave adults a memory fluency task in two ways: half of the participants were tested individually and orally, with the interviewer writing down notes on the participants' memories as they recalled them (the same methodology used here). The other half was tested in a group setting and participants were responsible for writing down their own notes on their memories (the method used by Peterson *et al.*, 2008; Wang *et al.*, 2004). There was no gender difference for the participants assessed orally, whereas when participants were tested in a group and had to write down their own memories, gender differences emerged – women recalled more. Thus, gender differences in task motivation may play a role in explaining differential memory retrieval.

The only gender difference we found was in the proportion of memories that were affectively neutral. As expected, the majority of memories were described by individuals as affectively toned, either positive or negative (or sometimes both), with the majority having a positive emotional valence. Only 6% of memories were described as affectively neutral by women whereas almost twice that were described that way by men. These findings are consistent with those by Davis (1999), who found that women were more likely to recall emotionally toned memories. However, this gender difference also interacted with one of the global factors, specifically parental involvement, and one of the NRI subscale measures, specifically maternal affection. If parents were high in involvement or mothers were high in affection, their sons were less likely to have affectively neutral memories.

Limitations

This is an exploratory study that investigates questions that have had little empirical attention so far. The relations that were found between parent–child relationship quality (measured in adulthood) and memories of one's earliest childhood were

modest, but they were also suggestive and raise questions for further investigation. The largest limitation of the current research is the nature of our parent–child relationship data, and there are several problematic issues here. Participants were asked to answer the parent–child questionnaires retrospectively, as when they were in high school. It was postulated that this was likely to be the most recent period of time when they lived communally with their parents. Thus, assessments of parent–child relations were retrospective, but only back to the high school years. Although this seemed to be the best compromise for this research, it is not ideal. Rather, one would like to have measures of parent–child relationship that were concurrent with the early childhood period of life that one was recalling. However, few adults have clear memory of the nature of parent–child interactions that far in the past (as reported by our adult participants in pre-testing). This is due not only to the distance in time, but also to the cognitive immaturity of children when preschool-aged and their limited skills at evaluating such abstract constructs as relationships. Instead, one would like to have longitudinal studies that track the consistency of parent–child relations across time. Considerable research has documented relatively consistency over shorter periods of time, but long-term investigations spanning decades of a child's life are difficult and rare (Block & Block, 2006). Nevertheless, coherence across many years has been found in a number of relevant domains (e.g., Block & Block, 2006). In terms of attachment, Benoit and Parker (1994) found attachment classification to be relatively consistent across three generations in a sample of middle-class individuals; in contrast, considerable instability has been found when families face changes in life circumstances such as stress, economic situation, or employment status (Thompson, 2006). Global perspectives on parent–child relationships stress overall coherence in these relationships, although considerable change can be discerned as well (Lollis & Kuczynski, 1997) since there are ongoing bidirectional interactions between parents and children at both the microanalytic level of parent–child interactions and the macroanalytic level of relationships. In a meta-analysis of parent child rearing over time, Holden and Miller (1999) stress that there is considerable evidence for both continuity and change in parenting. They state that 'child-rearing practices assessed at one time can reflect an enduring characteristic that persists over time, across different offspring, or to a less extent, across settings or tasks' (p. 243), and significant stability was found in all 11 child rearing constructs that were assessed in cross-time analyses. Nevertheless, their conclusion was that child rearing is both enduring and different across time.

In general, our correlations were relatively low although nevertheless significant – the more surprising because of the retrospective assessments of parent–child quality as well as our eliciting memory for events that occurred more than a decade and a half in the past, well before the period in their lives for which assessments of parent–child quality were made. It is acknowledged that relationships are constantly evolving, and the type of relationship participants had with their parents during high school may not be representative of the present situation or of the time when they were preschool-aged (Jackson *et al.*, 1998). Thus, using retrospective scores from their high-school years for the NRI and ARPM may have potentially weakened the associations between parent–child relationships and the memory measures.

The present study suggests that positive parent–child relationships are related to the ability of adults to readily retrieve memories from their early years. However, the current study cannot determine cause–effect relations. That is, it is possible that the results we found were because parents and children in warm relationships spent more time talking

about past events, or alternatively, they were more likely to have joint experiences that could be later recalled, or more likely still, both mechanisms played a role. It is also possible, of course, that there are unknown mediating variables (such as IQ or language development) that have yet to be explored. Nevertheless, this study, like that by Peterson *et al.* (2008), makes a beginning in the exploration of how parent–child relationships may affect infantile amnesia.

Summary

The purpose of this study was to examine whether adults' perceptions of the quality of their relationships with parents were associated with two measures of infantile amnesia: the number of memories from their early years and their age at the time of their first memory. In addition, was the affective quality of their early memories related to the quality of parent–child relationships? We indeed found associations between participants' ability to recall their early years and the perceived quality of the parent–child relationships they experienced. However, our findings were qualified by the gender of the parent. Mothers with more affectively intense parent–child relationships (greater social support but also more negative interchanges) had children who seemed to recall more early memories. In contrast, paternal companionship was most associated with how early an individual's first memory was. Other results were that there were no gender differences in how many memories women versus men retrieved nor in how early their first memory was. As well, for both genders, memories were more affectively positive when there was high parental involvement in their lives. Although males recalled more affectively neutral memories than did females, this was attenuated when they had highly involved parents or affectionate mothers. Overall, our findings suggest that some of the variability in adults' ability to recall their earliest years may be related to the quality of the parent–child relationships that they have experienced.

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Received 17 October 2008; revised version received 9 November 2009