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Autobiographical memory stability in the context of the Adult Attachment Interview

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ABSTRACT

Increasing evidence suggests that both attachment representations and autobiographical memories are moderately stable over time. Evidence examining the stability of attachment-related memories is scarce, although these memories of early caregiving are thought to underpin attachment representations. Connecting research on stability of autobiographical memories with research on attachment representation, the present study investigated the stability of attachment-related autobiographical memories, which were provided by 151 emerging adults in repeated Adult Attachment Interviews conducted seven years apart. Results show that these childhood memories are as stable as other memories from later periods of life, and that memory stability depends on retrieval mode, memory valence, autobiographical memory specificity, and memory content (i.e., maternal vs. paternal caregiver). Investigating the relation of stability of attachment-related memory content with attachment security revealed mainly an association with secure base script knowledge, supporting the notion that attachment representations are firmly rooted in semantic and autobiographical memory systems.

Research on autobiographical memory and attachment deem stability of personal memories and attachment representations as important for individuals' cognitive processes and psychological functioning (Köber & Habermas, 2017; Lewis, Feiring, & Rosenthal, 2000; Waters, Weinfield, & Hamilton, 2000). Studies investigating the stability of autobiographical memories across repeated tellings reveal moderate-to-high stability of memories from early childhood and emerging adulthood (Bauer, Tasdemir-Ozdes, & Larkina, 2014; McAdams et al., 2006; Syed & Azmitia, 2010; Thorne, Cutting, & Skaw, 1998). Likewise, global scores assessing the quality of attachment representations have demonstrated moderate stability throughout adolescence and emerging adulthood (e.g. Waters, Ruiz, & Roisman, 2017).

To date, however, no study has investigated and connected work on memory stability with work on attachment representations, even though memories of early experiences with primary caregivers are theorized to be a core component of attachment representations. Thus, it is unknown to what extent attachment-related autobiographical memories are stable, how this stability is related to security, and how this stability compares with the larger body of work on memory stability. Attempting to fill these gaps, the present study investigated the stability of autobiographical memories of early caregiving assessed using the Adult Attachment Interview (AAI; Hesse, 2008; Main, Kaplan,

& Cassidy, 1985) and how that stability related to attachment security and attachment stability. Furthermore, we explored memory features that may facilitate memory stability. We first introduce the conceptual connection of attachment with autobiographical memory and then present available evidence suggesting that memory stability varies with different memory features.

1. Attachment representations and autobiographical memory

Bowlby's (1969/1982) attachment theory argues that early relationship experiences with primary caregivers lead to generalized expectations and beliefs about the self, the world, and relationships, which are referred to as "internal working models" or attachment representations. These representations involve memories of specific autobiographical events from childhood that are organized, at least partly, in explicitly constructed narratives that help individuals understand and make sense of their experiences (Farrar, Fasig, & Welch-Ross, 1997; Newcombe & Reese, 2004; van IJzendoorn, 1995; Zaman & Fivush, 2013). In addition to autobiographical memories of attachment experiences, attachment representations also consist of cognitive scripts (Waters & Waters, 2006; Waters & Roisman, 2019).

A *cognitive script* is a set of expectations generated by a series of

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events that usually unfold in the same specific order (Schank & Abelson, 1977, 1995). Summarizing the most commonly occurring features of a class of events that comprise stereotypical episodes, cognitive scripts are a semantic memory structure that serves as a template to organize prior experiences and understand new experiences of the same type. Scripts influence both retrieval of old memories and storage of new ones (Brewer & Nakamura, 1984; Graesser, Woll, Kowalski, & Smith, 1980; Smith & Graesser, 1981). In terms of attachment, the typical script is believed to unfold as follows: Child and mother are constructively engaged in the environment, something disrupts this engagement, the child signals the need for support, the mother notices the need and offers support, the child accepts the help, the disruption is effectively resolved, and the child returns to the constructive engagement with the environment (Waters & Waters, 2006). Individuals who experience reliable effective caregiving following the sequence outlined above should abstract a cognitive script termed *the secure base script* (Waters & Waters, 2006; Waters & Roisman, 2019; Waters et al., 2017).

Though not explicitly focusing on the secure base script, several studies have explored links between attachment security and basic cognitive processes related to memory. For example, securely attached individuals benefit from attachment security primes when asked to recall autobiographical memories, such that those receiving a security prime produce memories with greater specificity (Bosmans, Dujardin, Raes, & Braet, 2012; Bryant & Bali, 2018). A lack of autobiographical memory specificity is characterized by an overrepresentation of recurring memories that summarize similar events (e.g., “I used to take the bus every morning”) or of extended memories that span a longer period of time (e.g., “my time in third grade”). Secure attachment, however, has been associated with enhanced executive control (Bernier, Carlson, Deschênes, & Matte-Gagné, 2012; Fay-Stammach, Hawes, & Meredith, 2014; Gillath, Giesbrecht, & Shaver, 2009; von der Lippe, Eilertsen, Hartmann, & Killèn, 2010), which facilitates the retrieval of specific events that happened at a particular place and time and lasted no longer than a day (Bryant & Bali, 2018). Securely attached individuals also retrieve both positive and negative childhood memories in a more timely manner (Mikulincer & Orbach, 1995). In contrast, insecurely attached individuals who score high in attachment avoidance show decelerated and impaired recall of both negative memories and negative descriptions of their parents (Dykas, Woodhouse, Jones, & Cassidy, 2014; Edelstein et al., 2005; Haggerty, Siefert, & Weinberger, 2010; Mikulincer & Orbach, 1995), whereas insecurely attached individuals who score high in attachment anxiety report more negative memories, even when they are not prompted to recall them (Haggerty et al., 2010). Taken together, the extant literature suggests that attachment representations influence not only the recall of early memories with caregivers, but also memory features such as specificity and valence, which also may influence the stability of attachment-related memories during repeated recall.

Corresponding to the close connection between attachment representations and autobiographical memories, the most widely used method for studying attachment representations is the Adult Attachment Interview (AAI; Hesse, 2008; Main et al., 1985). The AAI is a semi-structured interview that focuses on adults’ autobiographical memories of childhood experiences with their primary caregivers and is used to assign individuals to a secure or insecure attachment classification along with several sub-classifications (Main & Goldwyn, 1984-1998). The most common assessment of attachment representations applied to AAI transcripts emphasizes the organization and coherence of the AAI content. The coding of AAI coherence is theorized to reflect the organization of an individual’s attachment representation and is inferred from the truthfulness, consistency, clarity, and level of detail provided in the AAI transcript, with higher coherence ratings signifying a more secure attachment representation (Main & Goldwyn, 1984-1998). More recently, researchers have developed an AAI-based assessment of secure base script knowledge (Waters & Facompré, in press). This alternative coding system assesses an individual’s

knowledge of and access to the secure base script, as reflected in their narratives of caregiving experiences (i.e., do narratives follow the same temporal-causal sequence as the secure base script).

Although prior studies indicate that attachment representations measured in AAIs are moderately stable throughout adolescence and emerging adulthood (Hamilton, 2000; Lewis et al., 2000; Waters, Merrick, Treboux, Crowell, & Albersheim, 2000; Weinfield, Sroufe, & Egeland, 2000), the stability of attachment-related memories provided in AAIs has not yet been examined. Indeed, research on the stability of autobiographical memories has remained separate from that on attachment, even though the autobiographical memories provided in AAIs are one major criterion from which stability of attachment security is inferred (Hamilton, 2000; Lewis et al., 2000; Waters, Merrick et al., 2000; Weinfield et al., 2000). Drawing on both the influence of cognitive scripts on autobiographical memory retrieval and the stability of attachment representations, it seems plausible to expect some stability in the content and features of the autobiographical memories provided in AAI assessments.

2. Stability of autobiographical memories

To date, most studies investigating memory stability have focused on narrative accounts of important memories from childhood (Bauer et al., 2014; Josselson, 2000) or adulthood (McAdams et al., 2006; Thorne et al., 1998), or they have focused on life narratives covering the entire lifespan (Köber & Habermas, 2017). Defining stability as the similarity of events repeatedly selected to be part of repeated tellings across time, these studies find moderate-to-high stability. Two studies have reported high levels of stability of the earliest memories of adult women over periods of four years (82%, Bauer et al., 2014) and 18 years (54%, Josselson, 2000). Asking for the earliest memory, however, is a fairly specific prompt because it directs attention to a specific time during life with a limited choice of memories. When asking for memories in response to cue words or by broadly defining criteria such as personal significance, valence, or relationship experiences, individuals can choose from a much wider range of events. Consequently, memories elicited in this way are less stable. For example, when childhood memories were prompted by emotionally significant cues discrepant with their current self-concept, students repeated only 22.2% of the same events when given identical cues three years later (Strauman, 1996). For memories of important life events or events involving an important relationship, students repeated between 11.4% and 22.5% of the same events across time intervals ranging from two weeks to five years (Mackinnon, De Pasquale, & Pratt, 2016; McAdams et al., 2006; Syed & Azmitia, 2010; Thorne et al., 1998). When important memories were integrated in life narratives, emerging adults repeated up to 39.5% of life events in subsequent life narratives eight years later, exceeding the stability of their self-generated key words (20.7%) with which they labeled their important memories (Köber & Habermas, 2017). Overall, these studies point to high stability of earliest memories and to moderate stability of experiences from any life phase, but they do not specify the stability of childhood memories distributed across the full childhood period. Further, these studies suggest that stability of autobiographical memories varies due to retrieval modes, narrative detail, content, valence, retention interval, and personal importance.

Regarding retrieval modes, two methods have been predominately used to assess autobiographical memories (see Koppel & Berntsen, 2015 for a review). The first method requires participants to retrieve memories in response to cue words. The second method requires participants to report important autobiographical memories, sometimes with reference to certain life phases such as childhood (Strauman, 1996) or certain themes such as relationships (Mackinnon et al., 2016; Thorne et al., 1998). These two different cuing methods trigger two contrasting retrieval strategies. The cue word method elicits a rather lateral search in autobiographical memory because cues may activate experiences via

associative networks at the level of perceptions, emotions, persons, places, and actions. Each of these mnemonic details may then be used to reconstruct a memory (Conway & Pleydell-Pearce, 2000). In contrast, the request for a memory from a certain life phase or involving a certain theme tends to trigger a narrative-based search, which is usually guided by cognitive scripts (Bohn, Koppel, & Harris, 2017; Koppel & Rubin, 2016). This requires a more controlled, top-down process of comparing and selecting life events deemed appropriate to answer the request. Even though no studies to date have investigated whether the stability of autobiographical memories differs depending on different cuing methods, work on memory processes shows that retrieval supported by cues leads to better memory performance and enhanced recall of episodic details of autobiographical events (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002). Thus, cued attachment-related memories might be more easily recalled and, therefore, more stable than those freely recalled.

In addition to retrieval mode, specific negative memories may show greater stability than recurring and extended events or positive and neutral memories. Specific memories are remembered in greater detail because they often include sensory-perceptual, spatial, temporal, and contextual information (D'Argembeau, Comblain, & van der Linden, 2003; Schaefer & Philippot, 2005). Negative life events are often characterized by uniqueness, vividness, consequentiality, and emotional significance (Berntsen & Rubin, 2004; Svob, Brown, Reddon, Uzer, & Lee, 2013), meaning that they require more emotion regulation effort, especially when they are central to a person's life story (del Palacio-Gonzalez & Berntsen, 2018). Consequently, specific negative life events are more resistant to forgetting than positive or neutral autobiographical memories (Barnier, Levin, & Maher, 2004; Conway, 2005; Stone, Barnier, Sutton, & Hirst, 2013), which may also result in enhanced stability of these memories.

3. The present study

The present study aimed to integrate perspectives on autobiographical memory and attachment representation to examine the stability of attachment-related memories from childhood and the potential cognitive and task-based factors underlying that stability (or lack thereof). We sought to extend research on attachment by examining the stability of AAI content. This study also contributes to the growing literature on the stability of autobiographical memories by expanding this work to include the full childhood period. Further, we explored how attachment representations and stability of autobiographical memories of early caregiving experiences may be related to each other. More specifically, attachment representations stored in the form of a cognitive script may facilitate the stability of attachment-related childhood memories because information that matches a cognitive script is more easily remembered (Graesser et al., 1980). This may be especially true of adults recalling childhood memories given that cognitive scripts are more heavily recruited to retrieve remote experiences (Smith & Graesser, 1981), which is largely the focus of the AAI.

For the purpose of this study, we focused on memory stability defined as the similarity of events repeatedly selected to be reported in the AAI across time. Stability and change in the selection of events for inclusion in the AAI may reflect variability of attachment-related memories. The repeated selection of events is not a dichotomous decision, as events may be re-narrated in varying length and detailedness (Schank & Abelson, 1995). However, including events repeatedly in the AAI may be one way of reflecting stability of attachment representations. This study, therefore, sought to explore the stability of attachment-related autobiographical memories in terms of the proportion of events that were repeatedly mentioned in the AAI.

The AAI (Main et al., 1985) is a 20-question semi-structured interview designed to assess adults' cognitive scripts of attachment relationships with their primary caregivers. It asks for narrative

recollections of experiences with caregivers between the ages of five and twelve. At the beginning of the interview, participants are asked to give some background on their childhoods and to identify their primary caregivers. They then generate five adjectives that described their relationship during childhood with each caregiver and then discuss specific experiences that best exemplify each of these self-generated adjectives. Afterwards, participants are asked to discuss what happened when they, as children, were emotionally upset, physically hurt, sick, separated from their caregivers for the first time, felt rejected by their caregivers, felt threatened by their caregivers, and whether they experienced the loss of caregiver or a close other. The final part of the interview asks participants to discuss their future hopes. This last part of the AAI interviews was not analyzed in the present study given its focus on stability of autobiographical recollections from the past. From a memory perspective, the AAI requires three forms of autobiographical recall: (1) free recall of adjectives for each caregiver relationship; (2) free recall of specific autobiographical memories exemplifying the freely recalled adjectives for each caregiver relationship; and (3) cued recall of autobiographical memories in response to seven key event types specified in the interview—*upset, hurt, sick, separated, rejected, threatened, and loss*.

Based on previous research suggesting the stability of attachment representations and autobiographical memories, we derived several predictions regarding patterns of stability in attachment narratives and their associations. First, we expected individuals' autobiographical memories of attachment-related experiences would be moderately stable (hypothesis 1), similar to autobiographical memories from other life phases (e.g., McAdams et al., 2006; Syed & Azmitia, 2010; Thorne et al., 1998). This stability, however, may vary due to different forms of recall. More specifically, the adjectives describing one's childhood relationships with caregivers might be less stable than memories integrated in a complete narrative (hypothesis 1a), given that research has found memories integrated into a narrative to be more stable than memories linked to keywords (Köber & Habermas, 2017). Regarding narrated memories, we hypothesized that freely recalled autobiographical memories would be less stable than cued autobiographical memories (hypothesis 1b) because prompted recall tends to enhance memory performance (Levine et al., 2002). Second, we theorized that negative valence and autobiographical memory specificity would facilitate the stability of autobiographical memories (hypothesis 2). More specifically, we hypothesized that stable memories should more likely be negative (hypothesis 2a) and specific (hypothesis 2b) because both of these memory features render memories more distinct and, thus, easier to recall (Conway, 2005; D'Argembeau et al., 2003; Stone et al., 2013).

Drawing on the theoretical assumption that attachment representations form cognitive scripts that guide the retrieval of attachment-related autobiographical memories, we lastly predicted that the stability of attachment-related adjectives and memories would be significantly associated with: (a) the coherence with which individuals discuss early parent-child attachment experiences (AAI coherence, hypothesis 3a), (b) individuals' secure base script knowledge coded from their AAIs (hypothesis 3b), and (c) the stability of both of these attachment measures observed in the current sample (hypothesis 3c). All analyses were tested by examining the responses associated with all named caregivers as well as with maternal and paternal caregivers, separately.

4. Methods

4.1. Participants

The current sample comes from the Minnesota Longitudinal Study of Risk and Adaptation, a prospective longitudinal study of high-risk mothers and their children (MLSRA, Sroufe, Egeland, Carlson, &

Collins, 2005).¹ Primiparous mothers living below the poverty line and receiving prenatal services from local Minneapolis public health clinics were recruited between 1975 and 1977. Their firstborn children became the primary focus of the study. Mean maternal age at the time of their child's birth was 20.6 years ($SD = 3.4$). At the time of the child's birth, 48% of the mothers were teenagers, 65% were single, and 42% had not completed a high school education. In the current study, we included a subsample of 151 participants who had been followed from birth and had completed the AAI at both age 19 and age 26 (Köber, Waters, Simpson, & Facompré, 2019). Seventy-five participants were female (49.7%), and 32.5% self-identified as non-Caucasian.

4.2. Measures

4.2.1. Assessing stability of AAI adjectives

As part of the MLSRA, the Adult Attachment Interview was assessed when participants were 19 and 26 years of age. Once primary caregivers were identified, participants were asked to generate five adjectives that described their relationship during childhood (between ages 5–12) with each of their caregivers. Following prior research on autobiographical memory stability (Köber & Habermas, 2017), we defined stability of adjectives for each caregiver as the percentage of the five adjectives that were mentioned again at age 26. That is, we compared all adjectives generated for each caregiver at age 19 to each adjective generated for the same caregiver mentioned at age 26. An adjective counted as repeated when participants used the exact same word(s) or very similar wording compared to seven years earlier to describe their relationship to the same caregiver (see Table 1 for examples). Using a dichotomous coding system (repeated vs. non-repeated), we judged the number of the five adjectives per caregiver that were repeated. The resulting percentage indicates the portion of adjectives repeated seven years later. In total, participants generated 3639 adjectives across all caregivers. Interrater reliability for the stability of adjectives (Cohen's $\kappa = 0.87$) was high, based on two coders' independent coding of 30 participants, which included a total of 705 adjectives across all caregivers.

4.2.2. Latent semantic analysis of AAI adjectives

Given that also the underlying meaning of the adjectives might be stable (rather than the exact words that were produced), we investigated the semantic similarity of adjectives by applying *Latent Semantic Analysis* (LSA, Landauer, Foltz, & Laham, 1998). LSA is a computational approach based on the notion that the similarity in meaning of two words can be deduced from their usage in written text. Drawing on this principle, simulated representations are created for words and texts in a variety of specific domains, labeled *semantic spaces*, through a computational procedure that examines co-occurrence frequencies in some set of printed texts and then creates an optimal structure of semantic relatedness. Because we were focusing on the AAI in this study, we chose the semantic space "Psychology" containing three college-level psychology textbooks, with each paragraph used as a document resulting in 398 dimensions (Dennis, 2007). Assuming that the overall mental presentation of attachment is synoptically conveyed in the form of the adjectives that participants provided for each caregiver, we treated the five adjectives of each caregiver provided at both measurement times (19 and 26 years) as one text unit, respectively, and then compared these text units against each other, factoring in the

¹ This article draws on data from the Minnesota Longitudinal Study of Risk and Adaptation (MLSRA). The questions, hypotheses, and methods reported in this paper have not been applied to this data set before. In many prior papers, the MLSRA data has been used to examine a broad range of questions and hypotheses, many of which are summarized in Sroufe et al. (2005). For a complete list of MLSRA publications see <http://innovation.umn.edu/parent-child/publications>.

Table 1

Examples of stable and unstable adjectives with different implicit valences to describe the relationship with different caregivers.

Caregiver	Age	Adjectives	Stability	Valence
Mother	Age 19	Fun	Unstable	Positive
		Loving	Unstable	Positive
		Caring	Stable	Positive
		Close sometimes, sometimes	Unstable	Ambivalent
		not		
	Age 26	Kind	Unstable	Positive
		Caring		
		Understanding		
		Thoughtful		
		Patient		
Father	Age 19	Scared of him	Stable	Negative
		Hated him	Unstable	Negative
		Didn't like him	Unstable	Negative
		Wasn't around me a lot	Unstable	Negative
		Distant	Stable	Negative
	Age 26	Scary		
		Mean		
		Distant		
		Untrustworthy		
		Hard		
Grandmother	Age 19	Fun	Stable	Positive
		Easy	Unstable	Positive
		Loving	Unstable	Positive
		Happy	Unstable	Positive
		Special	Unstable	Positive
	Age 26	Comfortable		
		Secure		
		Routine		
		Fun		
		Like an escape		

similarity of adjectives within measurement times (Dennis, 2007). Scores could range from 0 to 1, with greater values representing greater semantic similarity between the two sets of five adjectives for each caregiver.

4.2.3. Assessing stability of AAI memories

Similarly to prior research on autobiographical memory stability (Köber & Habermas, 2017; McAdams et al., 2006; Thorne et al., 1998), we defined AAI memory stability as the percentage of all AAI memories that were mentioned again at the second measurement time. Applying a dichotomous coding system (repeated vs. non-repeated), we compared all freely recalled and cued memories to each memory mentioned at age 26 to judge whether a memory from age 19 was repeated or not. The resulting percentage indicates the portion of memories repeated seven years later. AAI memories were coded as having been repeated in the later interview if they were clearly recognizable as the same life event. Indicators of similarity of events were temporal and spatial markers, context, and similarity of plot and involved persons (see Table 2 for examples). In total, participants produced 5631 autobiographical memories across all caregivers and cued key words. Interrater reliability for the stability of AAI memories was high (Cohen's $\kappa = 0.88$), based on two coders' independent coding of 30 participants, which included a total of 1162 memories across all caregivers and cued key words.

Disagreements in the narratives used to measure interrater reliability were resolved by discussion. Once interrater reliability was established, the first author, blind to participants' attachment classification and untrained in the AAI scoring system, coded all remaining interviews for the stability of adjectives and memories and their related characteristics.

4.2.4. Implicit valence of AAI adjectives and memories

Adjectives and memories were coded for implicit valence using four

Table 2
Excerpts of stable memories with different implicit valences and levels of autobiographical memory specificity.

Age 19		Age 26	
In the winter we went skiing, cross country skiing for a week, and, to get us to go they put like candy along the trail and like frozen ice cream treats so that we would go skiing and not whatever sit in the house or whatever	Valence: positive Specificity: extended	Mom and Dad would go with us on vacation, to cross-country ski, so they made these ski trails for us, to get us to go skiing. Well, we usually wanted to go skiing, but it kind of encouraged us to start skiing at a young age. They put little treats in the snow for us and we'd go looking for them and so we'd want to go skiing. That was really fun	Valence: positive Specificity: extended
When um, when I was younger, her boyfriend was uh, was a big time alcoholic and stuff and he usually, liked to hit me around and stuff so, mom usually got him out of my face and stuff, and kept him away from me at times	Valence: negative Specificity: recurrent	Like I said, mom's boyfriend was a violent drunk and he took all of his crap out on us, you know, so we were always getting kicked around for some- one reason or another, and it- you know, that's what I remember	Valence: negative Specificity: recurrent
I remember one time when he made me go out and mow the lawn. It was like my first time and I was out there mowing. There was like roots from the tree that came up out of the ground, I didn't know they were there and I went over one of them and stuck the lawnmower blade in one of them and so, the lawnmower so stopped and it broke and so he was yelling at me for doing it and I didn't, you know, I didn't know anything about it	Valence: negative Specificity: specific	One time, there was, like, a tree root sticking out of the ground and I hit it with the lawn mower and broke the blade. He spanked me for it. I remember that	Valence: negative Specificity: specific
When I was about uh fifteen, ^a my grandma went on vacation for a week so I got- I had to stay home with grandpa. She went for like three days or somewhere she went somewhere so I had to stay home with him you know so, (uh-huh) I had to learn how to do what she did and, it wasn't easy work	Valence: ambivalent Specificity: extended	My grandmother had to go off for a meeting. She was gone for a week, so I was in charge of taking care of grandpa. I believe that was, like, fourteen, fifteen. So I had to get him up in the morning, get him out into his chair, get him some breakfast, and then go to school and then get him some dinner and then uh lay him back down in the bed 'cause he was paralyzed from the waist down. After that- strong relationship between the two of us	Valence: ambivalent Specificity: extended

^a We included all childhood recollections beyond the age limit of 12 when participants were allowed by the interviewers to tell these memories. These cases, however, were rare and no memories beyond the age of 15 were told.

categories: positive, negative, ambivalent, and neutral. Adjectives such as caring, loving, happy, creative, or patient, for example, were coded as positive. Adjectives such as mean, nagging, scary, distant, or bossy were coded as negative. When participants provided seemingly conflicting adjectives, this content was coded as ambivalent (e.g., weird, strict, love-hate, bittersweet, or disciplining, see Table 1). Although participants were encouraged to provide adjectives that described their *relationship* with their primary caregivers, in some cases descriptions of the caregivers themselves were given (e.g., athletic, slow, intellectual, vegetarian, religious). When this happened, these adjectives were coded as neutral.

Freely recalled memories were also coded for implicit valence. The cued memories, however, were not coded for implicit valence because the cue words such as hurt, sick, separated, etc., indicate negative valences, which limited participants' choice of what to tell and how to evaluate the narrative content. In contrast to the valence coding of adjectives, we coded in each freely recalled memory the implicit valence of how the life event was perceived based on the participant's description and subjective experience. For example, a memory of falling off a bike may be negative, but if mother came to help, the memory can be defined as a rather positive one (see Table 2 for examples). Thus, the implicit valence of adjectives captures how participants described their relationships with their primary caregivers, whereas the implicit valence of memories captures how they experienced their caregivers. Interrater reliability for implicit valence, based on two coders' independent coding of 30 participants, was ICC = 0.79 (absolute agreement).

4.2.5. Autobiographical memory specificity

Autobiographical memories were coded for memory specificity (see Table 2 for examples). Memories were coded as specific events if they occurred at a specific time that lasted less than a day and on one particular occasion. Memories that lasted longer than a day were coded as extended events. Memories that contained summarized events that repeatedly took place were coded as recurrent events. If participants merely gave descriptions of persons, places, things, situations, general commentaries, or conclusions that did not refer to concrete events, these answers were coded as semantic memories. Interrater reliability

for autobiographical memory specificity, based on two coders' independent coding of 30 participants, was Cohen's $\kappa = 0.86$.

4.2.6. AAI coherence score

AAIs were coded using the Main and Goldwyn (1984–1998) system. For the analyses presented here, we focused on the overall coherence of mind score (AAI_{COH}; Main & Goldwyn, 1984–1998), which reflects the organization of an individual's internal working model of attachment based on the coder's inference about the integrity and organization of the self as reflected in how events are discussed (Main, Hesse, & Goldwyn, 2008). Individuals who provide more coherent AAI narratives have a secure/organized attachment representation. Coherent AAI narratives are judged to be internally consistent, detailed, plausible, and not emotionally overburdened (e.g., Haltigan, Roisman, & Haydon, 2014). Trained and reliable coders coded all of the AAIs. Intraclass correlation coefficients (absolute agreement) for the 19-year and 26-year coherence scores were 0.83 and 0.87, respectively.

4.2.7. Secure base script knowledge

AAIs were also coded for secure base script knowledge using the AAI secure base script scale (Waters, Brockmeyer, & Crowell, 2013; Waters & Facompré, in press). Whereas traditional AAI coherence coding focuses on the extent to which interviewees conform to Grice's (1975) maxims of conversational discourse (i.e., *quality, quantity, relation, and manner*), secure base script knowledge assesses the extent to which interviewees recollections of early caregiving experiences reflect an underlying knowledge of the secure base script. Coders focus on explicit or implied expectations that are consistent with the secure base script (e.g., caregiver availability, responsiveness, or provision of effective comfort) and the recall of specific autobiographical memories that follow the secure base script. The 9-point AAI_{SB} scale is applied to the first 6 AAI questions (Waters & Facompré, in press). AAIs receiving high scores contain several specific event narratives that follow the secure base script structure well. AAIs receiving middle scores do not contain any specific event narratives organized around the script, but do contain numerous expectations consistent with secure base script knowledge. AAIs receiving low scores contain several specific scenes that directly violate secure base script structure (e.g., the need for help is

rejected). In some cases, negative secure base content found in the AAI may reflect alternative relationships expectations (e.g., recurring abuse). Transcripts such as these are assigned the lowest possible score. Two trained and reliable coders coded the AAIs. With 54% of the 19-year AAIs and 55% of the 26-year AAIs double-coded, intraclass correlation coefficients (absolute agreement) were 0.83 and 0.82, respectively. All coder disagreements were resolved through discussion. The remaining AAIs were coded independently by a single coder.

5. Results

Results are presented in several parts. First, we present the semantic similarity of adjectives and the overall percentage of adjectives and memories in the AAI that were stable from age 19- to 26-years across both free and cued recall, and across all caregivers. Nominated caregivers throughout the interview were mother, father, stepfather(s), stepmother, grandmother, grandfather, foster mother, aunt, uncle, friends of parents, babysitter, and adoptive parents.

Second, we separately present the percentage of stable adjectives and memories provided for primary maternal and paternal caregivers and compare their stability in relation to each other. In all cases, participants nominated their biological mothers as primary maternal caregivers. With respect to primary paternal caregivers, 68.2% ($N = 103$) of participants nominated their biological father, 30.5% ($N = 46$) nominated their stepfather, and 1.3% ($N = 2$) referred to a second stepfather. These analyses necessarily include only the adjectives describing the relationship with primary maternal and paternal caregivers along with the corresponding freely recalled memories exemplifying these adjectives. Memories cued by keywords could not be included in these analyses because they were not specified for any particular caregiver.

In each of these two sections (i.e., across all caregivers and for primary maternal/paternal caregiver, respectively), we also present variability in the stability data depending on: (a) the form of autobiographical recall (i.e., stability of adjectives versus stability of memories, hypothesis 1a, and stability of cued versus free recall, hypothesis 1b), (b) the implicit valence of stable adjectives and memories (hypothesis 2a), and (c) the autobiographical memory specificity (hypothesis 2b). Because we conducted a large number of paired t -tests to compare the stability of adjectives with that of memories as well as the stability of the various memory features to each other, we corrected the familywise error rate while taking into account the likelihood of both Type I and Type II errors. Following the statistical procedure suggested by Mudge et al. (2012), we calculated an optimal α level for a medium effect size, requiring a difference equal to the pooled standard deviation from the mean in order to detect true effects. The optimal threshold for significance for paired t -tests in this particular sample resulted in a critical p -value α of 0.01.

Third, we present associations between the stability of adjectives and memories with AAI coherence and secure base script knowledge (hypotheses 3a and 3b). Moreover, we explore the relation of the stability of these two attachment measures with the stability of attachment adjectives and memories (hypothesis 3c). For these analyses, we conducted zero-order correlations and once again calculated the optimal α level by applying the procedure suggested by Mudge et al. (2012). Setting the conventionally considered medium effect size for correlations at Pearson's $r = 0.30$ (Bosco, Pierce, Field, Singh, & Aguinis, 2014; Gignac & Szodorai, 2016) and factoring in our sample size, the optimal threshold for significance for correlational analyses in this particular sample resulted in a critical p -value of $p = 0.04$ in order to achieve a statistical power of 0.957.

5.1. Stability of attachment adjectives and memories across caregivers

Semantic similarity of adjectives across all caregivers was $M = 0.30$ ($SD = 0.15$), indicating moderate semantic similarity of adjectives

provided at both measurements that depicted relationships with caregivers. The stability of adjectives and memories across all caregivers resulted in 22.37% and 28.34%, respectively (Table 3). Running a series of paired t -tests to compare stability of adjectives versus stability of memories revealed that memories were more likely to be repeated than adjectives (Tables 3 and A.1), supporting hypothesis 1a. However, comparing stability of adjectives to stability of cued and freely recalled memories separately indicates that stability of adjectives exceeds the stability of freely recalled memories (20.06%), but not of cued memories across all caregivers (39.87%, Tables 3 and A.1). On the other hand, freely recalled memories exemplifying the self-generated adjectives of each caregiver relationship were significantly less stable than cued memories given in response to the nine key words (Tables 3 and A.1), confirming hypothesis 1b.

Of all stable adjectives, those with a positive valence were the most repeated (62.68%, Table 3) and significantly more stable than adjectives of negative, neutral, and ambivalent valence (Tables 3 and A.1). Contradicting hypothesis 2a, among all stable freely recalled memories,² the stability of negative experiences with caregivers (42.85%, Table 3) significantly outnumbered stable memories of neutral and ambivalent valence, but not of positive valence (30.77%, Tables 3 and A.1).

When memory specificity was calculated across both free and cued recall, stable specific memories (40.65%, Table 3) exceeded the amount of stable extended, recurrent, and semantic memories (Tables 3 and A.1), confirming hypothesis 2b. This also held true when computing the stability of autobiographical memory specificity for cued and freely recalled memories independently. The amount of freely recalled stable specific memories (44.40%, Table 3) outnumbered the amount of freely recalled stable extended, recurrent, and semantic memories (Tables 3 and A.1). Similarly, the amount of cued stable specific memories (40.63%, Table 3) significantly exceeded the amount of stable recurrent and stable semantic memories, but not cued stable extended memories (Tables 3 and A.1). This confirms prior research on autobiographical memories by showing that specific events are better remembered than extended, recurrent, or semantic memories. Furthermore, the stability of specific memories appears to be unaffected by the form of recall, as evidenced by freely recalled specific memories (44.40%, Table 3) and cued specific memories (40.63%) being equally stable ($t(150) = 0.88$, $p = .382$, $d = 0.14$).

5.2. Stability of adjectives and memories of primary caregivers

5.2.1. Maternal caregiver

Semantic similarity of adjectives provided to describe the maternal relationship was $M = 0.34$ ($SD = 0.20$), which was significantly higher ($t(150) = 3.74$, $p < .001$, $d = 0.21$) than the semantic similarity of adjectives across all caregivers ($M = 0.30$, $SD = 0.15$). Regarding stability, 25.31% of the maternal adjectives and 17.89% of the freely recalled maternal memories were repeated at the subsequent interview (Table 3). Thus, the stability of maternal adjectives significantly exceeded the stability of memories exemplifying these adjectives (Table A.2), contradicting hypothesis 1a in regard to maternal caregiving.

Examining the implicit valence revealed that stable maternal adjectives were mostly positive (54.31%, Table 3) and these were significantly more stable than adjectives of negative, neutral, and ambivalent valence (Table A.2). In contrast, stable experiences with mothers were mostly negative. Opposing hypothesis 2a, negative experiences with mothers (33.61%, Table 3) were as stable as positive experiences (20.14%, Table 3), but outnumbered stable experiences of neutral and ambivalent valence (Tables 3 and A.2). Further, according

² Because cue words such as hurt, sick, separated, etc., imply valences, we excluded cued memories from coding and testing for the predominant implicit valence of stable memories.

Table 3
Descriptive statistics of attachment measures and attachment-related stability separated by caregivers, valence, and autobiographical memory specificity.

AAI _{COH}		AAI _{SBS}							
Age 19		Age 26				Age 19		Age 26	
M	SD	M	SD	M	SD	M	SD	M	SD
3.94	1.69	4.50	1.87	3.29	1.69	3.25	1.25		
AAI stability across all caregivers									
		Adjectives		Memories Entire Interview		Free recall		Cued recall	
		M	SD	M	SD	M	SD	M	SD
Semantic Similarity		0.30	0.15						
Stability		22.37	17.15	28.34	12.52	20.06	13.11	39.87	20.87
Valence	Positive	62.68	41.75			30.77	38.34		
	Negative	15.73	30.24			42.85	41.83		
	Neutral	2.91	10.02			5.93	20.80		
	Ambivalent	2.79	11.45			10.52	26.81		
Memory Specifi- city	Specific			40.65	27.72	44.40	42.19	40.63	35.98
	Extended			25.90	23.86	10.42	24.41	33.64	31.62
	Repeated			16.48	20.03	16.61	29.35	13.73	21.93
	Semantic			14.97	19.51	18.63	29.294	7.35	16.34
		Mother				Father			
		Adjectives		Memories (free recall)		Adjectives		Memories (free recall)	
		M	SD	M	SD	M	SD	M	SD
Semantic Similarity		0.34	0.20			0.19	0.19		
Stability		25.31	24.27	17.89	16.29	14.68	20.85	19.03	21.92
Valence	Positive	54.31	48.86	20.14	38.41	25.17	40.86	17.08	35.67
	Negative	7.51	25.51	33.61	45.51	13.58	32.17	27.52	42.51
	Neutral	1.66	8.98	3.64	17.42	2.87	15.25	3.64	17.42
	Ambivalent	2.10	12.66	6.84	23.67	2.10	11.27	6.07	23.29
Memory Specifi- city	Specific			29.69	43.29			28.40	42.21
	Extended			9.00	25.76			2.54	13.57
	Repeated			10.82	28.69			11.76	29.48
	Semantic			14.73	32.27			11.61	29.13

Note. N = 151. The most stable valence and specificity category is in boldface. Percentages of valence and specificity category do not add up to a 100% due to lacking stability in some cases.

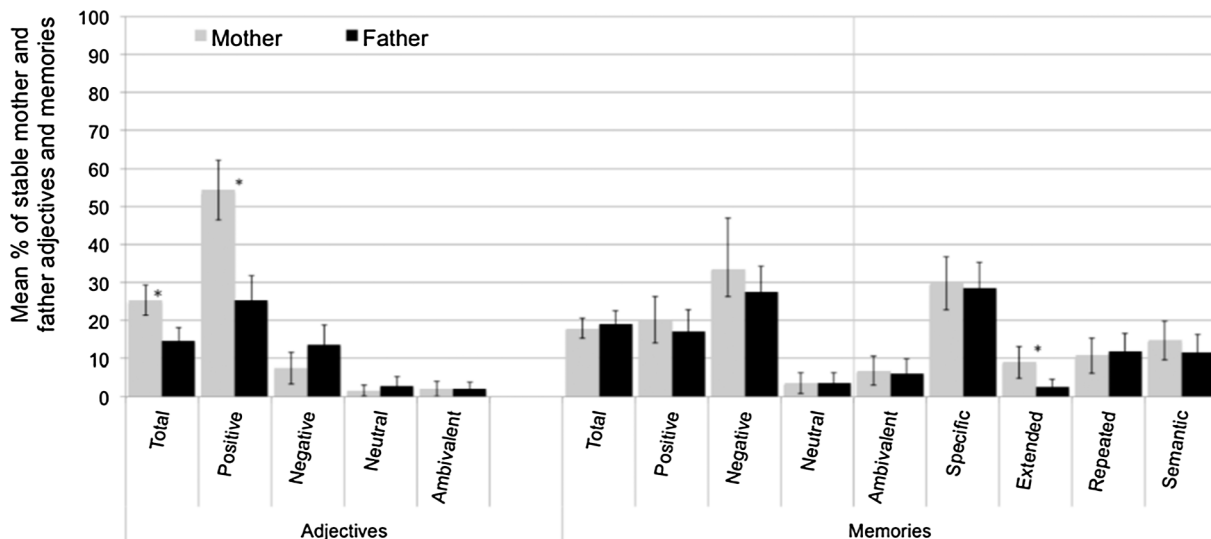


Fig. 1. Comparisons of stable mother versus father adjectives and memories, separated by valence and autobiographical memory specificity. * = significant differences between maternal and paternal means evidenced by paired *t*-tests with *p* = .01 as threshold of significance (Mudge et al., 2012).

to hypothesis 2b, specific memories (29.69%, Table 3) were more stable than memories of extended and recurrent events as well as semantic descriptions (Tables 3 and A.2).

5.2.2. Paternal caregiver

Regarding the relationship with paternal caregivers, semantic similarity was $M = 0.19$ ($SD = 0.19$), which was significantly lower ($t(150) = -7.70, p < .001, d = -0.62$) than the semantic similarity of adjectives across all caregivers ($M = 0.30, SD = 0.15$). In terms of stability, 14.68% of adjectives and 19.03% of memories were stable (Table 3). The t -test revealed that paternal adjectives were as stable as paternal memories exemplifying these adjectives (Table A.2). Thus, hypothesis 1a could not be confirmed in regard to paternal caregiving.

Similar to stable maternal adjectives, stable paternal adjectives were mostly positive (25.17%, Table 3), significantly exceeding both stable neutral and stable ambivalent adjectives, but not stable negative adjectives (Tables 3 and A.2). Once again, similar to stable maternal memories, stable paternal memories were mostly negative (27.52%, Table 3). However, contradicting hypothesis 2a, negative experiences were as stable as positive experiences (17.08%, Table 3), and exceeded only stable paternal experiences of neutral and ambivalent valence (Tables 3 and A.2). Specific paternal memories (28.40%) were more

stable than extended, recurrent, and semantic memories (Table A.2), supporting hypothesis 2b in regard to paternal caregivers.

5.2.3. Comparing stability of maternal and paternal adjectives and memories

Given that individuals tend to talk differently about their mothers and fathers (Köber & Habermas, 2018), we further compared the semantic similarity of maternal and paternal adjectives as well as the stability of maternal and paternal adjectives and memories against each other. The semantic similarity of maternal adjectives ($M = 0.34, SD = 0.20$) significantly outnumbered the semantic similarity of paternal adjectives ($M = 0.19, SD = 0.19, t(150) = 7.12, p < .001, d = 0.74$). For stability, Fig. 1 shows that the amount of stable mother adjectives exceeded those of fathers (Table 3, $t(150) = -4.78, p < .001, d = -0.78$), which was especially true for the stable positive adjectives ($t(150) = -6.24, p < .001, d = -1.02$). Mother and father memories, however, were equally stable, except for stable extended memories, which were more stable for mothers than for fathers ($t(150) = -2.65, p = .009, d = -0.43$).

Table 4

Zero-order correlations of stability of adjectives and memories separated by caregivers, valence, and autobiographical memory specificity with attachment measures and change scores of attachment measures.

	Adjectives						Memories					
	AAI _{COH}			AAI _{SBS}			AAI _{COH}			AAI _{SBS}		
	Age 19	Age 26	Change Score	Age 19	Age 26	Change Score	Age 19	Age 26	Change Score	Age 19	Age 26	Change Score
Across Caregivers												
Semantic Similarity	0.11	0.05	0.06	0.20*	0.03	0.12						
Overall Stability	0.11	0.08	0.04	0.27**	0.22**	0.07	-0.02	0.07	-0.05	-0.07	-0.05	-0.14
Valence												
Positive	0.02	0.12	0.19†	0.26**	0.33**	0.08	-0.07	0.09	-0.08	0.13	0.18*	0.14
Negative	-0.02	-0.06	-0.11	-0.14	-0.22**	-0.08	0.13	0.09	-0.02	-0.17	-0.20*	-0.14
Neutral	0.11	0.07	-0.02	-0.02	-0.02	0.11	-0.03	-0.04	0.03	-0.01	-0.04	-0.09
Ambivalent	0.16	0.01	0.16	-0.04	-0.13	-0.15	0.03	-0.04	0.02	0.12	0.09	0.01
Recall												
Free							0.08	0.14	-0.05	-0.07	-0.15	-0.12
Cued							0.02	0.05	-0.01	0.04	0.10	-0.01
Memory Specificity												
Specific							0.07	0.12	0.14	0.12	-0.01	0.02
Extended							-0.10	-0.04	-0.03	0.03	0.05	-0.03
Repeated							0.06	-0.01	-0.09	-0.06	0.05	0.08
Semantic							-0.10	-0.08	-0.18†	-0.07	-0.05	-0.06
Mother												
Semantic Similarity	0.02	0.03	0.09	0.12	-0.02	0.06						
Overall Stability	0.09	0.11	0.07	0.20*	0.18*	0.07	-0.06	-0.04	-0.02	-0.01	-0.14	-0.15
Valence												
Positive	0.05	0.18*	0.11	0.32**	0.34**	0.17*	-0.13	-0.06	-0.04	0.02	0.05	0.00
Negative	-0.02	-0.04	-0.10	-0.23**	-0.21**	-0.12	0.06	0.12	0.02	-0.05	-0.12	-0.06
Neutral	0.05	0.13	0.03	-0.16	-0.14	0.01	-0.12	-0.01	-0.03	-0.07	-0.01	-0.01
Ambivalent	0.19†	-0.12	-0.21**	-0.09	-0.16	-0.15	-0.07	-0.09	0.06	0.08	-0.05	-0.07
Memory Specificity												
Specific							-0.11	-0.05	-0.01	-0.05	-0.10	-0.13
Extended							-0.05	0.01	0.09	0.12	-0.01	-0.06
Repeated							0.14	0.08	-0.04	0.06	-0.01	-0.01
Semantic							-0.12	0.01	-0.01	-0.12	-0.01	0.07
Father												
Semantic Similarity	0.31**	0.25**	0.14	0.26**	0.16	0.16						
Overall Stability	0.23**	0.08	0.04	0.16	0.12	0.04	0.27**	0.26**	-0.03	-0.08	-0.02	-0.03
Valence												
Positive	0.17*	0.18*	0.16	0.22*	0.33*	0.21*	-0.01	0.12	-0.03	0.13	0.20*	0.15
Negative	0.07	-0.03	-0.05	-0.04	-0.06	-0.11	0.23**	0.09	-0.03	-0.17*	-0.22**	-0.08
Neutral	0.16	0.01	0.04	0.07	0.09	0.10	0.09	0.08	0.12	0.05	0.01	-0.08
Ambivalent	0.05	0.04	0.03	0.08	0.01	-0.05	0.19*	0.02	0.01	0.01	0.16	0.09
Memory Specificity												
Specific							0.37**	0.20*	0.08	-0.01	0.02	0.12
Extended							0.10	0.06	-0.07	0.05	0.02	-0.01
Repeated							-0.03	0.04	0.06	-0.10	0.02	0.03
Semantic							-0.03	-0.01	-0.15	0.03	0.00	-0.10

Note. N = 151.

* $p < .04$.

** $p < .01$.

5.3. Associations of attachment security with semantic similarity and memory stability

5.3.1. Semantic similarity

To examine whether semantic similarity and stability of adjectives and memories were related to attachment security and to the stability of attachment security, we conducted zero-order correlations. To correct for the combination of Type I and Type II error, we applied the critical p -value of $p = 0.04$ (see above; [Mudge et al., 2012](#)) as the threshold of statistical significance. In addition, absolute values of change scores of AAI coherence and secure base script knowledge were calculated to determine whether stability vs. change in attachment security was related to semantic similarity and the stability of AAI adjectives and memories. Further, we looked at the direction of change in attachment security, that is, whether individuals decreased or increased in AAI coherence and secure base script knowledge, and their relations with stability of attachment memory content. These analyses, however, revealed no clear trends, so they are not presented here.

Semantic similarity of adjectives across caregivers was not correlated with AAI coherence at age 19 and 26 or with the change scores of both attachment measures, but it was correlated positively with secure base script knowledge at age 19 ($r = 0.20$, [Table 4](#)). Separated for maternal and paternal caregiver, semantic similarity of maternal adjectives were unrelated to both attachment measures and their change scores. However, semantic similarity of paternal adjectives correlated positively with AAI coherence at age 19 and 26 ($r = 0.31$ and $r = 0.25$, [Table 4](#)) and secure base script knowledge at age 19 ($r = 0.26$, [Table 4](#)). This indicates that participants scoring higher on attachment security on both attachment measures provided more semantically similar adjectives to describe their relationships with their paternal caregivers.

5.3.2. Stability of adjectives

The stability of adjectives across caregivers was not associated with AAI coherence at age 19 and 26, but it was with secure base script knowledge ($r = 0.27$ and $r = 0.22$, respectively, [Table 4](#)). Examining the valence of stable adjectives, secure base script knowledge showed a significant positive association with the stability of positive adjectives at both assessments ($r = 0.26$ and $r = 0.33$, [Table 4](#)) and a significant negative correlation with stability of negative adjectives ($r = -0.22$, [Table 4](#)) at age 26. This suggests that the better individuals knew the secure base script, the more likely they were to repeat positive adjectives and the less likely they were to repeat negative adjectives describing their relationships with caregivers. Further, stability of positive adjectives ($r = 0.19$, [Table 4](#)) was positively associated with change scores on AAI coherence, indicating that individuals who changed in their coherence of mind were more likely to repeat positive adjectives across caregivers.

Looking at maternal caregivers separately, secure base script knowledge was significantly correlated with the stability of maternal adjectives at both assessments ($r = 0.20$ and $r = 0.18$, [Table 4](#)). When split by valence, secure base script knowledge correlated positively with positive maternal adjectives ($r = 0.32$, and $r = 0.34$, [Table 4](#)) and negatively with negative maternal adjectives ($r = -0.23$ and -0.21 , [Table 4](#)). Change scores of AAI coherence were also significantly negatively correlated with the stability of ambivalent maternal adjectives ($r = -0.21$, [Table 4](#)), and change scores of secure base script knowledge correlated positively with the stability of positive maternal adjectives ($r = 0.17$, [Table 4](#)). This suggests that individuals who changed less on AAI coherence over the 7 years repeated less ambivalent maternal adjectives, whereas those who increased more on secure base script knowledge repeated more positive maternal adjectives.

For paternal caregivers, the stability of positive paternal adjectives correlated significantly and positively with AAI coherence ($r = 0.17$ and $r = 0.18$, [Table 4](#)) and secure base script knowledge ($r = 0.22$ and $r = 0.33$, [Table 4](#)) at both measurements. The stability of positive paternal adjectives also correlated significantly and positively with

change scores on secure base script knowledge ($r = 0.21$, [Table 4](#)), indicating increasing stability of positive paternal adjectives with increasing change on secure base script knowledge.

5.3.3. Stability of memories

Turning to the stability of AAI memories, no significant correlations with attachment measures were found. However, looking more closely at the valence of memories across caregivers, secure base script knowledge was positively associated with the stability of positive memories ($r = 0.18$, [Table 4](#)) and negatively correlated with the stability of negative memories at age 26 ($r = -0.20$, [Table 4](#)). Furthermore, change scores on AAI coherence correlated significantly and negatively with stable semantic memories ($r = -0.18$, [Table 4](#)), suggesting that greater changes in AAI coherence are associated with less repetition of semantic memories.

While no significant correlations between stable maternal memories and attachment measures emerged, the overall stability of paternal memories was positively correlated with AAI coherence at 19 and 26 years of age ($r = 0.27$ and $r = 0.26$, respectively, [Table 4](#)), but unrelated to secure base script knowledge. Regarding the valences of stable memories, attachment coherence correlated positively with stable negative paternal memories ($r = 0.23$, [Table 4](#)), whereas secure base script knowledge correlated positively with stable positive paternal memories ($r = 0.20$, [Table 4](#)) at 26 years of age and negatively with stable negative paternal memories at both assessments ($r = -0.17$ and $r = -0.22$, [Table 4](#)). Finally, the stability of specific memories correlated significantly and positively with attachment coherence at both assessments ($r = 0.37$ and $r = 0.20$, [Table 4](#)), suggesting that individuals scoring higher on AAI coherence repeated more specific memories experienced with their paternal caregivers. Change scores on both AAI coherence and secure base script knowledge were largely unrelated with the stability of paternal memories ([Table 4](#)).

6. Discussion

The present study explored the stability of attachment-related semantic and autobiographical memory content in emerging adults in a high-risk sample and also examined how memory stability relates to both attachment security and the stability of attachment security across time. Both adjectives and memories elicited in repeated AAIs conducted over a seven-year interval revealed moderate stability, with the degree of stability varying with the form of recall, valence, and autobiographical memory specificity. Moreover, the stability of attachment-related adjectives and memories was significantly related to attachment security, especially to secure base script knowledge.

6.1. Stability of attachment adjectives and memories

Adjectives describing the relationships with caregivers exhibited moderate semantic similarity. In addition, about 22% of adjectives and about 28% of memories describing relationships with primary caregivers were stable (i.e., repeated in the AAI seven years later). These numbers coincide with prior studies on autobiographical memory stability in emerging adults, which have reported stability measures between 12% and 39% for autobiographical memories of any life phase ([Köber & Habermas, 2017](#); [McAdams et al., 2006](#); [Strauman, 1996](#); [Thorne et al., 1998](#)). Although the current attachment context is likely to influence the recall and reconstruction of memories (e.g., [Dykas, Woodhouse, Ehrlich, & Cassidy, 2010](#)), our findings suggest that childhood memories, when not limited to the earliest memories but distributed across a larger time-scale between the age of five and twelve, are as stable as memories from later periods of life.

Stability, however, varies with retrieval mode. To no surprise, cued memories were much more stable than freely recalled memories, confirming that supported recall leads to better memory performance ([Rubin & Wenzel, 1996](#)), presumably by facilitating repeated narration

and, thus, greater memory stability. Contrary to prior research, however, adjectives depicting relationships across caregivers and, more clearly, adjectives depicting the maternal relationship were more stable than freely recalled memories exemplifying these adjectives. Although prior research has found that key words labeling important memories are less stable than events that are coherently integrated into life narratives (Köber & Habermas, 2017), we found the opposite pattern in the present study. That is, even though attachment-related adjectives were also freely recalled and moderately stable, their corresponding memories across all caregivers and for mothers were less stable. Obviously, participants provided similar adjectives at both measurement times to describe their relationships with their primary caregivers, but told diverse memories to exemplify these. This difference in findings might have occurred due to differences in study design or in underlying cognitive processes. Participants in Köber and Habermas' (2017) study could name any key word to nominate their important memories, which might have triggered a narrative-based search. Participants in this study, by comparison, were asked to generate adjectives to describe relationships with their primary caregivers, which might have triggered lateral access to the semantic level of autobiographical memory (Conway, 2005; Conway & Pleydell-Pearce, 2000). Semantic information such as characteristics about the self, others, and relationships (Baldwin, 1992; Markus & Nurius, 1986) require merely knowing about an event or fact without necessarily prompting the retrieval of specific memories (Tulving, 1983, 2002). For example, participants can describe their maternal relationship as loving without associating this adjective to a particular event. When then asked to exemplify this adjective, their semantic knowledge might guide them to diverse corresponding memories. This supports the notion that attachment-related autobiographical information is stored in the form of semantic cognitive scripts, explaining why similar adjectives can correspond to different memories.

This interpretation is also consistent with our finding that maternal adjectives were more stable than paternal memories, whereas this was not true for paternal adjectives and memories. Moreover, maternal adjectives were more semantically similar and more stable than paternal adjectives (Table 3). In this study, biological mothers were in all cases the primary caregivers, whereas paternal caregivers were most likely to be the biological father. In several cases, however, also step-fathers were nominated, which is not uncommon in high-risk samples. Thus, secure base scripts for mothers in our sample might have been better established, rendering the recall of maternal adjectives more stable than that of paternal adjectives, although some recent findings suggest these scripts tend to generalize across maternal and paternal relationships (Waters et al., 2015). Even though our study design attempted to disentangle contributions of mothers vs. fathers to attachment-related memory stability, future research is needed to replicate and extend these findings in normative risk, middle-class samples, preferably with equivalent stability in maternal and paternal caregivers and caregiver involvement. Such research may highlight whether the differences in maternal and paternal adjective and memory stability are also present in other different samples and developmental contexts. Further, future studies should control for consistency in linguistic style, even though our results of the higher semantic similarity and stability in maternal adjectives than in paternal adjectives supports the notion of a semantic attachment script. These results may be better understood if linguistic style and personal preferences for particular words in other contexts can be ruled out as possible influencing factors on adjective similarity in attachment-related contexts.

Regarding the valence of stable adjectives and memories, we found that stable adjectives were mostly positive and stable memories were mostly negative. The greater stability of negative events than of neutral or ambivalent events supports partly our hypothesis 2a and prior research showing that negative events are well remembered. Due to their distinctiveness as well as their stronger and often more long-lasting emotional impact, negative events evoke more thorough processing

(Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Burgwyn-Bailes, Baker-Ward, Gordon, & Ornstein, 2001) and more attention during the memory storage phase (Conway, 2005). Yet negative events told across all caregivers and for both maternal and paternal caregivers were as stable as positive events. Research suggests that the memory advantage of negative events compared to positive events disappears when controlling for retention interval and emotional intensity (Waters, Bohanek, Marin, & Fivush, 2013). Even though our study compared events from the same life phase of participants, we did not control for emotional intensity. Future studies should further investigate the stability of autobiographical memories of varying valences and possible related factors increasing or decreasing memory stability.

However, the finding that stable adjectives are mostly positive and stable memories are mostly negative seems contradictory, and may hint at the operation of different attachment-related processes on autobiographical memory. For example, insecure attachment is typically associated with more negative memories of parents (Gamble & Roberts, 2005; Hinnen, Sanderman, & Sprangers, 2009), and avoidant individuals are less likely to retrieve and discuss negative life events (Edelstein et al., 2005) and tend to mislabel or downplay the intensity of negative life events (Chae, Goodman, & Edelstein, 2011; Mikulincer & Orbach, 1995). Future research should investigate whether attachment scripts and corresponding memories can be discrepant to each other, and whether this represents a distortion of secure base script knowledge insofar as positively depicted caregiving relationships are also associated with negative experiences.

In line with our hypothesis 2b, we also found that stable memories were mostly specific. Specific events are presumably more stable than extended events because narrating specific memories rather than recurring or extended memories is the normative way to communicate specific memories (Habermas & Diel, 2013). Moreover, their greater level of detail permits a sense of reliving these memories during reminiscing (D'Argembeau et al., 2003; Pillemer, 1998; Tulving, 2002). This makes these memories easier to remember and may explain their greater stability in repeated recall. Given that attachment-related primes increase memory specificity irrespective of an individual's attachment classification (Bryant & Bali, 2018), thinking about primary caregivers during the AAI may have further increased the recall of specific memories.

6.2. Associations of attachment security with semantic similarity and attachment memory stability

Semantic similarity of adjectives across caregivers was unrelated to AAI coherence, but it was correlated with secure base script knowledge at age 19. The semantic similarity of maternal adjectives was largely unrelated to both attachment measures and their change scores. However, semantic similarity of adjectives for paternal caregivers was significantly correlated with both attachment measures. Considering that the semantic similarity of paternal adjectives was low ($M = 0.19$, $SD = 0.19$), these positive correlations suggest that higher attachment security scores on both attachment measures are associated with more semantically similar adjectives. This supports our interpretation that attachment scripts in our sample may differ for mothers and paternal caregivers (van Ijzendoorn & De Wolff, 1997). This interesting result seems to be worth pursuing in future research because prior research has found attachment generalization across relationships (i.e., high correlations between attachment scripts for mothers and fathers in normative samples) (Waters et al., 2015). In the MLSRA sample, however, we found lower semantic similarity of adjectives and lower stability for attachment-related memory content for fathers, which might point to differences in experience with paternal caregivers that may moderate generalization of attachment across caregivers in higher risk contexts.

The notion that attachment representations form a cognitive script is further supported when looking at the correlation of attachment with

stability of adjectives. The stability of adjectives across caregivers correlated with secure base script knowledge measured at both time-points. More specifically, secure base script knowledge correlated positively with stable positive adjectives and negatively with stable negative adjectives. The same pattern was found for stable maternal adjectives as well as for positive and negative maternal adjectives. For paternal caregivers, the stability of adjectives correlated with AAI coherence, and stable positive adjectives correlated with both AAI coherence and secure base script knowledge as well as with change scores of secure base script knowledge. Stable negative paternal adjectives, however, were unrelated to attachment security.

Overall, these results suggest that stability of adjectives is less related to AAI coherence than to secure base script knowledge, contradicting hypothesis 3a but confirming 3b. Generally speaking, these findings confirm that both concepts and AAI coding systems are distinct (Waters, Raby, Ruiz, Martin, & Roisman, 2018). In contrast to secure base script knowledge, AAI coherence is coded for pragmatic conversations focusing on the quality of speech (Main et al., 2008). The stronger involvement of narrative in the AAI coherence coding may be less related to the stability of semantic attachment information, such as adjectives. Instead, the adjectives may relate stronger to the semantic memory associated with secure base script knowledge, as confirmed by the correlation of secure base knowledge with stable positive and negative adjectives across caregivers, mothers, and paternal caregivers. The higher participants scored on secure base script knowledge, the more stable were their positive adjectives, and the less stable were their negative adjectives. This suggests that the secure base script is extracted from and based on experiences with prior caregivers (Steele et al., 2014; Waters & Waters, 2006; Waters et al., 2017). As positive interactions accumulate, the secure base script becomes an increasingly abstract and well-consolidated set of expectations for help and support by caregivers, which is accessible in relevant situations. This in turn might facilitate the access to and stability of attachment-related adjectives, notably maternal and maternal positive adjectives. However, the secure base script is not related to the stability of maternal memories, which confirms that the secure base script is based on generalizations made from multiple instances and, therefore, is a semantic knowledge structure to which various memories can be linked.

For paternal and other caregivers, however, attachment scores were mainly related to the stability of negative memories. The higher participants scored on AAI coherence at age 19, the more stable were their negative paternal memories. In contrast, the higher participants scored on secure base script knowledge, the more stable their positive paternal memories were at age 26, and the less stable their negative paternal memories were at both ages. Although prior research found a moderate positive correlation between AAI coherence and secure base script knowledge (Steele et al., 2014; Waters et al., 2017), both constructs correlated with stable negative paternal memories in opposite directions. This seemingly contradicting result might again point to the stronger narrative aspect of AAI coherence and the stronger semantic aspect of secure base script knowledge. For securely attached individuals, negative memories might be especially unique and salient because such experiences violate their specific expectations of paternal support. If so, negative experiences might be particularly well retained in memory, which facilitates coherent integration into a narrative, as reflected in AAI coherence (but not in secure base script knowledge), and memory stability. In addition, narrative offers an explanatory framework to help individuals understand and come to terms with more negative events that may contradict their expectations. However, positive memories may require less of an explanatory framework and thus their stability is linked with the semantic level of representations (i.e. secure base script knowledge) and not necessarily integrated into the larger autobiographical narrative. Also, this finding may reflect differences in paternal caregiver attachment and involvement in this high-risk sample, and might not necessarily occur in normative-risk samples with more homogenous paternal caregiving.

Although our findings support the notion that attachment representations are stored in the form of a semantic cognitive script, it remains unclear whether an increase or decrease in AAI coherence or secure base script knowledge is associated with greater semantic similarity of adjectives. Likewise, the stability of adjectives and memories was not systematically related to the change scores of attachment representations, contradicting hypothesis 3c. Even though attachment representations are formed from autobiographical knowledge, the semantic similarity of adjectives depicting the relationship with caregivers or the stability of recall of attachment-related experiences do not seem to relate to attachment stability.

7. Conclusion

In sum, this study suggests moderate stability of attachment-related adjectives and autobiographical memories. In particular, we found the memories of early caregiving distributed across the period of childhood are as stable as memories from later periods of life. Mainly positive, negative, and specific experiences with primary caregivers were repeated in two AAIs conducted seven years apart. However, attachment-related adjectives describing relationships with primary caregivers were more stable than the corresponding memories. Moreover, the stability of adjectives was related to secure base script knowledge, but not to attachment security based on AAI coherence or to attachment stability. Altogether, these findings support the notion that attachment representations are firmly rooted in the semantic and autobiographical memory systems and are subject to the same cognitive processes as memory for early experiences more generally.

Appendix A. Supplementary material

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.cognition.2019.05.017>.

References

- Baldwin, M. W. (1992). Relational schemas and the processing of social information. *Psychological Bulletin*, 112, 461–484. <https://doi.org/10.1037/0033-2909.112.3.461>.
- Barnier, A. J., Levin, K., & Maher, A. (2004). Suppressing thoughts of past events: Are repressive copers good suppressors? *Cognition and Emotion*, 18, 513–531. <https://doi.org/10.1080/02699930341000428>.
- Bauer, P. J., Tasdemir-Ozdes, A., & Larkina, M. (2014). Adults' reports of their earliest memories: Consistency in events, ages, and narrative characteristics over time. *Consciousness and Cognition*, 27, 76–88. <https://doi.org/10.1016/j.concog.2014.04.008>.
- Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology*, 5, 323–370. <https://doi.org/10.1037/1089-2680.5.4.323>.
- Bernier, A., Carlson, S. M., Deschênes, M., & Matte-Gagné, C. (2012). Social factors in the development of early executive functioning: A closer look at the caregiving environment. *Developmental Science*, 15, 12–24. <https://doi.org/10.1111/j.1467-7687.2011.01093.x>.
- Berntsen, D., & Rubin, D. C. (2004). Cultural life scripts structure recall from autobiographical memory. *Memory & Cognition*, 32, 427–442. <https://doi.org/10.3758/BF03195836>.
- Bohn, A., Koppel, J., & Harris, C. B. (2017). Life happens when you are young: Reminiscence bump in cultural life scripts regardless of number of events elicited. *Journal of Applied Research in Memory and Cognition*, 6, 337–342. <https://doi.org/10.1016/j.jarmac.2017.07.004>.
- Bosco, F. A., Pierce, C. A., Field, J. G., Singh, K., & Aguinis, H. (2014). Correlational effect size benchmarks. *Journal of Applied Psychology*, 100, 431–449. <https://doi.org/10.1037/a0038047>.
- Bosmans, G., Dujardin, A., Raes, F., & Braet, C. (2012). The specificity of autobiographical memories in early adolescence. *The Journal of Early Adolescence*, 33, 710–731. <https://doi.org/10.1177/0272431612466172>.
- Bowlby, J. (1969/1982). Attachment and loss: Volume 1: Attachment (2nd ed., Vol. 1). New York, NY: Basic Books.
- Brewer, W. F., & Nakamura, G. V. (1984). The nature and functions of schemas. In R. S. Wyer, & T. K. Srull (Vol. Eds.), *Handbook of social cognition: Vol. 1*, (pp. 119–160). Hillsdale, NJ: Erlbaum.
- Bryant, R. A., & Bali, A. (2018). Activating attachment representations impact how we retrieve autobiographical memories. *Memory*, 26, 462–467. <https://doi.org/10.1080/09658211.2017.1367404>.
- Burgwyn-Bailes, E., Baker-Ward, L., Gordon, B. N., & Ornstein, P. A. (2001). Children's memory for emergency medical treatment after one year: The impact of individual

- difference variables on recall and suggestibility. *Applied Cognitive Psychology*, 15, 25–48. <https://doi.org/10.1002/acp.833>.
- Chae, Y., Goodman, G. S., & Edelman, R. S. (2011). Autobiographical memory development from an attachment perspective: The special role of negative events. In J. B. Benson (Ed.), *Advances in child development and behavior*. Elsevier Inc..
- Conway, M. A. (2005). Memory and the self. *Journal of Memory and Language*, 53, 594–628. <https://doi.org/10.1016/j.jml.2005.08.005>.
- Conway, M. A., & Pleydell-Pearce, C. W. (2000). The construction of autobiographical memories in the self-memory system. *Psychological Review*, 107, 261–288. <https://doi.org/10.1037/0033-295X.107.2.261>.
- D'Argembeau, A., Comblain, C., & van der Linden, M. (2003). Phenomenal characteristics of autobiographical memories for positive, negative, and neutral events. *Applied Cognitive Psychology*, 17, 281–294. <https://doi.org/10.1002/acp.856>.
- del Palacio-Gonzalez, A., & Berntsen, D. (2018). Emotion regulation of events central to identity and their relationship with concurrent and prospective depressive symptoms. *Behavior Therapy*, 49, 604–616. <https://doi.org/10.1016/j.beth.2017.11.002>.
- Dennis, S. (2007). How to use the LSA web site. In T. K. Landauer, D. S. McNamara, S. Dennis, & W. Kintsch (Eds.), *Handbook of latent semantic analysis* (pp. 57–70). Psychology Press.
- Dykas, M. J., Woodhouse, S. S., Ehrlich, K. B., & Cassidy, J. (2010). Do adolescents and parents reconstruct memories about their conflict as a function of adolescent attachment? *Child Development*, 81, 1445–1459. <https://doi.org/10.1111/j.1467-8624.2010.01484.x>.
- Dykas, M. J., Woodhouse, S. S., Jones, J. D., & Cassidy, J. (2014). Attachment-related diases in adolescents' memory. *Child Development*, 85, 2185–2201. <https://doi.org/10.1111/cdev.12268>.
- Edelman, R. S., Ghetti, S., Quas, J. A., Goodman, G. S., Alexander, K. W., Redlich, A. D., & Cordón, I. M. (2005). Individual differences in emotional memory: Adult attachment and long-term memory for child sexual abuse. *Personality and Social Psychology Bulletin*, 31, 1537–1548. <https://doi.org/10.1177/0146167205277095>.
- Farrar, M. J., Fasig, L. G., & Welch-Ross, M. K. (1997). Attachment and emotion in autobiographical memory development. *Journal of Experimental Child Psychology*, 67, 389–408. <https://doi.org/10.1006/jecp.1997.2414>.
- Fay-Stammach, T., Hawes, D. J., & Meredith, P. (2014). Parenting influences on executive function in early childhood: A review. *Child Development Perspectives*, 8, 258–264. <https://doi.org/10.1111/cdep.12095>.
- Gamble, S. A., & Roberts, J. E. (2005). Adolescents' perceptions of primary caregivers and cognitive style: The roles of attachment security and gender. *Cognitive Therapy and Research*, 29, 123–141. <https://doi.org/10.1007/s10608-005-3160-7>.
- Gignac, G. E., & Szodorai, E. T. (2016). Effect size guidelines for individual differences researchers. *Personality and Individual Differences*, 102, 74–78. <https://doi.org/10.1016/j.paid.2016.06.069>.
- Gillath, O., Giesbrecht, B., & Shaver, P. R. (2009). Attachment, attention, and cognitive control: Attachment style and performance on general attention tasks. *Journal of Experimental Social Psychology*, 45, 647–654. <https://doi.org/10.1016/j.jesp.2009.02.011>.
- Graesser, A. C., Woll, S. B., Kowalski, D. J., & Smith, D. A. (1980). Memory for typical and atypical actions in scripted activities. *Journal of Experimental Psychology: Human Learning & Memory*, 6, 503–515. <https://doi.org/10.1037/0278-7393.6.5.503>.
- Grice, H. P. (1975). Logic and conversation. In P. Cole, & J. L. Moran (Eds.), *Syntax and semantics 3: Speech arts* (pp. 41–58). New York, NY: Academic Press.
- Habermas, T., & Diel, V. (2013). The episodicity of verbal reports of personally significant autobiographical memories: Vividness correlates with narrative text quality more than with detailedness or memory specificity. *Frontiers in Behavioral Neuroscience*, 7, 110. <https://doi.org/10.3389/fnbeh.2013.00110>.
- Haggerty, G. D., Siefert, C. J., & Weinberger, J. (2010). Examining the relationship between current attachment status and freely recalled autobiographical memories of childhood. *Psychoanalytic Psychology*, 27, 27–41. <https://doi.org/10.1037/a0018638>.
- Haltigan, J. D., Roisman, G. I., & Haydon, K. C. (2014). II. The latent structure of the adult attachment interview: Exploratory and confirmatory evidence. *Monographs of the Society for Research in Child Development*, 79, 15–35. <https://doi.org/10.1111/mono.12111>.
- Hamilton, C. E. (2000). Continuity and discontinuity of attachment from infancy through adolescence. *Child Development*, 71, 690–694. <https://doi.org/10.1111/1467-8624.00177>.
- Hesse, E. (2008). The Adult Attachment Interview: Protocol, method of analysis, and empirical studies. *Handbook of attachment: Theory, research, and clinical applications* (pp. 552–598). New York, NY: Guilford Press.
- Hinnen, C., Sanderman, R., & Sprangers, M. A. G. (2009). Adult attachment as mediator between recollections of childhood and satisfaction with life. *Clinical Psychology and Psychotherapy*, 16, 10–21. <https://doi.org/10.1002/cpp.600>.
- Josselson, R. (2000). Stability and change in early memories over 22 years: Themes, variations, and cadenzas. *Bulletin of the Menninger Clinic*, 64, 462–481.
- Köber, C., Waters, T. E. A., Simpson, J., Facompré, C. (2019), "DATA STABILITY OF ATTACHMENT NARRATIVES", Mendeley Data, v3, <https://doi.org/10.17632/p896bncwbh.3>.
- Köber, C., & Habermas, T. (2017). How stable is the personal past? Stability of most important autobiographical memories and life narratives across eight years in a life span sample. *Journal of Personality and Social Psychology*, 113, 608–626. <https://doi.org/10.1037/pspp0000145>.
- Köber, C., & Habermas, T. (2018). Parents' traces in life: When and how parents are presented in spontaneous life narratives. *Journal of Personality*, 86, 679–697. <https://doi.org/10.1111/jopy.12350>.
- Koppel, J., & Berntsen, D. (2015). The peaks of life: The differential temporal locations of the reminiscence bump across disparate cueing methods. *Journal of Applied Research in Memory and Cognition*, 4, 66–80. <https://doi.org/10.1016/j.jarmac.2014.11.004>.
- Koppel, J., & Rubin, D. C. (2016). Recent advances in understanding the reminiscence bump: The importance of cues in guiding recall from autobiographical memory. *Current Directions in Psychological Science*, 25, 135–140. <https://doi.org/10.1177/09637214166631955>.
- Landauer, T. K., Foltz, P., & Laham, D. (1998). *An introduction to latent semantic analysis*, 25, 259–284.
- Levine, B., Svoboda, E., Hay, J. F., Winocur, G., & Moscovitch, M. (2002). Aging and autobiographical memory: Dissociating episodic from semantic retrieval. *Psychology and Aging*, 17, 677–689. <https://doi.org/10.1037/0882-7974.17.4.677>.
- Lewis, M., Feiring, C., & Rosenthal, S. (2000). Attachment over time. *Child Development*, 71, 707–720. <https://doi.org/10.1111/1467-8624.00180>.
- Mackinnon, S. P., De Pasquale, D., & Pratt, M. W. (2016). Predicting generative concern in young adulthood from narrative intimacy: A 5-Year Follow-Up. *Journal of Adult Development*, 23, 27–35. <https://doi.org/10.1007/s10804-015-9218-1>.
- Main, M., & Goldwyn, R. (1984-1998). Adult attachment scoring and classification system (Unpublished manuscript). Berkeley, CA.
- Main, M., Hesse, E., & Goldwyn, R. (2008). Studying differences in language usage in recounting attachment history: An introduction to the AAI. In H. Steele, & M. Steele (Eds.), *Clinical applications of the Adult Attachment Interview* (pp. 31–68). New York, NY: Guilford Press.
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development*, 50, 66–104. <https://doi.org/10.1007/3333827>.
- Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist*, 41, 954–969. <https://doi.org/10.1037//0003-066X.41.9.954>.
- McAdams, D. P., Bauer, J. J., Sakaeda, A. R., Anyidoho, N. A., Machado, M. A., Magrino-Failla, K., ... Pals, J. L. (2006). Continuity and change in the life story: A longitudinal study of autobiographical memories in emerging adulthood. *Journal of Personality*, 74, 1371–1400. <https://doi.org/10.1111/j.1467-6494.2006.00412.x>.
- Mikulincer, M., & Orbach, I. (1995). Attachment styles and repressive defensiveness: The accessibility and architecture of affective memories. *Journal of Personality and Social Psychology*, 68, 917–925. <https://doi.org/10.1037/0022-3514.68.5.917>.
- Mudge, J. F., Baker, L. F., Edge, C. B., & Houlahan, J. E. (2012). Setting an optimal α that minimizes errors in null hypothesis significance tests. *PLoS ONE*, 7, e32734. <https://doi.org/10.1371/journal.pone.0032734>.
- Newcombe, R., & Reese, E. (2004). Evaluations and orientations in mother-child narratives as a function of attachment security: A longitudinal investigation. *International Journal of Behavioral Development*, 28, 230–245. <https://doi.org/10.1080/01650250344000460>.
- Pillemer, D. B. (1998). *Momentous events, vivid memories: How unforgettable moments help us understand the meaning of our lives*. Cambridge, MA: Harvard University Press.
- Rubin, D. C., & Wenzel, A. E. (1996). One hundred years of forgetting: A quantitative description of retention. *Psychological Review*, 103, 734–760. <https://doi.org/10.1037/0033-295X.103.4.734>.
- Schaefer, A., & Philippot, P. (2005). Selective effects of emotion on the phenomenal characteristics of autobiographical memories. *Memory*, 13, 148–160. <https://doi.org/10.1080/09658210344000648>.
- Schank, R. C., & Abelson, R. P. (1977). *Scripts, goals, plans, and understanding*. Hillsdale, NJ: Erlbaum.
- Schank, R. C., & Abelson, R. P. (1995). Knowledge and memory: The real story. In R. S. Wyer Jr (Ed.), *Knowledge and memory: The real story*. Advances in social cognition (Vol. III, pp. 1–85). New Jersey, NY: Psychology Press.
- Smith, D. A., & Graesser, A. C. (1981). Memory for actions in scripted activities as a function of typicality, retention interval, and retrieval task. *Memory & Cognition*, 9, 550–559. <https://doi.org/10.3758/BF03202349>.
- Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York, NY: Guilford Press.
- Steele, R. D., Waters, T. E. A., Bost, K. K., Vaughn, B. E., Truitt, W., Waters, H. S., ... Roisman, G. I. (2014). Caregiving antecedents of secure base script knowledge: A comparative analysis of young adult attachment representations. *Developmental Psychology*, 50, 2526–2538. <https://doi.org/10.1037/a0037992>.
- Stone, C. B., Barnier, A. J., Sutton, J., & Hirst, W. (2013). Forgetting our personal past: Socially shared retrieval-induced forgetting of autobiographical memories. *Journal of Experimental Psychology: General*, 142, 1084–1099. <https://doi.org/10.1037/a0030739>.
- Strauman, T. J. (1996). Stability within the self: A longitudinal study of the structural implications of self-discrepancy theory. *Journal of Personality and Social Psychology*, 71, 1142–1153. <https://doi.org/10.1037/0022-3514.71.6.1142>.
- Svob, C., Brown, N. R., Reddon, J. R., Uzer, T., & Lee, P. J. (2013). The transitional impact scale: Assessing the material and psychological impact of life transitions. *Behavior Research Methods*, 448–455. <https://doi.org/10.3758/s13428-013-0378-2>.
- Syed, M., & Azmitia, M. (2010). Narrative and Ethnic Identity Exploration: A longitudinal account of emerging adults' ethnicity-related experiences. *Developmental Psychology*, 46, 208–219. <https://doi.org/10.1037/a0017825>.
- Thorne, A., Cutting, L., & Skaw, D. (1998). Young adults' relationship memories and the life story: Examples or essential landmark? *Narrative Development in Adolescence*, 8, 237–268. <https://doi.org/10.1075/ni.8.2.02tho>.
- Tulving, E. (1983). *Elements of episodic memory*. New York, NY: Oxford University Press.
- Tulving, E. (2002). Episodic memory: From mind to brain. *Annual Review of Psychology*, 53, 1–25. <https://doi.org/10.1146/annurev.psych.53.100901.135114>.
- van IJzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of IJzendoorn of the Adult Attachment Interview. *Psychological Bulletin*, 117, 387–403. <https://doi.org/10.1037/0033-2909.117.3.387>.
- van IJzendoorn, M. H., & De Wolff, M. S. (1997). In search of the absent father-meta-

- analyses of infant-father attachment: A rejoinder to our discussants. *Child Development*, 68, 604–609. <https://doi.org/10.1111/j.1467-8624.1997.tb04223.x>.
- von der Lippe, A., Eilertsen, D. E., Hartmann, E., & Killèn, K. (2010). The role of maternal attachment in children's attachment and cognitive executive functioning: A preliminary study. *Attachment and Human Development*, 12, 429–444. <https://doi.org/10.1080/14616734.2010.501967>.
- Waters, T. E. A., & Facompré, C. R. (2019). Measuring secure base content in the Adult Attachment Interview. In E. Waters, B. E. Vaughn, & H. S. Waters (Eds.), *Measuring Attachment*. Guildford Press (in press).
- Waters, T. E. A., Bohanek, J. G., Marin, K. A., & Fivush, R. (2013). Null's the word: A comparison of memory quality for intensely negative and positive events. *Memory*, 21, 633–645. <https://doi.org/10.1080/09658211.2012.745877>.
- Waters, T. E. A., Brockmeyer, S. L., & Crowell, J. A. (2013). AAI coherence predicts caregiving and care seeking behavior: Secure base script knowledge helps explain why. *Attachment & Human Development*, 15, 316–331. <https://doi.org/10.1080/14616734.2013.782657>.
- Waters, T. E. A., Fraley, R. C., Groh, A. M., Steele, R. D., Vaughn, B. E., Bost, K. K., ... Roisman, G. I. (2015). The latent structure of secure base script knowledge. *Developmental Psychology*, 51, 823–830. <https://doi.org/10.1037/dev0000012>.
- Waters, E., Merrick, S., Treboux, D., Crowell, J., & Albersheim, L. (2000). Attachment security in infancy and early adulthood: A twenty-year longitudinal study. *Child Development*, 71, 684–689. <https://doi.org/10.1111/1467-8624.00176>.
- Waters, T. E. A., Raby, K. L., Ruiz, S. K., Martin, J., & Roisman, G. I. (2018). Adult attachment representations and the quality of romantic and parent–child relationships: An examination of the contributions of coherence of discourse and secure base script knowledge. *Developmental Psychology*, 54, 2371–2381. <https://doi.org/10.1037/dev0000607>.
- Waters, T. E. A., & Roisman, G. I. (2019). The secure base script concept: An overview. *Current Opinion in Psychology*, 25, 162–166. <https://doi.org/10.1016/j.copsyc.2018.08.002>.
- Waters, T. E. A., Ruiz, S. K., & Roisman, G. I. (2017). Origins of secure base script knowledge and the developmental construction of attachment representations. *Child Development*, 88, 198–209. <https://doi.org/10.1111/cdev.12571>.
- Waters, H. S., & Waters, E. (2006). The attachment working models concept: Among other things, we build script-like representations of secure base experiences. *Attachment & Human Development*, 8, 185–197. <https://doi.org/10.1080/14616730600856016>.
- Waters, E., Weinfield, N. S., & Hamilton, C. E. (2000). The Stability of attachment security from infancy to adolescence and early adulthood: General discussion. *Child Development*, 71, 703–706. <https://doi.org/10.1111/1467-8624.00179>.
- Weinfield, N. S., Sroufe, L. A., & Egeland, B. (2000). Attachment from infancy to early adulthood in a high-risk sample: Continuity, discontinuity, and their correlates. *Child Development*, 71, 695–702. <https://doi.org/10.1111/1467-8624.00178>.
- Zaman, W., & Fivush, R. (2013). Stories of parents and self: Relations to adolescent attachment. *Developmental Psychology*, 49, 2047–2056. <https://doi.org/10.1037/a0032023>.