



Reaping what they sow: Benefits of remembering together in intimate couples



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ABSTRACT

Recent research suggests that remembering with a long-term partner may scaffold successful memory. To test whether collaboration reduces the episodic deficit shown by older adults, we created a social version of Addis, Musicaro, Pan, and Schacter's (2010) episodic memory paradigm. As predicted, in Experiment 1 20 long-married, older adult couples generated more "internal" – on topic, episodic – details when they remembered together versus alone, but the same amount of "external" – off-topic, semantic – details. In Experiment 2 this memory benefit did not extend to 20 young adult couples who generated high levels of internal details together or alone. Notably, however, young adults' self-reported relationship intimacy was related to their episodic recall across conditions. We discuss these findings in terms of possible benefits of collaboration in the face of ageing and cognitive decline as well as the development over time of "transactive memory systems" in intimate relationships.

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Remembering with others may have a range of costs and benefits. Although the costs of social memory have been well documented (for review, Harris, Paterson, & Kemp, 2008; Rajaram, 2011), attention has turned increasingly to potential benefits of collaborative remembering (Barnier, Sutton, Harris, & Wilson, 2008; Harris, Keil, Sutton, Barnier, & McIlwain, 2011). In fact, philosophers have argued that we can actively distribute cognition or "mix our minds" with external objects and people to "scaffold" our individual memories (Chalmers, 2008; Clark, 2008; Sutton, 2008). In cognitive psychology, Wegner (1987) made a similar case, arguing for the existence of "transactive memory systems". He proposed that individuals in long-term groups develop ways to share encoding, storage, and retrieval of information such that the group recalls more than the sum of individuals alone.

Consistent with the benefits predicted by transactive memory theory, Harris et al. (2011) found evidence for "social scaffolding" of memory (Sutton, 2008; Sutton, Harris, Keil, & Barnier, 2010) in a collaborative recall study of long-married, older adult couples. Some couples remembered far better with their spouse, co-constructing rich autobiographical memories and overturning the usual finding of 'collaborative inhibition' for list recall (Basden, Basden, Bryner,

& Thomas, 1997; Harris, Paterson, & Kemp, 2008; Rajaram, 2011; Rajaram & Pereira-Pasarin, 2010; see also Harris, Barnier, & Sutton, 2012, 2013). Thus, remembering with others might promote successful remembering, and might be especially valuable as we age (Barnier, 2010; Harris, Barnier, & Sutton, 2014). Indeed, collaborative recall has been proposed as a potential intervention to support memory abilities of older adults in care facilities (Blumen, Rajaram, & Henkel, 2013; see also Barnier, Harris, & Congleton, 2013).

To test potential benefits of collaboration for older adults, we adapted Addis, Musicaro, Pan, and Schacter's (2010) episodic recombination paradigm. This task indexes one aspect of age related memory decline: the ability to recall detailed autobiographical memories, which some older adults find increasingly difficult (Zacks & Hasher, 2006). In the first part of their experiment, Addis et al. (2010) asked older and young adults to generate specific autobiographical events from the past five years and to provide 'cues' for each one. During Session 2, one week later, Addis et al. (2010) re-presented the original cues and asked participants to recall the related past events in detail out loud for three minutes.¹

¹ Addis et al. (2010) also recombined participants' cues into novel combinations, and asked participants to imagine possible future events in response to these recombined cues. We did not adopt this aspect of the paradigm, and focused on recall of past events only.

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Addis et al. (2010) recorded, transcribed, and coded participants' memories using a detailed scheme adapted from Levine's Autobiographical Memory Interview (Levine, Svoboda, Hay, Winocur, & Moscovitch, 2002) to identify the amount of internal (or episodic) detail versus the amount of external (or semantic) detail in each narrative. Critically, older adults produced fewer episodic (internal) details for recalled and imagined events than young adults, but more semantic (external) details. Addis et al. (2010) argued that consistent with other work on memory and ageing (Craik & Salthouse, 2000; Zacks & Hasher, 2006), older adults showed an "episodic deficit" compared to young adults.

In our first experiment, we examined whether collaborating with a spouse or partner might reduce this episodic deficit for older adults. To do this, we adapted Addis et al.'s episodic memory paradigm for collaboration. In Session 1, we asked members of long-married, older adult couples to generate (individually) specific, autobiographical events they experienced with their partner in the last five years, and to provide cues for each one. One week later, in Session 2, we re-presented the original cues for some of their Session 1 memories and asked participants to recall each event in detail. In Session 2 half of the older couples recalled alone and half recalled together. We predicted that collaborating couples would generate more internal details than those who did not collaborate.

1. Experiment 1

1.1. Method

1.1.1. Participants

We tested 40 older adults (20 female, 20 male), aged 60–88 years ($M = 76.58$, $SD = 7.18$) who were members of 20 heterosexual couples married for 20–65 years ($M = 50.90$, $SD = 9.24$). We recruited them from local Sydney branches of Probus Australia (a social club for retired/semi-retired business or professional people). All were fluent in English and only one self-reported memory problems. We tested couples in their homes and paid them \$15 per person per session for their participation.

1.1.2. Materials and procedure

We tested couples in two one-hour sessions. In Session 1, we asked participants individually to retrieve memories of 10 specific events (i.e., specific in time and place and lasting no longer than one day) experienced with their spouse/partner in the last five years. If participants had difficulty recalling, we prompted them with Addis et al.'s (2010) list of memory cues (adapted for an Australian sample and likely to involve both spouses/partners). For each event we asked participants to briefly describe and date it, to provide three kinds of event 'cues' (i.e., the name of a person other than their spouse/partner; the location of the event; and an object featured in the event), and to give a title for the event. Finally, we asked participants to rate each event for vividness, emotionality, and personal significance on 5-point Likert scales (1 = *not at all detailed/emotional/personally significant*, 5 = *extremely detailed/emotional/personally significant*).

Using the event details generated during Session 1, we created individually tailored slide sets for Session 2, each containing seven event slides (one practice slide and six scored event slides). The first line of each event slide had the instruction "Recall a past event that involves:". The next three lines contained the person, place and object details from one of the 10 events elicited by participants in Session 1, followed by the title of the corresponding memory in parentheses to help them recognise which memory the details came from.

For couples who would recall alone in Session 2, we created separate slide sets for each participant (e.g., seven of the husband's

events for the husband, seven of the wife's events for the wife). For couples who would recall together in Session 2, we created combined slide sets for each couple (e.g., three of a husband's events combined with three of his wife's events plus a practice event from one partner, counterbalanced). For couples who recalled together, we alternated presentation of events from each spouse, and counterbalanced which spouse's event was presented first.

In Session 2, approximately one week after Session 1 (M days = 9.40, $SD = 5.44$), we presented the seven event slides and asked participants to recall in detail the associated events from Session 1. Critically, whereas 10 couples recalled individually in separate rooms, 10 recalled together in the same room and collaborated to remember as many details as possible. For those who recalled alone, for each event slide we first gave them one minute to think about the event and then gave them three minutes to describe the event in as much detail as possible. For those who recalled together, for each event slide we first gave them one minute to ensure they were both thinking of the same event and then gave them three minutes to collaborate to describe the event in as much detail as possible.

Finally, we asked all participants to individually complete the 21-item Depression Anxiety Stress Scale (DASS-21; Lovibond & Lovibond, 1995). For each subscale, participants rated how much each of seven statements applied to them over the past week (e.g., "I found it hard to wind down") using a 4-point severity/frequency scale (0 = *did not apply to me at all*, 3 = *applied to me very much or most of the time*). We created subscale scores by summing answers for the seven relevant items.

1.1.3. Transcribing, segmenting, coding and scoring memories

To calculate the number of internal and external details recalled for each event in Session 2, we followed Addis et al.'s (2010) scoring procedures (based on Levine et al., 2002). First, we transcribed audio recordings of Session 2 (individual or collaborative) word for word. Second, we segmented transcripts into discrete details (i.e., a unique occurrence, observation, or thought). Consistent with Addis et al. (2010), we only segmented and coded the first three minutes of each event (although some individuals/couples spoke longer). Third, for each scored event (six per participant for those who recalled alone and six per couple for those who recalled together), two trained coders (one not involved in testing) separately identified the central event of each memory. In cases where participants described more than one event or the event was vague, coders defined the central event by selecting one that occurred within a relatively short timeframe (i.e., a couple of hours). When there was more than one event that fit the criteria, coders selected the event with the most detail (by counting the number of segments) as the central event.

Fourth, the coders categorised each discrete detail as internal or external. Internal details included those directly related to the central event, specific in time and place, and reflecting episodic re-experiencing. They included five mutually exclusive categories of: (1) event (e.g., happenings or the unfolding of the story); (2) place (e.g., the location of the event); (3) time (e.g., when the event occurred); (4) perceptual (e.g., any sensory information); and (5) emotion/thought (e.g., participant's feelings and thoughts at the time of the event). External details included seven categories. From Addis et al. (2010) we included: (1) semantic detail (e.g., factual information or extended events that did not require recollection of a specific time and place and any detail not directly related to the central event); (2) repetitions (e.g., any repetitions of speech); and (3) other (e.g., thoughts about elicitation). We also created four new external categories to code processes of collaboration for those who remembered together (e.g., cross-cueing and prompting; based on Harris et al., 2011). These process variables included: (4) cues and probes (questions directed to one's partner to elicit

Table 1
Mean number of internal and external details recalled on average in 3 min across six events by older couples in Experiment 1 and young couples in Experiment 2.

Experiment	Recall condition	Internal details	External details
1 Older couples	Recalled alone	23.98(4.08)	34.73(6.12)
	Recalled together	30.32(6.12)	35.91(8.65)
2 Younger couples	Recalled alone	51.03(13.82)	22.27(11.50)
	Recalled together	53.62(18.47)	30.27(9.62)

Note. Unit of analysis is couples.

more information about the event); (5) mirrored repetitions (one partner immediately repeating their partner's previous comment); (6) corrections (any disagreements about specific details of the event); and (7) cue and interaction. We summed the number of details coded in each of the two categories to create internal (all variables) and external (variables 1–3) detail scores. Although we coded external process variables (4–7), we did not count these codes in the external detail scores to avoid artificially inflating external details for the collaborating groups. Inter-rater reliability was extremely high ($r = .90$).

1.2. Results and discussion

In Session 1, all 40 participants generated the required 10 memories. They provided complete sets of cues (title, object, person, and location) for almost all of their memories ($M = 9.40/10$, $SD = 1.03$) and rarely needed cues to prompt them ($M = 2.30/10$, $SD = 3.03$). According to subjective ratings, their memories were quite detailed ($M = 4.29/5$, $SD = 0.53$), emotional ($M = 3.70$, $SD = 0.63$), and significant ($M = 3.82/5$, $SD = 0.77$). Notably, there were no differences in the quantity and quality of memories elicited by older adults who (later, in Session 2) recalled alone vs. with their spouse/partner (all t 's < 1.56, all p 's > .070; the unit of analysis is individuals).

In Session 2, the unit of analysis was couples, and we compared the output of the collaborating couples (in 3 min) to the average output of the two individual members of the couples who recalled alone (also in 3 min). In Session 2, couples who collaborated were more productive than those individuals who did not collaborate. Those who recalled together (M words = 509.68, $SD = 87.33$) said more words on average in 3 min across the six events than those who recalled alone (M words = 374.84, $SD = 78.42$), $t(18) = 4.59$, $p = .0005$. Across conditions, older adults recalled significantly more external ($M = 35.32$, $SD = 7.32$, range = 22.17–48.00) than internal ($M = 27.15$, $SD = 6.02$, range = 15.71–43.25) details, $F(1, 18) = 14.76$, $p = .001$. This is consistent with the findings of Addis, Wong, and Schacter (2008) and Addis et al. (2010), suggesting an “episodic deficit”. But – central to our hypotheses – older adults who collaborated showed a specific benefit for internal details: they recalled significantly more internal details when they collaborated than those who remembered alone, $t(18) = 2.73$, $p = .014$ (see Table 1). They showed no evidence for similar benefit for external details, $t(18) = .35$, $p = .729$ (see Table 1), indicating that this increase in internal memory details was not simply due to an overall additive effect. This benefit was not moderated by relationship length, age, depression, anxiety or stress. None of these variables correlated significantly with internal or external details. Thus, as predicted, collaborating with a spouse or partner reduced (although did not abolish) the episodic deficit for older adults.

2. Experiment 2

Experiment 1's finding that collaboration facilitated the recall of internal, episodic details in older married couples is striking because older adults typically have difficulty recalling these types of details when remembering alone (Addis et al., 2008, 2010).

However, it remains unclear whether collaboration facilitates episodic recall for all kinds of couples or if this benefit is specific to older adults. In Experiment 2, we repeated Experiment 1 with a sample of younger couples. Does collaboration with a spouse or partner boost episodic recall no matter the age of the collaborators?

2.1. Method

2.1.1. Participants

We tested 40 young adults (21 female, 19 male), aged 26–42 years ($M = 32.40$, $SD = 3.79$) who were members of 19 heterosexual and 1 same sex couple married or in a relationship for 2–26 years ($M = 7.81$, $SD = 4.86$) and cohabiting for 2–19 years ($M = 6.08$, $SD = 3.52$). We recruited them from the Macquarie University campus. All were fluent in English and none self-reported memory problems. We tested couples either in their homes or in a laboratory on campus and paid them \$15 per person per session for their participation.

2.1.2. Materials and procedure

The materials and procedure for young couples in Experiment 2 were identical to those for older couples in Experiment 1, except we removed the DASS-21 and added a measure of intimacy. Since our younger couples had been married or in a relationship for, on average, only 8 years (compared to over 50 years for older couples in Experiment 2), we wanted an index of their relationship strength, which may influence collaboration. In Session 1, participants individually completed the 21-item Personal Assessment of Intimacy in Relationships Scale (PAIR; Schaefer & Olson, 1981), which measures couple intimacy across four sub-scales: (1) emotional intimacy, (2) social intimacy, (3) intellectual intimacy, and (4) recreational intimacy. We left out the sexual intimacy sub-scale for privacy reasons. Participants rated how much a series of statements applied to their current romantic relationship (e.g., “my partner helps me to clarify my thoughts”) using a 5-point Likert scale (1 = *strongly disagree*, 5 = *strongly agree*). Transcribing, segmenting, coding, and scoring memories also were conducted following Addis et al.'s (2010) procedure, exactly as in Experiment 1. Inter-rater reliability was again extremely high ($r = 0.94$).

2.2. Results and discussion

Like older adults in Experiment 1, all 40 participants generated the required 10 memories. They all provided complete sets of cues (title, object, person, and location) for all 10 of their memories and rarely needed cues to prompt them ($M = 2.03/10$, $SD = 2.01$). According to subjective ratings, their memories were reasonably detailed ($M = 3.70/5$, $SD = 0.59$), emotional ($M = 3.38$, $SD = 0.66$), and significant ($M = 3.23/5$, $SD = 0.69$). There were no differences in the quantity and quality of memories elicited by younger adults who (later, in Session 2) recalled alone vs. with their spouse/partner (all t 's < 1.77, all p 's > .085; the unit of analysis is individuals), except that young adults who later recalled alone rated their Session 1 memories as slightly more significant ($M = 3.45$, $SD = 0.64$) than young adults who later recalled together ($M = 3.02$, $SD = 0.69$), $t(38) = 2.10$, $p = .043$).

As in Experiment 1, in Session 2 the unit of analysis was couples, and we compared the output of the collaborating couples (in 3 min) to the average output of the two individual members of the couples recalling alone (also in 3 min). During Session 2 couples who collaborated were more productive than those who did not collaborate. That is, those who recalled together (M words = 466.15, $SD = 81.83$) said more words on average than those who recalled alone (M words = 376.52, $SD = 86.57$), $t(18) = 2.38$, $p = .029$.

However, unlike older couples in Experiment 1, young couples did not show significant benefits from collaboration in terms of

Table 2
Correlations between word counts, internal and external details, and scores on the PAIR scale for young couples in Experiment 2.

Condition	DetailsRecalled	PAIR Overall	PAIREmotional	PAIRSocial	PAIRIntellectual	PAIRRecreation
Overall	Words	.482**	.456**	.296	.414	.656**
	Internal	.386*	.456**	.240	.385*	.617**
	External	.186	.205	.138	.157	.446**
Individual	Words	.681**	.879**	.554*	.717**	.756**
	Internal	.477	.708**	.489	.650**	.787**
	External	.347	.456	.337	.475	.663**
Collaborative	Words	.432	.444	-.064	.526	.444
	Internal	.343	.373	-.039	.265	.528
	External	-.022	.057	-.264	-.106	.096

Note. Unit of analysis is couples.

* $p < .10$.

** $p < .05$.

the kinds of details recalled. Overall, young adults recalled significantly more internal ($M = 52.32$, $SD = 16.37$, range = 28.84–101.67) than external ($M = 26.27$, $SD = 11.10$, range = 8.00–48.33) details, $F(1, 18) = 60.91$, $p < .001$, the opposite pattern to older adults in Experiment 1 (and consistent with findings for young adults in Addis et al., 2008, 2010). However, there was no evidence that young couples who recalled together produced more internal details than those who recalled alone, $t(18) = .35$, $p = .73$ (see Table 1). If anything, there was a numerical trend for collaborating couples to recall more external details than those who recalled alone, but this was not significant, $t(18) = 1.69$, $p = .11$ (see Table 1). With or without their spouse/partner, young adults kept on task and generated extensive episodic details about autobiographical events.

Analysis of scores on the PAIR scale suggested relationships between intimacy and both recall productivity and the amount of internal details recalled, although effects were mixed. Across conditions, scores on the PAIR were positively and significantly correlated with output (in terms of the word count) during Session 2 recall, and marginally associated with internal details but not external details (see Table 2). These relationships held for the emotional intimacy and recreational intimacy subscales of the PAIR, and not for the social or intellectual intimacy subscales (see Table 2). Although we did not find significant differences in recall performance across conditions (as reported above), we also conducted these correlations separately by condition to determine whether participants in the collaborative condition were driving these overall effects. Conversely, results suggested that these relationships were driven mostly by participants in the individual condition (see Table 2), although the patterns were similar for both groups and splitting our sample in this way limited power. Overall, results suggest that intimacy (and particularly emotional and recreational intimacy) was associated with recall performance regardless of whether couples were recalling together or alone. We return to this in the Discussion.

3. General discussion

By creating a social version of Addis et al.'s (2010) episodic memory paradigm, we indexed the impact of collaboration on older couples' (Experiment 1) and younger couples' (Experiment 2) episodic memory performance. Older adults remembered better – at least in terms of the number of specific internal details – when they collaborated with their spouse. That is, collaboration reduced the episodic deficit reported by Addis et al. (2010) by boosting older adults recall of internal, episodic details. However, collaboration did not overturn the episodic deficit. Older adults still recalled more external, semantic information than internal, episodic information and their recall of internal details remained substantially lower than that of young adults in Experiment 2. Although for now we can only say that collaboration reduces the episodic deficit shown

by older adults remembering alone, this is the first time such an effect has been shown. And perhaps this benefit is enough to be useful in everyday life (Barnier et al., 2013)?

Whereas older couples benefited from collaboration, young couples in Experiment 2 did not. Young couples recalled many more internal than external details both together and alone. Collaboration may have helped older couples because they need and/or accept memory support from others more often. Older adults often report concern about declining memory abilities (Craig & Salthouse, 2000; Newson & Kemps, 2006), believe collaboration can be valuable (Rajaram, 2011), and invest in and rely on complex systems of external (material and social) scaffolding (e.g., Harris et al., 2011). Thus, collaboration may be appealing or natural to them, especially with their life-long partners. Collaboration may not have benefited young couples in the same way (at least in terms of the kinds of details recalled) because they do not need external help to successfully complete episodic remembering tasks.

Philosophers argue that social scaffolding of memory may provide one mechanism for successful remembering (Sutton, 2008; Sutton et al., 2010). Although the effects of scaffolding may not be obvious on traditional memory tasks when we are young, benefits may show as we age and our memories start to decline. There is great value then in adapting and extending established experimental memory paradigms to index remembering amongst long standing groups across a range of memory tasks; memory tasks that tap into the natural abilities and needs of people, as well as the “memory systems” in which they live and work (Harris et al., 2014).

More speculatively, older adults may benefit from collaboration because of their much longer history of “memory scaffolding”. Older couples in Experiment 1 had been married/in a relationship for 51 years (on average); six times longer (on average) than young couples (although relationship length in each sample separately was not associated with details recalled). Greater opportunities for intimacy – for “mixing their minds” (Chalmers, 2008; Clark, 2008; Sutton, 2008) – over a long period of time may lead some couples to form “transactive memory systems” (Wegner, 1987). Transcripts of the collaborative recall sessions of older couples in Experiment 1 certainly were consistent with the notion that shared knowledge and specific communication strategies (the theorised ingredients of “transactive memory”; Wegner, 1987) have benefits for memory. Shared knowledge and communication strategies may have helped some older couples co-construct their memory narratives by, for instance, prompting one another with informative cues when stuck (see also Harris et al., 2014). Consider the following example, where the husband came to remember an event that he had forgotten following personalised and idiosyncratic cues provided by his wife:

Wife: Remember that?

Husband: No.

Wife: No? That was the most recent. You remember Nel?

Husband: Oh yes. Yes. Where was it?

Wife: Hobart.

Husband: Oh!

Wife: That one. Remember?

Husband: Can't remember which one was called MONA.

Wife: It was that very modern one that was just being built. And we had to keep going down, down . . . We went there with the group on that holiday in Tasmania.

Husband: I remember now. I remember arriving. Departing. Eating tea and whatever. So yes.

In Experiment 2 we found that young couples who self-reported higher levels of relationship intimacy tended to recall more in general, and particularly more internal details, regardless of collaboration. These effects mostly were driven by two aspects of intimacy – emotional (feelings of closeness and mutual understanding), and recreational (spending time together and having shared experiences). While the results were mixed, and our conclusions remain speculative, a next step would be to directly compare older and younger adults both in terms of memory performance and relationship variables such as length and intimacy. We need to disentangle relationship attributes (such as length and quality) from the use of specific remembering strategies by people in relationships. As noted, “intimacy” in this research indexed a whole range of behaviours, strategies and experiences that are important to intimate couples. The possibility that different aspects of intimacy might be important is a first step that requires further investigation.

If social scaffolding of memory is possible and effective, future research also could consider how it is developed and maintained over time. This is especially important for potential applications of collaborative recall paradigms and findings to those at risk of memory problems, such as older adults (Barnier et al., 2013; Blumen et al., 2013). In future research, we plan to focus on older adults of known neuropsychological status, to see if benefits are strongest for those who most need support, as suggested by our finding that older, but not younger, couples showed benefits. One possibility is that investing in close, intimate, and satisfying relationships – with all that they bring – may help develop transactive systems that scaffold memory across the lifespan and yield cognitive benefits when they are needed. In other words, older adults may “reap” what they cognitively “sow” in their earlier years. Collaborative recall paradigms can help us to start answering such complex, but potentially important, questions.

Conflict of interest statement

The authors declare that they have no conflict of interest.

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