



# Gender Differences in Remembering about Things to Do Depend on Partnership Status

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## Abstract

Prospective memory, which is the ability to remember to do something in the future, is strongly linked to gender stereotypes. Women are expected to play a mnemonic role in romantic heterosexual couples and be successful in prospective memory tasks. Our purpose was to test whether stereotypical expectations manifest in gender differences in remembering to perform intended actions. Furthermore, we investigated whether these differences manifest only when participants are in a relationship with an other-gender partner which puts women under higher social pressure to be effective in prospective remembering. Forty Polish women (20 in relationship, 20 out of relationship) and 40 Polish men (18 in relationship, 22 out of relationship) were asked to send a SMS text to the experimenter every day for 7 consecutive days. As predicted, a female advantage in performance was found only for participants who were in a relationship, with no gender differences among those who were not. Of particular interest was that women who were in a relationship performed better compared to women without partners. In contrast, men performed worse if they were in a relationship compared to when they did not have a partner. Implications are discussed for how gender inequalities in prospective remembering can be tackled by educators in secondary schools and psychologists who conduct premarital workshops, as well as how they can be used by couple psychotherapists to deal with crises related to the division of labor in a couple.

**Keywords** Gender stereotypes · Gender roles · Gender differences · Prospective memory · Romantic relationship · Heterosexual couples

According to gender stereotypes, women are more communal than men, that is, more socially connected, helpful, nurturant, and selfless (Diekman and Eagly 2000; Eagly and Mladinic 1989; Eagly and Steffen 1984; Heilman 2001; Spence and Buckner 2000; Williams and Best 1990). These assumptions create expectations about what women should do and become standards against which women's behaviour is judged by others (Burgess and Borgida 1999; Carli et al. 1995; Eagly and Karau 2002; Heilman 2001; Rudman 1998). Furthermore, women internalise societal standards of what it means to be communal, and then judge and regulate their own behaviour and mental processes accordingly (Witt and Wood 2010; Wood et al. 1997).

The societal standards which hold that women are more communal are believed to influence their thinking (Ickes et al. 2000; Klein and Hodges 2001), memory processes (Gryzman and Hudson 2013; Niedźwieńska 2003), and everyday behaviour (Eagly et al. 2003; Witt and Wood 2010). For instance, compared to men, women tend to remember the communal aspects of their personal past better, that is, they have more communal themes and more references to other people in their autobiographical memories (Niedźwieńska 2003; McAdams et al. 2006; Walls et al. 2001). The expectation that women should facilitate the progress of others toward their goals and care about others' needs is an especially strong aspect of a gender stereotype and are believed to dictate a range of helping behaviours (Becker and Eagly 2004; Eagly et al. 2003). This expectation is also thought to manifest in women doing more work, compared to their male partners in heterosexual couples, both in terms of household labour (Bittman et al. 2003; Hochschild 1989; Shelton and John 1996) and the emotional effort necessary for relationship management (Duncombe and Marsden 1993).

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## The Mnemonic Role of Women

The expectation that women are good at caring and enact behaviours that support others' goals should also translate into a tendency to help others to remember to carry out their intended actions. Huppert et al. (2000) suggest that a descriptive stereotype of a woman playing a mnemonic role in a romantic heterosexual couple has two aspects. First, a woman is expected to remember to carry out herself those intentions which bring benefits to the couple, such as remembering to send cards or buy presents for friends and family members. Second, she is expected to remind a male partner about his individual intentions. These are tasks that he has already committed to pursuing but she thinks he may have temporarily forgotten (e.g., "Don't forget that you wanted to get your suit cleaned for your upcoming lectures").

The stereotype of being both a reservoir for the couple's intentions and a memory prompter is directly related to *prospective memory* (PM), which is the ability to remember to do something in the future, such as posting a card when seeing the post office (event-based PM) or taking a pill at 19:00 (time-based PM). A particular challenge in relation to succeeding in PM tasks is that the retrieval of the intended action (e.g., posting a card) has to be self-initiated upon encountering a target event (e.g., seeing the post office) when one is usually engaged in other ongoing activities (e.g., thinking about job-related problems while going to work) (Einstein and McDaniel 2005). Time-based PM tasks pose even a bigger challenge because the retrieval of the intended action cannot be facilitated by a target event and effortful time-monitoring is required in the absence of explicit cues. It is because of the high cognitive demands of PM tasks, as well as the fact that they constitute a significant part of an everyday routine, that remembering to carry them out is a daily struggle. At least half of the memory failures that people report in diaries involve the forgetting of planned actions (Crovit and Daniel 1984; Terry 1988), and PM failures are reported to be more frequent than forgetting information from the past (Kliegel and Jäger 2006). To avoid failures on important PM tasks in everyday life, people use a wide range of memory aids that include asking others to remind them about their intended actions (Delprado et al. 2013; Intons-Peterson and Fournier 1986; Maylor 1990).

The relationship between gender stereotypes and PM has received very little attention until now. Only two, very recent, known studies have empirically investigated this relationship (Ahn et al. 2017; Moulton-Tetlock et al. 2019). Both studies have drawn on evidence that heterosexual couples tend to establish collective memory systems (Hollingshead 1998; Wegner 1986; Wegner et al. 1991), that is, they coordinate the encoding and storage of information that one or the other may subsequently need. However, it has been suggested that because women are expected to be more communal and

concerned about the progress of others toward their goals, this mnemonic work may not be equitably divided between partners (Ahn et al. 2017; Moulton-Tetlock et al. 2019).

## Women Should Remember the Couple's Intentions

Moulton-Tetlock et al. (2019) empirically demonstrated that societal expectations about PM performance in everyday life are much higher for women than men. Study 1 presented fictitious vignettes that introduced a male and female character and then measured participants' beliefs about which character was more likely to remember (or forget) about a PM task. The wording made clear to participants that the man and the woman had equal responsibility for, and equal stake in, the execution of the intended activity. The intended activities represented "highly female activities" (i.e., childcare duty), gender neutral activities (i.e., calling the company's clients), "male activities" (i.e., debugging a computer program), or "highly male activities" (i.e., checking oil in the car before a long trip). Moulton-Tetlock and colleagues found that, compared to men, women were assumed to better remember almost all types of PM tasks, including those that had been regarded as "men's work" in the pilot study (debugging the code). Men were assumed to better remember only about checking the oil.

Furthermore, Moulton-Tetlock et al.'s (2019) Study 2 demonstrated that these expectations translated into the cognitive processes of men and women, that is, they translated into how accessible PM tasks were for them. When both partners of a romantic couple were asked to freely recall things which they would need to remember to resolve, women were far more likely than men to list among their PM tasks those tasks for which their partner or family was a beneficiary. Importantly, because women also listed more PM tasks for which they were the sole beneficiary, as well as listed more PM tasks overall than men did, their results suggest that women overall may do more prospective remembering than men within romantic couples. Moulton-Tetlock and colleagues propose that the relationship between the gender stereotype-induced expectations and gender differences in PM is best explained by a motivational account—due to societal expectations, women are more motivated to remember about PM tasks and thereby allocate more mental effort and cognitive resources to prospective remembering.

## Women Should Provide Reminders

Ahn et al. (2017) found evidence for the second aspect of a mnemonic role that women are believed to play in romantic heterosexual couples, that is, being a memory prompter. When participants were asked to rate how typical the tendency is for men and women to help others to remember their personal obligations, needs, and commitments, both women and men believed that helping others is more typical of women than of

men. Very low ratings for men suggested that this tendency is, in fact, considered atypical of men (Study 1). In their Study 2, participants rated the desirability of the tendency to help others to remember their PM tasks in a romantic partner in general, in a female partner, and in a male partner. Their results showed that this tendency was less valued in male partners as compared to both female partners and partners in general.

In Ahn et al.'s (2017) Study 3, participants who were in relationships provided an example of a reminder about a PM task that they had received or provided. The greater accessibility of examples of women's reminding acts than men's reminding acts was found for both genders. When men did mnemonically help their partners, the help more often involved the intended actions for which they were stakeholders (Study 4). Overall, their findings demonstrate that societal expectations to help others by issuing reminders are especially strong for women in relationships and that women strive to meet these expectations. Men, in contrast, face much lower pressure to help and, accordingly, they do less of the mental labour as a memory prompter than women do and benefit more from the collective nature of this mental work.

## Gender Differences in Prospective Memory Performance

The main aim of the present study was to investigate whether the previously found gender differences in the accessibility of PM tasks (Moulton-Tetlock et al. 2019) and the extent to which female and male partners help each other to remember (Ahn et al. 2017) extend to remembering to actually perform one's own intentions. There are several reasons to assume that gender stereotypes should translate to gender differences in the performance of PM tasks. First, a gender stereotype denotes not only that women should help their male partners remember their intentions, but also that women should remember to perform their own PM tasks for which the whole couple is a beneficiary (Huppert et al. 2000). In other words, women are expected to have very efficient PM.

The very generalised expectation that women should be successful on PM tasks was clearly demonstrated by Moulton-Tetlock et al. (2019), who found that women were assumed to remember to perform various PM tasks, ranging from typically female through gender-neutral and typically male tasks. As Moulton-Tetlock et al. (2019) suggested, high expectations may increase women's motivation to perform well and make them invest more cognitive resources and mental effort into their PM tasks. According to the most influential theory of PM (McDaniel and Einstein 2000), investing more cognitive resources may improve performance, especially on the PM tasks that cannot rely on intentions coming to mind spontaneously at the appropriate future moments (see also Kliegel et al. 2001, 2004, for converging evidence).

Second, because women conform with societal expectations and tend to remind their male partners about their PM tasks (Ahn et al. 2017), it is very unlikely that they do not do the same with their own intentions, that is, they should more often than men remind themselves about their own PM tasks through deliberate rehearsal (e.g., through thinking and talking about their intended actions). In fact, Tan and Kvavilashvili (2003) found that women engaged in more frequent conscious rehearsal of their intentions than men. Most importantly, there is evidence to suggest that deliberate rehearsal during the retention interval (i.e., between encoding the intention and the opportunity to carry it out), plays an important role in performance. Executed everyday intentions were found to be more often deliberately rehearsed compared to unexecuted intentions (Kvavilashvili and Fisher 2007; Szarras and Niedźwieńska 2011).

Third, when romantic heterosexual couples were enrolled in a study by Moulton-Tetlock et al. (2019), women, compared to men, were able to retrieve more of their PM tasks to be performed in the future. Moulton-Tetlock et al. found this gender difference by using a procedure that is commonly used to measure the accessibility of PM tasks during the retention interval (see Freeman and Ellis 2003; Szarras and Niedźwieńska 2011). The same gender difference in the accessibility of PM tasks was found by Penningroth (2005) who measured the intention-superiority effect (intentions being more accessible in memory than retrospective/episodic elements) and found this effect only in women. Importantly, a study by Freeman and Ellis (2003) shows that there is a positive relationship between the ability to access individual intentions during the retention period and the proportion of intentions completed.

There has been only a handful of studies on adults that investigated gender differences in PM performance. Although results have been mixed, the majority of studies that used objective measures of performance, as opposed to self-report, found a female advantage in remembering to perform the intended activities. A female advantage was found among young and middle-aged adults (Maylor and Logie 2010; Palermo et al. 2015) as well as older adults (Huppert et al. 2000; Riess et al. 2016). The data seem to tentatively suggest that it is more likely to find a female advantage in the performance of event-based PM tasks compared to time-based tasks (Palermo et al. 2015; Riess et al. 2016). Gender differences for time-based PM tasks can even be in the opposite direction. Bahrainian et al. (2013) found a male advantage on a task that required participants to click a button at 5-min intervals while responding to multiple choice questions. However, an event-based PM task—in which the person is required to hand over to the examiner a personal belonging, which is hidden, and the person needs to remember to ask for the belonging back when the session is over—does not conform to this pattern. Men were found no worse (Bakker et al. 2002) or even better than

women (Efklides et al. 2002) on this task. It is worth noting that some studies involving adolescents also found a female advantage in PM performance (Ceci and Bronfenbrenner 1985; Maylor and Logie 2010).

In sum, the findings on gender differences in PM performance are far from conclusive, but several issues are worth considering. On the one hand, the fact that it may be more likely to find a female advantage on performing one type of PM tasks (on event-based rather than time-based) may suggest that gender differences in PM result from differences in the cognitive abilities that underlie the performance on PM tasks. By cognitive abilities, we understand relatively broad capacities that are related to mind functioning and are rooted in biology. On the other hand, when Riess et al. (2016) used a computerized board game (Virtual Week) that required participants to remember to virtually perform very familiar PM tasks (e.g., such as picking up dry-cleaning when shopping or phoning the plumber at 17:00), a female advantage was found only for older adults, with no gender differences among students. This is not consistent with the claim that gender differences in PM can be explained by different cognitive abilities of women and men, and instead it suggests that factors related to accumulated everyday experience may be involved.

Furthermore, if we take into account that factors other than the different cognitive abilities of men and women may contribute to gender differences in PM performance, then gender differences should be analysed using naturalistic PM tasks to be executed in everyday life because they are less dependent on pure cognitive abilities and more on effort and the individual strategies that a person has developed when doing similar tasks on an everyday basis (see Schnitzspahn et al. 2011, 2018, for a similar argument and corroborating evidence from the research on PM and ageing). Nonetheless, studies that investigated gender differences in the PM performance of adults have invariably used laboratory-based tasks. This was also the case with one internet study in which the task was very similar to a laboratory-based task (i.e., remembering to click on a smiley face which occurred after other intervening tasks that were performed on the computer; Maylor and Logie 2010).

Finally, in order to verify whether gender stereotypes contribute to gender differences in PM performance, factors that intensify expectations toward women to play a mnemonic role and thereby intensify their efforts to have superb PM should be manipulated, with cognitive abilities kept equal. To the best of our knowledge, this control has not been done so far.

## The Present Study

The present research draws on evidence that, due to stereotypical expectations, women and men differently regulate their

cognitive processes and the behaviours that are related to everyday PM tasks (Ahn et al. 2017; Moulton-Tetlock et al. 2019). It has been suggested that these expectations increase women's effort not only to keep others' intentions in mind but also to effectively manage their own PM tasks (Moulton-Tetlock et al. 2019). Therefore, women may, for example, rehearse their PM tasks during the retention interval more often than men do, which could make these tasks more accessible in memory and more likely to eventually be carried out (Freeman and Ellis 2003; Kvavilashvili and Fisher 2007; Penningroth 2005; Szarras and Niedźwieńska 2011; Tan and Kvavilashvili 2003).

We suggest that one of the factors that directly intensifies expectations toward a woman to play a mnemonic role (both the expectations of her social environment and her expectations toward herself) is when a woman is in a romantic relationship with a male partner. This partnering effect is especially likely when a woman is in a long-term relationship for which she needs to put extra effort into keeping in mind both her partner's intentions and her own intentions as well as to learn what to do in terms of, for example, rehearsal, planning, or use of memory aids to meet high expectations toward her PM performance. This expectation can make women in relationships handle real-life intentions more effectively compared to men in relationships, who face much lower expectations and social pressure to remember about their own PM tasks (Moulton-Tetlock et al. 2019) and lower social pressure to help their female partners remember about their intentions (Ahn et al. 2017). The present study is the first known to examine, in a quasi-experimental design, whether women and men were or were not in romantic relationships with other-gender partners and to investigate how it influenced gender differences in PM performance.

We were also the first known to use a naturalistic PM task to measure gender differences in adults. This procedure enabled us to capture potential differences that result more from effort and the learned skills that are gained by practice, observation, and learning based on everyday experience rather than pure cognitive abilities. We used a gender-neutral PM task that both men and women perform on a daily basis—remembering to send a SMS (Short Message Service) text at a certain time. We expected to find, overall, a female advantage in PM performance (Hypothesis 1). However, we expected this gender difference to be qualified by partnership status. Specifically, we predicted a female advantage for participants who were in a romantic relationship with an other-gender partner (Hypothesis 2). In contrast, we predicted that women without partners and men without partners would not differ in PM performance. In sum, we hypothesized that the gender difference would disappear for the participants who would not be in relationships with other-gender partners.



## Method

### Design

The present quasi-experimental study was conducted as a two-way factorial design, with Participant Gender (man or woman) and Partnership Status (being in a relationship with an other-gender partner or not being in such a relationship) as between-subjects factors. The dependent variable was the proportion of correct PM responses.

### Participants

We recruited a total of 80 Polish adults, whose age ranged from 30 to 50 years-old. These participants were volunteers from the community who responded to invitations disseminated through companies and community groups as well as through a friendship network. They did not receive any remuneration for their participation. The study was approved by the Psychology Research Ethics Committee at the Jagiellonian University in Kraków.

At the beginning of the first meeting with the experimenter, organized at a convenient location for the participant, demographic data were collected to check whether the volunteer met the inclusion criteria for either in-relationship or out-of-relationship groups. The volunteers who met the criteria for either of the two groups were invited to continue their participation. To be included in the in-relationship group, the volunteer needed to be in a long-term romantic relationship with an other-gender partner at the time when the study was being conducted. For the relationship to qualify, the volunteer needed to cohabit with the partner for at least 12 months before the start of the study. To be included in the out-of-relationship group, the volunteer needed (a) not to be in a romantic relationship at all at the time when the study was being conducted and (b) not to have a long-term relationship with an other-gender partner in the past that included a long-term cohabitation.

The recruitment process continued to the point of having an equal number of men and women, with roughly half the participants in a relationship and half the participants who were not in a relationship in each group. To the best of our knowledge, our study was the first to analyse the effect of gender and partnership status on PM performance. Therefore, we were not able to conduct a power calculation, but instead we aimed to have about 20 participants per condition, as recommended by Simmons et al. (2011). The recruitment process resulted in a sample of 40 women (20 in relationship and 20 out of relationship) and 40 men (18 in relationship and 22 out of relationship).

A 2 (Participant Gender: woman or man) by 2 (Relationship Status; in relationship or out of relationship) between-subjects ANOVA was conducted on age and then

on years of education. No significant main or interaction effects were found for age (in relationship:  $M_{\text{women}} = 37.40$ ,  $SD = 4.60$ ,  $M_{\text{men}} = 40.72$ ,  $SD = 5.83$ ; out of relationship:  $M_{\text{women}} = 38.00$ ,  $SD = 6.76$ ,  $M_{\text{men}} = 37.41$ ,  $SD = 7.10$ ) ( $p$ 's > .162). Similarly, no significant main or interaction effects were found for education (in relationship:  $M_{\text{women}} = 15.10$ ,  $SD = 2.71$ ,  $M_{\text{men}} = 14.28$ ,  $SD = 2.63$ ; out of relationship:  $M_{\text{women}} = 16.00$ ,  $SD = 2.53$ ,  $M_{\text{men}} = 15.05$ ,  $SD = 2.94$ ) ( $p$ 's > .148).

Additional demographic details included whether the participant had children and (if yes) how many children they had and whether children lived with them. As it could be expected, there were more participants living with their children among those who were in a relationship (30, 79%), as compared to the number of participants with children among those who were not in a relationship (10, 24%),  $\chi^2(1) = 8.21$ ,  $p = .004$ . However, there were no significant differences on this variable either between women in a relationship (17, 85%) and men in a relationship (13, 72%) or between women without partners (6, 30%) and men without partners (4, 18%) ( $p$ 's > .334). Furthermore, there was no difference between women ( $M = 125.05$ ,  $SD = 82.67$ ) in a relationship and men ( $M = 136.56$ ,  $SD = 11.72$ ) in a relationship in how long (in months) they had been cohabiting with their partners ( $p = .716$ ).

## Materials

### Prospective Memory Task

Participants were asked to send an empty SMS text to the experimenter at 17:45 every day for the next 7 days, starting from waking the day after the briefing (hereinafter referred to as “the study period”). If the participant knew that they would not have access to their mobile phone or would not be able to use it at 17:45 during the study period, a new time was scheduled for the whole study period. The new times were scheduled according to a certain pattern (e.g. 15:45 p.m., or 16:45 p.m., or 18:45, or 19:45 p.m.). Participants were informed that it was important to send a text message on time but if they forgot to do it at the prearranged time, they had to send it as soon as possible afterwards. Only text messages that were sent no longer than 10 min after the designated time were considered correct PM responses (see Kvavilashvili and Fisher 2007; Schnitzspahn et al. 2018, for the same criterion for “hits”).

We emphasized that participants had to refrain from setting alarms for the designated time (on their mobile phones, watches or timers) to alert them to send an empty SMS text. The restriction was introduced to exclude this particular memory aid because that would entirely eliminate the need to remember about the PM task. However, participants were informed that among all possible memory aids, only setting alarms for the designated time was forbidden, and they should

feel free to use any other memory aids or memory devices that they usually use to help themselves remember about similar tasks in everyday life.

### A Memory Aid Questionnaire

Based on the literature of memory aids that people claim to use most often in their daily lives (Intons-Peterson and Fournier 1986; Maylor 1990; Penningroth and Scott 2013) and the classic distinction between internal and external memory aids (Harris 1980; Intons-Peterson and Fournier 1986), supported by factor analytic studies of general memory strategies and PM strategies (Dixon and Hultsch, 1983; Penningroth and Scott 2013), we developed a list of most commonly used memory aids. *Internal aids* involved reliance on mental activities, whereas *external aids* involved the use of tangible, physical aids external to the person. Participants were presented with the list and asked to check those aids that they had used during the study period to remember about the task of sending text messages. External aids included: (a) entering the task into a calendar or a diary, (b) posting notes with the task description in prominent places, (c) setting reminders in electronic devices, (d) asking others to remind you about the task, and (e) setting alarms on mobile phones, watches or timers. The last item was included only to check whether participants complied to the instructions of not setting alarms for the prearranged time. Internal aids included: (a) rehearsing the task mentally, (b) rehearsing the task aloud, (c) visualizing oneself when performing the task, and (d) associating the task with a specific event during which (or after which) the intended activity should be carried out. The number of aids used were summed separately for the external (four items) and internal aids (four items).

After participants had chosen the items, they were asked to use 7-point scales to answer two questions in relation to each chosen item: (a) how often they used this memory aid to remember about sending text messages during the study period (1 = *never*; 7 = *always*) and (b) how effective this aid was in helping them remember to send text messages during the study period (1 = *absolutely ineffective*, 7 = *always effective*). We included “never” in the frequency scale for the scale to be symmetrical and maximally correspond to the effectiveness scale. The perceived effectiveness and the frequency of usage were averaged separately for the external and internal aids.

### Procedure

Two sessions were conducted 8 days apart. At the beginning of Session 1, participants were asked to answer demographic items. Those who met the inclusion criteria were then introduced to the general aims of the study (i.e., how people remember to carry out an everyday task in the future) and asked to complete the consent form. Next, the experimenter provided the instructions for the

PM task (sending empty SMS texts at the designated time for the next 7 days) and addressed participants’ queries. Finally, the experimenter made sure that the participant remembered the PM task instructions.

A post-experimental inquiry was conducted at Session 2. Specifically, participants were asked to recall the PM task that they had needed to perform over the previous 7 days (all participants were able to do that) and to give reasons for missed PM opportunities (i.e., when they did not send the SMS text at all or sent it much later than the designated time). No participant reported technical or logistic problems that made it impossible for them to send the SMS on time. Next, participants were asked to fill in the memory aid questionnaire. When participants were filling in the questionnaire, the two categories of memory aids (internal and external) were not explicitly mentioned or defined. As we mentioned earlier, setting an alarm for the designated time was on the list from which they were choosing the memory aids that they had actually used. Nobody reported using the forbidden memory aid. Finally, participants were thanked and debriefed.

## Results

The effect size was measured by partial eta-squared ( $\eta_p^2$ ) with small, medium, and large effects defined as .01, .06, and .16, respectively (Cohen 1988). When measured by Cohen’s *d*, the effect size was defined as .2, .5, and .8 for small, medium, and large effects, respectively (Cohen 1988).

### Hypothesis Testing

To examine whether women overall outperformed men (Hypothesis 1) and whether this gender difference was present for participants in relationships, but disappeared for participants without partners (Hypothesis 2), the mean proportions of correct PM responses from seven PM opportunities were entered into a 2 (Participant Gender: woman or man)  $\times$  2 (Partnership Status: in relationship or out of relationship) factorial ANOVA (see Table 1). As expected, women demonstrated significantly better PM performance than men,  $F(1,76) = 10.72$ ,  $p = .002$ ,  $\eta_p^2 = .12$ . The main effect of partnership status was not significant,  $F(1,76) = .29$ ,  $p = .591$ ,  $\eta_p^2 = .00$ . The main effect of gender was qualified by a significant gender by partnership status interaction,  $F(1, 76) = 13.11$ ,  $p < .001$ ,  $\eta_p^2 = .15$  (see Fig. 1). As predicted, women scored higher than men in the in-relationship condition,  $F(1, 76) = 22.64$ ,  $p < .001$ ,  $\eta_p^2 = .23$ , but not in the out-of-relationship condition,  $F(1,76) = .06$ ,  $p = .802$ ,  $\eta_p^2 = .00$ .

Figure 1 shows that the flat line for women and men who were not in relationships nearly bisects the sloping line for women and men who were in relationships. It raises an exploratory question as to whether it is the case that women in relationships differ from women without partners and/or

**Table 1** Use of internal and external memory aids as a function of participants' gender and partnership status

Variables	Women		Men	
	In relationship <i>M (SD)</i>	Out of relationship <i>M (SD)</i>	In relationship <i>M (SD)</i>	Out of relationship <i>M (SD)</i>
Mean proportion of correct PM responses	.66 (.28)	.41 (.28)	0.24 (.21)	.43 (.31)
Mean scores coded for lateness	10.40 (3.60)	7.20 (4.05)	4.44 (3.15)	7.73 (3.62)
Number of aids used Internal aids External aids	1.05 (.22) .80 (.52)	1.05 (.69) .75 (.64)	.56 (.51) 0.72 (.75)	.77 (.43) .77 (.53)
Frequency of use Internal aids External aids	5.40 (1.14) 6.00 (1.41)	5.72 (.60) 6.58 (.64)	3.90 (1.20) 5.80 (1.53)	5.06 (1.45) 4.79 (2.01)
Perceived effectiveness Internal aids External aids	4.83 (.99) 5.47 (1.06)	4.25 (1.26) 4.50 (1.12)	3.10 (.99) 4.55 (1.30)	3.88 (1.54) 5.55 (1.17)

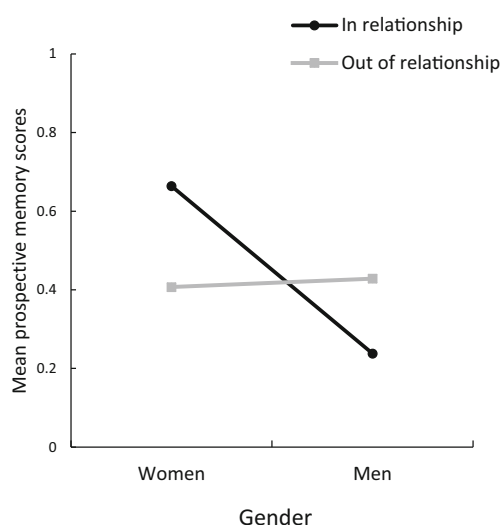
*Note.* Correct PM responses were the text messages sent no longer than 10 min after the set time. Scores coded for lateness were summed for 7 PM opportunities: 2 points = the SMS sent no longer than 10 min after the set time; 1 point = the SMS sent 10 min after the set time but within 30 min; 0 points = the SMS more than 30 min late or no SMS. Ratings of the frequency of using memory aids and the perceived effectiveness of memory aids used were made on 7-point scales; The frequency of using memory aids (1 = *never*, 7 = *always*); The perceived effectiveness of memory aids used (1 = *absolutely ineffective*, 7 = *always effective*)

whether men in relationships differ from men without partners. To answer this question, we conducted an additional set of tests of simple main effects which showed that both differences were significant. Women in a relationship demonstrated significantly better PM performance compared to women who were not in a relationship,  $F(1, 76) = 8.70, p = .004, \eta_p^2 = .10$ . For men, the difference was in the opposite direction. Men in a relationship demonstrated significantly worse PM performance compared to men who were not in a relationship,  $F(1, 76) = 4.73, p = .033, \eta_p^2 = .06$ .

## Supplemental Analyses

### Late Responses

It may be argued that the previous analyses revealed a female advantage in PM performance because they included only on-



**Fig. 1** Mean prospective memory scores as a function of participants' gender (women vs. men) and partnership status (in relationship vs. out of relationship)

time responses. In other words, the previous analyses did not take into account that men might have responded but they were late about it. To address this concern and examine whether support for the hypotheses holds up when late responses are included, PM performance was also calculated on a 2-point scale. The participant was given two points if they sent the SMS no longer than 10 min after the designated time. They were given 1 point if they sent the text message 10 min after the preset time but within 30 min. No point was given if the SMS was more than 30 min late or there was no SMS at all. In sum, across the seven trials, a participant could score from 0 (never responded within 30 min) to 14 (always responded within the 10-min window).

A 2 (Gender)  $\times$  2 (Partnership Status) factorial ANOVA, conducted on mean scores revealed exactly the same pattern of results as presented previously, of correct responding (see Table 1). Women demonstrated significantly better PM performance than men,  $F(1,76) = 11.13, p = .001, \eta_p^2 = .13$ . The main effect of partnership status was not significant,  $F(1,76) = .00, p = .960, \eta_p^2 = .00$ . The main effect of gender was qualified by a significant gender by partnership status interaction,  $F(1, 76) = 15.88, p < .001, \eta_p^2 = .17$ . Women scored higher than men in the in-relationship condition,  $F(1, 76) = 25.52, p < .001, \eta_p^2 = .25$ , but not in the out-of-relationship condition,  $F(1,76) = .22, p = .640, \eta_p^2 = .00$ . An additional set of tests showed that women in a relationship demonstrated significantly better PM performance compared to women who were not in a relationship,  $F(1, 76) = 7.78, p = .007, \eta_p^2 = .09$ . In contrast, men in a relationship demonstrated significantly worse PM performance compared to men who were not in a relationship,  $F(1, 76) = 8.10, p = .006, \eta_p^2 = .10$ .

### Potential Confounds to Partnership Status

It may be argued that, in most cases, a long-term cohabitation with an other-gender partner involves having children and

taking care of them. A woman is then not only expected to play a mnemonic role for a male partner, but she is required, to a likely greater extent than a male partner, to help her children in PM tasks. This creates stronger demands toward the effectiveness of her PM and may lead to better PM performance in everyday life as compared to her male partner. To explore this alternative explanation of different patterns of gender differences in those who were in relationships and those who were not, we investigated whether the number of children with which participants lived (0–3) influenced the patterns of gender differences in PM performance. It is worth noting that there were participants who lived with their children in both in-relationship and out-of-relationship groups. The mean proportions of correct PM responses were entered into a two-way ANCOVA, with Gender and Partnership Status as between-subject factors and Number of Children as a covariate. The main effect of gender was significant,  $F(1,75) = 10.86$ ,  $p = .002$ ,  $\eta_p^2 = .13$  such that women continued to score higher than men. The main effect of relationship status was not significant,  $F(1,75) = .04$ ,  $p = .838$ ,  $\eta_p^2 = .00$ . The main effect of gender was qualified by a significant gender by partnership status interaction,  $F(1,75) = 13.01$ ,  $p = .001$ ,  $\eta_p^2 = .15$ , and the pattern of pairwise comparisons duplicated the original findings. The effect of the covariate was not significant,  $F(1,75) = .31$ ,  $p = .579$ ,  $\eta_p^2 = .00$ . This pattern of results speaks against the experience of taking care of children as being a potential confound to partnership status.

It may also be argued that it is not being in relationship per se, but duration of cohabitation with a partner that is crucial for the patterns of gender differences in PM. To explore this explanation, we investigated whether the length of time during which participants were cohabitating with their partners influenced gender differences in PM performance for the in-relationship groups. The mean proportions of correct PM responses were entered into a one-way ANCOVA, with Gender as a between-subject factor and Number of Months during which participants were cohabitating with their partners (from 23 to 348) as a covariate. The main effect of gender was large,  $F(1,35) = 26.47$ ,  $p < .001$ ,  $\eta_p^2 = .43$ , still favouring women's performance, whereas the effect of the covariate was not significant,  $F(1,35) = .18$ ,  $p = .675$ ,  $\eta_p^2 = .01$ . Again, the pattern of results rules out duration of cohabitation as a potential confound.

### Use of Memory Aids

The analyses of memory aids that participants used to help them remember about sending text messages to the experimenter show how women and men approached this task, as well as how they approach their everyday intentions in general. These analyses enabled us to explore possible answers to the question about why women in relationships improved and men in relationships deteriorated in PM performance

compared to their non-relationship counterparts. To this aim, a series of independent sample *t*-tests was conducted on different measures of the aid use that compared women in relationships and women out of relationships, and then men in relationships and men out of relationships, for internal and external aids separately (see Table 1). The measures of the aid usage included: (a) the number of memory aids used, (b) the frequencies of using those memory aids that participants claimed to use to remember about the PM task, and (c) the perceived effectiveness of those memory aids that participants claimed to use to remember about the PM task. Because some participants did not use any external aids and some did not use any internal aids, the analyses of frequencies and the perceived effectiveness were conducted on smaller samples.

For women, the perceived effectiveness of external aids increased when women were in a relationship with a male partner compared to when they were not,  $t(26) = 2.35$ ,  $p = .027$ ,  $d = .89$ . No other differences between women in relationships and women without partners were significant ( $p$ 's  $> .125$ ). For men, those in relationships used internal aids less often compared to those who were not in relationships,  $t(26) = -2.25$ ,  $p = .034$ ,  $d = .87$ . No other differences between men in relationships and men without partners were significant (all  $p$ 's  $> .061$ ).

## Discussion

The issue of gender differences in remembering to complete the intended actions appears to have been very much overlooked because neither cognitive psychology in general, nor the prospective memory literature in particular, have provided reasons for why women and men may differ in PM performance. However, this difference is to be expected if we take into account that societal expectations toward women to be much better at the execution of the intended actions is a strong aspect of a gender stereotype and that the execution of intentions, especially when it is a part of a daily routine, depends not only on cognitive abilities, but also on motivation, effort, and the learned skills. The present study was conducted to help understand the nature of a possible gender difference in PM.

In accordance with our expectations, we found a female advantage in PM performance. However, we demonstrated, for the first time known, that this gender difference was significantly qualified by partnership status. In line with our predictions, a difference in PM was found between women and men in a relationship with an other-gender partner whereas women and men without partners did not differ. This is a very novel pattern which may suggest that gender differences in PM performance are sensitive to a factor of a social and interpersonal nature. Importantly, additional within-gender comparisons revealed an intriguing pattern: Women who were in



a relationship with a male partner demonstrated better PM performance compared to women who were not, whereas men performed better if they were not in a relationship with a female partner compared to when they were. This pattern may suggest that relationships make women in relations better, and men in relations worse, at prospective remembering compared to their uncommitted same-gender counterparts.

It is worth noting that, first, these patterns of results were found for a PM task that was not only gender-neutral, but also very familiar to both women and men. The task was very similar to real-life intentions that men and women need to perform on an everyday basis (e.g., remembering to text, call or email somebody at designated future moments). Second, the patterns held across two different measures of PM performance, that is, both when on-time responding was required and when late responses were allowed. Third, the results of the covariance analyses spoke against the possibility that the experience of taking care of children or that duration of cohabitation might have explained the obtained patterns. Finally, there is absolutely no reason to assume that partnership status was in any way related to the cognitive abilities of men and women, that is, that women with partners had higher cognitive abilities compared to women without partners or that men with partners had lower cognitive abilities compared to men without partners. All four groups of participants consisted of adults in middle adulthood, with no differences between the groups either in age or formal education. All of these findings suggest that it is indeed partnership status that explains our results.

It is reasonable to conclude that partnership status importantly qualifies gender differences in PM performance because being in a relationship with a male partner intensifies the stereotype-related expectations toward a woman to play a mnemonic role and to have superb PM. It is exactly when she is in a long-term relationship with a male partner that she needs to learn how to meet very high everyday demands with respect to remembering about her own and her partner's intentions. Our results suggest that women in relationships are successful in meeting those expectations and better handle everyday intentions compared to men in relationships who face much lower expectations and social pressure to remember about their own PM tasks or to help their female partners remember about their intentions. When these different social expectations and pressures on the two genders are not reinforced by being in a long-term relationship with an other-gender partner, women and men perform equally well.

Furthermore, our findings may suggest that, due to gender stereotypes and very high expectations toward female partners about prospective remembering, women in relationships develop better PM skills compared to when they do not have male partners and consequently have much lower pressure and demands in relation to their PM. For a woman, having a long-term relationship with a male partner may provide regular

training in developing better skills to handle effectively many PM tasks for which she or her partner are responsible. With regard to men, our results suggest that being in a relationship with a female partner makes men worse in PM than their uncommitted same-gender counterparts. Ahn et al. (2017) found that men in relationships did less mental labour as a memory prompter and benefitted more from the collective nature of this mental work than their female partners did. In addition, as Ahn and colleagues' study and the present study demonstrate, when men are in a heterosexual relationship, they have not only a helpful, but also very effective, female partner at hand. It may be that these factors make men put less effort into prospective remembering which causes their PM performance to deteriorate compared to when they do not have a female partner to help them.

The analyses of the memory aid usage enable us to explore what may be driving women's improvement and men's deterioration in PM performance when they are in relationships. The most important results in relation to women were that (a) neither the number of aids used nor the frequency with which they were used were related to partnership status in women, (b) the perceived effectiveness of aids used was, at least for external aids, significantly related to partnership status in women, with aids being evaluated as more effective by women who were in a relationship compared to women who were not. This pattern of results suggests that women's improvement in PM performance when they are in relationships, compared to when they are not, cannot be simply explained by an increase in their use of memory aids, at least when only typical memory aids are taken into account. However, the increase in both perceived and actual effectiveness of memory aids is more in line with our suggestion that women with partners develop better skills to handle everyday intentions and more effective skills utilization, which may involve, for example, using more individualised strategies of supporting PM or applying typical memory aids in a more strategic way.

With regard to men's deterioration in PM performance, we found that men who were in a relationship used internal aids less often than their noncommitted same-gender counterparts. This finding suggests that men, when they have a helpful and effective female partner at hand, minimise their cognitive effort allocated to prospective remembering, which manifests in less frequent use of memory aids that rely on internal mental resources.

### Limitations and Future Research Directions

The main limitation of the present study is the quasi-experimental design (i.e., recruiting existing groups that differed in partnership status). This design somewhat weakens our conclusions about partnership status as qualifying gender differences in PM performance, mainly due to possible untapped confounds to partnership status among these naturally

occurring groups. However, the groups that we recruited did not differ on demographic variables such as age and education. Furthermore, we tested for similarity between the groups on factors related to being in a relationship and found that women and men in relationships did not differ either in how long they had been living with their partners or how many children had been living with them. Similarly, women and men without partners did not differ in the number of children they had. Finally, we ruled out potential confounds, such as taking care of children and duration of cohabitation, through our covariance analyses. This excluded some alternative explanations of the patterns of results and suggests that it is partnership status, rather than other factors, that explains our findings. Nevertheless, future studies may take into considerations other possible confounds to partnership status such as personality in general and conscientiousness in particular.

In addition, future research may examine the issues that the present study did not address. For instance, it will be interesting to investigate whether, due to a societal imperative, women in relationships have higher motivation to perform well on PM tasks compared to men in relationships. Participants may be asked to indicate how important the successful completion of the PM task is for them and how upset they would be if they failed. It will be also interesting to investigate through what specific processes and techniques women who have male partners, compared to women who are not in a relationship, achieve higher effectiveness in PM performance. To this aim, emphasis should be placed more on very individualised ways of supporting PM rather than on the typical memory aids on which the present study was focused.

Of particular interest would be to investigate whether the dependence of gender differences in PM on partnership status is a cross-cultural phenomenon or a pattern limited to more traditional societies, such as Polish society, from which our sample was recruited. Traditional gender roles are strongly present in Poland. This traditionalism is related to the great political influence of the Catholic Church and other conservative social organisations that support a view of women gaining fulfilment as wives and mothers, rather than through employment, as well as the powerful myth of the Polish Mother, which places a duty on women to sacrifice themselves for the family (Hardy et al. 2008). This myth is held up as an icon that is overly exploited in the public discourse on masculinity and femininity in Polish culture and continues to play an important role in the socialisation of young Polish women (Hardy et al. 2008). Although Polish women are perceived as more responsible for family life than their male partners (Kocot-Gorecka 2014; Slany 2008), the egalitarian image of a couple in which both partners are similarly engaged in family and work roles is becoming more and more popular, particularly among well-educated couples with a stable financial situation (Każmierczak and Karasiewicz 2019; Wejnert and Djumabaeva 2005). Furthermore, there is a strong trend of

women articulating their interests in Polish non-governmental organisations and a growing number of influential feminist organisations (Hardy et al. 2008). Therefore, it will be interesting to investigate whether the pattern of results will hold when Poland progresses more toward greater egalitarianism in couples.

### Practice Implications

Our findings portray a complex picture of gender inequalities in romantic heterosexual couples. On the one hand, Ahn et al. (2017) made a valid point about the risks of women playing a mnemonic role. They suggest that women may become overburdened with their own and others' intentions, which may substantially reduce their resources to perform ongoing tasks in an efficient and effective manner, as well as lead to an increase in distractedness and anxiousness. On the other hand, our findings suggest that all these possible costs may come with a prize. The present investigation shows that with heightened demands for female partners and lowered demands for male partners, women in relationships are better at handling everyday intentions compared to men in relationships. However, our findings also suggest that the increased effectiveness of women in relationships, compared to women without partners, does not contribute to the increased effectiveness of the couple as a whole because it is accompanied by the decreased effectiveness of men in relationships compared to men without partners. This suggests that when both benefits and costs related to possible patterns of the division of mnemonic work in couples are taken into account, more equal division is to be recommended. With more evenly distributed responsibility and effort, male partners may maintain the higher effectiveness that they demonstrate without having a female partner at hand, and female partners do not need to pay the costs of increased effectiveness such as being overburdened and deprived of mental resources.

Practitioners of various professions may raise the awareness of stereotypical expectations about PM and their consequences, as well as stimulate changes in this area. First, the issue may be addressed when teaching about gender equality at secondary school level, either by teachers or educators from non-governmental organisations who run training and workshops on key gender equality issues for schools and youth groups. Students may confront their own implicit biases by, for example, answering the question: Why do we think that it is strange that a woman forgets about a birthday of her partner's father and a man reminds his female partner about important things that she needs to take to work next day? This questioning would be directed at bringing awareness and recognition of how the social expectations, induced by gender stereotypes related to PM, put much more responsibility and burden on women. Educators may highlight the heightened expectations toward women that manifest not only in an

increase in household labour, but also in an increase in mental labour that is less visible and direct (e.g., in thinking about and planning the completion of the couple's intentions). The ultimate goal would be to show that both partners in a couple have equal rights to expect help from the other person that includes helping with mnemonic work.

Second, the division of mnemonic work between partners may be addressed by psychologists and counsellors who run premarital workshops and who may highlight the negative consequences, for both women and men, of unevenly distributed responsibility and effort in relation to prospective remembering. The participants in these workshops may be given simple tasks, inspired by the procedures used by Ahn et al. (2017) and Moulton-Tetlock et al. (2019), to realise how mnemonic work has been already divided within their couple without them being aware of it or intending it and then consider whether they are satisfied with this division. For example, both partners may be asked to freely recall PM tasks about which they will need to remember and to decide whether completing each task will benefit themselves or their partner more to see whether one of the partners is disproportionately aware of and attuned to the other person's tasks.

Finally, our findings about gender differences in prospective remembering may be used by couple therapists in those cases where a crisis is primarily related to the division of labour in a couple, with a female partner feeling overburdened and a male partner feeling cut off from important domestic matters. If the couple is willing to introduce changes at a later stage of the therapy, they may be offered a task to perform repeatedly over a period of several weeks. The task would require each partner to list, at the beginning of each week, a few most important PM tasks to be completed during that week and then decide together how often they want to be reminded about those tasks. The partners would then be asked to stick to the agreed schedule of providing reminders during the week, with a male partner trying to provide a reminder as often as the schedule prescribes and in relation to all intentions listed by his female partner, as well as a female partner trying not to provide a reminder more often than the schedule prescribes and to prompt only those tasks of her male partner that were on the list. This training in more equal division of mnemonic work should enhance a sense of mutual caring and concern which is the central characteristic of high quality relationships (Colbert et al. 2008).

## Conclusions

The present investigation opens up a new research avenue which analyzes the role of romantic relationships for gender differences in everyday prospective memory performance. Previous studies have suggested that, due to gender stereotypes, women are expected to have better PM and thereby they

put more effort into prospective remembering. The present study extends this line of research and theoretical thinking by showing a female advantage in actual PM performance. Most importantly, our findings show that this gender differences manifest when stereotypical expectations toward the two genders are intensified (i.e., when women and men are in relationships with other-gender partners) and disappears for people without partners.

**Author Contributions** The two authors together (a) developed the study conception and design, and (b) analysed and interpreted the data. Monika Zielińska collected the data under Agnieszka Niedźwieńska's supervision. The first draft of the manuscript was written by Agnieszka Niedźwieńska. Monika Zielińska commented on previous versions of the manuscript. Both authors read and approved the final manuscript.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflict of interest.

**Ethical Approval** The study was approved by Psychology Research Ethics Committee at the Jagiellonian University in Kraków.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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