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Empathy and Autobiographical Memory: Are They Linked?

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Abstract. Autobiographical memory and empathy have been linked with social interaction variables as well as gender in independent bodies of literature. However a scarcity of research exists on the direct link between autobiographical memory and empathy. Exploring this link, in particular for memory of friendships and empathy, was the authors' main aim. A total of 107 Italian undergraduates participated. A memory fluency task was used to assess accessibility of memories spanning their entire life (preschool through university) and an empathy scale (Italian version of the Interpersonal Reactivity Index) was employed to measure the participants' level and dimensions of empathy. For men, empathy scores were related to how many memories they could recall. Specifically, men with higher scores on the fantasy and empathic concern scales and those with lower scores on the personal distress scales recalled more memories of friends. However, affective quality of their memories was unrelated to empathy. In contrast, for women there was no relationship between number of memories and empathy, but the emotional tone of their memories was related to empathy: those with higher scores on the personal distress scale had proportionately fewer affectively positive memories. Results are discussed in terms of gender differences in both empathy and parental socialization patterns.

Keywords autobiographical memory, empathy, dimensions of empathy, gender differences, memory affect

Autobiographical memories provide us with a sense of our past, but recently it has been argued that they provide much more: they are important contributors to our identity and provide our lives with a sense of coherence (Conway, 2005; Conway & Holmes, 2004; Habermas & Bluck, 2000; McAdams, 2006). These personal event-memories have been shown to be related to a number of social interaction variables such as parent–child interactional patterns and gender. A separate body of research has linked some of the same social interaction variables to the personality quality of empathy.

As various authors (e.g., Conway & Rubin, 1993; Nelson & Fivush, 2004) have argued, autobiographical memory is not just referenced to the self but is personally significant, concerned with episodes that have personal meaning. Personal meaning emerges from emotions, motivations, and goals that are constructed in interaction with others in the world. Thus, autobiographical memory is declarative, explicit memory for specific points in the past, recalled from the unique perspective of the self in relation to others. If we accept this definition, a close relationship between autobiographical memory and empathy could show that the perspective of the self in relation to others may vary in terms of the capacity to represent self-other relations in memory, and the type of self-other relations that are represented.

The thrust of the present study is to explore direct links between autobiographical memory and empathy. Although the research literatures on autobiographical memory and empathy have been separate, both literatures have focused on similar influences. For example, both stress the importance of social interaction variables. Research on autobiographical memory has stressed parent–child interaction styles (e.g., Fivush, Haden, & Reese, 2006; Peterson & McCabe, 2004), the quality of parent–child attachment (McCabe, Peterson, & Connors, 2006; Newcombe & Reese, 2004), and parental warmth (Peterson & Nguyen, 2010; Tani, Bonechi, Peterson, & Smorti, 2010). Likewise, research on empathy has stressed parent–child interaction styles (e.g., Barber, Stolz, & Olsen, 2005; Davidov & Grusec, 2006), the quality of parent–child attachment (e.g., Kochanska, 2002; Laible, Carlo, & Roesch, 2004), and parental warmth (Zhou et al., 2002). The host of studies demonstrating how the development of both autobiographical memory and empathy have strong relationships to parallel social interactive factors lends indirect support to our assumption that these two concepts are linked.

In the literature, studies directly linking autobiographical memory and empathy are rare as well as heterogeneous. For example, Harris et al. (2004) looked at how dispositional empathy facilitates recall, using films as prompts for autobiographical memory. More recently, Bluck and colleagues (Bluck & Alea, 2009; Bluck, Baron, Ainsworth, Gesselman, & Gold, 2013) have empirically supported another point of view, claiming that autobiographical memory sharing can serve the function of eliciting empathy. In their opinion, autobiographical memories constitute a key psychological process in empathy because the use of our own past experience constructs models that allow us to understand the inner world of others. Bluck et al. (2013) also showed how the communication of autobiographical memories to a listener can enhance a narrator's empathy toward that person.

The present study expands the extant limited body of research that directly considers the relationship between autobiographical memory and empathy in a number of ways. First, it differentiates different forms of empathy rather than considering empathy as a unified concept. Second, it focuses on a particular type of social relationship, specifically friends. Finally, it explores gender-differentiated patterns of relationship among these variables.

The Multidimensional Nature of Empathy

There is no universally accepted definition of empathy nor is there consensus on what constitutes this construct. However, empathy frequently has been defined as an emotional reaction to the emotional state or condition of other people (Eisenberg & Fabes, 1998). According to another

definition, empathy is the ability to feel or imagine another person's emotional experience, to understand their feelings and ideas (Decety & Jackson, 2004).

Nowadays there is increasing consensus that empathy is a multifaceted process, composed of several components (M. H. Davis, 1983; Eisenberg & Fabes, 1998). Specifically, M. H. Davis (1996) described empathy as a multidimensional phenomenon comprising emotional and cognitive components, and that can be described as a set of distinct but related dimensions that all interact. In particular, the four dimensions are: perspective taking, fantasy, empathic concern, and personal distress. Perspective taking and fantasy refer to the cognitive aspects of empathy and represent two different types of antecedents of experiencing emotions in response to emotions felt by others. Specifically, perspective taking is defined as the individual's disposition to adopt the point of view and the perspective of others. Fantasy describes the tendencies to identify and imagine oneself into the feelings and actions of characters in movies, books, plays, and in other forms of role taking in the fictional domain.

Empathic concern and personal distress, instead, are purely and typically emotional. Specifically, empathic concern includes feelings of warmth, compassion, and sympathy for another person; it is focused on the comprehension of his emotional state, and is other-focused. Personal distress, instead, is self-focused and is related to feelings of anxiety, discomfort, fearfulness and uncertainty in stressful situations or when observing negative emotions in others, which result in the desire to avoid contact with the distressed person if possible. In the present study, we differentiate these four dimensions of empathy.

Focus on Friendship Relationships

Friends become increasingly important in the individual's socialization processes in a number of ways as children move from early childhood to early adulthood. In particular, in the transition from adolescence to adulthood the nature and features of the relationships with friends change significantly. In this period having satisfactory friendship relationships constitute a significant protective factor against distressing experiences and depressive states (Allen, Porter, McFarland, Marsh, & McElhaney, 2005). Friends satisfy the need for social integration (Barry, Madsen, Nelson, Carroll, & Badger, 2009), become more important for improving feelings of self-esteem (Way & Greene, 2006) and serve as an important source of support toward achieving independence for young adults (Guarnieri & Tani, 2011). They also become more prominent in memory: when Peterson, Bonechi, Smorti, and Tani (2009) asked university students to recall memories from various periods of their lives, memories of friends became increasingly frequent and were more numerous than those about parents from early adolescence onward. Hence, the present study focuses on exploring memory and empathy in friendship relationships.

Gender

Gender has been strongly linked to empathy. Considerable research has shown that women are significantly more empathic than men at all ages (Gault & Sabini, 2000; Macaskill, Maltby, & Day, 2002), with higher scores in both affective (Soenens, Duriez, Vansteenkiste, & Goossens, 2007) and cognitive components (De Wied, Branje, & Meeus, 2007; Garton & Gringart, 2005) of

empathy. In fact, women evidence higher scores in all of the empathy components investigated in the present study, namely, perspective taking, empathic concern, personal distress, and fantasy (Davis, 1983; Karniol, Gabay, Ochio, & Harari, 1998). Consequently, they show a greater ability to understand the others' feelings, thoughts and emotions than do men (Klein & Hodges, 2001). From birth, girls show a higher level of the precursors of empathy, such as preferences for faces (Connellan, Baron-Cohen, Wheelwright, Batki, & Ahluwalia, 2000) and for eye contact (Lutchmaya, Baron-Cohen, & Raggatt, 2002). Girls are also more prone to exhibit comforting emotional expressions and vocalizations when others display feelings of distress (Hoffman, 1977). These gender differences in empathy increase during adolescence (Mestre, Samper, Frias, & Tur, 2009) and remain evident in adulthood (Baron-Cohen &Wheelwright, 2004; Carroll & Chiew, 2006).

The variable of gender has also been shown to be important for autobiographical memory. Women's and men's autobiographical memories have been shown to differ in a number of both quantitative and qualitative ways. For example, women's event memories are longer and richer in detail (Fivush, Berlin, Sales, Mennuti-Washburn, & Cassidy, 2003; Pohl, Bender, & Lachmann, 2005), and are more likely to include emotional and interpersonal information (Bauer, Stennes, & Haight, 2003; Davis, 1999; Fivush et al., 2003). Women also typically retrieve earlier memories of their childhood (P. J. Davis, 1999; MacDonald, Uesiliana, & Hayne, 2000). As well, women have been found to retrieve more memories in a memory-fluency task (Wang, Conway, & Hou, 2004), although others have suggested that gender differences in motivation may account for some of the memory differences (Peterson, Noel, Kippenhuck, Harmundal, & Vincent, 2008; Peterson, Warren, Nguyen, & Noel, 2010; Pillemer, Wink, DiDonato, & Sanborn, 2003). To explain these gender differences in autobiographical memory, a number of researchers have emphasized socialization differences between genders. For example, parents are more likely to engage in autobiographical memory sharing with daughters than sons; they are also more likely to embed remembered events within an emotional and interpersonal context (Buckner & Fivush, 2000; Fivush et al., 2003). This can suggest that women may learn to have more elaborate internal representations of their relationships, which may in turn lead them to develop better autobiographical memories of them.

Finally, gender also exercises a pervasive influence over friendship. Women's friendships are more exclusive (Giordano, 2003; Johnson, 2004) and tend to emphasize intimacy, self-disclosure, affection and supportiveness for mutual need satisfaction (Brown & Klute, 2003; Tani, Guarnieri, & Bonechi, 2008) than men do. In contrast, men are more focused on sharing activities and interests (Tani, 2000) and on establishing a dominance hierarchy, which can often lead to competition, with their friends (Bird, 2003).

All these differences are consistent with socially expected gender roles. Specifically, at an early age boys learn to avoid behaviors considered feminine such as sensitivity, nurturance and emotional expressiveness (Maccoby, 1998). In contrast, girls learn behaviors based on social support, care and nurturance for others, emotional disclosure and communion (Eagly & Koenig, 2006). These role expectations exert continuing influence into adulthood.

Research that investigated direct relationships between friendship and empathy showed that at all ages girls and women are more expressive in their friendships, showing higher levels of empathy, altruism, and tolerance than boys and men (Fox, Gibbs, & Auerbach, 2006). Empathy is associated with the quality and commitment of friendship relationships as well as dispositional

forgiveness following transgression (Goss, 2006). Moreover, higher levels of empathy are associated with more successful conflict management within the context of same-sex friendship. In particular, affective empathy is found to be positively linked to problem solving strategies and negatively linked to conflict engagement, whereas affective empathy is not related to the two more passive strategies of withdrawal and compliance. These relations are influenced by gender. Specifically, sex differences are established for both empathy and friendship, with girls scoring higher in empathic tendencies as well as friendship quality (De Wied et al., 2007).

In one of the few studies that has directly explored both autobiographical memory and empathy, Pohl et al. (2005) showed that the relation between autobiographical memory and empathy is moderated by gender: in girls and women autobiographical memories are correlated with empathy, while in boys and men with assertiveness. The authors concluded that autobiographical memory, empathy, and assertiveness develop in gender-specific mutual dependencies reflecting socialization processes.

The Present Research

Studies on relationships between autobiographical memory and child socialization as well as between empathy and child socialization suggest that there may be direct links between autobiographical memory and empathy. Hypothesizing a close relation between empathy and autobiographical memory suggests the idea of an empathic way of remembering, where, for instance, the subject remembers taking into account the perspective of others. If this could be demonstrated it could mean that empathy is not only a matter of creating a feeling of closeness, intimacy, and comprehension with others during a concrete interaction in the present but that this capacity is sustained by a memory of the past where, at a representational level, the self feels closeness, intimacy and comprehension with others.

The present study investigates the way that empathy and memory may be related to each other. More specifically, we predict that empathy will be related to how readily someone can retrieve memories of self and others as well as the emotional content of those memories. But it is important to remember that empathy is not a unitary concept; rather, theorists have described at least four different components of empathy, as described above. At the present time, we have no a priori basis for predicting which component(s) of empathy may be important. Thus, the present study is exploratory in terms of identifying which components of empathy are related to autobiographical memory. However, because empathy has so frequently been found to be moderated by gender, we combine an individual-differences approach with a cognitive approach, because the study of individual differences in performance can provide a powerful addition to cognitive studies (Underwood, 1975; Vogel & Awh, 2008). Therefore, we predict that any relationship between empathy and memory will also be moderated by gender. In prior research, men who had warm relationships with parents were able to retrieve more memories of their childhood from various points of time, whereas for women, parental relationship quality was associated with the affective quality of childhood memories, not how many they could retrieve (Tani et al., 2010). Gender may have a parallel influence here too; that is, the relationship between memory and empathy may be moderated by gender such that empathy is most related to the availability of memories in men but the emotional tone of memories in women.

METHOD

Participants

A convenience sample of 107 university students from the University of Florence (62 men and 45 women) were recruited for this study. Students ranged from 18 to 26 years old ($M = 20.2$ years; $SD = 2.3$ years); men's mean age was 20.9 years ($SD = 2.8$ years), and women's mean age was 19.4 years ($SD = 1.1$ years). The majority of these participants came from the center of Italy (89.7%), with the remainder from Southern (5.6%) or Northern (4.7%) Italy. All participants came from families of middle or high socioeconomic level with more than 70% of their parents having a high school diploma or university degree. As well, 64.5% of the participants had at least one sibling and 83.0% currently lived at home with their parents.[1]

Instruments

Empathy

To assess several aspects of empathy we used the Italian version of the Interpersonal Reactivity Index (IRI; M. H. Davis, 1980), adapted by Albiero, Ingoglia, and Lo Coco (2006). IRI is a multidimensional scale composed of 28 self-report items designed to measure both cognitive and emotional components of empathy and it consists of four subscales that contain seven items each. The perspective taking subscale (PT) assesses the ability to spontaneously adopt the psychological point of view of others (e.g., "I sometimes try to understand my friends better by imagining how things look from their perspective"). The fantasy subscale (FS) measures respondents' tendencies to transpose themselves imaginatively into the feelings and actions of fictitious characters in books, movies, and play (e.g., "I really get involved with the feelings of the characters in a novel"). The empathic concern subscale (EC) measures the tendency to experience[1] feeling of sympathy, compassion, and warmth for people involved in unpleasant experiences (e.g., "When I see someone being taken advantage of, I feel kind of protective toward them"). Finally, the personal distress subscale (PD) measures self-oriented feelings of personal anxiety and unease from observing other people in difficult social situations or in situations of emotional distress (e.g., "In emergency situations, I feel apprehensive and ill-at-ease"). The PT and FS are related to the cognitive aspects of empathy while the EC and PD measure the emotional aspects of empathy.

Participants rated each item using a 5-point Likert-type scale ranging from 1 (*does not describe me well*) to 5 (*describes me very well*). The completion of the IRI took about 15 min. The Italian version of the IRI has confirmed the original four-factor structure identified by M. H. Davis (1980). Specifically, the fit indices of confirmatory factor analysis were good, $\chi^2(261, N = 828) = 522.62$, $\chi^2/df = 1.98$, comparative fit index = .91, root mean square error of approximation = .04, standardized root mean square residual = .05. Furthermore, psychometric analyses showed that Pearson's r coefficients of the intercorrelations among the empathy subscales vary from

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[1] In Italy, as in other mediterranean cultures (Greece, Malta, Cyprus), males and females leave their homes late (29 or 30 years old) in comparison with northern European countries such as the Netherlands or Finland (EUROSTAT, 2009).

.21 to .39 and that internal consistency coefficients of all four subscales were satisfactory, with Alpha coefficients ranged .69 to .74 (Albiero et al., 2006). In the current study the Pearson's r coefficients of the intercorrelations among the empathy subscales vary from .28 to .45. There were no significant correlations between distress and perspective taking and empathic concern scales. Alpha coefficients ranged from .71 to .74.

Questionnaire on memories

Methodologically we considered those memories that are most readily accessible important for the construction of a coherent sense of self and most likely to be integrated into a person's life story (Bohanek, Marin, Fivush, & Duke, 2006). According to Conway and his colleagues (e.g., Conway & Holmes, 2004; Conway & Pleydell-Pearce, 2000) the memories that are readily accessible are those that are meaningful not only at the time of retrieval but also at the time the events occurred. They further argued that the most accessible memories from a particular period of an individual's life are best measured by providing subjects with a limited amount of retrieval time. That is, it is the first few memories that are most significant, and an optimal way to elicit them is through a time-limited recall task. Thus in the present study, we explore individuals' memories through use of this type of task.

Participants were engaged in a timed memory-fluency task that is described and employed in previous research (Peterson et al., 2009). In particular, they were asked to recall memories that involved friends from four different periods of their lives: (a) when they were preschool-aged, (b) in elementary school, (c) in middle school or junior high, and (d) in high school or university. These age periods were chosen because they demarcate significant educational transitions, which help people locate memories in time. Furthermore, we wanted participants to retrieve memories from the entire range of their earlier life rather than recalling all or most of their memories from just the most recent period of life.

During each timed memory-retrieval period, participants were asked to recall as many memories as they could that involved their friends and write down only a sentence or two about each memory before moving on to the next memory. For each age period they were given 3 min to do this task (timed by the researcher). After each timed memory-retrieval period, there was an untimed period during which participants were asked to go back over their listed memories and for each one, to specify the emotion involved, if any. The whole task entailed about 30 min.

Procedure

Participants were recruited while they were in class during university courses. They were told about the general goals of this research project, and then questionnaires on empathy and memories were presented and applied in a counterbalanced order with half of participants completing the empathy questionnaire before the memory task. The research was conducted in accordance with the guidelines for the ethical treatment of human participants of the American Psychological Association. Prior permission was obtained from the university dean and president as well as each course professor. Participants provided their individual consent and could withdraw at any time.

Data Coding

The number of memories from each age period was tabulated. Given a time-limited task, memories consisted of a brief sentence or two (e.g., "the day in which I did a bicycle trip with my friends" or "when I was not invited to the birthday party of my best friend"). For the emotion involved in each recalled memory, two raters independently read participants' responses and classified them according to the main meaning of the emotion: First, the emotion was classified as positive when the emotion referred to a basic state of pleasure of the narrator (e.g., joy, satisfaction, love). For instance, while recalling the middle school period a female participant recalled "that day when my friend Maria invited me for a pajama party" (when she was 12 years old). When later requested to specify the emotion involved, after the timed portion was done, she wrote "joy," which was classified as a positive emotion. Second, the emotion was classified as negative when the emotion referred to a basic state of unpleasure of the narrator (e.g., anxiety, pain, sorrow). For instance, while recalling the primary school period a female participant recalled "when I was defeated in a hand to hand struggle with a classmate" (when she was 9 years old). When later requested to specify the emotion involved, she wrote "shame" which was classified as negative. Third, an emotion was classified as neutral when the narrator identified no emotion or used negation to express his/her feeling (e.g., not anxious, not excited). Because there were so few memories classified as affectively neutral they will not be considered further. The two raters compared ratings and resolved disagreements through discussion. Cohen's K coefficient for agreement was high (.81).

RESULTS

Memory and Empathy Measures

Means and standard deviations for memory and empathy measures are shown in Table 1, separated by gender. For all analyses, independent samples t-tests were calculated for the data, with gender as the between-subjects variable. The t values and significance levels (ps) are also found in Table 1.

Overall, participants provided memories from the entire range of childhood, from their preschool years through high school and university years. However, men and women recalled more memories from middle school and high school and university (age periods 3 and 4). Not surprisingly, there were more memories from later periods of life, and t-tests on the number of memories recalled in these periods by women versus men showed that women recalled significantly more memories than men. With regard to percentages of positive and negative memories, there were no significant differences between men and women.

We found that t-tests on the empathy measures showed significant differences between men and women in three dimensions. Specifically, women displayed higher scores than men in perspective taking, empathic concern, and personal distress. In contrast, there were no significant differences between men and women in the fantasy subscales. Moreover, no significant difference was found in empathy scores or in the number or emotion of memories as a function of the order in which the empathy and memory tasks were done.

TABLE 1
Means and Standard Deviations for Memory and Empathy Measures, Separated by Gender

	Males		Females		Both				
	M	SD	M	SD	M	SD	t	df	p
Memory measures									
Age period 1									
Number of memories	3.22	1.66	3.39	1.71	3.29	1.69	0.49	105	ns
% Positive	72.49	29.88	67.70	32.43	70.44	30.93	0.76	105	ns
% Negative	21.95	30.52	25.93	30.52	23.65	27.73	0.70	105	ns
Age period 2									
Number of memories	4.23	2.10	5.20	2.15	4.64	2.17	2.30	105	.02
% Positive	63.41	29.46	58.70	24.43	61.42	27.42	0.88	105	ns
% Negative	27.61	28.14	32.85	23.81	29.83	26.40	1.01	105	ns
Age period 3									
Number of memories	5.17	2.39	6.14	2.87	5.58	2.64	1.99	105	.05
% Positive	63.95	27.84	60.81	23.47	62.62	26.01	0.62	105	ns
% Negative	23.13	21.14	29.03	21.08	25.63	21.21	1.41	105	ns
Age period 4									
Number of memories	6.67	2.84	8.00	3.15	7.23	3.03	2.25	105	.02
% Positive	62.74	25.70	62.68	22.84	62.71	24.41	0.01	105	ns
% Negative	28.06	24.16	29.72	22.64	28.76	23.43	0.36	105	ns
Empathy measures									
Perspective taking	19.71	2.74	21.22	2.17	20.25	2.61	3.07	105	.003
Fantasy	19.02	3.08	20.00	2.25	19.43	2.79	1.91	105	ns
Empathic concern	21.47	2.76	22.91	1.73	22.07	2.47	3.32	105	.001
Personal distress	17.11	3.61	21.22	4.09	18.84	4.31	5.49	105	.000

Memories of Friends and Empathy

To explore the moderating influence of gender on the relationship between empathy dimensions and autobiographical memories about recollections involving friends, a series of hierarchical regression analyses was conducted, following procedures recommended by Aiken and West (1991). The independent variables were the four dimensions of empathy (i.e., perspective taking, fantasy, empathic concern, and personal distress), and the dependent variables were the dimensions of memories (i.e., number of memories, percentages of positive and negative memories).

The independent variables were included in the regression equation in three consecutive steps. In Step 1 the scores of the four dimensions of empathy were entered separately. In Step 2 the moderating variable of gender was entered. Last, in Step 3 the two-way interactions between empathy dimensions and the moderating variable (the multiplicative products of the standard scores, Perspective Taking × Gender, Fantasy × Gender, Empathic Concern × Gender, Distress × Gender) were entered. Significant interaction between the predictor and the moderating variables are represented graphically. Moreover, in order to examine the significance of each slope, simple slope analyses were conducted utilizing post hoc regressions (Aiken & West, 1991). To avoid the problem of multicollinearity, we followed Aiken and West's (1991) guidelines and mean-centered the score of independent variables. The results of the hierarchical regression analysis regarding

TABLE 2
Moderation Analyses of Empathy Dimensions and Number of Memories by Gender

	β standardized	t	p	R^2	ΔR^2
Perspective taking	.14	1.23	ns	.005	—
Gender	.28	2.88	.005	.06	.06
Perspective Taking × Gender	.27	2.26	.03	.10	.04
Fantasy	.31	2.88	.005	.06	—
Gender	.23	2.44	.02	.10	.04
Fantasy × Gender	.19	−1.80	ns	.13	.03
Empathic concern	.27	2.44	.02	.05	—
Gender	.25	2.47	.01	.09	.04
Empathic Concern × Gender	.22	1.98	.04	.12	.03
Personal distress	−.21	−1.42	ns	.00	—
Gender	.31	2.92	.003	.08	.08
Personal Distress × Gender	.08	0.54	ns	.08	.00

the moderating role of gender on the relationship between empathy dimensions and number of memories are displayed in Table 2.

As shown in Table 2, gender was a significant factor for every empathy dimension. Furthermore, there was a significant interaction between perspective taking and gender. The moderating variable of gender acts as a buffer moderator on the relationship between perspective taking and number of memories. Specifically, perspective taking was more strongly associated with number of memories in women than in men. Post hoc analyses indicated that the relationship between perspective taking and number of memories was significant and positive only for women ($\beta = 1.91$), $t(43) = 2.12$, $p = .03$. In contrast, the relationship was non-significant for men ($\beta = 0.45$), $t(60) = 1.23$, ns.

There was also a significant interaction between empathic concern and gender. In particular, empathic concern was more strongly associated with number of memories in women than in men. Post hoc analyses indicated that the relationship between empathic concern and number of memories was significant and positive for women ($\beta = 2.37$), $t(43) = 2.42$, $p = .01$, and men ($\beta = 0.868$), $t(43) = 2.43$, $p = .01$. Finally, there were no significant interactions between the other two empathy dimensions, fantasy and personal distress, and gender in the prediction of number of memories.

With regard to emotional tone of memories, the hierarchical regression analysis regarding the moderating role of gender has shown significant interactions between the dimension of personal distress and percentages of both positive and negative emotions (see Table 3). There were no significant interactions between other empathy dimensions (i.e., perspective taking, empathic concern and fantasy) and gender.

With regard to percentages of positive emotions, there was a significant interaction between personal distress and gender. The moderating variable of gender acts as a buffer moderator on the relationship between personal distress and percentages of positive memories. Specifically, personal distress was more strongly associated with positive memories in women than in men (see Table 3). Post hoc analyses indicated that the relationship between personal distress and

TABLE 3
Moderation Analysis of Personal Distress and Percentages of Positive and Negative Memories by Gender

	β standardized	t	p	R²	ΔR²
% Positive memories					
Personal distress	.29	1.94	ns	.00	
Gender	.08	0.79	ns	.01	.01
Personal Distress × Gender	.41	2.87	.004	.08	.07
% Negative memories					
Personal distress	.13	0.860	ns	.02	
Gender	.09	0.847	ns	.03	.01
Personal Distress × Gender	.29	2.040	.04	.07	.04

percentages of positive memories was significant in women ($\beta = -1.31$), $t(43) = -2.11$, $p = .03$, and men ($\beta = 1.16$), $t(60) = 1.94$, $p = .05$.

With regard to percentages of negative emotions, there was a significant interaction between personal distress and gender. The moderating variable of gender acts as a buffer moderator on the relationship between personal distress and negative memories. Specifically, personal distress was more strongly associated with the percentage of negative memories in women than in men. Post hoc analyses indicated that the relationship between personal distress and negative memories was significant and positive only for women ($\beta = 2.07$), $t(43) = 3.70$, $p < .001$. In contrast, the relationship was nonsignificant for men ($\beta = 0.49$), $t(60) = .91$, ns.

DISCUSSION

The main focus of this study was exploring relationships between autobiographical memories and empathy. Moreover, because empathy is not a unitary concept, we expected to identify which specific component(s) of empathy are related to autobiographical memories. More specifically, we predicted that both how readily one could retrieve memories of friendship relations in a memory fluency task and the emotional tone of those memories would be related to one's level of empathy, as measured by the Italian version of the IRI. We also predicted that any relationship between empathy and memory would be moderated by gender.

All of these hypotheses were supported. Empathy significantly influenced the total number of memories about friends that individuals could recall as well as the emotional tone of those memories, but this influence was more significant in women than in men. As well, different components of empathy were differently related to memory. Empathic concern, the empathy component more focused on the comprehension of emotional states of other people including feelings of warmth, compassion, and sympathy for their emotional experience, significantly predicted the total number of memories that both women and men recalled about their friendships. However, this association was stronger in women than in men. Furthermore, only in women, but not in men, the total number of memories was also predicted by the cognitive component of empathy, perspective taking: women who had higher levels in this component recalled more memories about their friends. Because the perspective taking dimension is defined as the ability to understand another person's inner experiences and feelings and the capability to view the

outside world from the other person's perspective (Davis, 1996), these findings supported our hypothesis that the participants who recall more memories about their friends are more able to take into account the perspective of others.

In addition, one of the empathy scales was also related to the emotional tone of memories recalled by participants, and this relationship was significant for women but not men. Specifically, personal distress in women predicted recalling more negative and fewer positive memories about friends. The personal distress scale describes the feelings of fear, apprehension, and discomfort that a person experiences when witnessing a negative event involving another person (M. H. Davis, 1983; Decety & Lamm, 2009). These negative feelings lead to avoiding contact with the distressed person, and possibly avoiding memories of the distressing event (Tice, Bratslavsky, & Baumeister, 2001). In such a way people can defend themselves against negative feelings and experiences. In other words, our data show that a low rate of personal distress can be predictive of having positive memories of friends.

Why might empathy predict memory of friendships? As discussed in the introduction, both the body of research on parent–child style of memory-talk (e.g., Fivush et al., 2006; Peterson & McCabe, 2004) and that on parent–child relationship quality and autobiographical memories (e.g., McCabe et al., 2006; Newcombe & Reese, 2004) demonstrate that memory of social events is highly linked to the quality of social relationships. And in previous studies we demonstrated that the number of memories recalled in a memory fluency task was higher and the emotional tone of these memories was more positive in those individuals who had more intimate relationships (Peterson et al., 2009; Tani et al., 2010).

With particular regard to friendship, empathy plays an important role in the formation of important and mature components of these relationships, such as intimacy, trust, and self-disclosure (Erwin, 1993). Empathy helps promote good communication ability as well as better management of conflicts with friends (M. H. Davis, 1996; Hatfield, Cacioppo, & Rapson, 1994). During conflicts with friends, in fact, empathic individuals are able to adopt their friends' perspective and to share distress. Accordingly, a constructive resolution of disagreements is facilitated, preventing destructive acts (M. H. Davis, 1996; De Wied et al., 2007). Thus, there is substantial evidence that empathy is related to a higher quality of friendship relationships. Because social relationships are linked to both memory and empathy, it is sensible that empathy predicted memories of friendships.

Why was the relationship between memory and empathy stronger in women than in men? A possible answer is suggested by our results. Our data showed that women recall more memories of their friends than men do. This result is consistent with studies on gender differences in memories, relationships, and friendships. Adult women can recall more autobiographical memories than men when those recalled memories involve close relationships, affiliation, and family (Peterson et al., 2009; Peterson et al., 2010; Pillemer et al., 2003; Tani, et al., 2010). Women's friendships are characterized by intimacy (Cui, Conger, Bryant, & Elder, 2002), which frequently involves memory sharing. Likewise, parents are more likely to engage in elaborative, relationship-oriented, and emotion-laden conversations on memories with female than male children (Buckner & Fivush, 2000; Fivush et al., 2003). Thus, women are more likely to be enmeshed in a social world that involves considerable memory sharing and joint discussion of salient personal events, and this memory sharing frequently takes place with a range of social partners. In contrast, men are less likely to be enmeshed within this sort of memory-sharing interaction with either friends or parents.

Women report more intimate and exclusive friendships (Giordano, 2003; Johnson, 2004), and disclose more feelings and personal information than do boys (Camarena, Sarigiani, & Petersen, 1990). Whereas men's friendships are focused on sharing activities and interests and require the establishment of a dominance hierarchy (which can often lead to competition; Bird, 2003), women's friendships tend to emphasize intimacy, affection, and supportiveness for mutual need satisfaction (Brown & Klute, 2003). In other words, women's friendships may be described as communal and person-oriented because they are characterized by a more intimate involvement and are focused on self-disclosure, supportiveness and the exchange of confidences and emotions (Markiewicz, Devine, & Kausilas, 2000; Tani, 2000). As well, girls learn behaviors based on social support, care and nurturance for others, emotional disclosure and communion (Eagly & Koenig, 2006; Gilligan, 1982). Men's friendships, instead, may be described as instrumental and action-oriented because they are organized around shared interests and activities (Markiewicz et al., 2000).

Moreover, in our research women scored more highly in both affective and cognitive components of empathy, providing further evidence of gender differences in this ability (De Wied et al., 2007; Garton & Gringart, 2005; Soenens et al., 2007) and therefore of women's greater ability to understand the others' feelings, thoughts and emotions than do men (Klein & Hodges, 2001). These higher empathy-related abilities that characterize women at all ages (Bonino, Lo Coco, & Tani, 1998; Gault & Sabini, 2000; Macaskill et al., 2002) tend to increase during adolescence (Mestre et al., 2009) and remain evident in adulthood (Baron-Cohen &Wheelwright, 2004; Carroll & Chiew, 2006). These abilities also seem to be due to different socialization practices about emotion between genders that encourage girls to care for others more than do boys (Kuebli, Butler, & Fivush, 1995). Thus, because both social relationship quality and empathy are different according to gender, it makes sense that empathy predicts number of memories of friends more in women than in men.

There are a number of limitations in this study. The fact that women wrote more memories on friendship than men might depend on the fact that in studies of autobiographical memory, women typically remember more emotional information than do men (Bloise & Johnson, 2007) and because memories on friendship can involve emotional content, women of our sample might have more memories simply because have more memories of emotional situations. In a further study another control test on neutral content or an analysis of memory content could be fruitful. This could assess Pohl et al.'s (2005) hypothesis that men have more memories on assertiveness situations while women on empathic emotional situations. Another alternative interpretation is that women are more facile writers (Nation's Report Card, 2011) and can write a greater number of memories than men do, and this may explain why in our participants women were significantly superior to men in number of memories recalled. Future research that addresses these issues could ask participants to recall memories within a longer period of time.

It is possible that the increasing number of memories reported as participants referenced later ages could also reflect the fact that the ages were reported on chronologically, so there is an age-practice effect confound. A replication of this study can explore this possibility by randomly selecting the order of ages that different participants are asked to recall. Moreover, although we had 107 participants, the study would have been stronger with more. As well, the sample was limited to Italian university students. Though cross-cultural studies on empathy are missing, given possible cultural differences in terms of a more collectivistic Mediterranean society in comparison to a more individualistic society such as found in North American Anglo-Saxon societies such as

American or Canadian societies (Schneider, Fonzi, Tani, & Tomada, 1997; Smorti et al., 2007), it is possible that relationships between empathy and memory may differ within different social contexts.

Surely culture also affects friendship features. Verkuyten (1996) found that in collectivistic cultures there was a more allocentric attitude toward friends in comparison to individualistic cultures, where a more idiosyncratic attitude was common. In comparison to individualistic ones, collectivistic culture participants demonstrated a greater sensitivity to friends, using more ascribed features describing friends, seeing their relationship as closer, and perceiving less intimacy with other-than-best-friends. Because the sample of our research comes from what can be defined as a more collectivistic society (as are Mediterranean Societies) it may be that these participants referred to their friends in terms of allocentric attitudes, and because allocentric attitudes seem to imply more intimate relationships, these are likely to imply a more empathic attitude.

Finally, we had no direct evidence of the quality of either parent–child or friendship relationships. Nevertheless, because this is the first study of its kind to explore potential relationships between empathy and autobiographical memory, it suggests that this area of study is a fruitful one for future investigation.

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