



# Age, gender, and educational level predict emotional but not cognitive empathy in farsi-speaking iranians

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## Abstract

The affective and cognitive components of empathy have been extensively researched in various disciplines. However, little is known about how these components are influenced by individual differences in maturation or development. Acknowledging such a gap in the literature, the current study examined how individual differences (i.e., age, gender, and education) facilitate the development of dispositional empathy. Therefore, to meet the goals of this study, the Farsi version of three empathy questionnaires (i.e., Interpersonal Reactivity Index, Questionnaire Measurement of Emotional Empathy, and Empathy Quotient) were distributed among Farsi-speakers living inside or outside mainland Iran. The analysis of data obtained from 510 participants showed that age, educational level, and gender accounted for the changes in affective empathy, without any significant impact on cognitive empathy. The current study is the first study investigating developmental changes in self-report empathy score in a population of Farsi-speaking Iranians.

**Keywords** Dispositional empathy · Cognitive empathy · Affective empathy · Adult life- span · Emotional development

Empathy is an essential factor in interpersonal communication, emotional development, and managing social relationships (de Waal 2009). However, there is some dissent in the research literature regarding how empathy is operationalized (Clark 1980; Coll et al. 2017). Recently, Cuff et al. (2016) examined various definitions proposed by researchers from different disciplines including developmental psychology (e.g., Feshbach 1975; Hoffman 1977) and social neuroscience (e.g., Decety and Lamm 2006). Based on the commonalities found in thematic analysis of 43 distinct definitions available in the literature, the authors proposed a comprehensive definition encompassing various aspects and dimensions of empathy.

Multi-dimensional in nature, Cuff et al.'s (2016) definition is similar to traditional viewpoints, which regard empathy as a psychological construct involving both affective and cognitive processes (Davis 1983; Smith 2006). Accordingly, affective empathy refers to feeling a similar emotion as another (Cuff et al. 2016). Cognitive empathy, on the other hand, is defined as the

ability to create mental representations of oneself as enduring the emotional experience of another through theory of mind and perspective taking (Smith 2006). Cognitive empathy requires one to understand other individuals' thoughts and feelings from their perspective; however, the empathizer should be mindful of the difference between one's own and others' emotional state (Blair 2005; Schieman and Van Gundy 2000).

Neuroimaging studies also supported the multi-dimensionality of empathy by finding distinct neural pathways and temporal activation patterns related to affective and cognitive components of empathy (Decety and Hodges 2006; Fan and Han 2008; Rameson et al. 2012). More specifically, EEG studies reported an early emotional sharing followed by a late cognitive process in empathic-inducing situations (i.e., activity over central-parietal region at 380 ms after an increased activity in frontal lobe at 140 ms stimulus onset), which support the existence of affective and cognitive components of empathy (e.g., Fan and Han 2008). Likewise, findings from fMRI studies suggest that limbic system and medial prefrontal cortex (MPFC) are the main brain regions activated in empathic-inducing situations. Accordingly, MPFC activation found to increase when people are consciously empathizing with others and correlate positively with self-report empathy scores (Rameson et al. 2012). Morelli et al. (2012) reported similar findings while investigating people's empathic reactions to negative (pain) and positive (happiness) emotions in context-dependent and context-

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independent situations. They found higher activation in anterior insula (AI) and dorsal anterior cingulate cortex (dACC) in response to contextually independent events triggering a negative emotion. On the contrary, DMPFC and MPFC showed higher activation when participants were required to mentally evaluate the contexts of the events for empathic responses. Such findings questioned the automaticity of empathic responsiveness and inspired researchers to implement more complex approaches in studying empathy.

## Empathy and Development

Research on the changes in empathic responsiveness across life span has yielded contradictory findings. For instance, studies investigating the relationship between age and empathy, demonstrate inconsistencies on the role of each factor and its influence on the other. According to Dymond et al. (1952) there are four explanations for the relationship between age and empathy: (1) positive linear relationship, (2) negative linear relationship, (3) Inverse-U-shaped relationship, and (4) no relationship.

The first explanation points to a linear relationship between age and empathy suggesting that as people get older, their level of empathy increases. Older people tend to invest more emotion and time into their relationships. To maintain their social bonds with others, they need to understand others emotionally and cognitively, which eventually leads to developing greater empathy. Conversely, the negative relationship between empathy and age suggests a reduction in people's empathic responsiveness as they mature in age. Accordingly, as individuals age, they typically develop more sophisticated reasoning and firm opinions that could result in difficulty in taking others' perspective. Alternatively, it is suggested that as people get older they become less empathetic because their interactions with society decline, which often present challenges with adjusting behaviors based on empathetic feelings and emotions (Grühn et al. 2008; Schieman and Van Gundy 2000).

As the third explanation (Inverse-U-shaped relationship) implies, people experience growth in empathy until they reach the highest level of maturation. After that, there will be a gradual decrease as they distance from their maturational peak. The Inverse-U-shaped relationship is supported by a recent cross-sectional study in which higher levels of empathy was found in participants aged 50–60 compared to both younger and older participants (O'Brien et al. 2013). On the other hand, the fourth explanation of the relationship between empathy and age discards age as an indicator of empathy, which is confirmed by previous studies. For instance, examining the effect of age on emotional understanding in two different groups, Phillips et al. (2002) found no age effect on participants' understanding of emotional cues in verbal settings between young (20–40 years old) and old adults (60–80 years old).

Dymond et al.'s (1952) study emphasized on the developmental trajectory of empathy in childhood; as children grow, they experience an increased interest in socializing with their peers and begin to develop more empathic understanding. Other scholars with expertise in emotion development (e.g., Magai 2001; Phillips et al. 2002), explored developmental trajectory of empathy during late adolescence and adulthood. They constructed their hypotheses based on socio-cognitive and neuropsychological perspectives. Similar to Dymond et al.'s (1952) first hypothesis, socio-cognitive theory argues for incremental development of empathic responses as a result of maturation. Accordingly, experiencing a variety of emotional contexts across lifespan could lead to more profound knowledge of emotional cues and stronger social bonds. Consequently, as age increases people become more able to respond empathically toward others' emotion (Magai 2001).

On the contrary, neuropsychological perspective takes a different stance similar to Dymond et al.'s (1952) second hypothesis. Particularly, the literature suggests that as people mature there is a decline in essential brain areas such as the frontal and temporal lobes (Phillips et al. 2002). The neurological changes in the brain associated with aging correspond to decline in executive functioning, appropriate decision-making, perspective taking, and emotional reactivity. Consequently, empathy declines with age due to the decline in cognitive abilities required for emotional understanding (Davidson and Irwin 1999). However, neuroscience studies focusing on development challenged such a view and provided empirical evidence for an increase in emotional and cognitive understanding induced by maturation. Accordingly, the brain areas involved in emotion regulation, emotion understanding, and cognitive processes (especially prefrontal cortex) operate at higher functioning levels in older individuals compared to younger adults. Therefore, people increasingly rely on cognitive processing while decreasing emotional processing as they age. This shift in brain functioning supports the notion that older individuals show greater maturity in judgments and decision making in social interactions (Decety and Michalska 2010).

## Education, Gender, and Empathy

Along with age, there is evidence in the literature that speaks to education as another influencing factor in empathy development. Trait empathy has been reported to increase along with education level (Schieman and Van Gundy 2000). Education may help the development of cognitive abilities by enhancing intellectual and emotional maturity and cultivating deeper understanding toward others (Eisenberg and Fabes 1990). There is also evidence suggesting that education may be even more influential than age in changing empathy. For example, Phillips et al. (2002) collected data from two groups of participants differing in age and years of education.

Focusing only on age as a significant indicator, they found lower empathy in older adults compared to younger participants. However, after considering participants' education level as a possible factor, the significant effect of age on trait empathy disappeared. In other words, trait empathy was the same among participants with different age level after controlling for education. In the light of reported results, it is conceivable that lower empathy in older adults is influenced by educational attainment rather than age.

Lastly, while not considered as a developmental factor, gender has been shown to impact empathic responsiveness in some studies (e.g., Ang and Goh 2010; Endresen and Olweus 2001; Del Rey et al. 2016; O'Brien et al. 2013). According to these studies, females tend to report higher emotional empathy in self-report questionnaires; however, empathetic responses are somewhat dependent on the nature of the interpersonal relationships (Rueckert et al. 2011). Gender differences in empathy were also supported by longitudinal studies on adolescents indicating higher levels of empathy in female participants (Van der Graaff et al. 2014). Such a difference could be the result of higher emotional reaction rooted in environment and parenting styles that foster social constructions of gender where girls are encouraged to be caring and nurturing while boys are discouraged from expressing emotions (Gilligan 1982). Alternatively, higher levels of empathy in women could be the result of social desirability; women are more likely to adopt characteristics and behaviors associated with care and empathy (Eisenberg and Lennon 1983).

However, neuroimaging studies have questioned the latter argument by finding different brain response patterns between male and female participants. Particularly, women with higher trait empathy showed higher activation in right cerebral hemisphere (Rueckert and Naybar 2008). Likewise, Singer and colleagues (Singer et al. 2006) observed distinct brain activity across male and female participants in response to witnessing an "unfair" confederate peer receiving painful stimulus. More specifically, while male participants showed activation in brain regions associated with reward (nucleus accumbens), female participants had higher activations in empathy-related regions (bilateral AI and ACC). Derntl and collaborators (Derntl et al. 2010) explained gender differences in empathy by arguing that women are more socially sensitive compared to men because of higher activity in the amygdala (emotional generation region). Similarly, higher activation in left temporoparietal junction (self-other distinction brain area) was reported only for men, which supports different brain activation in response to empathic-inducing events between males and females (Schulte-Rüther et al. 2008). Together, these studies suggest higher emotional sensitivity in women that would bring higher empathic behavior toward other people. Therefore, women seem to be wired for showing more empathic behavior, which would discount the argument that empathy in women is attributed to social desirability.

## Statement of Problem

There is a significant body of literature examining the effect of developmental factors such as age and education on empathy; however, the literature is inconsistent. We believe that these inconsistencies are related to (1) the need to parse out the dimensions of empathy (i.e., affective and cognitive) and (2) utilizing different instruments. For instance, Phillips and colleagues (Phillips et al. 2002) used the Questionnaire Measuring Affective Empathy (QMEE) and found lower empathy score in older adults, whereas in a study using the Interpersonal Reactivity Index (IRI), participants' age positively correlated with their score on this questionnaire (O'Brien et al. 2013). The QMEE only measures affective empathy, whereas the IRI measures both affective and cognitive empathy (Chlopan et al. 1985). In addition to theory and instrumentation, the methodology utilized for data collection might play a role in the discrepancy found in the literature. For instance, cross-sectional studies established higher self-report empathy scores in younger adults, whereas longitudinal studies revealed no age effect on empathy scores (Grühn et al. 2008). Moreover, the age range of participants might contribute to inconsistent findings; studies in which participants were younger than 20 showed a positive correlation between age and empathy (Schwenck et al. 2014; Van der Graaff et al. 2014), while studies with older adults found no age effect (Grühn et al. 2008).

Although there is growing evidence suggesting that empathy is dependent on cultural norms (Chopik et al. 2017; Yaghoubi Jami et al. 2018), the number of studies investigating the developmental changes of empathy in non-Western societies is scarce. We failed to find studies directly exploring trait empathy with regard to participants' age, education, and gender among Eastern populations in general and Iranians in particular. There are relatively few cross-cultural studies examining personality differences among Eastern and Western populations, which include Chinese and American samples (Labouvie-Vief et al. 2000; Yang et al. 1998), and Iranian and American participants (Ghorbani et al. 2014). Similar to traditional empathy research, these studies also overlooked trait empathy. For example, Ghorbani and collaborators (Ghorbani et al. 2014) studied the relationship between personal distress and empathic concern with moral affects (i.e., shame and guilt). They found that similar to Western populations, Iranians' personal distress and empathic concern had a positive relationship with shame and guilt respectively. Although this study claimed that Iranians were similar to Westerners with respect to empathy, the low internal consistencies of the questionnaire ( $\alpha_{\text{empathic concern}} = .56$ ,  $\alpha_{\text{personal distress}} = .57$ , and  $\alpha_{\text{perspective taking}} = .48$ ) suggest some potential weaknesses in the measurement system utilized for assessing empathy.

## Purpose of Study

There are approximately 85 million people in Iran and with the diverse ethnic, social, cultural, and linguistic differences, it provides a rich context for psychological research. Although Iran remains underrepresented in the psychological studies, there is a robust body of literature pertaining to changes in empathy for healthcare professionals as a result of their academic majors and professional career choices (e.g., Rahimi-Madiseh et al. 2010; Shariat and Kaykhavoni 2010; Shariat and Habibi 2013). In these studies, however, there was no analysis of dimensions of empathy, nor did they address the contribution of developmental factors. Moreover, the instrument used in these studies was designed specifically for measuring empathy in people with a medical background such as nurses, doctors, or medical students (Hojat et al. 2001, 2002), which makes it inappropriate to generalize their results to non-medical populations. Therefore, the current study focused on association between developmental factors (i.e., age, marital status, and education) and self-report empathy among Iranians who are not educated nor work in the medical fields. In doing so, we tested Dymond et al.'s (1952) four hypotheses regarding the relationship between age and empathy to see which one would be more plausible within Iranian context. Regarding affective empathy, the first hypothesis seems more reasonable especially because both neurodevelopmental and socio-cognitive approaches support the positive relationship between age and empathy (Decety and Michalska 2010; Magai 2001). We think the same rationale can be applied for cognitive empathy as people's cognitive empathy is closely related to their perspective taking abilities, which is evidenced as a developmental construct (Epley et al. 2004).

Moreover, gender differences in trait empathy have received special attention from developmental social psychologists (Ang and Goh 2010; Endresen and Olweus 2001; Jolliffe and Farrington 2006; Rueckert et al. 2011) and social neuroscientists (Derntl et al. 2010; Schulte-Rüther et al. 2008). Therefore, the current study aimed to investigate the generalizability of gender differences reported in the literature using an Iranian sample. Along with the existing evidence, we hypothesized that female participants would score higher on the self-report questionnaires, especially those measuring affective empathy as argued to be the main source of difference in empathic responsiveness (Rueckert et al. 2011). The final objective of the current study was to examine the multidimensionality of empathy. We believed the main source of discrepancy in the age and empathy literature is related to how empathy is measured (i.e., uni-dimensional versus multidimensional). To test this hypothesis, we investigated the developmental trajectory of affective and cognitive empathy separately by using different questionnaires.

## Method

### Participants

The announcement of the study attracted 794 Iranian volunteers (213 males) living either in Iran or outside the country. Due to either incomplete responses or studying in medical-related majors, 284 participants were excluded from analyses. Previous studies have reported lower levels of empathy among medical school students because of the necessity to suppress empathetic emotions in favor of analytical thoughts that direct behaviors in life saving environments (e.g., Hojat et al. 2004). Because the number of medical students in our sample was small ( $N = 7$ ), we decided to keep the sample homogenous and exclude them from analyses. The final sample consisted of 510 participants within age range of 18 to 66 years old (123 males;  $M_{\text{age}} = 28.33$ ,  $SD_{\text{age}} = 9.86$  years). Forty-two participants lived outside Iran: USA ( $N = 8$ ), Europe ( $N = 28$ ), and Asia ( $N = 6$ ). Prior to participating in the study, all participants were provided with online informed consent forms approved by the Institutional Review Board of a southern university in the U.S. The study is performed in accordance with the ethical standards stated in Declaration of Helsinki (1964) and its later amendments. Table 1 provides detailed information of participants' demographic characteristics. Table 2 shows the distribution of age and education across sample.

### Instrument and Materials

To measure trait empathy, participants were required to fill in three online surveys. The questionnaires used for this purpose were the translated versions of the IRI (Davis

**Table 1** Participants' profile ( $N = 510$ )

	Female ( $N = 387$ )	Male ( $N = 123$ )
Age	28.38 ± 9.96	28.13 ± 9.96
Educational level	Bachelor 43.7% ( $n = 169$ )	Bachelor 41.5% ( $n = 51$ )
Marital status	Single 58.4% ( $n = 226$ )	Single 69.9% ( $n = 86$ )
Child	No 78% ( $n = 302$ )	No 80.6% ( $n = 99$ )

Education consists of three levels: Up to diploma ( $N = 181$ ), up to bachelor degree ( $N = 220$ ), and up to graduate degree ( $N = 109$ ). Marital Status consists of three levels: Single ( $N = 312$ ), divorced ( $N = 14$ ), and married ( $N = 184$ ). Child refers to having children. Age, gender, educational level, and marital status are independent variables



**Table 2** Distribution of age and education

Education	Age				Percentages of total (Education)
	Under 20	21–30	31–40	Above 40	
High school Diploma ( $N= 181$ )	114	26	21	20	35.5
4-year BA/BSc ( $N= 220$ )	18	108	68	26	43.1
Graduate ( $N= 109$ )	1	56	40	12	21.4
Percentages of total (Age)	26.1	37.3	25.3	11.4	

1983), the QMEE (Mehrabian and Epstein 1972), and the Empathy Quotient (EQ; Baron-Cohen and Wheelwright 2004). We calculated Cronbach's alpha for internal consistency of the questionnaires and all of them showed an acceptable reliability:  $\alpha_{IRI} = .79$  ( $\alpha_{\text{empathic concern}} = .68$ ,  $\alpha_{\text{personal distress}} = .69$ , and  $\alpha_{\text{perspective taking}} = .63$ ),  $\alpha_{QMEE} = .75$ , and  $\alpha_{EQ} = .79$ . A demographic survey developed by researchers was also conducted.

IRI is a multidimensional assessment of empathy measuring three empathy-related constructs, namely, *Empathic Concern* (EC; "I'm often quite touched by things that I see happen"), *Perspective Taking* (PT; "I sometimes find it difficult to see things from the other guy's point of view"), and *Personal Distress* (PD; "Being in a tense emotional situation scares me"). Items in the EC subscale are designed to measure affective empathy, the PD items measure the respondent's personal distress, and the PT subscale assess the cognitive empathy of the respondents (Chlopan et al. 1985). Participants responded to this survey using a 5-point Likert scale (1 = *Not at all like me* to 5 = *Just like me*). The factor structure of the IRI was evaluated using Confirmatory Factor Analysis (CFA; Schumacker and Lomax 2016). The result supported the multidimensionality of the questionnaire, Satorra-Bentler Adjusted chi,  $\chi^2 = .092$ ,  $p = .76$ . 99% of the model was reproduced, GFI = .999, and the error was very low, RMSEA = .00, with a 90% CI [.00, .08].

The QMEE consists of 33 items measuring only affective empathy ("It makes me sad to see a lonely stranger in a group"). Participants rated their agreement with the statements of the QMEE on 9-point scales ranging from -4 *Very Strongly Disagree* to +4 *Very Strongly Agree*. It was reported to be reliable at  $\alpha = 0.65$  (Preti et al. 2011). The EQ consists of 60 items (including 20 filler items excluded from scoring) measuring empathy on 4-point scales vary between *Strongly Agree* to *Strongly Disagree*. Using CFA, the one factor structure of the EQ was confirmed,  $\chi^2 = 1581.9$ ,  $p < .0001$ , Fit = .85. The original questionnaire has been used worldwide due to its acceptable internal consistency and test-retest reliability (Baron-Cohen and Wheelwright 2004; Preti et al. 2011). The questionnaire can be accessed through the Autism Research Centre website (<https://www.autismresearchcentre.com>).

## Procedure

Since participants were Farsi speakers, all surveys were translated from English to Farsi based on the recommendations of the International Test Commission (ITC; Hambleton 2001; Hambleton and de Jong 2003). First, three expert translators translated the original questionnaires to Farsi. Next, the translated versions were compared and combined into one coherent version. To assure the similarity between the translated and original versions of questionnaires, a back-translation procedure was used with the help of a separate group of translators. Differences found between the original questionnaires and the back-translated versions were addressed by group discussion. The first author finalized the final Farsi versions of questionnaires to ensure the meaning of the items reflects the original intention of the questionnaires.

The Farsi versions of questionnaires and the consent form were posted online. A flyer explaining the procedure and the purpose of study was distributed through face-to-face interactions, social media (e.g., Facebook, Instagram), and a commonly used messaging application in Iran (i.e., Telegram; <https://telegram.org>). Potential participants contacted one of the researchers by the email address provided in the flyer. Only participants who met the eligibility requirements stated in the flyer (at least 18 years of age) were provided access to the electronic link for the study. Participants were required to read and sign the consent form prior to getting access to the online questionnaires. The consent form contained detailed information about the procedure, risks and benefits, voluntary participation, and assurance of confidentiality of the data. After the surveys were completed, an automatic message indicating end of the study was shown to participants and they were thanked for their cooperation.

## Result

### Age and Empathy

Table 3 summarizes mean scores for each questionnaire. To assess the relationship between the three empathy questionnaires, a Pearson product-moment correlation coefficient was

**Table 3** Descriptive statistic of empathy traits (N = 510)

	Minimum	Maximum	M	SD
Empathic concern	6	28	19.41	4.08
Personal distress	1	27	14.88	4.63
Perspective taking	5	28	16.43	4.03
Empathy quotient	18	69	38.09	8.72
Emotional empathy	−42	103	41.83	22.78

computed. The only non-significant relationship was found between the IRI-PD and the IRI-PT,  $r = -.07, p = .12$ . The other variables correlated significantly; however, the strength of the relationship varied depending on the questionnaire. For example, the strongest relationship was found between the IRI-EC and the QMEE,  $r = .60, p < .001$ , whereas the correlation between other variables suggested either small or medium effect size (Cohen 1988). The EQ had a moderate relationship with the IRI-EC,  $r = .45, p < .001$ , the QMEE,  $r = .42, p < .001$ , and the IRI-PT,  $r = .41, p < .001$ . Although the relationship between the IRI-PD and the EQ was significant, it had a small effect size,  $r = -.09, p < .001$ . Likewise, the IRI-PD had a small significant correlation with the IRI-EC,  $r = .21, p < .001$ , and the QMEE,  $r = .28, p < .001$ . The results also suggested a small correlation between the IRI-PT and the IRI-EC,  $r = .24, p < .001$ , and the QMEE,  $r = .19, p < .001$ . The relationship found between the questionnaires support theoretical research arguing that *empathic concern* subscale of the IRI and the QMEE should be used as measures of affective empathy and the EQ as a questionnaire for measuring both affective and cognitive empathy.

### Age and Empathy

To assess the relationship between age and trait empathy, multivariate regression analysis was conducted with age as the predictor variable and subscales of the IRI (i.e., EC, PD, and PT), the EQ, and the QMEE as dependent variables. The result suggested at least one of the dependent variables has a significant linear relationship with age, Wilks'  $\lambda = .83, F(5, 504) = 21.15, p < .001, \eta_p^2 = .17$ . Age significantly predicted participants' score on the IRI-EC,  $b = .13, t(508) = 7.5, p < .001, \eta_p^2 = .10$ , and explained a significant proportion of variance in this subscale,  $R^2 = .10, F(1, 508) = 56.2, p < .001$ . Age also showed a significant prediction effect on the IRI-PD,  $b = -.06, t(508) = -3.08, p = .002, \eta_p^2 = .02$ , and explained 2% of the variation in this subscale,  $R^2 = .02, F(1, 508) = 9.47, p = .002$ . Participants' EQ scores could also be predicted by their age,  $b = .17, t(508) = 4.53, p < .001, \eta_p^2 = .04$ ; 4% of variation in the EQ scores was explained by age,  $R^2 = .04, F(1, 508) = 20.52, p < .001$ . Regarding the QMEE, age also significantly predicted participants' empathy scores on this measurement,  $b = .42, t(508) = 4.16, p < .001, \eta_p^2 = .03$ , however only 3%

of the QMEE variance was explained by age,  $R^2 = .03, F(1, 508) = 17.29, p < 0.001$ . For the last dependent variable (IRI-PT), age was not a significant indicator,  $b = -.02, t(508) = -1.15, p = .25, \eta_p^2 = .00$ , with  $R^2 = .00$ . Overall, participants' age explained only 18% of variance in their trait empathy and 82% remained unexplained, which could be due to systematic or random errors (Schumacker and Lomax 2016).

### Individual Differences and Trait Empathy

Since participants' age correlated significantly with their trait empathy, we had to control for it to test the effect of other potential variables. To do so, a  $2 \times 3 \times 3$  (Gender [male, female]  $\times$  Marital Status [single, married, divorce]  $\times$  Educational Level [diploma, bachelor, graduate]) multivariate analysis of covariance (MANCOVA) with age as covariate was conducted. Results indicated that age was a significant covariate, Wilks'  $\lambda = .88, F(5, 501) = 13.89, p < .001, \eta_p^2 = .12$ . Among the independent variables, only marital status was non-significant, Wilks'  $\lambda = .97, F(10, 998) = 1.54, p = .12, \eta_p^2 = .05$ , thus it was removed from further analyses. Regarding the interaction between the independent variables, the two-way interaction was not statistically significant and was removed from the model.

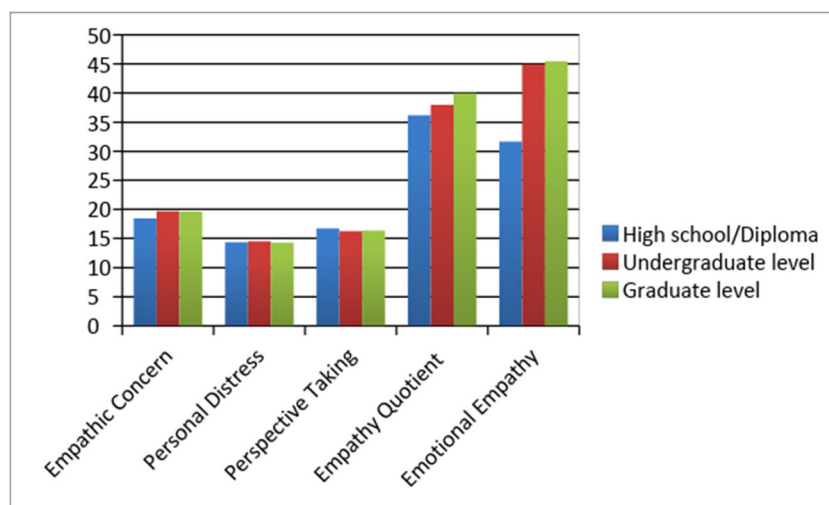
**Gender and Empathy** After controlling for participants' age, a significant multivariate main effect for gender was found, Wilks'  $\lambda = .96, F(5, 502) = 3.95, p = .002, \eta_p^2 = .04$ . Significant univariate main effects for gender were obtained for the IRI-PD,  $F(1, 505) = 16.36, p < .001, \eta_p^2 = .03$ , and the QMEE,  $F(1, 505) = 6.45, p = .01, \eta_p^2 = .01$ . The non-significant gender difference was found in the IRI-PT,  $F(1, 505) = .00, p = .98, \eta_p^2 = .00$ , and the EQ,  $F(1, 505) = 1.75, p = .18, \eta_p^2 = .00$ . Although females had a higher score in the IRI-EC, the difference was not statistically significant,  $F(1, 505) = 3.14, p = .08, \eta_p^2 = .01$ . Regardless of age, females had a higher score in *personal distress* and *emotional empathy* (see Table 4 for details).

**Table 4** Gender differences in trait empathy

	Male		Female		p value
	M	SD	M	SD	
Empathic concern	18.89	.35	19.60	.20	.077
Personal distress	13.41	.35	15.31	.24	.000**
Perspective taking	16.42	.37	16.44	.21	.978
Empathy quotient	37.48	.77	38.63	.45	.187
Emotional empathy	37.88	1.96	43.54	1.13	.011**

\*\* The mean difference is significant at the .05 level. Female participants had a higher personal distress and emotional empathy compared to the male participants

**Education and Empathy** A significant multivariate main effect of education was found after controlling for age, Wilks'  $\lambda = .87$ ,  $F(10, 1002) = 5.69$ ,  $p < .001$ ,  $\eta_p^2 = .05$ . Given the significance of the overall test, the univariate main effects were examined. There was a significant effect of education on the IRI-EC,  $F(2, 505) = 5.59$ ,  $p = .004$ ,  $\eta_p^2 = .02$ , the EQ,  $F(2, 505) = 5.95$ ,  $p = .003$ ,  $\eta_p^2 = .02$ , and the QMEE,  $F(2, 505) = 19.97$ ,  $p < .001$ ,  $\eta_p^2 = .07$ . Education did not have a significant effect on the IRI-PD,  $F(2, 505) = .11$ ,  $p = .90$ ,  $\eta_p^2 = .00$ , and the IRI-PT,  $F(2, 505) = .62$ ,  $p = .54$ ,  $\eta_p^2 = .00$ . Results of a pairwise comparison revealed that participants with more years of education scored higher on emotional empathy as well as the EQ. With regard to the IRI-EC, participants with high school education (i.e., diploma) differed significantly from the other two groups and had the least score on this subscale. Although, participants who had at least some graduate courses scored slightly lower than participants with some undergraduate courses, the difference was not significant. On the EQ, the highest score was for participants with the highest education (i.e., graduate), which was significantly different from participants with the least education (i.e., high school diploma). Participants who had some college courses scored in the middle; however, the difference between this group and the other two was not significant. Regarding the QMEE, participants with the least education had the lowest score, while there was no significant difference between undergraduate and graduate participants. Figure 1 illustrates the mean comparison of trait empathy among participants with different educational background.



**Fig. 1** Differences in Self-reported Empathy Score based on Education. *Note.* Y-axis represents the mean score of participants in each questionnaire and X-axis shows different subscales of empathy questionnaires. Participants with only a high school education significantly differ from the other two groups in empathic concern and

## Discussion

The purpose of this study was to explore the developmental path of affective and cognitive empathy within an Iranian context. Much of the empirical research studies on empathy development throughout lifespan focused on Western populations (Grühn et al. 2008; O'Brien et al. 2013; Phillips et al. 2002). Although there is a significant body of research on trait empathy in Farsi speakers, these studies are saturated with populations of Iranians in healthcare fields, which highlights a need to study empathy within a broader range of participant coming from this context. Comparatively, research on empathy development using samples from other non-Western populations is limited. Moreover, studies on the effect of developmental factors on cognitive and affective empathy have yielded contradictory results promoting the need for further investigations. Using a sample of Farsi-speaking participants, we explored how developmental factors (i.e., age and education) affect empathic responsiveness. We also examined whether reported gender differences in empathic response can be generalized to other samples. Overall, the results confirmed existing empirical evidence that regards empathy as a developmental construct. However, when two facets of empathy were considered individually the results suggested different patterns for affective and cognitive empathy. In this section, we present conclusions as they relate to the research questions for this study.

As mentioned earlier in the paper, the most common theoretical frameworks that have been used for studying empathy development are socio-cognitive and neuropsychological approaches. The socio-cognitive theory suggests that as individuals mature in age, there is a tendency to develop higher

emotional empathy. In the empathy quotient subscale, the difference between participants with high school/diploma and graduate level was the only significant difference. In none of these subscales, undergraduate and graduate participants differ

abilities for understanding emotional cues in social interactions (McConatha et al. 1997; Schwenck et al. 2014). On the contrary, neuropsychological studies have shown a decline in empathic response as individuals mature due to brain aging (Phillips et al. 2002). Additionally, our literature search noticed another possible relationship between age and empathy, where development occurs as an Inverse-U-shaped relationship (Dymond et al. 1952; O'Brien et al. 2013). To that point, people develop empathy until they reach middle adulthood (age 50–70), which is claimed to be the peak of maturation (cognitively and emotionally).

Results of previous studies exploring empathy development are in line with one of the aforementioned theoretical frameworks, which indicates inconsistency in the literature regarding developmental trajectory of empathy. Such inconsistency could be associated with research methodologies that employ instruments focusing only on one aspect of empathy. Therefore, previous studies should not be considered conclusive, especially considering the extensive evidence of neuroimaging studies that clearly illustrate distinct neural networks for affective and cognitive empathy (Fan and Han 2008; Morelli et al. 2012). Relying on the reported evidence, it is critical to consider empathy as a multi-dimensional construct. To that end, the current study used various questionnaires for measuring empathy to test its mono- or multi-dimensionality. Our results suggested distinct patterns of development for affective and cognitive empathy. Accordingly, age significantly predicted scores on *personal distress*, *empathic concern*, *emotional empathy*, and *empathy quotient*. Younger participants had higher scores for *personal distress*, whereas older participants' scores on *empathic concern*, *emotional empathy*, and *empathy quotient* were higher. However, *perspective taking* (a measurement for cognitive empathy) did not vary between younger and older participants. Together, the present findings not only corroborate the existence of a relationship between age and empathy, but also validate the relationship between age and components of empathy.

From a developmental perspective, our results can be explained using a socio-cognitive framework. Correspondingly, as people get older they are motivated to bring emotional meaning into their life, which leads them to experience a wide variety of emotional states. Thus, they are able to draw upon these diverse emotional experiences and make it easier to relate to different emotional states of others. Therefore, older people are more mature in their emotional development, which enables them to perceive emotional responses faster and more accurately while understanding emotional cues in different settings. In other words, the familiarity with various emotional situations across life span directly impacts the development of affective empathy.

It is worth discussing these interesting findings from a neurodevelopmental perspective as well. As reported in the literature, there is a significant shift in empathic response with

an increase in age. Specifically, younger adults may feel more personal distress and rely on emotions to perceive and judge empathy-inducing situations, while older people may be better at regulating their distress and employing cognitive processes to evaluate social situations and show appropriate empathic responses. Such maturation is accompanied by development of prefrontal cortex (area of response inhibition and cognitive control) and helps people to behave altruistically (Decety and Michalska 2010). Other neurodevelopmental studies have suggested that prefrontal cortex has the most delayed growth curve among other brain areas, which could play a major role in explaining higher self-regulation in older people, whereas the amygdala has a rising and falling pattern of activation during lifespan (Johnson and de Haan 2015).

The other influential factor on dispositional empathy was years of education. Empathy scores varied among individuals depending on their educational level after controlling for their age. In all subscales of affective empathy, participants in higher education significantly reported higher scores compared to participants without college education. Similar to the effect of age, education significantly influenced only one component of empathy. In other words, education enhanced the development of affective empathy, but it had no effect on cognitive empathy. Such results also support the developmental trajectory of emotional empathy suggested by socio-cognitive and neurodevelopmental approaches.

Moving to the last statistically significant factor, the results indicated gender differences in *personal distress* and *emotional empathy*. These results are congruent with previous studies wherein female participants reported higher levels of empathy, especially affective empathy (Del Rey et al. 2016; O'Brien et al. 2013; Rueckert et al. 2011). Similarly, neuroimaging studies have evidenced different levels in brain activation between males and females in response to empathy-inducing events (Schulte-Rüther et al. 2008; Singer et al. 2004). Accordingly, women are more emotionally sensitive toward others (Van der Graaff et al. 2014), which results from higher activity in the amygdala (Derntl et al. 2010), and right cerebral hemisphere (Rueckert and Naybar 2008).

From a developmental perspective, empathy research has consistently suggested that women are more inclined to be emotional and empathic, while men are more logical and cognitive-oriented (Damon et al. 2008). Although, our results showed slightly higher scores on empathy quotient and perspective taking in females, the differences were not statistically significant, which is consistent with the results of previous studies (Fernández et al. 2011; Kim and Lee 2010; Lafferty 2004). Unlike the findings of previous studies (e.g., O'Brien et al. 2013), the results showed no gender difference in empathic concern. Empathic concern has been categorized as a form of affective empathy resulting in feelings of concern for others (Chlopan et al. 1985). In most studies that reported higher levels of empathic concern in women, participants



were from Western cultures with socially constructed ego-centric norms. However, in our study all the data were collected from Iran, which is categorized as a socio-centric society (Hofstede et al. 2010). The cultural differences between our sample and those of previous studies may be the reason of inconsistency between our results and those reported in the literature. However, a similar pattern of empathic responsiveness was observed in a study with Chinese participants (Siu and Shek 2005). From a cultural standpoint, men in Eastern societies are raised with similar socially constructed behaviors, which encourage care and sensitivity characteristics that are more often attributed to women. Therefore, men from some Eastern societies may be enriched with feelings of concerns for others' well-being as a result of their environment.

## Limitation and Future Direction

The current study has some limitations that should be considered before generalizing the results to all Farsi-speaking Iranian populations. This study contained an unbalanced sample size, and as such, presents limitations in gender generalizability. There were twice as many female participants in the sample. To account for the unbalanced sample sizes we used the recommended analysis: Type III Sum Square in MANCOVA (Pituch and Stevens 2015). For more accuracy in analyzing gender differences in trait empathy, future studies with equal sample size are encouraged. Secondly, participants in this study completed self-report questionnaires, and as such, it is necessary to consider the accuracy in participants' responses. Therefore, we excluded all responses that followed identical patterns such as repeating one response across the entire questionnaire. Future studies may want to use other means of data collection such as behavioral observation and measurement of empathy within an Iranian context in order to provide more robust findings. The present study employed the use of two questionnaires measuring emotional empathy (i.e., the IRI-EC and the QMEE) while only utilizing one questionnaire subscale to measure cognitive empathy (i.e., the IRI-PT). This limitation in measurement of affective and cognitive empathy evidences the need for future empirical research to construct and validate additional empathy measurements. To the best of our knowledge, no other self-report questionnaire that only measures cognitive empathy is available. The paucity of cognitive empathy measurement instruments should encourage scholars with a focus on psychological assessment to develop a valid and reliable questionnaire that could empower future studies.

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## Compliance with Ethical Standards

**Informed Consent** This study was approved by the Institutional Review Board (IRB #15-OR-336-R1) at the University of Alabama. Online Written informed consent forms were collected from all participants prior to participating in current research. Participation was completely voluntary.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Conflict of Interest** All authors declare that there is no conflict of interest concerning the research reported in this manuscript.

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