



## Research Paper

## Empathy profiles differ by gender in people who have and have not attempted suicide

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## ABSTRACT

**Background:** High levels of empathy may inhibit hetero-aggressive behaviors; however, the role of empathy on suicide behaviors is still unknown. This study aimed to compare the Interpersonal Reactivity Index (IRI) empathic profiles of 56 patients hospitalized after a suicide attempt with those of 138 people who had never attempted suicide.

**Methods:** Differences were tested with *t*-test and Chi-square test. The associations between attempted suicide and empathy scores were tested with linear regression models, controlling for sex and age. Latent Class Regression Analysis was applied to investigate the relationship between multivariate categorical empathy response items and suicide attempts, controlling for sex and age.

**Results:** Suicide attempters scored significantly higher on the 'Personal Distress' and 'Fantasy' IRI subscales. Women in the control group had similar probabilities of belonging to the class of high or low Personal Distress and Fantasy levels, while women who had attempted suicide were more likely to have high scores at the same scales. Men in the control group had higher probabilities of scoring low at the Personal Distress and Fantasy subscales, while men who had attempted suicide had similar probabilities of belonging to the class with high or low scores.

**Limitations:** The use of a self-administered tool may have introduced a gender-role stereotype bias in empathy assessment. Additionally, it was not possible to test the role of psychopathology.

**Conclusions:** Our results suggest that distinct empathic profiles are associated with suicidal behavior, with a gender specific pattern. Addressing empathy constructs may help identifying suicidal individuals.

## 1. Introduction

Suicide attempt is a complex phenomenon of high social relevance. Commonly recognized risk factors for suicide attempt include, among others, female gender, young age, low education level and mental disorders (Nock et al., 2008). Suicidal behaviors have strong repercussions on the individual's family and own interpersonal functioning. Despite being an act directed against the self, a suicide attempt often has a communicative value regardless of its severity in terms of somatic outcomes, and the subject does not always have a clear and real intent to die (Jacobson et al., 2013). For these reasons, the degree of suicidal intent and the lethality of the method are to be critically considered.

Besides being significantly associated with the risk of repetition, these factors allow a distinction between two situations: desperate attempts to seek help and obtain immediate changes in response to an unbearable environmental or internal situation (Cry For Help); and cases where the act is related to a real wish to die in response to a stressful and painful situation (Cry of Pain) (Williams, 1997). In the context of interpersonal difficulties, persons dealing with a challenging situation may look for alternative ways to express their needs and their longing for help, even through a suicide attempt.

Empathy is a personal characteristic that allows individuals to build relationships with others, to experience social feelings and to accept the others' emotionality, while being aware of own personal boundaries. As such, empathy is crucial for the construction of positive in-

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terpersonal relationships and for the promotion of cooperative behavior (Blakemore and Frith, 2003; Völlm et al., 2006).

Empathy is considered a fairly stable trait of personality (Leiberg and Anders, 2006; Mangione et al., 2002) and a psychological quality that brings continuity to an individual's behavior in different situations and at different times (Zimbardo et al., 2003). However, it is known to be influenced by sociodemographic (e.g., sex) and psychopathological characteristics (e.g., hostility, phobic anxiety) (Baez et al., 2017; Bennik et al., 2019; Gadassi et al., 2011; Gawronski and Privette, 1997). Empathy has been long considered a gendered construct (Shields, 1995), based on the assumption that women are more emotional and more caring than men (Zahn-Waxler et al., 1991). Consistently with this view, women frequently score significantly higher than men on self-reported empathy scales (Eisenberg and Miller, 1987; Hojat et al., 2002), including the Interpersonal Reactivity Index (IRI) (Davis, 1983). However, this assumption has been questioned by recent studies where empathy was assessed with experimental methods (Baez et al., 2017).

According to some authors (Reniers et al., 2011), empathy consists of a cognitive component, i.e. the ability of building a working model of others' emotional states, and an affective component, which refers to being sensitive to and vicariously experiencing the feelings of others. The more other-oriented (both cognitive and affective) empathic response induces an altruistic motivation to help others (Batson et al., 1987) while taking distance from the situation, and reflects the ability to experience and understand the feelings of others. This dimension is well captured by the Perspective Taking (PT) and Empathic Concern (EC) subscales of the IRI. By contrast, the Personal Distress (PD) and Fantasy (FS) subscales reflect a more (emotional and cognitive, respectively) self-oriented response, often lacking a buffering distance, where the individual may be overwhelmed by the exposure to others' suffering. In this context, feelings of personal distress may evoke an egoistic motivation to relieve own discomfort, posing vulnerable individuals at risk for psychological distress (Gleichgerrcht and Decety, 2013).

Even though high levels of empathy may inhibit hetero-aggressive behaviors (Davis, 2018; Jolliffe and Farrington, 2004; Miller and Eisenberg, 1988), the possible influence of empathy on self-aggressive behaviors is not known. Specifically, to the best of our knowledge empathy in patients who have attempted suicide has been explored only to a limited extent. Recently, Zhang et al. (2019) found that older adults with a history of suicide attempt failed to integrate others' emotions into their decision processing, this possibly blunting the effect of social deterrents to suicide, such as the impact of suicide on family and friends. It has also been suggested that a reduced ability to recognize social emotions may impair the individual's capacity to adequately interact with his/her social environment, potentially increasing the risk of a suicidal crisis (Richard-Devantoy et al., 2013). On the other hand, feelings of perceived burdensomeness (a person's belief that others would benefit more from their suicide than if they continued living) are associated with suicide risk, and the nature of this belief requires consideration of others (Joiner, 2005; Van Orden et al., 2010). Given this peculiar mental state, it cannot be excluded that individuals who attempt suicide may in fact have higher levels of empathy. Alternatively, as suggested by Klonsky and May (2015), individuals may attempt suicide partly due to their emotional or physical pain being greater than their connectedness to others. According to this model, those who act suicidal behaviors would not have a dampened empathy, but rather lack the connections to others that are needed to experience higher levels of empathy.

Thus, the aim of this study was to compare the empathic profiles of patients hospitalized after a suicide attempt (cases) with those of people who had never attempted suicide (controls). A further aim was to test if any sociodemographic characteristics accounted for or added to the possible relationship between suicidal behavior and empathy profiles. We hypothesized that suicide attempters would display a distinct empathy profile (possibly lower other-oriented, but higher self-oriented empathy levels) compared to their non-suicidal counterparts.

## 2. Methods

### 2.1. Participants

Our study sample included 194 individuals aged 18 years and over. Of them, 56 (Cases) were inpatients hospitalized, between January 2017 and December 2018, at the psychiatric ward of the Padova Hospital (Italy) after an attempted suicide. For the purpose of this study, 'attempted suicide' was defined as "A non-habitual act with non-fatal outcome that the individual, expecting, or taking the risk, to die or to inflict bodily harm, initiated and carried out with the purpose of bringing about wanted changes" (De Leo et al., 2004). The remaining 138 participants (Controls) were enrolled at a General Practitioner (GP) office of the same catchment area. Inclusion criteria for the selection of control individuals were a negative history of psychiatric disorders and of suicidal behavior (as self-reported and further confirmed by the GP), and lack of current suicidal ideation, as indicated by a negative response ("Not at all") to the fifteenth question ("Thoughts of ending your life") of the Symptom Check List-90 (Derogatis et al., 1973). No further restrictive inclusion criteria were applied beyond the ability to correctly read, understand and write in Italian.

The institutional review board approved the study protocol in accordance with the guidelines of the 1995 Declaration of Helsinki (as revised in Tokyo in 2004). Participation was voluntary and no fee or other compensation was given for taking part in the study. All participants provided informed consent and all data were collected and stored anonymously.

### 2.2. Interview and questionnaires

All participants were asked to provide information about their socio-demographic characteristics (sex, age, education, civil and occupational status). Education level (low, medium, high) was defined according to the recommendations of the International Standard Classification of Education (ISCED) (UNESCO, 2011), as detailed in Supplementary Table 1; the occupational status was classified by splitting the nine groups of the International Standard Classification of Occupations (ISCO) (ILO 2012) into three groups: low (groups 7-8-9), medium (groups 4-5-6) and high (groups 1-2-3) (Supplementary Table 2). The participants were additionally asked to fill in a self-administered questionnaire (the Interpersonal Reactivity Index - IRI) (Davis, 1983). Patients admitted to the psychiatric ward were interviewed as soon as allowed by their medical conditions, and anyhow within one week after admission. Non-suicidal controls were interviewed in connection with their visit to the GP.

#### 2.2.1. Empathy

The IRI is a self-administered, 28-item instrument that measures the emotional and cognitive components of a person's general capacity for empathy. It consists of four subscales:

- (1) Perspective Taking (PT): the tendency to spontaneously adopt the psychological point of view of others, and the cognitive capacity to see things from the point of view of others, without necessarily experiencing any affective involvement;
- (2) Empathic Concern (EC): the tendency to experience affective reactions of sympathy, concern and compassion for other people undergoing negative experiences;
- (3) Personal Distress (PD): the tendency to experience personal feelings of distress and discomfort in witnessing other people's negative experiences and/or suffering;
- (4) Fantasy (FS): the imaginative capacity to transpose oneself and identify strongly with fictitious characters in movies, books, and plays.

The 28 items are scored on a five-point Likert scale from one ("Does not describe me well") to five ("Describes me well"). Some items are expressed in a negative form and the score needs to be reversed. A validated Italian version of the IRI is available (Ingoglia et al., 2016). Each

**Table 1**  
Characteristics of the study samples.

	Controls (n=138)	Cases (n=56) n (%) / mean (SD), range	Total (n=194)	p-value
<b>Sex</b>				0.165 (1.93) <sup>a</sup>
Women	84 (60.9%)	28 (50.0%)	112 (57.7%)	
Men	54 (39.1%)	28 (50.0%)	82 (42.3%)	
<b>Age (years)</b>	48.7 (15.3), 19–70	49.2 (15.4), 18–86	48.8 (15.3), 18–86	0.883 (0.04) <sup>b</sup>
<b>Education</b>				0.174 (3.5) <sup>a</sup>
Low	38 (27.5%)	23 (41.1%)	61 (31.4%)	
Medium	79 (57.2%)	27 (48.2%)	106 (54.6%)	
High	21 (15.2%)	6 (10.7%)	27 (13.9%)	
<b>Occupational status</b>				0.019 (7.95) <sup>a</sup>
None	59 (42.8%)	18 (32.1%)	77 (39.7%)	
Low	20 (14.5%)	18 (32.1%)	38 (19.6%)	
Medium/High	59 (42.8%)	20 (35.7%)	79 (40.7%)	
<b>IRI subscales</b>				
PT	16.41 (4.33), 7.0–26.0	15.55 (5.57), 4.0–27.0	16.17 (4.72), 4.0–27.0	0.251 (1.32) <sup>b</sup>
EC	19.28 (4.03), 5.0–28.0	19.25 (5.39), 6.0–28.0	19.27 (4.45), 5.0–28.0	0.963 (0.002) <sup>b</sup>
PD	9.43 (5.11), 0.0–22.0	13.34 (5.40), 0.0–25.0	10.56 (5.48), 0.0–25.0	<0.001 (22.6) <sup>b</sup>
FS	12.34 (5.19), 2.0–26.0	14.61 (4.75), 6.0–25.0	12.99 (5.16), 2.0–26.0	0.005 (7.97) <sup>b</sup>

Note. EC = Empathic Concern; FS = Fantasy; IRI = Interpersonal Reactivity Index; PD = Personal Distress; PT = Perspective Taking.

<sup>a</sup> Chi-Square test (test statistics)

<sup>b</sup> t-test (test statistics)

scale was found to reliably measure the identified variables and to have adequate internal reliability, with an alpha coefficient ranging from 0.71 to 0.77 (Davis, 1983; Litvack-Miller et al., 1997).

### 2.3. Statistical analyses

Descriptive analyses and inferential procedures were conducted with the free software R, version 3.6.1 (R Core Team, 2019) using the packages “base”, “stats” and “poLCA” (Linzer and Lewis, 2011) for estimation of Latent Class Analysis (LCA; see Appendix and Fruhwirth-Schnatter et al. (2019) for further details). Differences in the location parameters were tested with the *t*-test, while associations between categorical variables were tested using Chi-square tests. All tests were conducted at a level of significance  $\alpha=0.05$ .

Linear regressions with Gaussian response were estimated using the average IRI scores as response variable, using attempted suicide and demographic information as control covariates. Model comparisons were performed in terms of Akaike information criterion (AIC) and Bayesian information criterion (BIC), while regression diagnostics were based on the analysis of the residuals and studentized residuals.

LCAs on the raw categorical items were estimated to investigate the relationship between empathy and suicide attempts. LCA was used to investigate the presence of different latent profiles in the population under study, focusing on the raw items of the questionnaires instead of the average scores. LCA was further extended in a regression framework to allow the probability of belonging to a specific group to be a function of control covariates such as sex and case/control status, thereby allowing to investigate the impact of such variables in the composition of the groups.

## 3. Results

Descriptive statistics reported in Table 1 show that individuals who had attempted suicide (Cases) and those who had not (Controls) did not significantly differ in terms of sex, age and education. On the other hand, those who had attempted suicide were more likely to have a low professional status compared to the controls.

### 3.1. Empathy profile

Suicide attempters had a significantly higher score at the PD ( $p<0.001$ ) and FS subscales ( $p=0.005$ ) than the non-suicidal control group; the two groups did not differ with regard to the PT and EC subscales (Table 1).

Table 2 illustrates differences in each IRI subscale scores by sex, separately in cases and controls. In the control group women reported higher scores than men at all the IRI subscales. On the contrary, among cases, women and men scored similarly at all the IRI dimensions, except for the PD subscale, where women reported higher scores.

In order to further investigate whether patients who had attempted suicide had a peculiar empathic profile, linear models with Gaussian response were estimated using each IRI subscale score as the dependent variables. Case/control group, age, sex, educational level and professional status were used as independent variables. Because educational level and professional status did not significantly impact on the empathic profile, these variables were removed from further analyses, and only case/control group, sex and age were entered as final covariates, resulting in a better goodness of fit for the model (AIC 11712 (df=5) vs. 1181 (df=10), with a lower AIC value corresponding to a better fit). The moderate differences in professional status between cases and controls did not impact on the outcome of interest, and were entirely captured by the case/control status. No associations emerged with the PT and EC subscales, while significant associations between case/control status, sex and age emerged in relation to the PD (Cohen- $f^2 = 0.276$ ) and FS (Cohen- $f^2 = 0.333$ ) subscales (Table 3). Table 3 indicates that having attempted suicide was associated with increased average scores on the PD and FS subscales by 4.3 and 2.6 points, respectively. Similarly, being a woman increased these average scores by 3.1 and 2.1 points, respectively. Lastly, age had a negative effect, meaning that older individuals reported on average lower scores than younger ones. The interaction term between suicide attempt status and sex was not significant in the investigated models (Supplementary Table 3).

### 3.2. Latent Class Analysis

In order to further investigate the relationship between the PD and FS scores and the status of suicide attempters, we performed a latent class regression analysis on the raw categorical items, using the same

**Table 2**  
IRI subscale scores by sex and case/control status.

IRI subscales	F	M	p-value <sup>a</sup>
		mean (SD), range	
<b>Cases</b>	n = 28	n = 28	
PT	14.64 (5.26), 5.0–23.0	16.46 (5.81), 4.0–27.0	0.224 (1.51)
EC	19.32 (5.19), 9.0–28.0	19.18 (5.68), 6.0–28.0	0.922 (0.010)
PD	15.11 (4.51), 7.0–25.0	11.57 (5.70), 0.0–24.0	0.013 (6.63)
FS	15.79 (5.02), 6.0–25.0	13.43 (4.22), 8.0–23.0	0.063 (3.62)
<b>Controls</b>	n = 84	n = 54	
PT	17.26 (4.29), 8.0–26.0	15.09 (4.08), 7.0–24.0	0.004 (8.73)
EC	19.95 (3.78), 9.0–28.0	18.24 (4.22), 5.0–26.0	0.014 (6.16)
PD	10.73 (5.0), 1.0–21.0	7.41 (4.64), 0.0–22.0	<0.001 (15.3)
FS	13.51 (5.19), 2.0–26.0	10.52 (4.67), 2.0–22.0	0.001 (11.8)

Note. EC = Empathic Concern; FS = Fantasy; IRI = Interpersonal Reactivity Index; PD = Personal Distress; PT = Perspective Taking.

<sup>a</sup> t-test (test statistics)

**Table 3**  
Linear regression analyses of the associations with each IRI subscale.

	Coefficient	Standard Error	t value	p-value	95% CI
<b>Personal Distress</b>					
Intercept	9.91	1.35	7.34	<0.001	7.25, 12.57
Case	4.28	0.78	5.50	<0.001	2.75, 5.80
Female	3.13	0.72	4.32	<0.001	1.71, 4.55
Age	-0.05	0.02	-2.11	0.037	-0.09, -0.004
<b>Fantasy</b>					
Intercept	17.22	1.24	13.85	<0.001	14.77, 19.68
Case	2.56	0.72	3.58	<0.001	1.16, 3.97
Female	2.14	0.67	3.21	0.002	0.83, 3.45
Age	-0.13	0.02	-5.92	<0.001	-0.17, -0.09
<b>Perspective Taking</b>					
Intercept	19.74	1.26	15.63	<0.001	17.25, 22.23
Case	-0.76	0.73	-1.04	0.299	-2.19, 0.68
Female	0.58	0.68	0.86	0.391	-0.75, 1.92
Age	-0.08	0.02	-3.47	0.001	-0.12, -0.03
<b>Empathic Concern</b>					
Intercept	19.73	1.22	16.12	<0.001	17.32, 22.14
Case	0.10	0.71	0.14	0.886	-1.29, 1.49
Female	1.12	0.67	1.71	0.089	-0.17, 2.42
Age	-0.02	0.02	-1.10	0.274	-0.07, 0.02

covariates as described above. The class specific probabilities for the items identified in the PD and FS subscales are reported in Appendix, Figures A and B, respectively.

**3.2.1. Personal Distress**

For the PD subscale, the LCA identified two groups of individuals: those who remain calm (Class 1) and those who are more stressed (Class 2) in witnessing other people’s negative experiences and/or suffering (Figure A in Appendix reports the estimated class specific response probabilities for the two latent classes in the PD subscale). Subjects in the first class assigned low scores to the items E6, E10, E17, E24 and E27, and high scores to the remaining items (see Appendix for a detailed description of the questionnaire items). Individuals belonging to the second class reported an opposite score pattern.

Table 4 displays the impact of the covariates on varying the class-membership probabilities. Specifically, individuals who had attempted suicide and women had higher probabilities (1.6 and 1.7, respectively) to belong to the second class (high-stress). Fig. 1A illustrates the probabilities of belonging to the high- and low-stress classes, stratified by sex and case/control status. Women who had not attempted suicide had similar probabilities of belonging to the low- or high-stress classes, while women who had attempted suicide had higher probabilities to belong to the high-stress class. On the other hand, men in the control group had

higher probabilities of belonging to the first class (low stress), while suicide attempters had similar probabilities to belong to the low- or high-stress classes.

**3.2.2. Fantasy**

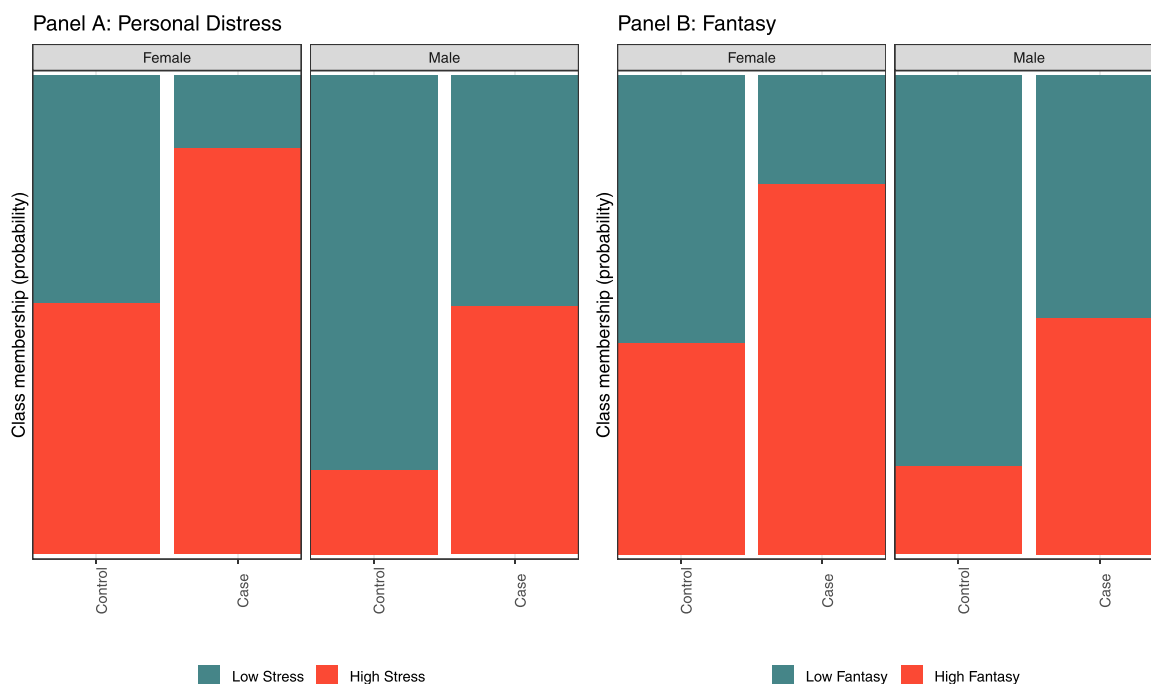
For the Fantasy subscale, the LCA identified two groups of individuals: those who do not transpose themselves and feel involved in movies, books or plays (Class 1), and those with high levels of fantasy and personal involvement (Class 2). Figure B in Appendix shows the class specific probabilities for the two latent classes estimated on the Fantasy items. Subjects in the first class assign low scores to the items E1, E16, E23 and E26, while subjects in the second class assign high scores to the items E5 and E26 (see Appendix for further description).

According to regression analyses, individuals who had attempted suicide and women had higher odds (1.5 and 1.3, respectively) of belonging to the high-fantasy latent class (Table 4). Fig. 1B shows that both men and women in the control group had higher probabilities of belonging to the low-fantasy class, even if the likelihood was much higher for men. On the other hand, women who had attempted suicide were more likely to belong to the high-fantasy class, while men who had attempted suicide had similar probabilities to belong to the high- or low-fantasy classes.

**Table 4**  
LCA on Personal Distress and Fantasy subscales: estimated regression coefficients of the probability of belonging to the High Personal Distress and High Fantasy profile.

	Coefficient	Standard Error	t value	p-value	95% CI
<b>Personal Distress</b>					
Intercept	-0.22	0.87	-0.26	0.798	-1.93, 1.49
Case	1.63	0.63	2.60	0.010	0.40, 2.85
Female	1.65	0.50	3.33	0.001	0.68, 2.62
Age	-0.03	0.02	-1.68	0.096	-0.06, 0.01
<b>Fantasy</b>					
Intercept	1.72	0.82	-2.10	0.037	0.12, 3.33
Case	1.47	0.49	-2.97	0.004	0.50, 2.43
Female	1.26	0.52	-2.43	0.017	0.24, 2.27
Age	-0.07	0.02	3.82	<0.001	-0.10, -0.03

Note. LCA = Latent Class Analysis



**Fig. 1.** Latent regression analysis for the Personal Distress (Panel A) and Fantasy (Panel B) subscales. Effect of sex and suicidal behavior status.

**4. Discussion**

The main findings of this study are those of a relationship between suicidal behavior and empathy profiles, with a gender specific pattern. To the best of our knowledge, this is the first study to evaluate the possible associations between suicidal behaviors and specific empathy profiles, as measured by the IRI, in a sample of patients admitted to a psychiatric ward after a suicide attempt, and in a control group of persons who have never attempted suicide and have no recent suicidal ideation.

Specifically, the suicide attempter group scored significantly higher than the non-suicidal group on the ‘Personal Distress’ and ‘Fantasy’ subscales of the IRI. The two groups did not differ on the ‘Perspective Taking’ and ‘Empathic Concern’ subscales. An additional finding is the one of an additive effect of gender on the prediction of empathy profiles in the domains of PD and FS. In detail, women in the control group had similar probabilities of belonging to the class of high or low PD levels, while women who had recently attempted suicide were more likely to have high PD scores. A partially opposite effect was found for men: i.e., men in the control group had higher probability of scoring low at the PD scale, while men who had attempted suicide had similar probabili-

ties of belonging to the class with high or low PD scores. Similar patterns emerged with regard to the FS subscale.

Our finding of an association between empathy profiles and suicidal behavior is a novel one. It is of interest that only specific domains of empathy resulted significantly associated with the risk of suicidal behavior. Previous studies have examined the relationship between empathy levels at different domains and specific psychiatric disorders, finding impaired empathic responses in schizophrenia and bipolar patients. For example, results of a recent meta-analysis show that schizophrenia patients have deficits in Empathic Concern, Perspective Taking and Fantasy empathic domains of the IRI, but increased Personal Distress levels, with a possibly moderating effect of gender (Bonfils et al., 2017). Similarly, patients suffering from bipolar disorder were found with reduced PT scores, but enhanced PD especially in relation to the severity of their symptomatology (Cusi et al., 2010). In addition, depressed inpatients scored higher at the PD subscale (O’Connor et al., 2002), and outpatients with (current or past) depression reported lower scores at the EC and PT domains of the IRI (Cusi et al., 2011). To the best of our knowledge, only one previous study has examined empathy in relation to suicidal behavior, and found that old adults with current or past suicide attempt had lower empathic perception, or a dampened behavioral

empathy, compared to depressed non-suicidal patients or healthy controls. The authors hypothesized that such diminished empathic skills, and the consequent isolation and distress typical of the suicidal crisis, may reduce the social deterrent of considering the impact of suicide on family and friends (Zhang et al., 2019).

These findings are not totally contradictory with ours; rather, it seems that, similarly to depressed patients, individuals with a recent history of attempted suicide have a tendency to score high at the more egocentric domains of the IRI, i.e. at those subscales that require a self-identification as victims, either as of being exposed to fictional events or of experiencing personal distress in response to others' stress. In particular, depressed patients seem to score especially high at the PD scale when having higher levels of alexithymia (Banzhaf et al., 2018). On the other hand, depressed patients score lower on scales that are more centered on the others, and that imply more understanding, cognitively or affectively, the others' distress. Indeed, the EC dimension of the IRI indicates more "other-oriented responses", i.e. the ability to experience and understand the feelings of others, and is related to compassion and ability to approach and support others. The more self-oriented PD scale rather reflects the tendency of feeling, and thus experiencing distress for, the feelings of others, possibly leading to social anxiety, loneliness, shyness and inability to social interaction (Banzhaf et al., 2018; Schreiter et al., 2013). In line with this view, depressed patients appear to be more self-focused, and thus to use a more PD-oriented approach to interpersonal situations, this leading to avoidance and withdrawal behavior (Schreiter et al., 2013). Our findings add to this evidence, further suggesting that individuals who choose a more self- and PD-oriented approach, may also tend to act suicidal behaviors. It could be speculated that higher levels at the more egocentric dimensions of empathy may be related to higher risk of demonstrative behaviors, such as suicide attempts aimed at seeking help. However, this hypothesis has to be further explored.

Interestingly, there seems to be a gender difference in individuals' empathic patterns, even though the evidence is still controversial. In general, the affective component of empathy, which may be associated with impaired interpersonal and social functioning and depression, seems to be higher in women, and women tend to score higher in the PD and EC domains. In other words, women may be more prone to personally experiencing empathic stress (Schreiter et al., 2013). Several studies also suggest a gender difference in the empathic accuracy, which seems to be impaired in depressed women but not men (Baez et al., 2017). Our results are in line with these previous findings of a gender effect on empathy levels. However, other studies have suggested that gender differences in self-reported empathy are biased by cultural stereotypes of women and men's roles (Baez et al., 2017). For example, a recent study found only irrelevant gender differences when empathy was assessed with an experimental paradigm, but a more obvious gender pattern when using the (self-reported) IRI (Baez et al., 2017). While this hypothesis cannot be ruled out, if true, it would suggest that cultural gender stereotypes, including those in empathic response, may be indirectly related to non-lethal suicidal behavior. This is in line with the well-known observation that attempted suicides are more common in women than in men (Canetto and Sakinofsky, 1998), and it would suggest that, because of cultural or biological (or both) mechanisms, women tend to personally experience (other's) distress and to express, or communicate, such personal distress by acting it through more or less lethal behaviors. In many societies both, empathy (intended as the ability to understand and being more sensitive to the feelings of others), and attempted suicide, especially by less-lethal means, are considered more feminine traits (Baez et al., 2017; Canetto, 2008). To further confirm this hypothesis, the possible association between empathy domains, gender and suicidal behavior should be tested in relation to the lethality of the suicidal intent. Moreover, if similar associations between empathy, suicidal behavior and gender emerge also in different cultural contexts, remains to be examined. However, if only cultural stereotypes and social desirability would explain the generally-reported gender difference

in empathy levels, it is likely that other (than the more self-oriented) empathic domains would differ between genders. Thus, it is plausible that a combination of social, cultural and biological factors interact in contributing to gender difference in the link between empathy and suicidal behavior.

In general, our results suggest that addressing empathy and cognitive and affective constructs may be of relevance in the identification of suicidal individuals and possibly in the prevention of such behaviors. While the personal response to stressful situations, and thus the levels of individual psychological pain and distress vary between and within individuals, empathy is considered a fairly stable individual trait. However, whether our detected associations between high PD and FS empathy levels and suicidal behavior vary within individuals (e.g., in relation to traumatic events such as attempting suicide or experiencing the suicide of a loved one) remains to be examined in a long-term longitudinal setting.

#### 4.1. Strengths and limitations

This study has a number of limitations. Psychiatric disorders are among the main risk factors for suicidal behavior. Similarly, the association between psychiatric disorders and impaired empathic response is a common finding. Additionally, many psychiatric disorders, especially those related to suicidal behavior, occur with a gender pattern. Thus, it is not possible to exclude that our finding of a link between empathy, gender and suicidal attempts reflects the impact of psychopathology. Because of the rather small sample size, and because current or previous psychiatric disorders were one of the exclusion criteria in the selection of the control sample, it was not possible to examine the role of psychopathology in influencing empathy and suicidal behaviors. Additionally, the lack of a control sample of psychiatric patients with no current or past suicidal behavior precluded us from testing the possible mediation effect of empathy. An additional limitation arises from the use of a self-administered tool to assess empathy, which may introduce a gender-role stereotype bias (Baez et al., 2017). However, the IRI is a widely used, valid and reliable instrument to measure empathy levels. Additionally, because the control group was selected on the basis of a negative history of attempted suicides as reported by their GPs, we cannot rule out that a number of individuals in the control group had in fact previously attempted suicide without disclosing it to their GP. However, given the relatively large size of the control group and the low prevalence of such acts in the population with no psychiatric disorders, it is plausible that this limitation concerned only a small number of individuals, and thus did not bias our results. Furthermore, it cannot be excluded that a proportion of attempted suicide cases in our sample were in fact cases of non-suicidal self-injurious behavior. However, because non-suicidal and suicidal self-injurious acts share common risk factors and both may be expression of important psychological pain and distress that need careful consideration, this limitation does not affect the possible clinical implications of our findings. Similarly, it is possible that individuals who act repeated suicidal attempts represent a distinct group, with specific psychological and empathic profile. Further research should address in detail the associations between empathy profiles and different phenotypes in the continuum between non-suicidal and seriously suicidal self-injurious behavior.

Even with the above limitations, this is the first study to show that distinct empathic profiles are associated with attempted suicide in a gender-specific manner. Specifically, women who score high at the Personal Distress and Fantasy subscales appear at higher risk of a recent suicidal behavior. Whether specific empathy profiles mediate the effect of psychopathology on suicidal behavior, and what is the impact of addressing empathy constructs in the psychiatric and psychotherapeutic practice, remain to be studied.

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## Author contributions

P.S. contributed to conception and design of the study, interpretation of the data and drafting of the manuscript. E.A. and G.C. contributed to the analysis and interpretation of the data. E.T. contributed to the interpretation of the data and drafting of the manuscript. G.A. contributed to the acquisition of the data. All the authors critically reviewed the manuscript and approved the final article.

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## Declaration of Competing Interest

All the authors have no conflict of interest.

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## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jadr.2020.100024](https://doi.org/10.1016/j.jadr.2020.100024).

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