



The Association among Difficulties in Emotion Regulation, Hostility, and Empathy in a Sample of Young Italian Adults

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The aim of the present study was to assess the role of empathy in mediating the association between difficulties in emotion regulation and hostility. Three hundred and sixty young Italian adults (220 women and 140 men) were enrolled in the study. Psychopathological assessments included the Difficulties in Emotion Regulation Scale (DERS), the Interpersonal Reactivity Index and the Buss–Durkee Hostility Inventory (BDHI). Perspective taking (PT) and Personal distress (PD) are significantly associated with both DERS total score and BDHI total score. A mediational model analyzing the direct and indirect effects of DERS on BDHI through the mediating role of PT and PD showed that the relation between DERS and BDHI was partially mediated by PT total score ($b = 0.16$; $se = 0.01$; $p = 0.02$). Taken together our findings support the possibility that PT skills could play a crucial role in inhibiting hostility behaviors.

Keywords: emotion regulation, hostility, empathy, difficulties in emotion regulation, mediational model

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INTRODUCTION

Emotion regulation consists of “the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one’s goals” (Thompson, 1994). This involves: (1) emotional clarity, awareness, and acceptance; (2) the capacity to control impulsive behaviors when feeling negative emotions; (3) the ability to choose contextually suitable emotion regulation strategies in order to meet personal goals and situational demands (Gratz and Roemer, 2004).

In recent years, difficulties in emotion regulation have been increasingly associated with the development and maintenance of several mental-health problems and maladaptive behaviors (Amstadter, 2008; Gillanders et al., 2008; Aldao et al., 2010; Jimenez et al., 2010; Marroquín, 2011; Aldao and Mennin, 2012; Berking et al., 2012; Svaldi et al., 2012). Furthermore, it has been observed (Berking and Whitley, 2014) that difficulties in emotion regulation are detected in almost all mental disorders included in the 5th edition of Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013). For example, difficulties in emotion regulation seem to be related with both internalizing (e.g., major depression and anxiety disorders) (Mennin et al., 2007; Nolen-Hoeksema et al., 2008; Contardi et al., 2013) and externalizing behavior problems (e.g., attention-deficit/hyperactivity disorder) in adolescents and young adults (for a review see Steinberg and Drabick, 2015).

Among the behavioral correlates of the difficulties in emotion regulation, expressing hostility has been particularly investigated in both clinical and non-clinical settings (Bowie, 2010; McLaughlin et al., 2011; Carrère and Bowie, 2012; Mitrofan and Ciuluvică, 2012; Roberton et al., 2012). Hostility is conceptualized as a multidimensional construct including cognitive (i.e., negative thoughts, cynicism, or resentment), affective (i.e., negative emotions, including distaste, and anger), and behavioral components (i.e., verbal and physical aggression) (Garcia-Leon et al., 2002). A recent review of longitudinal studies investigating the association between emotion regulation and aggressiveness in adolescents suggested that deficits in emotion regulation are an important risk factor for aggressive behaviors (Roll et al., 2012). Similarly, a lower emotion regulation predicted subsequent relationship aggressiveness (Bowie, 2010). Moreover, Mitrofan and Ciuluvică (2012) reported that several components of emotion regulation (i.e., acceptance of emotions, ability to control impulses) should be enhanced in order to reduce the expression of anger and hostility as well as to increase life satisfaction in adolescents.

Both difficulties in emotion regulation and hostility seem to be closely related with trait (or dispositional) empathy (Jolliffe and Farrington, 2004; Decety, 2010). As defined by Davis (1994), dispositional empathy is a multidimensional construct with both emotional (i.e., the tendency to worry or feel solidarity with others) and cognitive (i.e., the tendency to identify with others and take into consideration their point of view) components. It has been proposed that emotion regulation may be one of the core components (together with affective arousal and emotion understanding) of human empathy (Decety, 2010). Furthermore, experimental studies reported that both cognitive and emotional components of empathy are related with emotion regulation (Eisenberg et al., 1994; Okun et al., 2000).

Similarly, the association between empathy and hostility has been widely detected. Low levels of empathy may be positively associated with more aggressiveness and disruptive behavior disorders (Jolliffe and Farrington, 2004; de Wied et al., 2010). Furthermore, higher levels of empathy increase prosocial behaviors (Davis et al., 1994; McMahan et al., 2006; Gini et al., 2008; Masten et al., 2011) and moderate the expression of aggressive behaviors and different types of violence, such as delinquent bullying behavior, alcohol-related and sexual aggressions (Wheeler et al., 2002; Giancola, 2003; Lovett and Sheffield, 2007; Jolliffe and Farrington, 2011).

Despite the strong association between difficulties in emotion regulation and hostility, no study so far has investigated the association between these two constructs while considering the possible role of empathy as a mediating factor. Therefore, the aim of the present study was to investigate in a sample of young Italian adults (i) the association between self-reported difficulties in emotion regulation and hostility, and (ii) whether this association was mediated by self-reported deficits in empathy. We decided to focus on this developmental stage because it is known that the onset of several mental disorders, characterized by severe emotion dysregulation, such as addictive disorders and impulse control disorders, occurs in young adulthood (Christie et al., 1988; Jones, 2013). We hypothesized that more severe difficulties

in emotion regulation were associated with increased hostility, and that this association was partially mediated by empathy.

MATERIALS AND METHODS

Participants and Procedure

Participants were 360 young Italian adults (220 women and 140 men). Inclusion criteria were: (i) age range between 18 and 34 years, (ii) good ability to understand written Italian. Exclusion criteria were the presence of factors that impeded complete assessment, such as the refusal of informed consent. The sample was recruited through accidental sampling. University psychology students ($N = 267$) were enrolled at the European University of Rome and completed the assessment during normal academic activities at their teaching sites. The non-university sample ($N = 93$) was recruited through advertisements for established community groups (e.g., hospitals, shopping malls, church groups operating in Rome).

Participation rate was 98%. There were no sociodemographic differences between responders and non-responders as well as between university students and the non-university sample. All subjects participated voluntarily and anonymously in the study after providing written informed consent; they did not receive payment or any other compensation (i.e., academic credit).

Mean age of the respondents was 23.17 years ($SD = 3.72$). Of the respondents, 23.6% had a college degree, while the remaining were middle and high school graduates (no one attended school for less than 8 years). Around 94% were single, 3.6% were married, and 2.5% were either widowed or divorced. Other characteristics of the sample are reported in **Table 1**.

After receiving information about the aims of the study, subjects provided written consent to participate in the study, which was performed according to the Helsinki declaration standards and was approved by the European University's ethics review board.

Measures

The Italian versions of the Difficulties in Emotion Regulation Scale (DERS) (Gratz and Roemer, 2004; Sighinolfi et al., 2010), the Interpersonal Reactivity Index (IRI) (Davis, 1980, 1983; Albiro et al., 2006), and the Buss–Durkee Hostility Inventory (BDHI) (Buss and Durkee, 1957; Castrogiovanni et al., 1993) were administered in the present study.

The DERS is a 36-item multidimensional self-report measure assessing individual's characteristic patterns of emotion regulation. Items are rated on a 5-point Likert-type scale (from 1 = *almost never* to 5 = *almost always*) indicating the degree to which each statement describes the respondent's behavior. Scores range from 36 to 180; greater scores on the DERS reflect greater difficulties with emotion regulation. This test consists of the following six subscales, theoretically formulated and confirmed through factor analysis: (1) *Non-acceptance*, referred to non-acceptance of emotion responses (e.g., "When I'm upset, I feel guilty for feeling that way"); (2) *Goals*, related to the difficulty in engaging in a goal-directed behavior while experiencing negative emotions (e.g., "When I'm upset, I have

TABLE 1 | Descriptive statistics of all participants (N = 360).

Variables	Count/M	%/(SD)
Females	220	61.1
Age – M (SD)	23.17	(3.72)
Job status		
Employed	93	25.8
Students	267	74.2
School attainment > 13 years	85	23.6
Marital status		
Unmarried	338	93.9
Married	13	3.6
DERS total scores – M (SD)	86.91	(20.70)
Non-acceptance – M (SD)	13.34	(4.80)
Goals – M (SD)	14.11	(4.41)
Impulse – M (SD)	14.04	(5.12)
Awareness – M (SD)	15.20	(4.37)
Strategies – M (SD)	18.26	(6.33)
Clarity – M (SD)	11.95	(4.10)
IRI		
FS – M (SD)	2.18	0.67
EC – M (SD)	2.70	0.54
PT – M (SD)	2.31	0.64
PD – M (SD)	1.62	0.64
BDHI – M (SD)	35.16	(10.10)
Covert – M (SD)	10.89	(4.50)
Overt – M (SD)	24.26	(7.50)

DERS, Difficulties in Emotion Regulation Scale; IRI, Interpersonal reactivity index; FS, Fantasy; EC, Empathic concern; PT, Perspective taking; PD, Personal distress; BDHI, Buss–Durkee hostility inventory.

difficulty concentrating”); (3) *Impulse*, referring to the impulse control difficulty when experiencing negative emotions (e.g., “When I’m upset, I have difficulty controlling my behaviors”); (4) *Awareness*, related to emotional awareness (e.g., “I am attentive to my feelings”); (5) *Strategies*, concerning the limited access to emotion regulation strategies that are perceived as effective (e.g., “When I’m upset, I start to feel very bad about myself”); and (6) *Clarity*, related to the lack of emotional clarity (e.g., “I’m confused about how I feel”). The DERS showed a good level of internal consistency for both total score (Cronbach’s $\alpha = 0.93$) and the six subscales (Cronbach’s $\alpha > 0.80$) (Gratz and Roemer, 2004). The instrument also revealed an adequate concurrent validity with measures of emotion dysregulation and emotional avoidance, as well as a good predictive validity with behaviors associated with emotion dysregulation, such as self-harm and marital violence (Gratz and Roemer, 2004). In the present sample Cronbach’s α for the DERS total score was 0.91.

The IRI is a 28-item self-report measure of dispositional empathy. Each item is rated on a 5-point Likert-type scale, ranging from 1 (*Does not describe me well*) to 5 (*Describes me very well*). Scores range from 28 to 140; greater scores on the IRI reflect greater dispositional empathy. The IRI measures four dimensions of empathy: (1) *Perspective taking* (PT), measuring the reported tendency to spontaneously adopt the psychological point of view of others in everyday life (e.g., “I sometimes try to understand my friends better by imagining how things look

from their perspective”); (2) *Empathic concern* (EC), measuring the tendency to experience feelings of sympathy and compassion for unfortunate others (e.g., “I often have tender, concerned feelings for people less fortunate than me”); (3) *Personal distress* (PD), assessing the tendency to experience severe discomfort in response to extreme distress in others during a tense emotional situation (e.g., “In emergency situations, I feel apprehensive and ill-at-ease”); (4) *Fantasy* (FS) measuring the tendency to imaginatively transpose oneself into fictional situations (e.g., “I daydream and fantasize, with some regularity, about things that might happen to me”). Although several self-report measures of empathy have been developed (for a review see Pedersen, 2009), currently the IRI is the most widely and frequently used scale to measure individual differences in empathic tendencies (Spreng et al., 2009). We decided to use IRI because it is based on a multidimensional conceptualization of empathy and it is considered the most comprehensive measure of self-reported empathic dispositions (De Corte et al., 2007; Ingoglia et al., 2016). Finally, under the psychometric point of view, the IRI is characterized by several good psychometric properties, such as good internal consistency (Davis, 1994) as well as high replicability of the four-factor model in many countries (Ingoglia et al., 2016), including Italy (Albiero et al., 2006). In the present sample all IRI dimensions had Cronbach’s α of 0.78 or higher.

The BDHI consists of 75 dichotomous items (i.e., true–false answers). It was specifically developed to tap seven different subtypes of hostility (66 items) and guilt (9 items). Scores range from 28 to 140; greater scores on the BDHI reflect greater hostility. The dimensions of the BDHI, based on a theoretical classification of subtypes of hostility, are: (i) *Assault* (e.g., “If somebody hits me first, I let him have it”); (ii) *Indirect Hostility* (e.g., “I sometimes spread gossip about people I don’t like”); (iii) *Irritability* (e.g., “I often feel like a powder keg ready to explode”); (iv) *Negativism* (e.g., “When someone is bossy, I do the opposite of what he asks”), (v) *Resentment* (e.g., “Almost every week I see someone I dislike”); (vi) *Suspicion* (e.g., “I know that people tend to talk about me behind my back”); (vii) *Verbal Hostility* (e.g., “If someone annoys me, I am apt to tell him what I think of him”). Factor analysis of the BDHI has yielded two factors, one related to overt expression of hostility, generally consisting of *Assault*, *Indirect Hostility*, *Irritability* and *Verbal Hostility* and the other linked to covert expression of hostility, consisting of *Resentment* and *Suspicion* subscales (Buss and Durkee, 1957; Sarason, 1961; Bendig, 1962; Musante et al., 1989; Bushman et al., 1991). Two-week test-retest reliability coefficients have been reported to range from 0.64 to 0.78 for the subscales, and to be 0.82 for the total score (Biaggio et al., 1981). The BDHI revealed a good convergent validity with other self-report measures of anger, hostility, and aggression (Matthews et al., 1985). In the present sample Cronbach’s α for the BDHI total score was 0.85.

Statistical Analysis

Relationships between variables were computed through Pearson’s indices of associations (r).

To determine whether the relationship between difficulties in emotion regulation and hostility severity was partially mediated by empathy, we used the Preacher and Hayes’ (2008) strategy,

which assesses “how, or by what means, an independent variable (X) affects a dependent variable (Y) through one or more potential intervening variables, or mediators (M)” (Preacher and Hayes, 2008, p. 879).

This strategy tests mediation with a product-of-coefficients approach via a series of regressions analysis (Pompili et al., 2015). In the present analyses, we used standardized variables to generate standardized coefficients and the corresponding p values. As suggested by Preacher and Hayes (2008), for indirect effects, we also calculated bias-corrected and accelerated 95% CI produced using a bootstrapping method.

In the present study, we tested a model in which hostility severity (BDHI total score) was the dependent variable and difficulties in emotion regulation (DERS total score) were the independent variable. IRI dimensions, significantly associated with both the DERS and the BDHI at the bivariate analyses, were examined as a potential mediator. Additionally, we included age and gender in the model, which are known to be related with both emotion regulation (Blanchard-Fields et al., 2004; Nolen-Hoeksema, 2012) and hostility (Barefoot et al., 1993; Davidson and Hall, 1995). In order to test the adequacy of the model, we have also performed a reverse mediational model, in which hostility is the independent variable and difficulties in emotion regulation is the dependent variable.

It should be noticed that in the mediational models, the relations between variables are supposed to be causal, and mediational processes usually develop over time (Pompili et al., 2015). For this reason, several researchers questioned the use of cross-sectional data in mediation models. However, it is also argued that the use of prospective studies does not always prove causality (Hayes, 2013). Furthermore, according to Salhouse (2011), mediation strategies can also be viewed as a type of variance partitioning, similar to other methods (e.g., partial correlation), and they can also be useful when investigating whether the relation between two variables is reduced when a mediating variable is considered.

All analyses were performed with the statistical package for the social sciences (SPSS) version 19.0 (IBM, Armonk, NY, USA) and the macro for SPSS Indirect (Preacher and Hayes, 2008).

RESULTS

In the present sample the mean score of DERS, BDHI, and IRI subscales were comparable to those reported in previous studies which investigated these variables in non-clinical subjects having similar socio-demographic characteristics to our sample (Fossati et al., 2004; Albiro et al., 2006; Giromini et al., 2012).

Associations among Difficulties in Emotion Regulation, Hostility, and Empathy

Correlations between variables are reported in **Table 2**. The DERS total score was positively and strongly associated with the BDHI total score ($r = 0.51$; $p < 0.001$). The DERS total score was also positively associated with FS ($r = 0.12$; $p = 0.02$) and PD ($r = 0.38$; $p < 0.001$) total score, and negatively associated with

PT total score ($r = -0.13$; $p = 0.01$). PD ($r = 0.17$; $p = 0.002$) and PT ($r = -0.31$; $p < 0.001$) were also associated with the BDHI total score.

The mediational model explained 30% of data variability ($F_{5,354} = 33.88$; $p < 0.001$). Preacher and Hayes' (2008) strategy indicated that the total effect of the DERS on the BDHI was significant ($b = 0.25$; $se = 0.02$; $p < 0.001$), with more severe difficulties in emotion regulation being associated with more severe hostility (**Figure 1**). Moreover, the relationship between difficulties in emotion regulation and hostility was partially mediated only by PT, with higher scores on the DERS being associated with lower PT scores, which were associated with higher BDHI scores [$b = 0.02$; $se = 0.01$; $p = 0.02$; (95% CI: 0.01/0.04)]. No significant effect was observed for PD [$b = -0.01$; $se = 0.01$; $p = 0.75$; (95% CI: $-0.02/0.02$)]. Age and gender had no effects on BDHI total score (Age: $b = 0.19$; $se = 0.12$; $p = 0.88$; Gender: $b = -0.40$; $se = 0.99$; $p = 0.69$). A second mediational model with only PT as mediator was also significant explaining 32% of data variability ($F_{4,355} = 42.41$; $p < 0.001$).

Finally, the reverse mediational model, with BDHI total score as the independent variable and DERS total score as the dependent variable, explained 27% of data variability ($F_{4,355} = 34.58$; $p < 0.001$). Although Preacher and Hayes' (2008) strategy indicated that the total effect of the BDHI on the DERS was significant ($b = 1.03$; $se = 0.09$; $p < 0.001$), no significant mediational effect was observed for PT [$b = -0.02$; $se = 0.03$; (95% CI: $-0.08/0.04$)].

DISCUSSION

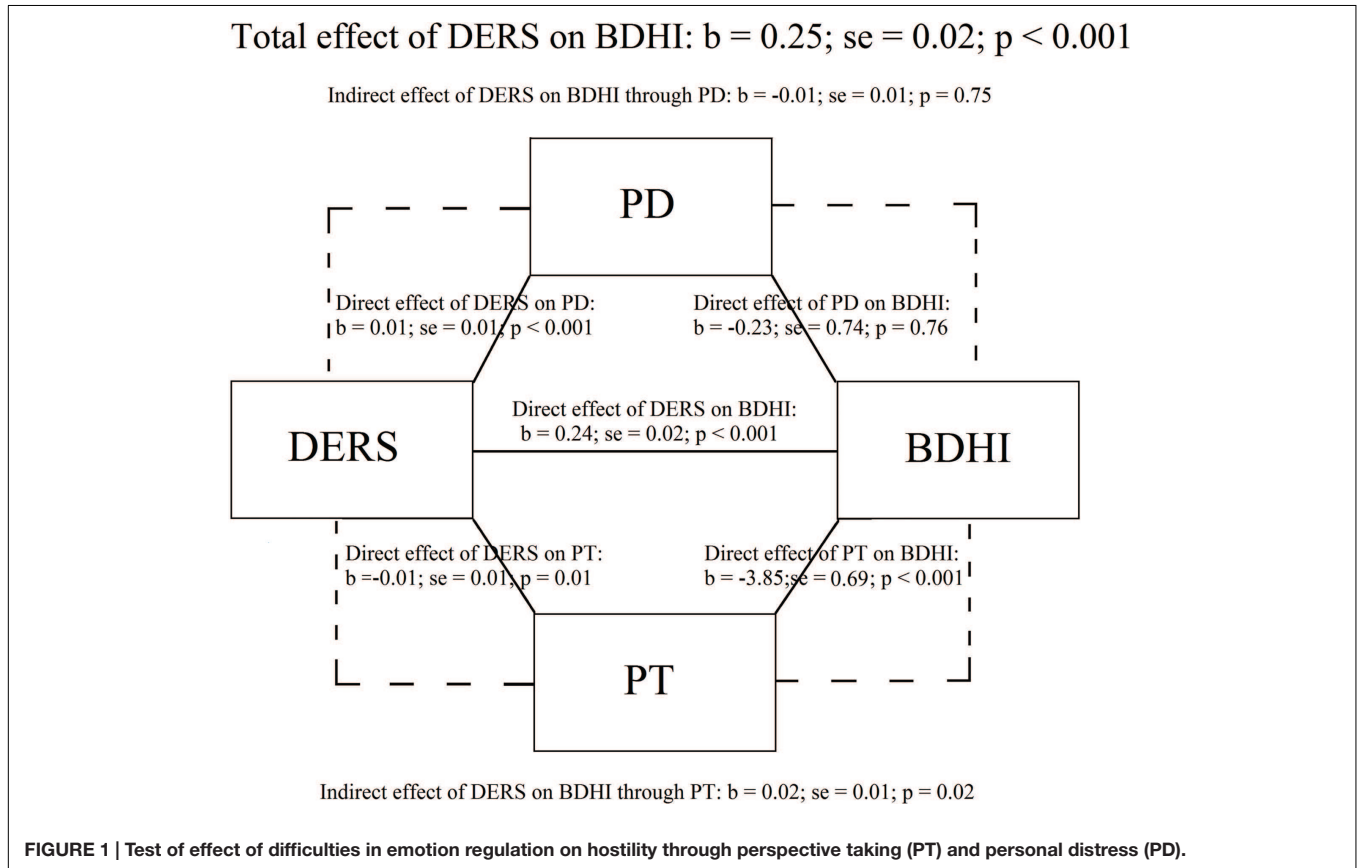
The main aim of the present study was to assess the association between emotion regulation and hostility, exploring the role of empathy as a ‘mediator.’ Our results showed that: (i) difficulties in emotion regulation are positively associated with hostility, (ii) personal distress dimension is positively related with both difficulties in emotion regulation and hostility, (iii) perspective taking dimension is negatively associated with both difficulties in emotion regulation and hostility, (iv) fantasy dimension is positively related with difficulties in emotion regulation but not with hostility, and (v) more severe difficulties in emotion regulation are associated with increased severity of hostility, and this association was partially counterbalanced only by the mediational effect of perspective taking.

The association between difficulties in emotion regulation and hostility has been consistently detected in both clinical and non-clinical settings (Bowie, 2010; McLaughlin et al., 2011; Carrère and Bowie, 2012; Mitrofan and Ciuluvică, 2012; Robertson et al., 2012). For example, Roll et al. (2012), reviewing longitudinal studies, investigating the relationship between emotion regulation and aggressive behavior in childhood, concluded that emotion dysregulation is an important risk factor for aggressive behaviors (Roll et al., 2012). In line with previous data, our results also showed that empathy dimensions (i.e., personal distress and perspective taking) were related with both difficulties in emotion regulation (Eisenberg et al., 1994; Okun et al., 2000) and hostility (Gini et al., 2007; Fernández et al., 2011;

TABLE 2 | Association between the DERS, the BDHI, and IRI dimensions (N = 360).

	DERS	FS	EC	PT	PD	BDHI
DERS	–					
FS	0.12*	–				
EC	–0.05	0.33***	–			
PT	–0.13*	0.30***	0.44***	–		
PD	0.38**	0.25***	0.15**	0.20	–	
BDHI	0.51***	0.07	–0.10	–0.31***	0.17**	–

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. DERS, Difficulties in Emotion Regulation Scale; FS, Fantasy; EC, Empathic concern; PT, Perspective taking; PD, Personal distress; BDHI, Buss–Durkee hostility inventory.



Day et al., 2012). Previous data showed that low levels of empathy are positively associated with more aggressive behaviors and disruptive behavior disorders (Jolliffe and Farrington, 2004; de Wied et al., 2010). Conversely, higher levels of empathy moderate the expression of different kinds of aggressive behaviors (Wheeler et al., 2002; Giancola, 2003; Lovett and Sheffield, 2007; Jolliffe and Farrington, 2011) and increase prosocial behaviors (Davis et al., 1994; McMahon et al., 2006; Gini et al., 2008; Masten et al., 2011).

In our study, while the personal distress dimension was positively related with both difficulties in emotion regulation and hostility, perspective taking was negatively associated with both difficulties in emotion regulation and hostility. These results could be interpreted according to several models of emotion regulation (Rottenberg and Gross, 2003; Koole, 2009; Aldao et al., 2010) suggesting that individuals use different strategies

(i.e., automatic or controlled, adaptive or maladaptive) to cope with their emotional experiences as well as to respond to environmental demands (Rottenberg and Gross, 2003; Koole, 2009; Aldao et al., 2010). It has been observed that while adaptive strategies (e.g., reappraisal and problem solving) are related with good health outcomes, dysfunctional strategies (e.g., suppression and avoidance) are associated with mental disorders and behavioral problems (Aldao et al., 2010).

The personal distress dimension assesses the tendency to experience severe discomfort in response to extreme distress in others during a tense emotional situation (Davis, 1980, 1983), and high personal distress scores has been positively associated with irritability, resentment, and suspicion (Davis, 1983). Therefore, during stressful interpersonal settings, individuals with high scores in this empathy dimension, may use hostile behaviors as

a dysfunctional coping strategy to escape from that unpleasant state and/or self-regulate emotions. This is in line with several studies suggesting that subjects may engage in aggressive behaviors in order to regulate and/or improve their own affective states (Bushman, 2002). Conversely, perspective taking assess “the tendency to spontaneously adopt the psychological point of view of others” (Davis, 1983, pp. 113–114). Previous research reported that perspective taking was positively associated with high levels of self-esteem (Davis, 1983), as well as with prosocial behaviors (Davis et al., 1994; McMahan et al., 2006; Gini et al., 2008; Masten et al., 2011). Therefore, during stressful interpersonal situations, individuals with high scores in this empathy dimension may regulate emotion engaging in functional behaviors (e.g., prosocial behavior) rather than hostile behaviors.

It is also interesting to notice that IRI’s fantasy dimension was positively associated with difficulties in emotion regulation, but not with hostility. Previous studies reported that this dimension of empathy was positively associated with emotional vulnerability (Davis, 1983; Kawakami and Katahira, 2015) as well as with sensitivity to others, and introversion (Davis, 1983). It is known that individuals with high introversion personality, are more worried and uncertain in social situations and frequently suppress/avoid their emotions (Aldao et al., 2010; Gresham and Gullone, 2012; Vantieghem et al., 2016). Thus, according to our results (i.e., positive correlation between fantasy and DERS and no significant correlation between fantasy and BDHI), in stressful interpersonal settings, people with higher fantasy may experience difficulties in emotion regulation and use dysfunctional coping strategies, such as avoidance, rather than hostile behaviors. However, it is important to notice that our interpretation remains largely speculative because, in the present study, we did not assess coping strategies. Furthermore, the small correlation between DERS and fantasy should be considered when drawing definitive conclusions from our data.

Our mediation model indicated that more severe difficulties in emotion regulation were associated with higher hostility and that perspective taking partially counterbalanced this relationship. Conversely, personal distress does not seem to mediate the association between emotion regulation and hostility (**Figure 1**), suggesting the crucial role of perspective taking skills in our mediation model. It is also interesting to underline that in the reverse mediational model, no significant effect was observed for perspective taking. This dimension is considered a key component of empathy (Gerace et al., 2013). Mohr et al. (2007), showed that lower perspective taking scores were a crucial predictor of anger in students as well as in violent offenders. The same results were observed by Day et al. (2012), who proposed that the perspective taking ability may play a crucial role in inhibiting anger arousal and behavioral aggressions.

Our results could be interpreted in line with Decety’s (2010) model of empathy. The author reported that the development of emotion regulation, through the maturation of crucial brain areas [i.e., the anterior cingulate cortex (ACC) and prefrontal cortex (PFC)], is functionally linked to the development of executive and metacognition functions, which are closely related to the cognitive aspects of empathy (i.e., perspective taking) (Decety, 2010). Thus, as suggested by our results, it is possible that deficits

in emotion regulation could lead to impairment in perspective taking, which make manifestations of hostility and aggressive behaviors more likely.

Moreover, our mediation model results may reflect several recent neuroimaging studies which detected some overlapping in the brain’s regions involved in emotion regulation, hostility, and empathy. From a neurobiological point of view, several brain regions, such as PFC, ACC, the insular cortex and the amygdala, play a crucial role in various aspects of emotion and emotion regulation (for a review see Davidson et al., 2000a; Arnsten and Rubia, 2012). It has been hypothesized (Davidson et al., 2000b) that functional and/or structural abnormalities in this brain areas (e.g., hypo-activation of PFC) or in the functional integration among them, may increase the tendency of hostile and aggressive behaviors. Coherently, recent studies have shown the involvement of these brain structures in empathy dimensions (for a review see Singer and Lamm, 2009). For example, Haas et al. (2015) reported that higher scores in perspective taking were associated with increased prefrontal cortex activity during an emotion attribution task. Furthermore, Banissy et al. (2012) showed that the perspective taking total score was positively correlated with gray matter volume of the anterior cingulate.

Although the present findings are promising, some issues which limit the generalizability of our results include: (i) a non-clinical sample; (ii) the use of self-report measures, which are known to be potentially affected by social desirability (Arnold and Feldman, 1981); (iii) the enrollment of a young adult cohort; (iv) the non-assessment of the diagnostic status/history of participants and several socioeconomic variables (e.g., income or ethnicity) which may affect the relationship among emotion regulation, hostility and empathy. Moreover, although BDHI was the dependent variable and DERS was the independent variable in our model, it is important to underline that the statistical design, we used is correlational in nature, which precludes a definitive causal interpretation of the association between these variables. Finally, we have assessed empathy using only IRI subscales. Therefore, it is possible that other general measures of empathy, such as the Empathy Quotient (Lawrence et al., 2004), might provide important insights on other mediators between difficulties in emotion regulation and hostility. Although these ideas are purely hypothetical, they might be useful in guiding future research studies with clinical and non-clinical samples and with longitudinal designs.

CONCLUSION

Our results suggest that (i) high scores in difficulties in emotion regulation are strongly associated with high hostility, and (ii) this association is partially counterbalanced by high levels of perspective taking. From a clinical point of view, our results highlight the importance of those therapeutic approaches which focus on the enhancement of perspective taking in people with deficits in emotion regulation as well as with aggressive behavioral problems (i.e., Violent Offenders) (Hanson and Scott, 1995).

AUTHOR CONTRIBUTIONS

AC: Study design, interpretation of results, preparation of the manuscript. CI: Preparation of the manuscript, data

analysis, interpretation of the results. IP: Data collection, preparation of the manuscript. CD: Data collection, preparation of the manuscript. BF: Study design, interpretation of results, preparation of the manuscript.

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