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Theory of Mind in Non-suicidal Self-Injury (NSSI) Adolescents

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Theory of Mind in Non-suicidal Self-Injury (NSSI) Adolescents

Abstract

The aim of the present study is to investigate different facets of the theory of mind (ToM), i.e. first vs. third-person, first vs. second-order ToM, egocentric vs. allocentric perspective, in a clinical sample of 20 Non-suicidal self-injury (NSSI) adolescent inpatients and 20 healthy controls.

Methods: We investigated whether performance in ToM tasks was related to both the type and frequency of self-injuring behavior and attitude toward life and death, using a semi-structured interview and different self-report questionnaires. *Results:* NSSI participants performed less well than the control group in all the ToM dimensions investigated. Furthermore, ToM performance was negatively related to Attraction to Death, in terms of both the type and frequency of self-injuring behavior, and it was positively related to Attraction to Life.

Conclusions: These preliminary findings have interesting implications for future clinical investigations, in that they provide previously unavailable information regarding the association between ToM and NSSI behavior.

Keywords: non-suicidal self-injury; theory of mind; self-injuring behavior ; adolescent inpatients; suicidal ideation.

1. Introduction

Non-suicidal self-injury (NSSI) is broadly defined as a direct, not socially sanctioned behavior that causes physical injury which results in the destruction of one's own body tissue in the absence of any observable intent to die (Muehlenkamp, 2005; Nock, 2010). In recent years the increase in all Western countries of self-injurious behaviors, especially during adolescence and young adulthood, has made NSSI a major public health issue (Klonsky, 2011; Klonsky, May, & Glenn, 2013). Studies suggest that NSSI is prevalent among preadolescents (approximately 7.5%; Hilt, Nock, Lloyd-Richardson, & Prinstein, 2008), and it peaks in middle and late adolescent years with lifetime prevalence rates ranging from 13% to 41.5% within community adolescent samples (Laye-Gindhu & Schonert-Reichl, 2005; Jacobson & Gould, 2007; Cerutti, Manca, Presaghi & Gratz, 2011; Giletta, Scholte, Engels, Ciairano & Prinstein, 2012; Zetterqvist, Lundh, Dahlström & Svedin, 2013; Bifulco, Schimmenti, Moran, Jacobs, Bunn, & Rusu, 2014). Further studies involving clinical samples of adolescent inpatients indicated notably higher lifetime rates of NSSI (ranging from 37% to 80%; Darce, 1990; DiClemente, Ponton & Hartley, 1991; Nock & Prinstein, 2004; Jacobson, Muehlenkamp, Miller, & Turner, 2008; Ferrara, Terrinoni, & Williams, 2012) suggesting that self-injurers may manifest more or different psychiatric problems than others (Klonsky & Olino, 2008). However, it should be noted that the variability in the prevalence estimates of NSSI among different studies may be related to the various ways in which NSSI has been defined and assessed including frequency of each self-injury behavior (e.g., one or more behaviors during the lifetime versus one or more behaviors occurred in the last 12 months) (Laye-Gindhu & Schonert-Reichl, 2005; Muehlenkamp, Claes, Havertape & Plener, 2012).

Generally, self-injury behavior has been considered as relating specifically to severe mental health conditions, such as personality disorders (e.g., borderline personality disorder) and in the context of a wide range of different Axis I psychiatric disorders (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006) but self-injury in absence of a conscious suicidal intent may also be present without any psychiatric

comorbidities (Wilkinson, 2013) supporting the hypothesis of NSSI as a potentially separate diagnostic entity (Selby, Bender, Gordon, Nock, & Joiner, 2012).

In this perspective, NSSI is currently taken into consideration in DSM-5 as a potential distinct clinical entity with respect to other disorders including suicidal behavior (American Psychiatric Association, 2013). Although there is not yet an official diagnosis, its delimitation is helpful for converging on a clear definition. It is important in research and clinical settings to test suggested criteria sets for its diagnostic validity (In-Albon, Ruf, & Schmid, 2013), NSSI takes a variety of forms that differ in terms of severity and frequency (Nock, 2010).

Recent research has highlighted that individuals who engage in self-injury may deliberately use more than one method, either at the same time or on different occasions (Klonsky, 2011; Ferrara, Terrinoni, & Williams, 2012) NSSI among those who perform it repetitively can be mild, moderate, or severe depending on the lethality of the injury (Klonsky & Olino, 2008; Nock, 2010). The most common form of self-injury in clinical samples appears to be skin-cutting, utilized by 70% (Nock, & Prinstein, 2004) or more (Klonsky, May, & Glenn, 2013) of those who self-injure, with most cases among females (Claes, Vandereycken, & Vertommen, 2006). Previous studies have described the typical self-cutter as female, adolescent or young adult, single, usually from a middle-to-upper class background (Darche, 1990; Favazza & Conterio, 1989). As noted by Whitlock and Selekman (2014), the chosen method of NSSI often communicates a lot about the intent of the behavior and cutting is frequently observed in association with suicidal thoughts and behaviors. Although the distinction between NSSI and suicidal behaviors has been made (Nock, 2010) the question is still controversial (Joiner, Di Ribeiro, & Silva, 2012; Klonsky, May, & Glenn, 2013). The DSM-5 (American Psychiatric Association, 2013), refers to suicidal behavior disorder (SBD) and NSSI as different conditions placing them within Section III.

1.1 NSSI and Theory of Mind

For most individuals who engage in NSSI, its purpose appears to be the reduced intensity of painful emotions (e.g., anxiety, tension) and previous studies have highlighted that the reduction of emotion

dysregulation will decrease the need for maladaptive behaviors that are employed to regulate emotions, such as self-injury (Gratz, 2007). Despite research documenting a strong association between emotion dysregulation and non-suicidal self-injury (Gratz & Chapman, 2007), there is a notable lack of research on the relationship between NSSI and Theory of Mind (ToM).

Theory of mind is the specific ability of people to attribute mental states, such as intentions, emotions, desires and beliefs, to themselves and others in order to explain and predict behavior (Premack & Woodruff, 1978). The understanding of mind is one of the most important attainments in childhood which allows children to function socially and to distinguish accidental and intended behavior, wishes and reality, truth and deception (Bellagamba, Laghi, Lonigro, & Pace, 2012; Bellagamba, Laghi, Lonigro, Pace, & Longobardi, 2014). Thus, theory of mind is fundamental for the understanding of the social world and engaging in human interactions. The difficulty to mentalize and to have emotional awareness, that are part of ToM, have implications for several severe personality disorders (e.g., borderline personality disorder) as well as psychological problems deriving from the low capacity to think about mental states (Allen, Fonagy, & Bateman, 2008).

In a recent study, Sharp and colleagues (2011) have investigated the mentalizing capacity in adolescents with borderline traits, and this is the first study to evaluate the impairment of mentalizing in BPD considering, specifically, its potential dysfunctions such as "hypermentalizing" (excessive, inaccurate mentalizing) which result in an incorrect and reduced attribution of the mental state rather than in a complete absence of ToM. The results of this study have shown that neither the undermentalizing nor its complete absence are linked to traits of borderline. Instead, the hypermentalizing (i.e. excessive interpretation of mental states) is strongly associated with the traits characterizing borderline adolescents.

An assessment of ToM in NSSI could be important, since recent studies have produced evidence to suggest that individuals who engage in NSSI have significant difficulties with managing specific mental states, i.e. emotions. It is generally assumed that NSSI often represents a dysfunctional form of emotional regulation (Klonsky, 2007; Klonsky, May, & Glenn, 2013; Nock & Prinstein, 2007); Fonagy and Bateman

(2008) suggested that mentalization may be temporarily inhibited by intense emotional arousal. NSSI can be considered as a maladaptive coping strategy to regulate and control emotion (Di Pierro, Sarno, Gallucci, & Madeddu, 2014; Gratz, 2007), and it is performed with the intent of alleviating negative affect (Klonsky, 2007); similarly, an increased mentalization might reduce NSSI behaviors.

Since ToM allows psychic and symbolic representation of one's own internal state and at the same time it serves to regulate and control one's emotions, increased mindfulness, defined as attentiveness to present experience, may serve to reduce the symptoms of NSSI (Lundh, Karim & Quilisch, 2007).

Lundh and colleagues (2007) demonstrated the association between NSSI and mindfulness, using The Mindful Attention Awareness Scale (MAAS) that was constructed by Brown and Ryan (2003) to assess individual differences in the frequency of mindful states over time, defined as attention to and awareness of what is occurring in the present. This study found self-injurers to have lower mindfulness than non-self-injurers. In another recent study, Rossouw and Fonagy (2012) examined whether mentalization-based treatment for adolescents (MBT-A) was more effective than treatment as usual (TAU) for adolescents who engaged in self-harm behaviors. The authors determined that MBT-A may be more effective than routine care in reducing the recurrence of self-harm behavior as well as depression. However, this study considered self-harm acts from a broader perspective without distinguishing between suicidal and non-suicidal intentions.

Despite a growing body of research on the clinical correlates of NSSI in adolescents, to date there has been limited research to examine the relationship between ToM and NSSI and mentalizing capacity comparing adolescent inpatients with healthy adolescents. In particular, to the best of our knowledge, no previous studies have provided an articulated assessment of ToM abilities in NSSI patients.

A large amount of research has highlighted the complex nature of ToM (Bosco, Colle, & Tirassa, 2009; Laghi, Cotugno, Cecere, Sirolli, Palazzoni, & Bosco, 2014; Lonigro, Laghi, Baiocco, & Baumgartner, 2014; Tirassa & Bosco, 2008; Tirassa, Bosco, & Colle, 2006a; 2006b) and hinted at the possibility of breaking it down into different aspects or components (Abu-Akel, 2003; Vogeley & Fink, 2003). Nevertheless, the

classical ToM tasks (see for example Wimmer and Perner, 1983; Happé, 1994; Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999; but also see more recent tools such as Sivaratnam, Cornish, Gray, Howlin, & Rinehart, 2012; Hutchins, Prelock & Bonazinga, 2012) focus on a specific component of ToM, called third-person ToM, i.e. the ability to reason about another person's mental states, overlooking first-person ToM, i.e. the ability to reason about one's own mental states (see Nichols & Stich, 2003).

Another important distinction made in the literature is between first and second-order ToM. First-order ToM engages the ability to understand a person's belief about a state of the world, while second-order ToM involves the ability to ascribe nested mental states, that is to understand a person's beliefs about the beliefs of another person. Empirical data have shown that in clinical populations second-order ToM tasks are more difficult than first-order ones (Chiavarino, Bianchino, Brach-Prever, Riggi, Palumbo, Bara, et al., 2013; Laghi et al., 2014).

Finally a distinction has been made between egocentrism and allocentrism (Frith & De Vignemont, 2005). In the egocentric perspective, others are represented in relation to the self, while in the allocentric perspective others' mental states are represented independently from the self.

In order to investigate by a unique tool all these ToM, aspects, i.e. first vs. third person, first vs. second order, egocentric vs. allocentric, we used the Theory of Mind Assessment Scale (Th.o.m.a.s.; Bosco, Colle, De Fazio, Bono, Ruberti, & Tirassa, 2009). It is a semi-structured interview based on open questions (see Appendix A). Th.o.m.a.s. has been proved to be useful to investigate healthy adolescents (Bosco, Gabbatore, & Tirassa, 2014) and in young adults with bulimia (Laghi et al., 2014) and with various clinical and non clinical population as: schizophrenia, (Bosco et al., 2009), sex offenders (Castellino, Bosco, Marshall, Marshall, and Veglia, 2011), person with alcohol use disorder (Bosco, Capozzi, Colle, Marostica and Tirassa, 2013) and persons with congenital heart disease (Chiavarino, et al., 2015). In all the above mentioned studies Th.o.m.a.s. has demonstrated to be an useful clinical instrument, able to discriminate between clinical and healthy participants, it has offered the opportunity to directly compare and observe

various patterns of performance to several aspects of ToM and it also showed a good inter-reability. Globally, these studies testify the opportunity to use Tho.m.a.s as a tool capable to assess and compare different ToM components in clinical population.

To summarize, the present study was designed to address the existing gap in the NSSI literature and provide additional information about NSSI in the clinical population of adolescent inpatients. The key issue is whether a focus on theory of mind abilities is useful, i.e. provides an appropriate domain for therapeutic intervention (Fonagy, Bateman, & Bateman, 2011).

1.3 Study Aims

The purpose of our study was to describe the phenomenological aspects of non-suicidal self-injury in a clinical sample of NSSI adolescents. The comparison between a clinical sample of adolescent psychiatric inpatients and a control group may add information for theoretical and clinical models of NSSI. More specifically, this study aimed to provide an articulated assessment of these patients' theory of mind abilities. Since there is little empirical evidence regarding the ability of NSSI subjects to perform theory of mind (ToM) tasks, we wanted to explore different facets of theory of mind abilities, i.e. first vs. third person ToM, first vs. second order, egocentric vs. allocentric perspective, in order to gain a better understanding of the complex nature of this behavior. Additionally, we wanted to explore whether performance in ToM tasks: i) might be significantly related to both the type and frequency of self-injuring behaviors; and ii) to attitude toward life and death.

2. Methods

2.1 Participants

The participants for this study were adolescents consecutively admitted to a psychiatric inpatient unit (XXX, for blinded review) that specializes in treating severe behavioral problems and psychotic episodes. All youths who presented NSSI over a 12-month period preceding admission were included.

Information collected during the clinical assessment included duration of illness, past medical history, and demographics. Each patient was evaluated by one of two senior clinicians who established whether they met the inclusion criteria listed below and whether they had engaged in repetitive NSSI according to the proposed DSM-5 criteria for a NSSI condition. Diagnosis of NSSI was made according to the criteria proposed by DSM 5 (Conditions for Further Studies - section III; APA, 2013), screened using DSHI (Deliberate Self Harm Inventory), and R-NSSI-Q (Repetitive-Not Suicidal Self Injury-Questionnaire): on 5 or more days, in the last year, the individual engaged in intentional self-inflicted damage to the surface of his or her body, without suicidal intent (criterion A); the individual engages in the self-injurious behavior with the expectation to obtain relief from a negative feeling or cognitive state, to resolve an interpersonal difficulty, or to induce a positive feeling state (criterion B); the intentional self-injury is associated with interpersonal difficulties or negative feelings or thoughts, an antecedent period of preoccupation with the intended behavior that is difficult to control, or thinking about self-injury that occurs frequently, even when it is not acted upon (criterion C); the behavior is not socially sanctioned (criterion D); it causes clinically significant distress or interference in interpersonal, academic, or other important areas of functioning (criterion E); and it does not occur exclusively during psychotic episodes, delirium, substance intoxication, or substance withdrawal (criterion F). The diagnosis was corroborated using the Italian version of the Schedule for Affective Disorders and Schizophrenia for School-Age Children/Present and Lifetime Version (K-SADS-PL; Kaufman et al., 1997). At the K-SADS-PL, 11 patients presented Mood disorders, 7, Impulse control disorders, and 2 presented Eating disorders. All adolescents with an admission diagnosis of attempted suicide were triaged to a separate unit and not included. Patients diagnosed with intellectual disabilities, pervasive developmental disorders, schizophrenia spectrum disorders or associated neurological conditions were excluded, given the relevance of such conditions for stereotypic self-injury. The selected clinical sample consisted of 20 female adolescents (age 12-17: mean = 14.74; SD = 1.64).

Healthy controls (HCs; $n= 20$ females) were students, matched to the study group for age and years of formal education, who were evaluated at a research laboratory at the Faculty of Medicine and

Psychology. Exclusion criteria for the HC group were Axis I mental disorder, neurological disease, history of head trauma and current use of psychotropic medication. All participants were native Italian speakers.

2.2 Materials

2.2.1 The Deliberate Self-harm Inventory (DSHI). The DSHI (Gratz, 2001) is a 17-item self-report measure that assesses lifetime history of various aspects of NSSI (defined as the deliberate, direct destruction of body tissue without suicidal intent), including frequency, duration, and type of NSSI behavior. Specifically, the DSHI asks participants whether and how often they have engaged in a variety of behaviors “intentionally (i.e., on purpose)”. Further, for the one behavior that could also be used to end one’s life (cutting), participants are asked whether they have cut themselves “without intending to kill yourself”. The DSHI has been found to demonstrate high internal consistency, adequate test–retest reliability, and adequate construct, discriminant, and convergent validity (Fliege, Kocalevent, Walter, Beck, Gratz, Gutierrez, et al., 2006; Gratz, 2001). The DSHI was recently translated into Italian by Cerutti et al. (2001) using the translation–backtranslation method, and was found to have adequate psychometric properties within an Italian adult sample, including adequate internal consistency, and good convergent and discriminant validity, as evidenced by significant correlations with both clinical and non-clinical dimensions of personality and body perception. For descriptive purposes we used the indexes of frequency = number of episodes per-month (seldom = episodic self-injury; sometimes to always = repetitive self-injury), types of self-injurious behaviors (e.g., self-cutting, self-burning, etc.), diversification= occurrence of multiple types of self-injurious behaviors measured on a two-level scale (2-4: moderate diversification; and 5-11: high diversification).

2.2.2 The Repetitive Non-Suicidal Self-Injury Questionnaire. The Repetitive Non-Suicidal Self-Injury Questionnaire (R-NSSI-Q; Manca, Presaghi, & Cerutti, 2014) is composed of 15 items, and in conjunction with the DSHI, is a valid and reliable measure that may also be helpful for identifying an area of NSSI risk. The items fall within one of the following criteria of the current DSM-5: failing to resist the impulse to self-injure or being frightened of being unable to resist the impulse to self-injure (criterion B2); increased levels

of tension just before committing the self-injurious act (criterion B1); a pervasive sensation of gratification and relief immediately after having committed the self-injurious behavior (criterion B4); feelings of estrangement and/or guilt and difficulty in sharing the self-injurious experience with others (criterion C); check for the repetitiveness of the self-injuring behavior. This last item only partially satisfies criterion B3 (“The urge to engage in self-injury occurs frequently, although it might not be acted upon”), because it did not ask for an intention but rather asked for endorsed self-injurious behaviors. The R-NSSI-Q has been used in a number of studies, and its reliability have been shown to be satisfactory (Cerutti et al., 2012; Manca et al., 2014). A score of 21 of the R-NSSI-Q resulted in the “optimal” cut-off score that maximally discriminated between occasional and repetitive NSSI adolescents. Internal reliability of the R-NSSI-Q in the present study was .83.

2.2.3 The Multi-Attitude Suicide Tendency (MAST). The Multi-Attitude Suicide Tendency (MAST; Osman, Gilpin, Kopper, et al. 2000) scale is a 30-item self-report measure of adolescent attitude toward life and death. The four types of conflicting attitudes identified are Attraction to Life (AL, 7 items), Repulsion by Life (RL, 7 items), Attraction to Death (AD, 7 items) and Repulsion by Death (RD, 9 items). Aspects concerning robustness and reliability of the Scale are included in Orbach et al. (1991). All dimensions exhibited acceptable levels of internal consistency (Cronbach’s α in the present study ranged from 0.83 to 0.94).

2.2.4 Theory of Mind. The Theory of Mind Assessment Scale (Th.o.m.a.s.) is a semi-structured interview aimed at assessing a subject’s theory of mind (Bosco et al., 2009; see the Appendix A for a more detailed description). Recently, the psychometric proprieties of ToM has been provided in a group of healthy adolescents and adults (Bosco et al. 2016) showing good internal consistency and inter-rater agreement. Furthermore factor analysis pointed out a good fit of the 4 scales composing it that also showed an high correlation.

All the interviewees gave their written consent to the tape-recording of their interviews, that were then transcribed. The transcripts were rated by two independent judges, who were blind to the goal of the research and to which participants belonged to the experimental or control group. Each judge assigned

each answer a score from 0 to 4 (see the Appendix B for a more detailed description). Following previous studies (Bosco, Colle, De Fazio, Bono, Ruberti, & Tirassa, 2009; Bosco, Gabbiatore, & Tirassa, 2014), co-score reliability on the theory of mind assessment was established at 90% before data collection began. Reliability for the two coders was calculated by correlating their scores on four scales for each interview. Range reliability was .83-.87, and was calculated by using the Spearman Brown correction formula. Disagreements were resolved by conferencing.

2.3 Procedure

All participants were tested individually in a quiet room. They gave their written informed consent before completing the questionnaires and within one week of the first session where they completed the questionnaires, they were administered the Th.o.m.a.s. interview. This was done during a two-to-three-hour session by two interviewers – both of whom were trained experienced clinicians – under the supervision of the first author.

Participants in the control group completed the questionnaires in a laboratory at the Department of XXX (for blinded review), and were interviewed within one week of the first session.

This survey was reviewed and approved by the Ethics Committee of the Department of XXX (for blinded review).

2.4 Data Analysis

The Statistical Package for the Social Sciences (SPSS 18.0) was used to conduct bivariate and multivariate analyses relating to independent variables. We conducted ANOVAs to investigate differences between the two groups regarding demographic characteristics and the Th.o.m.a.s scale and dimensions. Within-subjects ANOVAs with four levels on within-subjects factors (both scale type and subscale dimensions) were also carried out. We used ANOVA and post hoc tests (Tukey test; $p < .05$) to verify significant differences between the groups. Mann–Whitney U-tests were conducted to examine differences between the two clinical groups for the occurrence of multiple types of self-harming behaviors (1-4 vs. 5-11

types). Additionally, for the clinical sample, we performed correlations to investigate the relationship between the Total Th.o.m.a.s score and Attraction to Life, in terms of both the type and frequency of self-harming behaviors.

3. Results

3.1 Demographic and clinical characteristics

All individuals in the clinical sample had performed more than 5 NSSI in the previous 12 months and obtained a score above the cut-off (mean= 31; SD= 4.24; range: 22-39) for The Repetitive Non-Suicidal Self-Injury Questionnaire. Consistent with past research on NSSI within clinical samples of adolescents, most of them (N=18) reported using at least two different methods to injure themselves, with the most commonly endorsed methods (see Table 1) being cutting, head-banging, and interference with wound healing. Table 1 provides information both on the frequency of each NSSI behavior among this clinical sample and on the reported age of onset for each of the NSSI behaviors.

-----Insert Table1 about here-----

3.2 ToM performance in NSSI subjects and Controls

The ANOVA showed a significant group effect on all theory of mind dimensions and on the subscales, where the NSSI group achieved significantly lower scores than the controls, as reported in Table 2.

-----Insert Table2 about here-----

Focusing on the NSSI group's performance on the Th.o.m.a.s., we conducted a within-subjects ANOVA with four levels on within-subjects factors (scale type: A, I–Me, first-person ToM in an egocentric

perspective; B, Other–Self, third-person ToM in an allocentric perspective; C, Me–Other, third-person ToM in an egocentric perspective; D, Other–Me; second-order ToM task). We found no significant differences in the NSSI subjects' mean scores on the four individual scales, $F(3,76) = 1.09, p = .36$. We did not find any significant differences between the NSSI subjects' mean scores on the three individual Th.o.m.a.s. subscales (Awareness, Relation, and Realization), $F(2,57) = .30, p = .74$.

Focusing on the control group's performance on the Th.o.m.a.s., we found significant differences in subjects' mean scores on the four individual scales, $F(3,76) = 18.93, p < .001$. In particular, post hoc pairwise comparison (Bonferroni corrected; $p < .01$) revealed that the subjects scored lower on scale D (I–Me), which investigates second-order ToM, than on scales A, B, and C. There were no significant differences between the latter three scales.

We found significant differences between the control subjects' mean scores on the three individual Th.o.m.a.s. subscales (Awareness, Relation, and Realization), $F(2,57) = 10.06, p < .001$.

In particular, the post hoc pairwise comparison (Bonferroni corrected; $p < .01$) revealed that the subjects scored lower on the Realization scale than on Awareness and Relation, which did not differ significantly.

Additionally, Mann–Whitney U-tests were conducted to examine differences between the two clinical groups for the occurrence of multiple types of self-injuring behaviors (1-4 vs. 5-11 types). The results revealed that adolescents with high diversification scored lower ($M=1.70; SD=.53$) on scale D (I–Me) than subjects with low diversification ($M=2.40; SD=.81; Z=-2.01, p < .05$).

3.3 Theory of Mind, self-harming behaviors, and attitude toward life and death

The total ToM score (overall Th.o.m.a.s. score) was negatively related to Attraction to Death, in terms of both the types and frequency of self-injuring behaviors, and it was positively related to Attraction to Life, as reported in Table 3.

-----Insert Table 3 about here-----

4. Discussion and Conclusions

To our knowledge this is the first study to investigate the relationship between mild or severe NSSI disorder diagnosed according to the DSM-5 proposed criteria and Theory of Mind comparing a clinical group with a non-clinical control group of adolescents. We examined DSM-5 criteria for an NSSI disorder in female inpatient adolescents. As we expected, our findings indicate that in the clinical group, adolescent inpatients showed more than one type of NSSI and displayed a repetitive modality of these behaviors. The most reported method was cutting (i.e., cutting wrists, arms, or other parts of the body); this datum is consistent with the majority of studies that have shown this modality to be more frequent among girls who have engaged in NSSI both in clinical and non-clinical populations (Claes, Vandereycken, & Vertommen, 2006; Laye-Gindhu & Schonert-Reichl, 2005).

Interestingly, we found an impaired ToM to be associated with NSSI. Adolescent inpatients, who reported having engaged in at least one kind of self-injury for more than five days, exhibited poorer performance on the overall Th.o.m.a.s. scale than HCs. Specifically, the NSSI group scored lower on scales A (I-me: first-person ToM in an egocentric perspective), B (Other-self: third person and allocentric perspective), C (I-other: third-person ToM in an egocentric perspective), D (Other–Me: second-order ToM task) with respect to the control group. Unlike in the NSSI group, where no difference emerged among the four scales, the control group obtained lower scores on scale D, showing no significant differences among the other three scales. Additionally, adolescent inpatients who engaged in NSSI also performed worse than healthy adolescents on the Awareness, Relation, and Realization subscales. Furthermore, while the control subjects scored lower on the Realization scale than on Awareness and Relation, no difference emerged among the three subscales in adolescents with NSSI.

These findings suggest that adolescent inpatients with NSSI are more likely to have a pervasive and comprehensive ToM impairment than adolescents in the control group. Self-injury inpatients find it more difficult to be aware of their mental states, i.e., emotions, desire and beliefs and physical sensations, to adapt to these and adopt effective strategies to achieve a desired state, that is, to reduce their psychological suffering. Conversely, in the control group the differences that emerged belong to a profile of the typical adolescent phase of development for which the more complex mentalizing abilities, such as second-order ToM (Scherzer, Leveillé, Achim, Boisseau, & Stip, 2012) are not yet completely acquired (Bosco, Colle, De Fazio, Bono, Ruberti, Tirassa, 2009; for a review see Brizio, Gabbatore, Tirassa & Bosco, 2015).

However, considering that no other studies have exhaustively examined ToM in patients with NSSI disorder, it is not yet possible to make a comparison between our results and those of other investigations.

Nonetheless, we observed that some characteristics of ToM abilities in NSSI patients are similar to those of patients with other different disorders, e.g. eating disorders, which frequently co-occur with NSSI (Claes, Klonsky, Muehlenkamp, Kuppens, & Vandereycken, 2010; Muehlenkamp, Claes, Peat, Smits, & Vandereycken, 2011). Specifically, our findings are similar to those of a recent study (Laghi et al, 2014) exploring the different dimensions of ToM in patients with eating disorders (i.e., bulimia nervosa, eating disorder not otherwise specified in the form of subthreshold bulimia nervosa). The results of this latter study highlighted an overall impairment of ToM abilities, with patients with eating disorders performing less well than control subjects on the Th.o.m.a.s. scale, in particular on scales B and D as well as on the Awareness and Realization subscales. Nevertheless, patients with eating disorders showed a less severe impairment of ToM in comparison to NSSI patients.

It has been argued that NSSI may contribute to later suicidal thoughts and behaviors (Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006) and that it plays a role in the development of the acquired capability for suicide because the pain tolerance, combined with a desire to die, might increase the risk of lethal self-injury (Joiner, Di Ribeiro, & Silva, 2012). Nevertheless, an important distinction should be made

between NSSI as an act to preserve life as a way of terminating an intolerable emotional condition (Klonsky, 2007) or alleviating negative affect (Gratz & Chapman, 2007), and suicidal behavior disorder that is considered a pathological condition characterized by the presence of one or more suicide attempts (Klonsky, May, & Glenn, 2013).

In line with such perspective, the present findings show that the clinical sub-group reported a severe self-injury, - i.e., at least 1 NSSI act that required surgical treatment or NSSI acts over 12 or more days using a single method or NSSI acts over 8 or more days using more than one method (APA, 2013) - with sub-threshold depressive symptoms, suicidal thoughts and anhedonic traits. Our results are in line with a previous study (Ferrara, Terrinoni, & Williams, 2012) in which the patients were found to have an impaired ToM profile similar to that of the participants in the present study.

Also in line with the study by Ferrara et al. (2012), our results showed that performance by our participants on the MAST scale of Attitude toward life (AL) was positively related to their total ToM score and that performance on the Attitude toward death (AD) scale was related to a higher frequency and diversification of NSSI.

Some limitations of the study must be pointed out. Firstly, the relation identified in the study is correlational and not causal. For this reason, this study represents only a first step in understanding the key components of mindreading abilities as protective factor in NSSI adolescents. Secondly, the results of this study could thus be considered as a pilot study. Further research is required to replicate and confirm these findings considering a larger sample of NSSI adolescent inpatients. Thirdly, because of small sample, it has not been possible to consider potential covariates in the research design, as for example sociodemographic variables.

It would be useful if future research provided an assessment using different tools, for instance including the Happe's Strange Stories Test (Happé, 1994) or other instruments that can evaluate competences in reading mental states in more typical situations of everyday life.

Despite this limit, the results of our research seem promising, especially in the light of a recent study by Scott, Pilkonis, Hipwell, Keenan, Stepp (2015) showing that adolescent girls who have engaged in NSSI also report suicide ideation. NSSI thus represents a particularly high-risk group in need of prevention and intervention efforts. Specialized treatment programs designed to enhance mentalizing, as well as perceived meaning in life and developing positive relationships with others, could therefore be particularly helpful in reducing the risk of suicide among adolescents with NSSI (Whitlock, Muehlenkamp, Eckenrode, Purington, Abrams, Barreira, & Kress, 2012). It has been demonstrated that Mentalization-based Therapy (MBT) is more effective than routine care in reducing suicidal and non-suicidal self-injury as well as depression in female adolescents (Bateman & Fonagy, 2010).

To conclude, our findings seem to indicate that ToM is an interesting focus for both future research and forthcoming work on the prevention and treatment of mild and severe types of NSSI that might plausibly benefit from targeted intervention. Improved mentalizing may prevent the repetition and the dangerousness of NSSI behaviors as well as the risk for suicidal ideation.

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