



## Research paper

## Theory of mind and suicide ideation and attempt in adolescent inpatients

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## ABSTRACT

**Background:** Suicide ideation and attempt are alarmingly prevalent in adolescents, and even more so for youth in psychiatric settings. Interpersonal factors have been emphasized as important in the etiology and maintenance of suicide ideation and attempt in adolescents. Evaluating social cognitive deficits offers important insight into processes underlying interpersonal problems associated with suicide ideation and attempt; however little social-cognitive research has been conducted in this area. The aim of the current study was to explore the relation of theory of mind (ToM) impairments and suicide ideation and attempt among adolescent inpatients.

**Methods:** A sample of 391 adolescent inpatients completed measures on ToM, suicidal ideation and attempt, clinical symptoms and sociodemographics.

**Results:** Binary logistic regression analyses revealed significant relations between excessive ToM (hypermentalizing) and two suicide outcome variables (suicide ideation in the past four weeks, suicide attempt in the past year), while covarying for sociodemographics and multiple clinical symptom scales.

**Conclusions:** Excessive ToM, or over-attributing the mental/emotional states of others, appears to share a salient relation to recent suicidal thoughts and behavior in adolescent inpatients. Current findings may indicate that interventions incorporating social cognitive components (e.g., Mentalization Based Therapy and Cognitive Behavioral Therapy) may be of promise to treating youth with suicidal thoughts and behaviors and excessive ToM.

**Limitations:** The current study uses cross-sectional data and discrepancies exist in time periods assessed by primary measures.

## 1. Introduction

Suicide is a major public health concern in adolescent populations, as the second leading cause of death in youth aged 10–14 and 15–24 (Centers for Disease Control and Prevention, 2014). Amongst the strongest predictors of eventual suicide-related death are previous non-fatal suicide attempts and suicide ideation (Brown et al., 2000; Christiansen and Jensen, 2007). Suicide attempts, or self-injurious acts with non-zero intent to die, are a prevalent precursor of suicide-related death in adolescent populations, with 7.1–9.7% of community adolescents reporting a previous attempt (Andrews and Lewinsohn, 1992; Evans et al., 2005). Suicide ideation, or thoughts about suicide-related behavior and death (Nock et al., 2008), is a distinct, but related, early warning sign for suicidal behavior, with longitudinal changes in ideation differentially predicting adolescent suicide attempt (Prinstein et al., 2008). Suicide ideation is prevalent in adolescents, with nearly 30% of community adolescents reporting suicidal thoughts

(Evans et al., 2005) and even higher rates reported in psychiatric youth (Steer et al., 1993). Taken together, suicide ideation and attempt represent major public health problems in adolescence, associated with a number of severe psychosocial and affective outcomes (e.g., shame, loneliness, acquired capability for suicide; Gallagher et al., 2014; Kene and Hovey, 2014; Wiklander et al., 2003).

In order to better understand suicide-related ideation and attempt in adolescents, research has studied co-occurring difficulties in interpersonal (i.e., social) functioning and relationships. Consistent with multiple social/contextual theories of suicide (e.g., the Interpersonal Theory of Suicide; Joiner, 2005), empirical work broadly indicates a link between maladaptive social functioning and adolescent suicide ideation and behavior. Multiple studies indicate that suicidal adolescents experience a number of interpersonal difficulties, including: longstanding and ongoing relational conflict (e.g., abuse, maltreatment, victimization; Brown et al., 1999; Cleary, 2000), poor social problem solving skills (Sadowski and Kelley, 1993), low social support

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(Rigby and Slee, 1999), and greater rejection among peers (Prinstein et al., 2000).

The study of social cognition offers one pathway to better understanding the identified interpersonal difficulties associated with adolescent suicide ideation and attempt. Social cognition is broadly defined as one's ability to encode, store, and meaningfully understand the thoughts, feelings, emotions, of the self and others (Beer and Oschner, 2006; Fiske and Taylor, 2013). Conceptually, social cognition encompasses one's ability to recognize and label emotions, understand the mental state of self/others, problem solve, and engage in perspective-taking (Bandura, 2001; Choudhury et al., 2006; Lochman and Dodge, 1994). In adolescence, social-cognitive processes are crucial to adaptive socioemotional development, as they promote one's ability to engage in prosocial behavior (Eisenberg et al., 1991), empathize (Eisenberg et al., 1991), and communicate effectively (Choudhury et al., 2006). It is not surprising that when social cognitive processes are impaired, adolescents have notable difficulties in interpersonal functioning (e.g., Sharp and Vanwoerden, 2015; Venta and Sharp, 2015).

Several social-cognitive processes have been studied in relation to adolescent suicidal ideation and attempt, such that adolescent cross-sectional research has found links between suicide attempt risk and interpersonal problem solving deficits (Rotheram-Borus et al., 1990), poor problem orientation (Sadowski and Kelley, 1993), and greater cognitive errors/negative self-perceptions (Wolff et al., 2013). Research has also linked social-cognitive deficits, and specifically social problem solving deficits, to suicide ideation in a community sample of adolescents (Labelle et al., 2013).

Despite this existing work, Theory of Mind (ToM) remains one, potentially relevant social-cognitive process largely understudied in relation to adolescent suicide ideation and attempt. ToM, or mentalizing, was seminally defined by Premack and Woodruff (1978) as an individual's ability to make inferences about the mental states and emotions of others. Currently, ToM is recognized as an increasingly complex, multifaceted process with the same core components as proposed by Premack et al.: specifically, ToM/mentalizing is conceptualized as one's ability to make accurate inferences about the thoughts [i.e., cognitive ToM], emotions [i.e., affective ToM], behaviors, and intentions of others (Baron-Cohen et al., 1985; Green and Horan, 2010; Poletti et al., 2012). ToM is even more complex when considered in the context of adolescence; a review by Brizio et al. (2015) describes how core features of ToM (e.g., affective ToM; Sebastian et al., 2011) continue to develop amidst adolescents being faced with increasingly complex social situations (e.g., social groups, dating), exposure with larger systems/social roles, and as teens' brains develop (Sowell et al., 2002).

All in all, ToM is a crucial process to adaptive socioemotional development; it enables youth to understand what others are thinking and feeling, promotes emotional and social-interaction skill development, fosters perspective taking, and helps to build close, trusting relationships (Bosacki and Astington, 1999; Hughes and Leekam, 2004). In contrast, when ToM is impaired—or simply put, when youth make errors in inferences about the thoughts, emotions, behaviors, intentions of others—youth appear to experience a host of issues across cognitive, affective, and interpersonal domains (e.g., Sharp et al., 2011; Renouf et al., 2010).

Recent theory and research in ToM/mentalizing has revealed multiple forms of inaccurate mentalizing/ToM. Specifically, 'types' of ToM impairments described in seminal work by Abu-Akel and Bailey (2000) and Frith (2004) include: (1) excessive ToM [hypermentalizing or "over-mentalizing"], or when youth over-interpret social information or excessively attribute personal meaning/inferences to others (Frith, 2004; Sharp et al., 2011); (2) less ToM ["under-mentalizing"], or when youth engage in inadequate attribution of mental states (Montag et al., 2011); or no ToM [no mentalizing], when youth entirely lack the ability to make inferences about the mental states/emotions of others (Fleck, 2007; Montag et al., 2011). These inaccurate forms of mentalizing/ToM

have been recently studied and evidenced across discrepant literature bases (i.e., in adult Schizophrenia; adolescents with emerging Borderline Personality diagnoses; individuals with Autism), and these impairments measured concurrently with a newly-introduced experimental task intended to approximate social cognition in real-world situations (i.e., the Movie for the Assessment of Social Cognition; Dziobek et al., 2006; Fleck, 2007). Taken together, previous research and novel methodologies have recently recognized subtle nuances in inaccurate mentalizing/ToM errors. Given that ToM impairments have been highlighted as a core feature underlying deficits in social functioning among youth (Peterson et al., 2007), and social difficulties are evident in many suicidal adolescents, ToM impairments may be a key and relevant variable to explore in relation to risk for suicidal ideation and attempt.

Existing theoretical and empirical work provides a preliminary indication that ToM impairments, and particularly excessive ToM/hypermentalizing (Sharp et al., 2011), may be important constructs to explore related to adolescent suicidal ideation and behavior. Theoretically, Wenzel and Beck (2008)'s cognitive model of suicidal behavior proposes that dispositional or trait-like vulnerability factors, cognitive processes associated with psychiatric disturbance, and cognitive processes associated with suicidal acts cumulatively confer risk for suicidal behavior (p. 190–191). Of note in this model, cognitive processes associated with psychiatric disturbance include both maladaptive thought content and information processing biases (e.g., disturbances in how individuals process information). Aligned with this model, ToM impairments involve distortions in information-processing, and specifically represent inaccurate interpretations of available social information. For example, excessive ToM/hypermentalizing involves individuals over-interpreting social interactions and cues based on information available. Aligned with Wenzel and Beck (2008)'s model, it is possible that ToM impairments and hypermentalizing specifically may be potential cognitive risk factors for suicidal ideation and attempt in adolescence. Excessive ToM may be a particularly salient social cognitive risk factor for suicidal thoughts and behaviors, as previous research has demonstrated links between hypermentalizing/excessive ToM and other known risk factors for suicidal thoughts and behaviors (e.g., emotion dysregulation; Sharp et al., 2011). Aside from excessive ToM, it is also possible that other mentalizing impairments (i.e., no ToM, less ToM) may be risk factors for suicidal thoughts and behaviors, such that teens who entirely lack ability to make inferences about the thoughts and emotions of others may be at increased risk of experiencing suicidal ideation and behavior. In summary, ToM impairments may be a critical construct to empirically investigate in relation to adolescent suicidal ideation and behavior.

Despite this being an important potential focus of empirical work, research has only directly examined and provided support for the link between ToM and suicide ideation and behavior in adult samples (Dunó et al., 2009; Ofoghi et al., 2012; Szanto et al., 2012). Although not specific to suicidal thoughts or behaviors, a study by Laghi et al. (2016) provides preliminary evidence for a relation between nonsuicidal self-injurious (i.e., NSSI) behaviors and ToM impairment in adolescents; specifically, this cross-sectional study found that youth engaging in NSSI behavior performed more poorly on a ToM task than non-NSSI youth, and these findings may extend to youth engaging in suicidal self-injurious behavior. However, to our knowledge, no empirical work has directly studied the relations between concurrent ToM impairments (no ToM, less ToM, excessive ToM) and suicidal ideation and behavior in an adolescent sample. This remains a critical gap in empirical work, as research examining the direct relations between ToM and suicide ideation and behavior may serve to elucidate proximal, socio-cognitive risk factors for suicide-related experiences in adolescents.

Against this background, the current study aimed to address this empirical gap via cross-sectionally examining the link between ToM and suicide-related ideation and attempt in an inpatient psychiatric adolescent sample. Based on existing social cognitive and suicide/self-

injury research (e.g., Laghi et al., 2016; Sharp et al., 2011; Szanto et al., 2012), it was expected that adolescents reporting suicide ideation and/or attempts would experience impaired ToM abilities [excessive ToM, no ToM, less ToM]. Specifically, we hypothesized that excessive ToM would significantly associate with suicidal thoughts and behaviors, as we believe this particular mentalizing style may co-occur with intense emotion dysregulation (Sharp et al., 2011) and act as a particularly salient interpersonal risk factor for suicidal thoughts and behaviors. In the current study, ToM impairments [no ToM/less ToM/excessive ToM] were assessed with the aforementioned experimental movie task, the Movie for the Assessment of Social Cognition (MASC; Dziobek et al., 2006). ToM impairments were studied in relation to four suicide-related variables, while covarying for gender, age, and clinical symptoms: (1) suicidal ideation in the past four weeks; (2) suicidal ideation in the past year; (3) suicide attempt in the past year; and (4) lifetime suicide attempt. Given gender differences in ToM abilities (Bosacki, 2000), and that adolescence is a critical period for general social cognitive and affective ToM development (Choudhury et al., 2006; Vetter et al., 2013), we chose to covary for gender and age in our primary regression models. In addition, we also covaried for multiple DSM-oriented clinical symptoms (as assessed by the Youth Self-Report [YSR]), revealed to be related to primary study variables (ToM impairments, suicide variables) in bivariate analyses. We hypothesized that the aforementioned relations would exist while covarying for the effects of gender, age, and multiple YSR DSM-oriented clinical symptoms.

## 2. Methods

### 2.1. Participants

The full sample included  $n = 391$  inpatient adolescents recruited consecutively from a private psychiatric facility ( $M_{age} = 15.37$  years,  $SD = 1.44$ ). This particular unit serves adolescents who present with psychiatric comorbidity and have not responded to other outpatient and/or acute inpatient intervention (Sharp and Vanwoerden, 2014). The sample was 62.7% female. Racial breakdown was as follows: 88.2% Caucasian, 2.3% African American, 3.7% Asian, and 5.7% multiracial or otherwise specified. As determined with a structured clinical interview, the Computerized Diagnostic Interview Schedule for Children (CDISC; Shaffer et al., 2000): 50.1% were diagnosed with a mood disorder (Major Depressive Disorder [MDD; 46.8%], Dysthymic Disorder [1.8%], Hypomania [1.8%], Mania [4.3%]); 52.2% with an anxiety disorder (Generalized Anxiety Disorder [15.1%], Panic Disorder [15.6%], Agoraphobia [9.2%], Specific Phobia [16.6%], Social Phobia [23%], Obsessive Compulsive Disorder [23.8%], Post-Traumatic Stress Disorder [8.4%]); and 39.4% with an externalizing disorder (Oppositional Defiant Disorder [21.7%], Conduct Disorder [18.9%], Attention Deficit Hyperactivity Disorder [19.9%]). The study adopted the following exclusion criteria: (a) presence of a psychotic disorder or intellectual disability, (b) not 12–17 years of age, (c) non-English speaking.

### 2.2. Measures

#### 2.2.1. Theory of mind

ToM was assessed using the Movie for the Assessment of Social Cognition (MASC; Dziobek et al., 2006; Fleck, 2007), a computerized experimental movie task which assesses excessive ToM, no ToM, or less ToM, based on responses to movie scenario questions. Participants are asked to watch forty-five video clips depicting interactions between friends at a dinner party. Following each clip, participants were asked to think about the cognitive/emotional state of an individual depicted in the scene (e.g., “What is Sandra feeling?”), and select one of the following multiple-choice options: a response indicating either no ToM abilities, less ToM, accurate ToM, or excessive ToM (Dziobek et al., 2006; Fleck, 2007; Sharp et al., 2011). After participants responded to

all video clips, individual scores were computed for each ToM impairment (excessive, less, and none) and accurate ToM, based on the total number of corresponding participant responses (potential ranges: 0–45; Sharp et al., 2013). ToM impairments and accurate ToM were utilized in the current study; however, accurate ToM was only included in descriptive and bivariate analyses, as ToM impairments are the primary focus of current study. Original measure development studies have established psychometric properties for both an open-ended version of the MASC (Dziobek et al., 2006) and the current multiple-choice response version (Fleck, 2007), with the latter establishing test-retest reliability, discrimination ability with other ToM measures, and internal consistency of the overall multiple-choice measure at  $\alpha = 0.81$  in an adult sample with Asperger's Syndrome or control subjects.

Critically, in the current sample, participants are receiving treatment for highly comorbid psychiatric illness and the diagnostic profiles are therefore considerably diverse. Traditional internal consistency statistics are not quantitatively meaningful or accurate in the context of this sample as: 1) internal consistency statistics for the overall sample do not account for psychiatric heterogeneity, as Dziobek et al. (2006) and Fleck et al. (2006; 2007) did through sample selection procedures for particular diagnostic inclusion; 2) the multiple-choice response MASC measure is experimental, and responses are multiple-choice (non-scaled), thus consistency statistics for scaled measures does not apply. To demonstrate meaningful psychometric properties for the MASC in the current sample, we conducted criterion validity statistics (i.e. concurrent validity) between the MASC and another well-established experimental measure of ToM, the Reading the Mind in the Eyes Test revised version (Baron-Cohen, Wheelwright, Hill, Raste, and Plumb, 2001), which was administered at the same time as the MASC; concurrent validity between the MASC and the Reading the Mind in the Eyes Test was established, and both were significantly correlated at a  $p < .001$  level. The MASC also is strengthened by its naturalistic design which approximates real-life situations, and its use in adolescents with Autism and those with other forms of psychopathology (Gökçen et al., 2016; Sharp et al., 2011).

#### 2.2.2. Clinical symptoms

Clinical symptoms were captured continuously via the Youth Self Report (YSR; Achenbach and Rescorla, 2001). The YSR is a 112-item self-report measure, intended to capture emotional and behavioral problems with a series of broadband DSM-IV oriented scales. Participants respond to all items on a 3-point Likert scale, with greater responses indicating greater emotional/behavior problems. Items load onto six DSM-4 oriented clinical scales: affective problems, anxiety problems, somatic problems, attention deficit/hyperactivity [ADHD] problems, oppositional defiant problems, and conduct problems (Achenbach and Rescorla, 2001). Of note, the YSR affective scale is highly concordant with other diagnostic and symptom measures of Major Depressive Disorder (MDD; Ferdinand, 2008; van Lang et al., 2005), and is used to capture depressive symptoms in the current study. Given the high rates of psychiatric disorder and comorbidity in the current sample, we utilized standardized t-scores for DSM-oriented clinical scales in our analyses, and multiple scales [affective problems, anxiety problems, ADHD problems] were included as clinical covariates in primary analyses (for further information, see below). The YSR is a widely-used self-report based measure, whose psychometric properties and concurrent validity with other diagnostic/symptom-based measures have been well-established (e.g., Ferdinand, 2008; van Lang et al., 2005).

#### 2.2.3. Suicide ideation and attempt

Suicide ideation and attempt were captured via the Computerized Diagnostic Interview Schedule for Children (CDISC; Shaffer et al., 2000)—a structured diagnostic interview for DSM-IV psychiatric disorder diagnoses, which is intended for use in youth aged 9–17 years of age (Shaffer et al., 2000). Within the Major Depressive Disorder (MDD)

section of the CDISC, four suicide-related thoughts and behaviors variables were assessed and utilized by the current study: suicide ideation in the past four weeks, suicide ideation in the past year, suicide attempt in the past year, and lifetime suicide attempt (Shaffer et al., 2000). For all suicide variables, data was coded dichotomously for the presence or absence of suicidal ideation and attempt (e.g., “Have you ever, in your whole life, tried to kill yourself or made a suicide attempt?”; with coding as 1 = ideation/attempt present, 0 = ideation/attempt absent; Shaffer et al., 2000). Trained doctoral-level students and research coordinators carried out the CDISC administration and coding. The CDISC has been previously used in a variety of applied and research settings, demonstrating its empirical applicability and clinical utility (Shaffer et al., 2000; Johnson et al., 2006; Sharp et al., 2012). Further, and consistent with the analytic approach of the current study, previous empirical studies have used dichotomous suicide ideation and attempt items from the CDISC (e.g., Hatkevich et al., 2019; Sharp et al., 2012).

### 2.3. Study procedures

The relevant Institutional Review Board approved this study. All participants were recruited formally upon admission. Following parental consent, adolescent informed assent was obtained from all participants included in this study. During the first four days following inpatient admission, study participants completed the assessment battery and diagnostic interviews with trained doctoral-level students and research coordinators. All variables included in this study were based on this initial assessment.

### 2.4. Data analytic approach

Descriptive statistics and bivariate analyses were first used in order to examine the characteristics and relations of study variables. Bivariate analyses, including correlations, chi-square analyses, independent sample t-tests were used to test the relation of potential covariates (YSR DSM-oriented clinical scales, gender, age) and main study variables (i.e., ToM, suicide ideation, suicide attempt). A series of four binary logistic regression analyses were conducted in order to concurrently explore relations between ToM impairments (i.e., no ToM, less ToM, excessive ToM) and potential covariates (i.e., gender, age, and YSR affective problems, YSR anxiety problems, and YSR ADHD problems) on suicide-related variables. The four suicide-related outcome variables (i.e., suicide ideation past four weeks, suicide ideation past year, past year suicide attempt, lifetime suicide attempt) were entered as dependent variables in separate regressions. All data analyses were conducted using IBM SPSS Statistical Software (Version 21.0.0) using the standard entry method.

## 3. Results

### 3.1. Preliminary analyses

Descriptive statistics for all continuous variables (i.e., age, ToM impairments and accurate ToM, YSR DSM-oriented scales) are reported in Table 1. For CDISC suicide variables, frequencies were as follows: 34.0% experienced suicidal ideation in the past 4 weeks, 50.7% experienced suicidal ideation in the past year, 32.9% attempted suicide in the past year, and 42.2% had at least one attempt in their lifetime. Of the ToM impairments, participants reported the highest overall mean average for excessive ToM ( $M = 7.88$ ); means and SD for excessive ToM by each group endorsing CDISC suicide ideation/attempt variables are as follows: past four week suicide ideation ( $M = 8.56$ ;  $SD = 3.45$ ); past year suicidal ideation ( $M = 8.02$ ;  $SD = 3.63$ ); past year suicide attempt ( $M = 8.52$ ;  $SD = 3.7$ ); and lifetime suicide attempt ( $M = 8.01$ ;  $SD = 3.67$ ). For YSR DSM-oriented scales, participants had highest mean averages in YSR affective, anxiety, and ADHD problems, although

**Table 1**  
Descriptive statistics for continuous study variables.

Study variable	Mean	Standard deviation	Range
Age (years)	15.37	1.44	12–17
MASC: Excessive ToM	7.88	3.71	1–26
MASC: Less ToM	3.23	2.31	0–18
MASC: No ToM	1.81	1.64	0–8
MASC Accurate ToM	32.08	5.06	10–42
YSR Affective problems	68.72	11.66	50–95
YSR Anxiety problems	61.74	9.42	50–80
YSR Somatic problems	57.46	9.26	50–91
YSR ADHD problems	60.89	7.76	50–80
YSR ODD problems	60.32	8.52	50–80
YSR Conduct problems	62.04	9.04	50–94

Note: ToM = Theory of Mind; MASC = Movie for the Assessment of Social Cognition; YSR = Youth Self-Report; All YSR scales included are standardized t-scores for each DSM-oriented scales; a T-score at or above 65 represents borderline clinical elevations, and at 70 or above represents a clinical elevation (Achenbach and Rescorla, 2001).

only the mean average for YSR affective problems was borderline clinically elevated.

### 3.2. Sociodemographic variables, ToM impairments, and suicide ideation and attempt

Interrelations among sociodemographic variables (i.e., gender, age), ToM impairments, accurate ToM, and suicide-related variables were investigated next with bivariate analyses (chi square analyses, t-tests, correlations). Table 2 presents bivariate correlations between aforementioned variables. T-tests were used to unpack significant bivariate gender differences. Gender was significantly related to excessive ToM, such that males demonstrated higher levels of excessive ToM relative to females ( $t = -2.37$ ;  $df = 389$ ;  $p = 0.018$ ), but was not significantly related to no ToM ( $t = -0.954$ ;  $df = 389$ ;  $p = 0.341$ ) or less ToM ( $t = -1.181$ ;  $df = 389$ ;  $p = 0.238$ ). Gender was significantly related to suicide ideation variables; chi-square analyses revealed that females were significantly more likely to endorse suicide ideation in the past year,  $\chi^2(1, n = 377) = 7.01$ ,  $p = .008$ , and four weeks,  $\chi^2(1, n = 377) = 4.92$ ,  $p = .026$ , than males. There were, however, no significant relations noted between gender and suicide attempt in the past year,  $\chi^2(1, N = 377) = 0.29$ ,  $p = .59$ , or lifetime,  $\chi^2(1, n = 377) = 1.39$ ,  $p = .239$ .

Age was significantly related to excessive ToM ( $r = -0.259$ ;  $p < .001$ ), less ToM ( $r = -0.186$ ;  $p < .001$ ), and no ToM ( $r = -0.108$ ;  $p = .033$ ), such that younger age was associated with greater ToM impairments on the MASC. Older age was significantly associated with a greater number of accurate ToM responses. Non-significant relations were yielded for age and all suicide-related variables. Accurate ToM was also not significantly associated with any suicide risk variables.

### 3.3. YSR DSM-oriented scales relations with ToM impairments, and suicide ideation and attempt

Bivariate relations among YSR DSM-oriented scales and ToM impairments, accurate ToM, and CDISC suicide variables were examined. YSR affective problems was significantly related to all CDISC suicide variables ( $p < .001$ ) and to excessive ToM ( $r = 0.117$ ;  $p = .022$ ) and less ToM ( $r = -0.181$ ;  $p < .001$ ), such that higher depressive symptoms were associated with greater hypermentalizing, less accurate mentalizing, and endorsing suicidal ideation and behavior. YSR anxiety problems was also significantly related to all CDISC suicide variables ( $p < .001$  to 0.025) and excessive ToM ( $r = 0.112$ ;  $p = .028$ ), such that greater anxiety symptoms associated with greater hypermentalizing and endorsing ideation and attempt. Of the other YSR DSM-oriented scales, only ADHD problems was significantly related to both CDISC

**Table 2**  
Bivariate correlation matrix.

	Age	Gender	Exc. ToM	No ToM	Less ToM	Accurate ToM	Past 4 week SI	Past year SI	Past year SA	Lifetime SA
Age	–									
Gender	0.083	–								
Exc. ToM	–0.259**	0.119*	–							
No ToM	–0.108*	0.048	0.126*	–						
Less ToM	–0.186**	0.060	0.011	0.276**	–					
Accurate ToM	0.309**	–0.130**	–0.779**	–0.543**	–0.554**	–				
Past 4 week SI	–0.080	–0.114*	0.157**	–0.019	–0.111*	–0.056	–			
Past year SI	–0.072	–0.136**	0.068	–0.086	–0.111*	0.032	0.708**	–		
Past year SA	–0.043	–0.028	0.146**	–0.065	–0.061	–0.057	0.571**	0.646**	–	
Lifetime SA	–0.005	–0.061	0.054	–0.097	–0.127*	0.053	0.488**	0.606**	0.820**	–

Note: Data are bivariate correlations.

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

suicide variables and ToM impairments (i.e., excessive ToM;  $r = 0.121$ ;  $p = .018$ ); YSR ODD and conduct problems were not significantly related to CDISC suicide variables, and YSR somatic problems were not related to any ToM impairments. Accurate ToM was not significantly related to any YSR DSM-oriented scales. Thus, we elected to include the YSR affective, anxiety, and ADHD problem scales as clinical covariates in regression analyses, alongside gender and age.

### 3.4. ToM impairments and suicide ideation and attempt

Bivariate relations between ToM impairments and suicide-related variables were examined. Excessive ToM was significantly related to suicide ideation in the past four weeks ( $r = 0.157$ ;  $p = .002$ ) and past year suicide attempt ( $r = 0.146$ ;  $p = .004$ ), but not past year suicide ideation ( $r = 0.068$ ;  $p = .187$ ) or lifetime suicide attempt ( $r = 0.054$ ;  $p = .297$ ). Less ToM was significantly related to past four week suicide ideation ( $r = -0.111$ ;  $p = .031$ ), past year suicide ideation ( $r = -0.111$ ;  $p = .031$ ), and lifetime suicide attempt ( $r = -0.127$ ;  $p = .014$ ), but not past year suicide attempt ( $r = -0.061$ ;  $p = .239$ ). No significant relations were yielded between no ToM and suicide ideation and attempt at all time points.

Together, bivariate correlations, chi-square analyses and independent sample t-tests revealed significant relations between potential covariates (gender, age, and multiple YSR DSM-oriented scales), ToM impairments, and CDISC suicide variables. As such, gender, age, and YSR affective, anxiety, and ADHD problems were included as covariates in all subsequent regression analyses to reduce potential third variable effects.

### 3.5. Regression analyses

Four binary logistic regressions were used to test the concurrent relation of ToM impairments (no ToM, less ToM, excessive ToM) and potential covariates (gender, age, YSR affective, anxiety, and ADHD problems) on suicide-related variables in separate analyses. All logistic regressions were run with  $n = 374$  individuals included who completed all study measures and had complete item-level data. In each regression, the following variables were added as concurrent independent variables: gender, age, YSR affective problems, YSR anxiety problems, YSR ADHD problems, excessive ToM, no ToM, and less ToM. Suicide-related variables (i.e., suicidal ideation in the past four weeks, suicidal ideation in the past year, suicide attempt in the past year, and lifetime suicide attempt) were entered as dependent variables in separate regressions.

Regression model findings are fully depicted in Table 3. In the first regression, with past four-week suicide ideation as the dependent variable, only two independent variables emerged as significant: YSR affective problems ( $B = 0.111$ ;  $SE = 0.015$ ;  $p < .001$ ), and excessive ToM ( $B = 0.092$ ;  $SE = 0.037$ ;  $p = .013$ ), such that higher levels of

depressive symptoms and hypermentalizing associated with suicide ideation in the past four weeks. In the second regression, with past year suicide ideation as dependent variable, only the following covariates emerged as significant: age ( $B = -0.198$ ;  $SE = 0.092$ ;  $p = .032$ ), YSR affective problems ( $B = 0.131$ ;  $SE = 0.016$ ;  $p < .001$ ), and YSR anxiety problems ( $B = -0.036$ ;  $SE = 0.016$ ;  $p = .027$ ). In this regression, younger age and greater depressive and anxiety symptoms associated with past year suicidal ideation; no ToM impairments were significant in this regression. In the third regression, with past year suicide attempt as dependent variable, two independent variables emerged as significant: YSR affective problems ( $B = 0.071$ ;  $SE = 0.013$ ;  $p < .001$ ), and excessive ToM ( $B = 0.079$ ;  $SE = 0.034$ ;  $p = .021$ ), such that greater depressive symptoms and hypermentalizing associated with suicide attempt in the past year. In the fourth regression, with lifetime suicide attempt as dependent variable, only YSR affective problems was significant in relation to lifetime suicide attempt ( $B = 0.068$ ;  $SE = 0.013$ ;  $p < .001$ ). No ToM impairment subscales were significant variables in this regression.

## 4. Discussion

The current study investigated the relation between ToM impairments and suicide ideation and attempt in a sample of adolescent inpatients presenting to a psychiatric facility. Through use of an experimental, movie-based task, the present study considered the association of multiple inaccurate mentalizing styles concurrently, alongside the effect of DSM-4 oriented clinical symptoms (YSR affective, anxiety, and ADHD problems) and sociodemographic covariates (e.g., gender, age) on suicidal ideation and attempt. Extending adult research on ToM and suicide-related thoughts and behaviors (e.g., Szanto et al., 2012) and adolescent research on ToM and nonsuicidal self-injury (Laghi et al., 2016), the present study provided the first direct investigation of ToM and suicidal ideation and attempt in a sample of adolescent inpatients, where suicidal phenomena remain particularly severe, chronic, and life-threatening. Findings from the current study reveal that excessive ToM shares a distinct, significant relation with suicidal ideation and attempt at two time points (past four-week suicidal ideation, past year suicide attempt), relative to other forms of inaccurate mentalizing (no ToM, less ToM), which were non-significant. Significant relations remained between excessive ToM and recent suicide ideation and attempt alongside included covariates (gender, age, multiple clinical symptoms); it is important to note that excessive ToM emerged as a significant variable concurrent to depressive symptoms, which was also significantly related to ideation and attempt in all models.

Consistent with proposed a-priori hypotheses and cognitive models of suicidal behavior (Wenzel and Beck, 2008), and NSSI-specific work (Laghi et al., 2016), findings from the present study indicate that excessive ToM may share a unique link with adolescent suicidal ideation and attempt, distinct from other ToM impairments (i.e., lack or

**Table 3**  
Binary logistic regression analyses summary.

Variable	B (SE)	Odds ratio	OR confidence interval	p	R <sup>2</sup>
<i>CDISC Past 4 Week Ideation</i>					
Gender	−0.498 (0.227)	0.607	0.353–1.046	<0.001	.240
Age	−0.179 (0.095)	0.836	0.695–1.007	.072	
<b>YSR Affective</b>	<b>0.111** (0.015)</b>	<b>1.117</b>	<b>1.084–1.152</b>	<b>&lt;0.001</b>	
YSR Anxiety	−0.008 (0.016)	0.992	0.962–1.023	.604	
YSR ADHD	−0.030 (0.018)	0.970	0.938–1.004	.086	
<b>Excessive ToM</b>	<b>0.092* (0.037)</b>	<b>1.097</b>	<b>1.020–1.180</b>	<b>.013</b>	
No ToM	0.046 (0.085)	1.047	0.886–1.238	.589	
Less ToM	−0.083 (0.067)	0.920	0.808–1.049	.212	
<i>CDISC Past Year Ideation</i>					
Gender	−0.441 (0.264)	0.644	0.384–1.080	<0.001	.277
Age	−0.198* (0.092)	0.820	0.685–0.983	.032	
<b>YSR Affective</b>	<b>0.131** (0.016)</b>	<b>1.140</b>	<b>1.104–1.177</b>	<b>&lt;0.001</b>	
<b>YSR Anxiety</b>	<b>−0.036* (0.016)</b>	<b>0.965</b>	<b>0.935–0.996</b>	<b>.027</b>	
YSR ADHD	−0.010 (0.017)	0.990	0.958–1.024	.574	
Excessive ToM	0.014 (0.037)	1.014	0.944–1.090	.699	
No ToM	−0.075 (0.083)	0.927	0.789–1.090	.361	
Less ToM	−0.023 (0.060)	0.978	0.868–1.101	.708	
<i>CDISC Past Year Attempt</i>					
Gender	−0.023 (0.254)	0.977	0.594–1.608	<0.001	.121
Age	−0.069 (0.087)	0.933	0.786–1.108	.431	
<b>YSR Affective</b>	<b>0.071** (0.013)</b>	<b>1.073</b>	<b>1.046–1.101</b>	<b>&lt;0.001</b>	
YSR Anxiety	−0.022 (0.015)	0.978	0.950–1.007	.139	
YSR ADHD	0.002 (0.016)	1.002	0.971–1.034	.900	
<b>Excessive ToM</b>	<b>0.079* (0.034)</b>	<b>1.083</b>	<b>1.012–1.158</b>	<b>.021</b>	
No ToM	−0.091 (0.079)	0.913	0.782–1.067	.251	
Less ToM	0.001 (0.058)	1.001	0.893–1.121	.988	
<i>CDISC Lifetime Attempt</i>					
Gender	−0.169 (0.242)	0.844	0.525–1.357	<0.001	.120
Age	−0.060 (0.084)	0.942	0.799–1.110	.476	
<b>YSR Affective</b>	<b>0.068** (0.013)</b>	<b>1.071</b>	<b>1.044–1.098</b>	<b>&lt;0.001</b>	
YSR Anxiety	−0.020 (0.014)	0.980	0.953–1.008	.162	
YSR ADHD	0.000 (0.015)	1.000	0.970–1.030	.981	
Excessive ToM	0.021 (0.033)	1.022	0.958–1.090	.518	
No ToM	−0.088 (0.076)	0.916	0.789–1.063	.247	
Less ToM	−0.055 (0.057)	0.946	0.847–1.057	.328	

Note: All dependent variables are dichotomous CDISC suicide ideation and attempt variables. YSR Affective = YSR Affective Problems T-score. YSR Anxiety = YSR Anxiety Problems T-score. YSR ADHD = YSR Attention deficit/hyperactivity problems T-score. Cox & Snell R squared values are reported for each regression model. \* $p < .05$ ; \*\* $p < .01$ .

deficiency in mentalizing ability), and these associations are non-inherent to depressive, anxiety, or ADHD symptomatology. One reason that excessive ToM may be related to suicide ideation and attempt is that hypermentalizing may be one factor contributing to interpersonal problems evident in many suicidal adolescents. To explain, excessive ToM/hypermentalizing is best understood as a pseudo-mentalizing style (Allen et al., 2008) by which individuals over-interpret information from their social environment about others' mental states or emotions (Sharp et al., 2011; 2013). Inherent to this style, excessive attributions of others' thoughts, affect, and intent often reflect hypersensitive attenuation to nonverbal cues and cognitive over-simplifications (Bateman and Fonagy, 2015), which may involve previously available meta-cognitive and social information (e.g., memories, personal beliefs; Sharp et al., 2013). Not surprisingly, hypermentalizing is maladaptive for interpersonal functioning, as it may lead individuals to regularly over-interpret information, assume malevolent intentions of others (Montag et al., 2011), and inappropriately respond, thus detracting from interpersonal communication, empathy, closeness, and potentially long-term relational stability (Kalpakci et al., 2015; Sharp, 2014; Sharp and Vanwoerden, 2015). If excessive ToM is the 'modus operandi' for youth and their relationships, this may manifest in a number of interpersonal difficulties (e.g., conflictual peer relations, malevolent understanding of social interactions, heightened rejection sensitivity, and loss of social relations/support), all of which could underlie and exacerbate the emotion dysregulation and psychiatric illness reported by many suicidal adolescents.

In tandem, one reason that excessive ToM differentially associates

with adolescent suicide ideation and attempt, versus other inaccurate forms of mentalizing, is that hypermentalizing may relate to specific processes proposed by the Interpersonal Theory of Suicide: perceived burdensomeness [i.e., beliefs about being of no value, burdensome to others], and thwarted belongingness [i.e., sense of feeling disconnected from social relationships; Anestis et al., 2011; Joiner, 2005). Inherently, constructs proposed by the IPTS are social-cognitive in nature and center around one's perceptions of social information, particularly about one's value and connectedness to others. Excessive ToM may be relevant to perceived burdensomeness and thwarted belongingness, as adolescents who regularly over-attribute others' intentions and beliefs may also be more likely to mistakenly interpret rejection, abandonment, or criticism in social interactions, subsequently exacerbating beliefs of burdensomeness and/or lack of connectedness. This seems plausible, given that hypermentalizing has been found to predominate amongst a subset of individuals who regularly perceive abandonment and rejection in interpersonal relations: adolescents with borderline personality traits (Sharp et al., 2011). Beyond this, excessive ToM may relate to perceived burdensomeness and thwarted belongingness through increased attenuation to negative social cues, subtle facial and non-verbal affect, alerting them of negative interpersonal encounters and slights (e.g., rejection). In this way, excessive ToM may lead adolescents to become hypersensitive to social cues/expression, misinterpret social information as negative or rejecting, and further foster the belief that they are burdensome or without meaningful connection to others. It is important to note that this explanation is highly tentative, given our lack of direct investigation of excessive ToM in everyday

interpersonal interaction, as well as in relation to IPTS constructs.

An additional critical finding of the current study is that excessive ToM differentially associated with past four-week suicidal ideation and past year attempt, but *not* past year ideation or lifetime attempt in our primary models. In other words, excessive ToM was only associated with more proximal suicidal thoughts and behaviors, after covarying for sociodemographics and clinical symptoms. One potential and highly tentative explanation for these differential findings is that excessive ToM/hypermentalizing may not be a stable construct and may in fact fluctuate over time, and worsen alongside other state-dependent changes (i.e., in psychiatric illness course, in experienced emotion). Indeed, recent theoretical models and data in borderline personality pathology (e.g., Sharp and Vanwoerden, 2015) indicate that hypermentalizing is likely to occur in response to emotionally-charged interpersonal events in which social information integration is difficult. Other disorder-specific research indicates that mentalizing fluctuates through illness phases (e.g., in Schizophrenia; Balogh et al., 2014; Drury et al., 1998). This existing work is relevant to our findings, in the sense that it indicates hypermentalizing may in fact be state dependent and variable over time. With this in mind, it is plausible that excessive ToM captured by the MASC represents more proximal social cognitive functioning, which in turn differentially associates with more ‘recent’ suicidal thoughts and behaviors. As aforementioned, this hypothesis is tentative and in need of further exploration, as our data is cross-sectional, non-ecological, and suicide items are retrospectively reported.

Concurrent to these social cognitive findings, the current study also revealed significant relations between depressive symptoms and suicide ideation and attempt at all time points. This result is highly consistent with a breadth of empirical literature, identifying depressive symptomatology as a salient risk factor involved in the development, prediction, and maintenance of adolescent suicidal ideation and attempt (Garrison et al., 1991; Kandel et al., 1991; Kovacs et al., 1993). Unique to the current study, however, depressive symptoms emerged alongside excessive ToM as significant, concurrent factors relevant to adolescent suicidal ideation and attempt. This fact remains critical, indicating that excessive mentalizing abilities are not entirely *inherent* to depressive symptomatology, but may moreover exist independently and act complexly with one another in relation to adolescent suicidal ideation and attempt. In other words, excessive ToM and depressive symptoms may both be critical risk factors for adolescent suicidal ideation and attempt, which to some extent, exist autonomously of one another and likely have intersectional effects. These relations are likely complex and time-varying, respective to psychiatric illness course, and should be explored with more focalized, ecological models in future research.

Multiple sociodemographic and sample-specific findings are important to note. First, as indicated by our bivariate analyses, age was significantly associated with all inaccurate mentalizing styles and accurate ToM, such that older age was related to more accurate ToM and younger age was associated with more inaccurate mentalizing. This finding is in line with previous developmental and social cognitive research, indicating that adolescence is a critical period where advanced ToM abilities and affective ToM continue to develop (Vetter et al., 2013). Second, descriptive statistics revealed excessive ToM to be especially pronounced in the current sample. To illustrate, the average value for excessive ToM in the current sample was calculated at 7.88, a value slightly greater than the mean average for an adult schizophrenia sample (Mean = 6.1; Montag et al., 2011), whereas other inaccurate mentalizing style averages were similar to healthy adult controls (Montag et al., 2011). We believe the elevated rate of excessive ToM in the overall sample may be related to sample-specific characteristics, specifically that youth presenting to this psychiatric unit are teens with comorbid psychiatric diagnoses and who have not responded to previous intervention; to this end, youth included in the sample may represent a particularly severe and heterogeneous clinical subgroup. A second potential hypothesis and limitation, if true, is that mood-dependent states upon psychiatric admission may have exacerbated

hypermentalizing on the MASC. Lastly, significant gender differences were evidenced for excessive ToM, such that males experienced greater hypermentalizing than females in the current sample. Given the absence of similar findings in extant research and, indeed, the presence of contradictory findings in which gender differences show suppressed ToM in males, this finding is in need of replication.

Several limitations to the findings of the present study should be noted and represent important areas for future research. First, this study relied upon concurrent data and, thus, cannot speak to causal links between ToM and suicide-related thoughts and behaviors. While theoretical models would suggest that ToM impairments drive vulnerability for suicide-related thoughts and behaviors, in part by contributing to interpersonal impairments and emotion dysregulation, these causal links could not be evaluated in the present study given cross-sectional data available. Second, this study relied upon a broadband self-report of clinical symptoms (i.e., the YSR) and suicide-related variables, with temporal variation in the time periods assessed. Specifically, the YSR assessed clinical symptoms in the past month, whereas suicide-related variables were based on retrospective report of the past month and the past year. Specific data regarding the onset of clinical symptoms, the onset of ToM deficits, and the dates of suicide ideation and attempt were not available. This limitation contributes to the aforementioned preliminary nature of this study—that is, the present study points to important links between ToM, depressive symptoms, and suicide ideation and attempts but cannot speak to causal or temporal relations between these variables. Additionally, the study was conducted in a sample of predominantly Caucasian adolescents with complex and treatment-refractory psychiatric illness at a private pay, medium stay psychiatric hospital. Together, these characteristics of the sample preclude generalization to inpatient adolescents at short-stay crisis units or adolescents who do not identify as Caucasian.

Methodologically, several additional limitations are of note. First, because of the psychiatric comorbidity and complex presentations of youth presenting to the unit, the YSR was chosen as a self-report to capture a spectrum of internalizing and externalizing concerns and DSM-4 oriented clinical symptoms; because of this, the study is limited in that it did not also include other well-validated, disorder-specific self-reports of child depression, such as the Child Depressive Inventory (Kovacs and Beck, 1977). Second, the interview-based measure of suicide ideation and attempt in this study required dichotomous coding of this data and, thus, continuous variations in ideation frequency/severity or attempt frequency were not captured. Third, and critical to our hypothesis that hypermentalizing may be potentially state-dependent and time varying, the current study only assessed the MASC upon admission and is therefore unable to assess fluctuations in ToM between admission and discharge, nor test-retest reliability. Future research should implement the MASC at repeat assessments to better understand within-person variation in hypermentalizing, and study this concurrent to changes in suicide ideation and attempt. Lastly, our primary findings were limited in the sense that effect sizes were small, and results may not be particularly robust and subsequently are in need of further replication.

Notwithstanding these limitations, the findings of the present study are strengthened by a large sample size and recruitment of inpatient adolescents, a group in whom suicide-related thoughts and behaviors are a pressing public health concern and often the cause of costly, inpatient admission. Moreover, this study used well-validated empirical measures in adolescents alongside a novel, experimental task of social cognition. Finally, this study sought to extend adult research on links between ToM and suicide-related thoughts and behaviors to adolescents as a critical first investigation of these direct relations. To that end, this study included assessment of both suicide ideation and attempts and inaccurate forms of mentalizing—providing an important basis for future research in this area. Statistically covarying for clinical symptoms and demographics allowed for examination of unique relations between ToM and suicide-related thoughts and behaviors in psychiatric youth.

Lastly, current findings and discussion provide important implications for future research directions, as well as for clinical intervention of suicide-related symptoms in psychiatric youth. First, evidenced links between excessive ToM and suicide-related ideation and attempt provide rationale for the continued study of excessive ToM to suicide-related constructs in adolescence, particularly in extension to the IPTS constructs, broad interpersonal impairment, and concurrent emotion dysregulation. Future longitudinal investigation of the link between excessive ToM, IPTS constructs, and suicidal thoughts and behaviors, may provide a preliminary information for understanding how mentalizing impairments interplay with one's self-perceptions to confer risk for adolescent suicide ideation and attempt.

Current findings also bolster previous treatment-based research, suggesting that interventions incorporating social-cognitive components (e.g., MBT, CBT) may be utilized in targeting ToM impairments and associated suicide-related thoughts and behaviors. For example, previous research indicates that adult patients receiving Mentalization-Based Treatment (MBT), a clinical intervention with pointed emphasis on social cognitive abilities, experienced greater reduction in suicidality at 5-years post-discharge, relative to a treatment as usual group (Bateman and Fonagy, 2008). To our knowledge, MBT for adolescents (MBT-A) has yet to be studied in direct relation to suicide-related symptoms amongst adolescent inpatients, though preliminary work indicates that MBT-A reduces self-harm in adolescents (Rossouw and Fonagy, 2012). Therefore, MBT-A may be one promising treatment for improving ToM impairments evident in many suicidal adolescents at inpatient care settings. Another evidence-based treatment which incorporates social cognitive components is cognitive behavioral therapy (CBT); particularly, CBT focuses heavily on various forms of inaccurate/unhelpful thinking (e.g., overgeneralization, mind-reading, catastrophizing) that may overlap with hypermentalizing, and assist individuals with more accurately perspective taking, understanding others' thoughts/emotions based on social information available. To this end, MBT and CBT may both be treatments of promise for addressing mentalizing impairments and concurrent suicidal thoughts and behaviors in youth.

Beyond intervention, the present study may have highly tentative implications for suicide prevention efforts. Specifically, findings suggesting that excessive ToM differentially associates with past four-week suicide ideation and past year attempt, may indicate that suicide prevention efforts may benefit from: 1) early identifying youth with concurrent mental illness and with tendencies to hypermentalize; and 2) providing secondary prevention programs to improve accurate mentalizing in these youth. However, these prevention implications are based on our preliminary findings and would be supported by further replication and future research efforts.

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## Contributions

Dr. Hatkevich intellectually conceptualized the present study and primarily wrote the manuscript. Dr. Venta contributed to writing the manuscript introduction and discussion, and assisted with conducting analyses. Dr. Sharp provided oversight and principally investigated the study which the data was obtained from. All authors contributed to and approved the manuscript in its final version.

## CRediT authorship contribution statement

**Claire Hatkevich:** Conceptualization, Data curation, Formal analysis, Writing - original draft, Writing - review & editing. **Amanda Venta:** Data curation, Writing - review & editing, Project administration. **Carla Sharp:** Conceptualization, Funding acquisition,

Methodology, Project administration, Supervision, Writing - review & editing.

## Declaration of Competing Interest

No author or immediate family member has financial relationships with commercial organizations that might appear to represent a potential conflict of interest with the material presented.

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