**PERSPECTIVE**

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# Mentalizing strategies for navigating the social world in adolescence

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**Abstract**

Mentalizing—the ability to represent or infer the mental states of others—continues to develop into and throughout adolescence. Increased mentalizing sophistication during adolescence is thought to support the navigation of increasingly complex social relationships and contexts. However, developmental science has yet to aggregate the seemingly disparate findings from research relating mentalizing to functional outcomes, such as internalizing mental health concerns, into clear and comprehensive theories that explain individual variability during adolescence. In this review, we describe approaches that have been used to measure mentalizing during adolescence and propose a methodological framework to measure mentalizing as a multi-dimensional process that continues to develop as a response to the environment during adolescence.

**KEYWORDS**
friendships, internalizing, measurement, perspective taking, social network, theory of mind

## 1 | CONCEPTUAL BACKGROUND

Developmental researchers have long documented the development of mentalizing capacities—or the representation of the underlying thoughts, desires, beliefs, or intentions of others and the understanding that these may differ from our own—across childhood (Karniol, 1978; Wellman & Bartsch, 1988). Research over the past two decades has further demonstrated that social cognitive processes continue to develop with increasing sophistication into and

throughout adolescence (Smetana & Villalobos, 2009). The creation of behavioural tasks that assess more complex mentalizing processes has spurred this research. For instance, the propensity to represent the perspective of others during a computerized social interaction continues to increase in adolescence (e.g., Dumontheil et al., 2010), and has been proposed to be central to the completion of core developmental tasks in adolescence (Crone & Dahl, 2012). Further, it has been theorized that adolescence may represent a developmental period with a heightened capacity for learning about complex aspects of the social environment given the continued development of brain regions involved in mentalizing alongside the continued development of mentalizing processes (Blakemore & Mills, 2014).

The development of mentalizing during childhood has been theorized to be influenced, in part, by the social environment. However, this work has mostly examined how social environmental characteristics impact mentalizing abilities such as false belief understanding. For example, preschool-aged children in larger families with more siblings demonstrate better performance on false belief tasks than children from smaller families (Jenkins & Astington, 1996; Perner et al., 1994), which may be due to the increased opportunities to engage in pretend play—another factor that's been shown to relate to false belief understanding in early childhood (Taylor & Carlson, 1997; Youngblade & Dunn, 1995). Preschool-aged children whose parents use more mental state language demonstrate stronger false belief understanding (Ruffman et al., 2002). Characteristics of the family, including the amount of stress parents are experiencing, parenting strategies, and parental occupational class and education, have also been found to relate to false belief understanding in early childhood (Cutting & Dunn, 1999; Guajardo et al., 2009). One specific theory regarding how the social environment can shape the development of mentalizing is that children who grow up in adversarial social environments might develop a theory of 'nasty minds' that reflect the reality of the environments they must navigate (Happé & Frith, 1996). The development of a theory of nasty minds could be reflected in psychological measures as misattribution of hostile intentions, rather than an overall deficit in mentalizing capacity. Indeed, children who have experienced peer rejection demonstrate more aggressive biases when interpreting other people's intentions than children who have not experienced peer rejection (Badenes et al., 2000).

Inter-individual variability in how adolescents represent the perspective of others during an interactive situation has been found to relate to both working memory capacity and trait-level self-reported perspective taking abilities (Mills et al., 2012). While differences within the individual can account for some of this variability in mentalizing, considerable variability remains unaccounted for. Research in adults has demonstrated that social environmental factors, such as social status, can explain inter-individual variability in social cognitive processes such as emotion perception and perspective taking (Dietze & Knowles, 2021). Despite this evidence, research on individual differences in mentalizing among *adolescents*, specifically, has favoured research on within-individual factors over social environmental influences when examining variability in mentalizing processes during development. Measuring the influence of social environmental factors on mentalizing processes can also provide insight as to how children and adolescents develop specific approaches to mentalizing, or *mentalizing strategies*, that facilitate navigating their specific environment (Frankenhuis & Nettle, 2020) and could account for some of this unexplored inter-individual variability. We use the phrase mentalizing strategy to evoke the idea that mentalizing is more than just an ability, and that mentalizing processes are developed, in part, to help us navigate other people. This approach to understanding individual differences in mentalizing is guided by the sociocultural view of mentalizing development (Carpendale & Lewis, 2004; Dunn, 1988), which is embedded in the broader bioecological model that underscores the necessity for understanding bidirectional influences between individuals' developmental processes and their surrounding social environment (Bronfenbrenner & Morris, 2006).

In this paper, we review current measures of mentalizing used in research on adolescents and show that most studies propose to address only one dimension of mentalizing, whether that's ability, propensity, or degree. We refer to mentalizing ability/accuracy as an individual's capacity to mentalize correctly, including by accurately identifying a target's knowledge (e.g., their visual perspective) or by correctly inferring the mental state of another person. We define propensity as an individual's tendency to engage in mentalizing in a given situation. Finally, degree is the extent or depth to which one engages in mentalizing (e.g., hypomentalizing or hypermentalizing).

Altogether, we argue that the current literature is missing the following: explicit acknowledgements of the type, or dimension, of mentalizing being measured in a given study and a combination of multiple measures of mentalizing

to create multi-dimensional *mentalizing profiles*. We detail how future investigations can measure mentalizing as a multi-dimensional construct to understand how adolescents develop overall strategies in understanding others. We also provide actionable recommendations to improve the field of adolescent mentalizing. For instance, given that individual variability in social cognition may be related to cognitive strategies, the field would benefit from an understanding of how these strategies affect functional outcomes down the line. Thus, among other suggestions, we propose that future investigations also include measures relating mentalizing strategies to psychosocial outcomes such as social relationship development and degree of internalizing symptoms.

## 2 | CURRENT MEASURES OF MENTALIZING FOR ADOLESCENTS

Ranging from self-report questionnaires to interactive tasks, a variety of measures of mentalizing ability and propensity have been developed and used in adolescent populations. While mentalizing is sometimes referred to as a cognitive process related to thinking about the underlying mental states of others as well as *oneself* (Bateman & Fonagy, 2010), in this review, we will focus specifically on mentalizing about others. Mentalizing differs from other commonly used terms in the literature such as perspective taking—which is a *type* of mentalizing, but not mentalizing in its totality— and empathic concern, which is a more affective, rather than cognitive, process. Below we provide a brief, non-exhaustive review of measures used to describe mentalizing in adolescents, as outlined in Table 1.

### 2.1 | Ability/accuracy

One of the most common ways to measure mentalizing in adolescence has been to assess mentalizing ability or accuracy. Both the adult and children's version of the Reading the Mind in the Eyes Test (RMET) have been used by researchers to measure 'individual differences in social sensitivity' in adolescents (Baron-Cohen et al., 2002; Clarke

**TABLE 1** Mentalizing measures used in adolescents

| Name of measure | Mentalizing dimension: Description of measure |
|---|---|
| Reading the Mind in the Eyes Test (RMET; Baron-Cohen et al., 2002) & Children's version of the RMET (RME-C-T; Baron-Cohen et al., 2002) | Ability: Affective theory of mind or emotion recognition |
| Mentalization Questionnaire (MZQ) (Hausberg et al., 2012) | Ability: Self-reported measure of mentalizing ability |
| Movie for Assessment of Social Cognition (MASC) (Dziobek et al., 2006) | Ability & Degree: Video-based test of the degree of mentalizing used when interpreting interpersonal interactions |
| Story-based tasks (Białecka-Pikul, Stępień-Nycz et al., 2021) | Ability: A series of naturalistic stories that tests mentalizing ability in relation to fictional characters. Tasks include the Modified Hinting Task, the Modified Unexpected Outcomes Task, the Flexibility and Automaticity of Social Cognition (FASC), the Self-Persuasion Story Task, the Picture Test of Theory of Mind, and the Faux Pas Test. |
| Director task | Propensity: Online application of the perspective of another who could have either a congruent or incongruent visual perspective from the participant. |
| The Interpersonal Reactivity Index-Perspective Taking Subscale (IRI-PT: Davis, 1983) | Propensity: Self-reported tendency to spontaneously adopt the psychological point of view of others |

et al., 2020; Peñuelas-Calvo et al., 2021). The test asks participants to identify the word that best matches the underlying mental state of a cropped image of eyes. The RMET has faced considerable criticism as it has been proposed to measure affective theory of mind or facial emotion recognition rather than understanding of mental states. Indeed, researchers have found that alexithymia, but not autism, diagnoses significantly influence performance on the RMET (Oakley et al., 2016). Research on developmental samples using the RMET has described emotion recognition in images of eyes as generally increasing—albeit not necessarily linearly—in the transition into adolescence (van Rooijen et al., 2018).

The Mentalization Questionnaire (MZQ) is a self-report measure, originally designed and validated among psychiatric inpatients, that asks participants to report on their mentalizing ability (Hausberg et al., 2012). Original scale development identified four factors of mentalizing present in adults: (1) refusing self-reflection: understood as avoiding thinking about–or rejecting–one's own feelings; (2) lack of emotional awareness or a lack of identifying, and differentiating, one's own feelings; (3) psychic equivalence mode: where one's outer world and inner experience are equated and it is assumed that outer reality must match one's inner experience; and (4) poor regulation of affect: described by three items that 'embody the inability to modulate affect, which can lead to feelings of helplessness, and make people feel threatened by their own feelings' (Hausberg et al., 2012, p. 704–705). However, this four-factor structure did not replicate in a group of Finnish adolescents (Eloranta et al., 2020). The majority of studies that have adopted the MZQ to measure mentalizing in adolescents have focused mainly on examining inter-individual differences rather than the development of mentalizing ability across age. For example, in a study using the MZQ, lower mentalizing ability was associated with greater depressive symptomatology and engagement in externalizing behaviours (Belvederi Murri et al., 2017). Self-report questionnaires, particularly those related to mentalizing *ability or accuracy* such as the MZQ, have been criticized for their subjectivity. Indeed, the MZQ is not an objective measure of mentalizing performance. As Hausberg and colleagues point out, one limitation of this measure is that accurately reporting on mentalizing requires the ability to accurately mentalize (Hausberg et al., 2012). Moreover, in a recent meta-analysis, self-report measures of cognitive empathy explain only about one percent of the variance captured by behavioural tasks of cognitive empathy—performing no better than questionnaires measuring affective empathy (Murphy & Lilienfeld, 2019).

The Movie for the Assessment of Social Cognition (MASC) is a video-based task designed to assess mentalizing while watching a series of unfolding social interactions (Dziobek et al., 2006). Specifically, participants are shown chronologically-ordered interactions between four characters and are asked to infer one of the character's mental states at multiple points of the unfolding story. Mentalizing in this task involves considering a character's underlying intentions, emotions, or thoughts, and these items have positive, negative, or neutral valence. Participant's responses can be coded as reflecting accurate levels of mentalizing, versus too little (hypomentalizing), too much (hypermentalizing), or no mentalizing at all. As interactions in the MASC are based on scripts performed by actors, researchers have criticized this measure for lacking ground truth and ecological validity (Long et al., 2022). Research using the MASC suggests that older adolescents have improved accuracy compared to younger adolescents (Poznyak et al., 2019).

Several story-based tasks have been adapted and used in adolescents to measure mentalizing ability. These tasks, including the Modified Hinting Task and the Modified Unexpected Outcome Task, generate scores reflecting a participant's understanding of hinting and unexpected reactions, respectively (Białecka-Pikul et al., 2021). The Flexibility and Automaticity of Social Cognition Task are composed of eight comic-like cartoon stories (Hayward et al., 2018). Participants are asked to provide explanations for the protagonist's actions, with answers coded along two dimensions representing flexibility and automaticity in ascribing mental states measured by 'the number of unique, plausible explanations' and the speed with which the participant responds, respectively (Hayward et al., 2018, p. 1). The Self-Persuasion Story Task was developed to measure an individual's ability to accurately recognize the impact of self-persuasion (attempts to modify one's own thoughts/attitudes) on one's mental state (Kołodziejczyk & Bosacki, 2016). The Picture Test of Theory of Mind is composed of pictures that participants are asked to order to form a story (Brüne, 2003). Participants are then asked to tell the story and to respond to questions

about the story character's mental states which consist of first, second, and third-order beliefs (Białecka-Pikul et al., 2021; Brüne, 2003). The Faux Pas Test (Stone et al., 1998) is an adult adaptation of the child Faux Pas Test used with children and preadolescents (Baron-Cohen et al., 1999) that consists of stories, half of which contain a *faux pas*. Participants are asked to respond to questions about *faux pas* detecting and understanding. In a recent study of early (13 years old) and late (16 years old) adolescents, participants completed all of the above stories (Białecka-Pikul et al., 2021). Late adolescents had higher scores compared to early adolescents on the Modified Hinting Task, Modified Unexpected Outcomes Task, Flexibility and Automaticity of Social Cognition Task, and a portion of the Self-Persuasion Story Task but not the Picture Test of Theory of Mind or Faux Pas Test (Białecka-Pikul et al., 2021). Notably, the factors generated from the tasks (or task components in the case of the Self-Persuasion Story Task) displayed non-significant age-related associations and also showed low-reliability indices, potentially indicating poor reliability of the tasks themselves as reasoned by the authors (Białecka-Pikul et al., 2021). Moreover, the authors reported mostly weak, non-significant correlations for the factors of tasks that presented reliable indices in their study and, using confirmatory factor analysis, were unable to produce a single factor from the story-based tasks that met their goodness of fit criteria for either age group (Białecka-Pikul et al., 2021). Białecka-Pikul and colleagues reason that their findings highlight the need for the development of additional measures of advanced mentalizing, that are reliable, valid, and sensitive to developmental changes such as enhanced sophistication of mentalizing skills across adolescence. While we agree that the development of novel reliable and valid measures of adolescent mentalizing is an important endeavour for the field, we believe that researchers may begin to reconcile such disparate findings when they use multiple measures of multiple domains of mentalizing to create individual mentalizing profiles for adolescents.

## 2.2 | Propensity

In addition to the above measures geared towards assessing an individual's ability to mentalize, several measures have been designed to assess mentalizing propensity—or individual differences in the likelihood of engaging in mentalizing. The Director Task is a computerized visual perspective taking task that requires participants to dynamically make decisions based on instructions from an avatar who may or may not share the same visual perspective as the participant (Dumontheil et al., 2012). The Director Task has been used to measure the propensity for adolescents to inhibit an egocentric perspective in order to take another's perspective, as well as contrast performance on a perspective taking task when instructions are driven by social cues compared to non-social cues. Of note, it has been disputed whether visual perspective taking constitutes mentalizing. For instance, a linchpin developmental study found that children with autism have normative understanding of another's visual perspective, but lack understanding of another agent's beliefs and knowledge (Leslie & Frith, 1988). Despite this, the Director Task has important strengths. In contrast to many of the mentalizing tasks that preceded it (such as the Sally-Anne task for children), the Director Task does not display ceiling effects and is able to capture individual and developmental variability in mentalizing propensity among neurotypical adolescents. Indeed, perspective taking propensity as assessed by the Director Task increases with age across adolescence (Pile et al., 2017), and adults demonstrate better overall performance compared to adolescents and children (Symeonidou et al., 2016). In addition, adolescents with greater inhibitory control and working memory capacity demonstrate greater propensity to take the appropriate perspective in the Director Task (Mills et al., 2012; Symeonidou et al., 2016).

The Perspective Taking subscale of the Interpersonal Reactivity Index (IRI-PT) is a 7-item self-report questionnaire that assesses 'the tendency to adopt the point of view of other people in everyday life' (Davis, 1983, p. 117). The IRI-PT is also often referred to as a measure of cognitive empathy. Longitudinal studies of adolescents suggest that perspective taking tendencies increase with age among 13 year olds followed for 5 years (Van der Graaff et al., 2014) and 9th and 10th graders followed for 3 years (Davis & Franzoi, 1991).

## 2.3 | Degree

Of the dimensions of mentalizing described in this review, degree is the dimension with the least number of measures developed to assess it. In addition to measuring mentalizing accuracy, the MASC also assesses the degree to which participants engage in hypomentalizing (mentalizing too little), hypermentalizing (mentalizing too much), or no mentalizing and, thus, can be considered a measure of degree of mentalizing. Hypomentalizing on the MASC has been found to be negatively correlated with age in a cross-sectional study of adolescents aged 12–17 years, whereas this same study found that hypermentalizing did not relate to age (Poznyak et al., 2019). Notably, hypermentalizing was more common than hypomentalizing or lack of mentalizing in this convenience sample of 89 adolescents (Poznyak et al., 2019).

While research has assessed the relation between degree of mentalizing, as assessed by the MASC, and functional outcomes, including psychopathology, fewer studies have assessed this relationship in adolescents, specifically. Studies of adolescents have reported significant associations between hypermentalizing and psychopathology, such as borderline personality (Sharp et al., 2013; Somma et al., 2019). Considerably less research has probed associations between degree of mentalizing and internalizing among adolescents, however, insights can be gleaned from existing research among older adolescents which tends to focus on social anxiety. One study of young adults reported significant relationships between hypermentalizing and social anxiety (Hezel & McNally, 2014). Washburn and colleagues also found a significant association between hypermentalizing and social anxiety among young adults but found no such relationship for those with Major Depressive Disorder (Washburn et al., 2016). Finally, these findings were extended by Ballespí and colleagues who reported that hypermentalizing was associated with social anxiety in self-referential social situations only—emphasizing the importance of context in this association (Ballespí et al., 2019). In apparent conflict with these findings, other studies have reported null associations between mentalizing and social anxiety (Lenton-Brym et al., 2018).

In addition to the critiques mentioned in the 'Ability/Accuracy' section, there remains an outstanding question regarding what hypomentalizing and hypermentalizing look like in the real world that is, perhaps, not best addressed by the MASC.

## 2.4 | Summary of current research on adolescent mentalizing

In summary, current research on mentalizing in adolescence often proposes to measure only one dimension of mentalizing in any given study. These measures can be roughly grouped into three distinct dimensions: (1) ability/accuracy, (2) propensity, and (3) degree. Despite this, it is rare that a study explicitly states the dimension of mentalizing that is being measured and, often, the use of one measure is generalized to be 'measuring mentalizing' (although there are exceptions, e.g., Ballespí et al., 2019). In addition, it is rare for any given study to combine multiple measures which would allow researchers the ability to more readily capture the nuanced and multi-dimensional nature of mentalizing. In this paper, we make the case that these limitations can be addressed by future studies that (1) more clearly state the dimension of mentalizing being measured and (2) build multi-dimensional mentalizing profiles using multiple measures of mentalizing.

## 3 | APPROACHES TO MEASURE MENTALIZING STRATEGIES: THE CASE FOR MENTALIZING PROFILES

While the discovery that mentalizing continues to develop after the capacity is first demonstrated in early childhood has made a substantial impact on the field, we have a less clear understanding about how inter-individual differences in mentalizing during adolescence relate to aspects of social functioning and internalizing mental health difficulties.

This gap in the literature may be due to work measuring only one dimension of mentalizing in isolation and not taking context—particularly social environmental context—into account. For example, prior research has measured ability in isolation based on performance on the MASC (Poznyak et al., 2019); likewise, propensity has been measured in isolation, in one case using Director Task performance (Pile et al., 2017), and in another, using Interpersonal Reactivity Index scores (Van der Graaff et al., 2014). Indeed, the measurement of mentalizing solely as an ability or propensity discounts the multi-dimensional nature of mentalizing, as well as the reality that engaging in mentalizing is not always helpful. Certainly mentalizing can be a hindrance in situations where it distracts from the task at hand, and can also become problematic when it develops into a ruminative cognitive style. We argue that adolescents develop mentalizing strategies to navigate specific social contexts, and that these strategies can have impacts on adolescent well-being. Below, we make a case for building individual mentalizing profiles that may reflect such strategies and investigating how these relate to functional outcomes, such as the achievement of social developmental milestones and development of mental health outcomes like internalizing problems.

## 3.1 | Mentalizing profiles and social development

Developmental tasks of adolescence include navigating complex social hierarchies among peers (Brown & Larson, 2009), nurturing intimacy in friendships (Buhrmester, 1990; McNelles & Connolly, 1999), and exploring romantic relationships (Donaldson & Mills, 2021). The achievement of these tasks arguably involves mentalizing in order to appropriately engage and respond to social interactions. Importantly, effective social interaction requires not only the ability to mentalize but also assessing when mentalizing is appropriate as well as one's confidence in the accuracy of mental state inferences. Although there are few studies relating individual differences in mentalizing to the achievement of social developmental tasks in adolescence, there have been several investigations of how mentalizing abilities in early childhood relate to social development (Banerjee et al., 2011; Caputi et al., 2012; Hoglund et al., 2008; Slaughter et al., 2002; Slaughter et al., 2015). For example, children with greater mentalizing ability at age 5 years are more likely to engage in prosocial behaviour at age 6 years and subsequently accepted by peers at age 7 years (Caputi et al., 2012). A classic study by Bosacki and Astington (1999) found that mentalizing abilities in adolescents aged 10–13 years were positively associated with peer ratings of social competence. Mentalizing accuracy/ability is also associated with higher levels of trust and communication with friends in 16–18 year olds (Białecka-Pikul et al., 2021).

There is much to be gained by extending the longitudinal peer nomination methods that have been employed primarily in studies of childhood friendships into adolescence. Work that has been conducted in this area demonstrates that measuring both influences of the social environment and individual differences in mentalizing is important to consider when predicting behavioural outcomes. For example, one study found that peer acceptance during primary school was related to social decision-making in adolescence—and that this relationship was moderated by individual differences in self-reported perspective taking as measured by the IRI (Will et al., 2018). Specifically, adolescents who had experienced chronic peer rejection showed considerable individual variability in self-reported perspective taking, and those who reported greater propensity to take other's perspectives were more likely to share with others even when this was costly to themselves (Will et al., 2018). This interaction between perspective taking and social decision-making was not observed in the adolescents who had experienced stable peer acceptance (Will et al., 2018).

By integrating measures of mentalizing within longitudinal peer nomination studies, we can further understand if specific profiles of mentalizing are predictive of forming or maintaining intimacy (or stability) in friendships, as well as a sense of inclusion and belonging in peer groups during adolescence. For example, does the propensity to take another's perspective to predict friendship intimacy, or do we need to consider propensity as well as degree and ability when trying to understand the individual factors that support social development? We can also examine how mentalizing profiles might reflect the adoption of strategies in response to social experiences. For example, if an adolescent is chronically excluded from peers, will they be more likely to adopt hypermentalizing strategies or increase in the propensity to take another's perspective?

Longitudinal peer nomination studies are a powerful approach to examine social development in adolescence, and they have often been paired with longitudinal social network analysis methods such as stochastic actor-oriented modelling (SAOM) to distinguish between homophily (similarity between two individuals) and influence effects, as well as assess real social consequences and preceding patterns of relating in a group of adolescents (Snijders et al., 2010). This approach is common in research examining how *behaviours* propagate through social networks, or influence the connections between people, but has not yet been applied to examine the selection and influence effects of *cognitive strategies*. Using SAOM, we could assess if adolescents with similar mentalizing profiles are more likely to form (or maintain) peer or friendship ties. SAOM could also allow us to assess if adolescents are likely to adopt the mentalizing strategies of peers or friends. Or, perhaps, the similarity between adolescents in their mentalizing profile is actually more likely to predict friendship intimacy and peer acceptance than the specific mentalizing profile itself. For example, two adolescents with higher levels of hypermentalizing (degree) and ability could be more (or less) likely to develop more intimate friendships than a discordant friendship in which only one member has this specific profile. This approach presents an exciting opportunity to examine how social cognitive development is shaped by the peer environment during adolescence.

It is possible that the mentalizing strategies developed in relation to the social environment during adolescence provide a short-term adaptation but also a longer-term maladaptation. Measuring profiles of mentalizing in relation to social processes and mental health, as described below, will yield needed insights linking social environments, cognitive development, and functional outcomes.

## 3.2 | Mentalizing profiles and internalizing outcomes

Adolescence is not only a time of profound social cognitive development but also a period of vulnerability to mental health problems, particularly internalizing disorders such as anxiety and depression (Solmi et al., 2021). Depression is the leading cause of years lost to disability among adolescent girls and the third leading cause of years lost to disability among adolescent boys (Mokdad et al., 2016). Additionally, youth-onset internalizing disorders predict future mental (Fergusson et al., 2005) and physical health problems as well as social and occupational functioning (Birmaher et al., 2002).

Of the preliminary research on mentalizing and internalizing disorders that exist, findings are somewhat mixed. This may be due, at least in part, to a tendency to measure only one dimension of mentalizing in the current literature. A study using the MASC found a post-hoc significant association between higher self-reported symptoms of depression and poorer performance on MASC items that required mentalizing about what another person was thinking or feeling (Poznyak et al., 2019, p. 120). Similarly, in a study using the Director Task, adolescents with social anxiety display poorer performance when they had to consider the Director's perspective (Pile et al., 2017).

However, in apparent contrast with the aforementioned findings, Ballespí and colleagues found that hypermentalizing—which they measured via the MASC and their method for inducing mentalization in a self-referential situation (MIMS)—was associated with social anxiety in the self-referential condition of their study of young adults (Ballespí et al., 2019). However, in a follow-up study of adolescents, Ballespí and colleagues used the Adolescent Mentalizing Interview–a semi-structured interview where participants answer questions about the mental states of fictitious characters from a story and close others–instead of the MASC (Ballespí et al., 2021). Participant answers in this task correspond to scores of 'absent', 'poor', 'sufficient', 'good', and 'sophisticated' mentalizing (Ballespí et al., 2021). The MASC was not used in this study and Ballespí and colleagues found null associations between mentalizing, including self-referential mentalizing, and internalizing symptoms (Ballespí et al., 2021).

The variability in findings relating mentalizing to internalizing outcomes may be due to inaccuracies resulting from conflating various aspects of mentalizing (e.g., propensity and degree). A study of 171 late adolescents (mean age = 18.96 years) with and without generalized anxiety disorder (GAD) used *both* the RMET and MASC to measure emotion recognition and mentalizing and found different results related to each measure (Zainal & Newman, 2018). The adolescents with GAD demonstrated increased mentalizing accuracy (as measured by the MASC) during times of high worry, which was not observed in the participants without GAD (Zainal & Newman, 2018). Importantly, this

**TABLE 2** Examples of mentalizing profiles and possible related outcomes

| Ability | Propensity | Degree | Possible outcome |
|---|---|---|---|
| High ability (RMET) | • Prone to egocentric errors (Director Task)<br>• Low self-report perspective taking (IRI-PT) | • Average mentalizing (MASC) | • Some social difficulties, but no mental health difficulties |
| High ability (RMET) | • Prone to altercentric errors (Director Task)<br>• High self-report perspective taking (IRI-PT) | • Hypermentalizing (MASC) | • High self-consciousness and internalizing symptoms<br>• Paranoia |
| Low ability (RMET) | • Prone to egocentric errors (Director Task)<br>• Average self-report perspective taking (IRI-PT) | • Hypomentalizing (MASC)<br>• Hypermentalizing (MASC) | • Isolated from peers |

association was not present for emotion recognition (which the authors measured via the RMET; Zainal and Newman, (2018). Additionally, individuals with GAD had higher scores of accurate mentalizing (measured via MASC) for negative (but not positive) social stimuli, and, in contrast to their non-GAD counterparts, this mentalizing accuracy for negatively-valenced social situations improved following an induction of worry (Zainal & Newman, 2018). Critically, however, the same association was not found for emotion recognition (measured via RMET; Zainal & Newman, 2018).

Current research on mentalizing and internalizing outcomes would also benefit from further contextualization of findings. For instance, in the study by Zainal and Newman, findings differed depending on the valence (negative or positive) of the social stimuli (Zainal & Newman, 2018). Additionally, in their study of young adults, Ballespí and colleagues found that hypermentalizing was only associated with social anxiety in the self-referential social condition of their study (Ballespí et al., 2019), emphasizing the importance of context in this association. Additionally, the *functionality* and *adaptability* of various mentalizing strategies should be taken into consideration. For instance, when might 'mentalizing failures' be adaptive? Conversely, when might engaging in mentalizing be harmful?

Mentalizing profiles composed of various forms of mentalizing may relate to individual differences in mental health problems during adolescence. For instance, a mentalizing profile demonstrating low–to–average emotion recognition performance as assessed by the RMET, higher levels of hypermentalizing of negative items as assessed by the MASC, high accuracy on mentalizing tasks in self-referential conditions, and more altercentric errors on the Director Task, might be related to higher levels of social anxiety problems. This relationship between mentalizing profiles and internalizing outcomes might not be identified if a researcher assesses only one of these forms of mentalizing alone.

Despite the evidence that several mental health symptoms are related to social cognitive functioning, little research has investigated the link between mentalizing and functional outcomes such as internalizing disorders during adolescence. This research is important because adolescence presents an important period not only for early intervention to minimize the adverse impact of internalizing problems, but also an opportunity to prevent future psychosocial difficulties. In Table 2, we provide examples of multi-dimensional mentalizing profiles and possible related functional consequences—including both social and internalizing outcomes.

## 4 | FUTURE DIRECTIONS

### 4.1 | Building mentalizing profiles

Future research would be aided by the construction of multi-dimensional mentalizing profiles, aggregated from existing measures that capture distinct aspects of mentalizing (e.g., ability/accuracy, propensity, and degree). One central

and simple component of this solution includes clearly labeling the dimension(s) of mentalizing being measured in a given study.

Researchers can take several analytic approaches to assess mentalizing as a multi-dimensional construct. A relatively straightforward approach would be to test the utility of including multiple dimensions of mentalizing in multiple regression with power to detect interactions between the dimensions. Latent class or cluster analyses are two further approaches that could be used to identify distinct categories based on patterns across multiple measures of mentalizing.

Finally, we acknowledge that research would certainly be aided by the development of novel mentalizing measures that can simultaneously assess multiple dimensions of mentalizing, including those with improved ecological validity. To this end, Long and colleagues have recently developed a task that asks participants to watch a real practice job interview and to make inferences about a target individual's mental states (Long et al., 2022). Participant responses are compared to ground truth mental states that were reported by the actual targets to generate a measure of mentalizing accuracy (Long et al., 2022). This task could be paired with other measures of mentalizing to create ecologically-valid mentalizing profiles.

## 4.2 | Directionality and the promise of longitudinal research

While certain mental health disorders (e.g., internalizing disorders and borderline personality disorder) appear to be associated with certain mentalizing processes, the temporal precedence of these processes is unclear. Do certain mentalizing strategies put an individual at risk for a given disorder? Do factors that put individuals at risk for certain mental health disorders also influence the way in which individuals develop mentalizing strategies? Are mentalizing processes an adaptation—for instance a coping strategy—to distress associated with mental health disorders? Is the relationship between mentalizing and mental health bidirectional? Longitudinal research which captures adolescence—a period marked by the development of mentalizing strategies and vulnerability to mental health difficulties—is needed to elucidate the (uni- or bi-) directionality of these associations.

Current theories posit that increased sophistication of mentalizing capacities facilitates adolescents' navigation of increasingly complex social environments (Blakemore & Mills, 2014). Future research should take empirically supported approaches to parse out directionality. For example, longitudinal approaches to measuring the selection and influence effects of friendships on behaviour within social networks, such as stochastic actor-oriented modelling, could be used to measure how the characteristics of one's place within peer networks impact mentalizing strategies in adolescence. Additionally, there may be a bidirectional relationship between social environmental changes and the development of mentalizing capacities (as has been seen in academic achievement and cognitive abilities; Peng & Kievit, 2020). We look forward to future research tackling these and many more important developmental questions that are related to the multi-dimensional construct of mentalizing.

## 4.3 | The role of neuroimaging in research on adolescent mentalizing

Although a thorough review of the research on social brain development is beyond the scope of this review, it is important to acknowledge the role that this work has in shaping scientists' understanding of the development of social cognition and, more specifically, mentalizing (see Blakemore, 2012; Blakemore & Mills, 2014; Crone & Dahl, 2012; Will & Güroğlu, 2016; for reviews of the functional and structural changes that occur in the social brain across adolescence). A major contribution of this body of neuroimaging research thus far has been the provision of evidence that social brain regions continue to develop throughout adolescence (Mills et al., 2012), and that the

development of these regions is related to aspects of an adolescent's social environment (Becht et al., 2021). Thus, these neuroimaging findings provide additional support for the theory that more sophisticated social cognitive capacities such as mentalizing continue to develop past childhood.

Despite these impressive findings, there is still much that neuroimaging research can contribute to our understanding of adolescent mentalizing. When paired with behavioural and self-report measures of mentalizing, neuroimaging methods in longitudinal study designs can help address developmental questions of temporal precedence. For instance, aspects of brain function and structure that develop alongside mentalizing strategies could be disentangled from those which *support* and *predict* behavioural adolescent mentalizing strategies.

Neuroimaging research on mentalizing can also be leveraged to address developmental questions about how cognitive computations underlying mentalizing change across the lifespan. Many theories accounting for the acquisition of mentalizing skills have been proposed. These include—but are not limited to—simulation theory, which argues that we learn to understand others by putting ourselves in their shoes or 'simulating' them (Goldman, 2011); theory-theory (sometimes referred to as child-scientist theory), which claims that, much like scientists, children develop domain-specific theories and that these theories are informed by their environment (Gopnik & Wellman, 1994; Gopnik & Wellman, 2012); and modularity theory which argues that mentalizing is an innate process originating from a core, selective mechanism housed in the brain (Leslie et al., 2004). When approached from a developmental lens, neuroimaging research could address questions not only about the cognitive process underlying mentalizing but also about whether or not these processes *change* across development. For instance, longitudinal task-based functional magnetic resonance imaging studies may be able to address questions such as: Do young people change from using more effortful, controlled, and verbatim simulations earlier in development to employing more automatic, gist-based approaches to mentalizing as they mature (as in developmental models of fuzzy-trace theory; Reyna & Brainerd, 2011; Reyna, 2012; Weldon et al., 2014)?

Finally, particularly relevant to the topic of individual differences in mentalizing strategies and mental health outcomes is research on reward processing in adolescence. Aberrant functioning of neural systems related to reward processing has been heavily implicated in internalizing difficulties such as depression among both adults (Ng et al., 2019) and adolescents (Forbes et al., 2009; Gotlib et al., 2010; Kwon et al., 2019). Given potential associations between mentalizing strategies and internalizing symptoms previously discussed in this review, exploring the relationship between neural and behavioural markers of mentalizing and reward processing could be a fruitful endeavour.

## 4.4 | Conclusion

Measuring mentalizing as a multi-dimensional construct that is developed in relation to an adolescent's social environment will increase our ability to promote positive development for young people. Indeed, adolescents might be engaging in mentalizing strategies that reflect adaptations in the short-term, but ultimately put them at risk for developing ruminative cognitive styles related to mental health disorders. Future research would benefit from investigating relations between mentalizing strategy profiles and functional outcomes including, but not limited to, mental health outcomes such as internalizing disorders.

**Key recommendations for future research**

1. Recognize mentalizing as a cognitive strategy. The context in which youth develop mentalizing skills and inter-individual variability in skill usage and development may reflect responses to navigating one's social environment.
2. Incorporate mentalizing profiles that recognize and, ideally, measure the multi-dimensionality of mentalizing. This can be done by combining existing measures of mentalizing.

**Additional suggestions for future research**

3. Clearly label the dimension of mentalizing being measured in a given research study (e.g., ability/accuracy, propensity, degree).

4. Develop new mentalizing tasks that address limitations in current measures (e.g., more ecologically valid tasks; see preprint by Long et al.)

5. Leverage longitudinal research to parse apart directionality in associations between social environmental factors, mentalizing, and mental health.

6. Consider social context when seeking to understand why and how individuals develop distinct mentalizing profiles.

7. Use longitudinal research integrating neuroimaging methods with behavioural and self-report measures to parse what aspects of brain function and structure support mentalizing versus which aspects develop alongside mentalizing strategies.

## AUTHOR CONTRIBUTIONS

**Victoria Guazzelli Williamson:** Conceptualization; investigation; methodology; visualization; writing – original draft; writing – review and editing. **Kathryn L. Mills:** Conceptualization; investigation; methodology; project administration; supervision; writing – original draft; writing – review and editing.

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## DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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