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Luca Ronchi, Robin Banerjee and Serena Lecce

Authors names and affiliations:

Dr. Luca Ronchi
Department of Brain and Behavioral Science,
University of Pavia
P.zza Botta 6,
27100 Pavia, Italy
email: luca.ronchi@unipv.it

Prof. Robin Banerjee
School of Psychology,
University of Sussex, Falmer, Brighton
BN1 9RH, United Kingdom
email: r.a.banerjee@sussex.ac.uk

Prof. Serena Lecce
Department of Brain and Behavioral Science,
University of Pavia
P.zza Botta 6,
27100 Pavia, Italy
email: slecce@unipv.it

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Abstract

Recent research has shown that individual differences in Theory of mind (ToM) during middle childhood are linked with individual differences in children's peer relationships. The present longitudinal study investigated this association more deeply, exploring the potential mediating role played by children's social anxiety. We tested a group of 66 children (11.5 years old at Time 1) three times over one year after their transition to secondary school. Over and above language, SES and stability in individual differences, ToM performance shortly after starting secondary school (Time 1) predicted higher peer acceptance, as well as lower peer rejection, one year later (Time 3) via lower levels of social anxiety over time (Time 2). This study extends our knowledge about the links between social understanding and interpersonal relations in middle childhood. The results suggest that ToM may play an important role in children's adjustment when confronting new social contexts.

Keywords: Theory of mind; social anxiety; school transition; middle childhood; peer relationships

Theory of Mind and Peer Relationships: The Role of Social Anxiety

Recent research into children's Theory of mind (ToM), the ability to understand others' behaviors in terms of mental states (Wellman, 1992), has shown both normative progressions and individual differences in children's ToM development during middle childhood (Hughes, 2016), opening the way to the exploration of social correlates. The few studies on this topic are encouraging and show a significant association between individual differences in ToM and in children's peer relationships, both concurrently (Slaughter, Imuta, Peterson, & Henry, 2015) and longitudinally (Banerjee, Watling, & Caputi, 2011). However, to date, no study has explored the mechanisms that underlie the developmental association between individual differences in ToM and children's peer relationships in middle childhood. The present study was designed to address this gap in the literature by investigating the role of children's emotional experience in the social context, and specifically of children's social anxiety. In doing so, we adopted a longitudinal design spanning over the period just after the transition from primary to secondary school, a relevant period for children's social and emotional adjustment.

ToM and Peer Relationships in Middle Childhood

The idea that individual differences in ToM are related to children's social relationships has a long tradition in developmental psychology (Carpendale & Lewis, 2004; Hughes & Leekam, 2004). However, studies on this topic typically focused on preschoolers, with the link between individual differences in ToM and children's social relationships at school being a very recent focus of investigation (Hughes, 2016).

In one of the first studies on this topic, Devine and Hughes (2013) showed that individual differences in ToM were concurrently and negatively associated with 8- to 13-year-old children's self-rated loneliness and dissatisfaction in relationships with classmates.

Notably, the existence of a significant concurrent association between children's ToM and social relationships at school was supported by a recent meta-analysis (Slaughter et al., 2015) showing that children, ranging in age from 2 to 10 years, who are better in ToM also are more likely to be more accepted, and less rejected, by their peers. This finding is complemented by a longitudinal study in which Banerjee and colleagues (2011) followed two cohorts of children (respectively 6 and 9 years old at the first time point) over a period of two years. Banerjee et al. (2011) found that peer rejection at age 7 predicted lower ToM at age 8 in the younger cohort, and also identified a recursive longitudinal pattern of association in the older cohort. That is, early peer rejection at age 9 predicted poorer ToM performance one year later, which, in turn, explained greater peer rejection at age 11. Finally, ToM performance at age 9 positively predicted peer acceptance at age 10. These results provide evidence for a longitudinal (and not only a concurrent) relationship between ToM and children's social experience with peers at school. In addition, results from this latter study indicate that the association between ToM and peer relationships is likely to be recursive, with the direction of the longitudinal link varying depending on children's age. In particular, the predictive effect of ToM on later peer relationships seems to emerge in children older than 9 years of age (Banerjee et al., 2011).

Social Anxiety as a Mediator in the Association Between ToM and Peer Relationships

Social anxiety is characterized by worries of being evaluated negatively during social interactions, or during performance situations, which causes emotional distress and disturbs the individual's social functioning (Beidel & Morris, 1995). In the present study we focused on social anxiety as a possible mediator in the expected developmental link between children's ToM and peer relationships in middle childhood because social anxiety is associated, at this age, with difficulties in mental-state understanding (e.g., Banerjee &

Henderson, 2001), on the one hand, and poor social functioning with peers, on the other (see Rubin, Coplan, & Bowker, 2009 for a review).

The link between social anxiety and children's social life has been investigated widely in past years. Both cross-sectional and longitudinal studies have shown that children who are more worried about social situations experience a higher level of distress in social encounters and are more likely to experience a wide range of negative social outcomes, including low peer acceptance, peer rejection, victimization and poor friendship quality (Inderbitzen, Walters, & Bukowski, 1997; Siegel, La Greca, & Harrison, 2009). Moreover, research also has revealed that the link between heightened social anxiety and poor social success is mediated by more anxious children's tendency to adopt avoidance strategies in distressing social situations (Daleiden & Vasey, 1997; Rubin et al., 2009), including the period following the transition to secondary school (Erath, Flanagan, & Bierman, 2007).

The longitudinal effect of early social anxiety on later peer problems, combined with the effects of peer relationships on children's well-being (Parker, Rubin, Erath, Wojslawowicz, & Buskirk, 2006), encourages researchers to investigate the factors that contribute to the onset and maintenance of social anxiety in childhood. In the present study we focused on the predictive role of ToM in typically developing children's social anxiety, a topic that has been overlooked in the past years. The few empirical studies on this issue are, however, promising as they suggest that higher performance on ToM tasks is associated with lower levels of social anxiety during the preschool (Colonnesi, Nikolić, de Vente, & Bögels, 2016) and the primary school (Banerjee & Henderson, 2001; Broeren & Muris, 2009; Nikolić et al., 2019) years. More specifically, Colonnesi and colleagues (2016) found that children's performance on ToM tasks was associated concurrently and negatively with parents' reports on their children's social anxiety symptoms at 4.5 years. Furthermore, Broeren and Muris (2009), focusing on an older sample ranging in age from 4 to 9 years, found that higher

performances on a composite ToM battery (including tasks assessing basic emotion recognition, understanding of pretence, first- and second-order beliefs understanding, as well as appreciation of humour and sarcasm) were related to lower anxiety symptoms as rated by parents. To date only two studies have focused explicitly on older children, and both provided support for a negative association between ToM and social anxiety in middle childhood. Nikolić and colleagues (2019), showed that the ability to read mental states from the eye region was related concurrently and negatively to self-reported social anxiety in a sample of adolescents. Banerjee and Henderson (2001) using a sample of 10- to 11-year-old children found that lower performance on an advanced ToM task requiring an understanding of the links among multiple mental states (e.g., intentions, emotions and beliefs) in social gaffe situations was associated with higher levels of self-reported social anxiety.

Interestingly, Banerjee and Henderson (2001) also provided new insights into the interplay between social anxiety, poor ToM and social functioning by showing that social anxiety was related to poor teacher-rated social skills specifically when the rated social skills required an insight into others' mental states (e.g., 'Initiates conversation of interest to others').

Taken together, these empirical studies on older children are interesting as they suggest that difficulties in inferring and reasoning about others' mental states could exacerbate children's concerns and emotional distress in social encounters. For example, difficulties in understanding others' mental states and behaviour make social situations less predictable, thus increasing children's feeling of uncertainty and social anxiety (Schlenker & Leary, 1982). Notably, ToM skills may become especially relevant for children's social anxiety in challenging or ambiguous social situations such as those involving unfamiliar contexts and unknown peers (Lemerise & Arsenio, 2000; Zimbardo, 1977). For example, the transition to secondary school appears as an interesting period to understand the associations between ToM and social anxiety as it marks a time of social novelty and instability in

children's social relationships (Symonds & Galton, 2014) that challenges children's socio-cognitive skills and also can increase children's feelings of anxiety (Grills-Taquechel, Norton, & Ollendick, 2010).

It is important to acknowledge here that the work by Nikolić and colleagues (2019) described above also reported a *positive* indirect association between adolescents' ability to read others' mental states from the eye region and self-reported social anxiety, mediated by blushing. This finding is interesting as it suggests that better ability to read others' mental states may increase children's sensitivity to self-related social cues, which in turn may enhance social anxiety. Nevertheless, this study adopted a cross-sectional design and, therefore, does not clarify whether ToM-related social sensitivity is adaptive or not in the long term (see Hughes, 2011). This is an intriguing point given that past research has shown that ToM increases children's sensitivity to teacher's criticism and that this, in turn, translates into higher academic competence (Lecce, Caputi, & Hughes, 2011).

The Present Study

In the present study we adopted a 3-wave longitudinal design with a 5-month interval between time points, in order to test whether children's ToM skills predicted changes in peer relationships via their associations with social anxiety over time in middle childhood. Our hypothesis was that social anxiety mediates the longitudinal association between early ToM and later peer relationships. Specifically, higher levels of ToM were expected to predict lower levels of social anxiety. In turn, lower levels of social anxiety were expected to predict higher acceptance and lower rejection by peers.

To test this hypothesis, we followed a group of children from the early months after the transition to secondary school (which occurs at age 11 in the Italian school system) across a period of one year. To be stringent, we measured all the three focus variables (ToM, social anxiety and peer relationships) at each time point; we were, therefore, able to control for

continuities across development. We also measured and controlled for children's verbal ability and socioeconomic status, as these variables are known to be related to both ToM (Devine & Hughes, 2016) and social relationships (Beauchamp & Anderson, 2010).

Finally, it is important to note that previous studies (Banerjee & Henderson, 2001; Nikolić et al., 2019) adopted a cross-sectional design, thus limiting conclusions that can be drawn about the developmental nature and directionality of the links between ToM and social anxiety in older children. As a consequence, we cannot rule out the possibility that poor ToM skills may be an outcome, rather than a predictor, of social anxiety. To strengthen our results, we therefore tested two alternative models according to which i) social anxiety directly predicts later ToM which in turn predicts later peer relationships and/or ii) social anxiety indirectly predicts later ToM via peer relationships. The first model is derived from cognitive-behavioural accounts of social anxiety, according to which excessive self-focus during arousing social interactions precludes anxious children from attending important external social information (Morrison & Heimberg, 2013), such as others' mental states (Colonnesi et al., 2016); thus negatively affecting social outcomes (Hughes & Devine, 2015). The second model is based on socio-constructivist theories of socio-cognitive development according to which participating in positive interactions with peers is crucial for children's opportunity to practice and learn ToM (Carpendale & Lewis, 2004) and on existing literature indicating that social avoidance, as a consequence of heightened social anxiety, limits social participation (e.g., Erath et al., 2007).

Method

Participants

Seventy-nine children (out of 80 invited children) took part in the present study. Criteria for inclusion were parental written consent, absence of cognitive or learning difficulties, and being a native Italian speaker. Among the 79 children for whom parents'

consent to participate was obtained nine were clinically referred for cognitive or learning difficulties or were not native Italian speakers and were excluded from the analyses. In addition, four children were absent at Time 2 or at Time 3. The present analyses are therefore based on the 66 children (36 boys) for whom complete data were available across all waves. Participants were 11.5 years old ($M = 11.53$, $SD = 0.30$, range: 10.65–12.47) at Time 1, 12 years old ($M = 11.89$, $SD = .29$, range: 11.29–12.82) at Time 2, and 12.5 years old ($M = 12.32$, $SD = .29$, range: 11.75–13.25) at Time 3. The sample consisted of four classes belonging to the same school located in Northern Italy. Most of the children came from affluent families. Specifically, when the Family Affluence Scale (FAS; Currie et al., 2008) was used to categorize the sample, 82% of the sample were classed as ‘high affluence’ (total score ranging 6–9) and 18% as ‘middle affluence’ (total score ranging 3–5), with none classed as ‘low affluence’ (total score ranging from 0–2). In terms of family structure, 15.20% of the children were singletons, 51.50% had one sibling, 25.80% had two siblings, 6.10% had three siblings and 1.50% had four siblings.

Procedure

Time 1 data collection took place in December 2015 (Time 1), three months after children made the transition to secondary school. Children were then retested five months later (Time 2), at the end of the first year of secondary school and ten months later (Time 3), at the beginning of the second year of secondary school. At each time point children completed two different ToM tasks, the Strange Stories (White, Hill, Happé, & Frith, 2009) and Silent Films tasks (Devine & Hughes, 2013), sociometric peer nominations (Coie, Dodge, & Coppotelli, 1982) and a self-report questionnaire of social anxiety (Social Anxiety Scale for Children, SASC; La Greca, Dandes, Wick, Shaw, & Stone, 1988). Children also completed a verbal ability test (Primary Mental Abilities, PMA; Thurstone & Thurstone, 1962) and a socioeconomic status questionnaire at Time 1 (Family Affluence Scale; FAS;

Currie et al., 2008). Tasks were administered collectively. One researcher introduced the tasks and read the questions out loud one at a time, supported by a PowerPoint presentation that displayed: tasks instructions, stories for the Strange Stories task and clips for the Silent Film task. A second researcher in the classroom ensured that all participants understood the task instructions and completed their response booklets independently.

Measures

Socioeconomic status. The Family Affluence Scale (FAS - Currie et al., 2008) is a short child-report on familial (material) wealth that was developed in the WHO Health Behaviour in School-aged Children Study to investigate the SES-health association in youth (Currie et al., 2008). Previous studies indicated high agreement between 11-year-old children's and their parents' reports on the FAS (Andersen et al., 2008). In addition, compared to other family affluence measures relying on parental occupation, education and/or income, the FAS has shown superior criterion validity and is much less affected by nonresponse bias (Boyce, Torsheim, Currie, & Zambon, 2006). There are four questions about the following: family car ownership (range: 0–2), the participants having/not having their own unshared room (range: 0–1), the number of computers at home (range: 0–3), and the number of times the participants went on a holiday during the past year (range: 0–3). Responses were summed into an overall index of family affluence (possible range: 0–9). The Cronbach's α was .40, a value that is in line with that reported in existing studies (e.g., Schnohr et al., 2008) and that is due to the limited number of items (Torsheim et al., 2016).

Verbal ability. The Italian version of the Vocabulary subtest of the Primary Mental Abilities, Intermediate Form (age 11–17) (PMA; Rubini & Rossi, 1982; Thurstone & Thurstone, 1962) requires children to find the synonym of 50 target words, choosing among five alternatives. A time limit of 6 minutes was set (possible range: 0–50).

Theory of mind. The Strange Stories task (White et al., 2009) and the Silent Films task (Devine & Hughes 2013) have been used in large-scale studies of individual differences in children's ToM across middle childhood (Devine & Hughes, 2013, 2016). They show convergent validity in that they are strongly related, and these correlations cannot be explained by either verbal ability or narrative comprehension (Devine & Hughes, 2016).

The Strange Stories task is an advanced test of ToM that requires participants to interpret non-literal statements and understand the actual intentions of the speaker in complex social scenarios. We administered 5 stories: 2 double bluff, 2 misunderstanding and 1 persuasion (see White et al., 2009 for examples of each story type). Parallel versions of the stories were used at different time points. After reading the stories, children were asked to explain a character's non-literal utterance in a written format. No time limit was imposed. In line with scoring guidelines (White et al., 2009), we rated children's answers on a 3-point scale: 0 for an 'incorrect answer', 1 for a 'partially correct and implicit answer', and 2 for a 'full and explicit answer' (possible range: 0–10). A second rater independently coded 25% of the responses at each time point; the interrater agreement was established using Cohen's kappa (at T1, $k = .91$; at T2, $k = .88$; at T3, $k = .83$).

The Silent Films task (Devine & Hughes 2013) is an advanced test of ToM that consists of five short film clips (mean length = 25.4 s) from Harold Lloyd's classic silent comedy, *Safety Last* (Roach, Newmeyer, & Taylor, 1923). Each clip presents a different scenario (depicting deception, false belief, belief-desire reasoning, and misunderstanding) in which a character's behaviour could be understood and explained with reference to his/her mental state. During administration, each clip was played once and followed by a question in which participants were required to explain the behaviour of a character. Answers were scored using a three-point scale according to the standard scoring guidelines: 0 for an 'incorrect response', 1 for a 'partially correct response' and 2 for an 'explicit mentalistic

explanation' of the character's behaviour. There were 5 film clips and 6 questions (possible range: 0–12). A second rater independently coded 25% of the responses at each time point, and interrater agreement was established using Cohen's kappa (at T1, $k = .81$; at T2, $k = .81$; at T3, $k = .80$).

Social anxiety. The Social Anxiety Scale for Children (SASC; La Greca et al., 1988) includes 10 test items to be rated on a 3-point Likert scale, which measure two different facets of social anxiety: fear of negative evaluation (FNE) and social avoidance and distress (SAD). The first reflects the level of fear about receiving negative evaluation from others and is made up of 6 items. The second reflects the experience of distress in and deliberate avoidance of social situations and is made up of 4 items. Children received a total score across the 10 test items, with higher scores indicating higher social anxiety (range: 0–20). The α values were as follows: Time 1 ($\alpha = .60$), Time 2 ($\alpha = .66$) and Time 3 ($\alpha = .59$). An examination of the item-total statistics revealed problems with one item ('I'm quiet when I'm with a group of children'). It showed low, as well as negative, item-total correlation across all the time points. Moreover, deleting the item increased the α values, which became adequate though modest at each time point; Time 1 ($\alpha = .66$), Time 2 ($\alpha = .68$) and Time 3 ($\alpha = .65$). We therefore excluded this item, calculating total scores across the nine remaining items (possible range: 0–18). Please also note that the key results reported below were unchanged when the item was included.

Peer nominations. Peer acceptance and peer rejection indices were obtained via the peer nomination procedure (Coie et al., 1982). Each child was asked to indicate the name of three peers whom he or she most and least liked. Each child could nominate only peers belonging to his or her classroom. Cross-gender nominations were permitted. Each child's individual Like-Most (LM) and Like-Least (LL) scores were standardized within classroom

to control for the group size. Care was taken to instruct children about the confidentiality of responses.

Data availability

The data that support the findings of this study are openly available in “OSF repository” at <http://doi.org/10.17605/OSF.IO/YKFDE>.

Results

Data Reduction and Descriptive Statistics

A preliminary confirmatory factor analysis (CFA), using a robust maximum likelihood estimator, in which the two ToM tasks were permitted to load onto a single latent variable at each time point provided an excellent fit to the data, $\chi^2(4) = 1.33$, $p = .723$, CFI = 1.00, TLI = 1.12, RMSEA = 0. At each time point both ToM tasks loaded significantly onto the respective latent factor, all standardized loadings $> .34$, all $ps < .01$. The only exception was the Time 2 Strange Stories score, whose loading onto the Time 2 latent factor was just marginally significant, standardized loading = .21, $p = .056$. The factor determinacy coefficients were .80 at Time 1, .94 at Time 2, and .84 at Time 3, indicating high internal consistency (Brown, 2015). On the basis of these preliminary analyses, our primary analyses were conducted using an aggregate ToM measure obtained by summing z scores on the Strange Stories and Silent Films tasks. This is consistent with existing literature (e.g., Lecce, Bianco, Devine, & Hughes, 2017) and reduced the number of variables. Note that, for descriptive analyses (see Table 1) and mean comparisons only, we computed an aggregate ToM score by adding the proportions of success in the Silent Film and the Strange Stories tasks, to avoid the problem of standardised scores having a mean of 0 and a standard deviation of 1.

A one-way repeated measures ANOVA was conducted to examine how social anxiety and aggregate ToM scores changed across time. Results showed a decreasing linear effect of

time for social anxiety, $F(1, 65) = 4.86, p < .05$, and an increasing quadratic effect of time for ToM, $F(1, 65) = 52.19, p < .001$. Table 2 shows associations within and across time points. As can be seen, individual differences in all the study variables were stable over time, with correlations among corresponding variables across two time points all exceeding $r = .50, p < .05$. Socioeconomic status was significantly associated with ToM (at all the time points), with social acceptance (at Time 1 and Time 2) and with social anxiety (at Time 2). Verbal ability was associated with ToM (at Time 1 and Time 2). We therefore controlled for both verbal ability and socioeconomic status in our main analyses.

Relationships Between ToM, Social Relationships and Social Anxiety

To evaluate the potential mediating role of social anxiety in the association between early ToM and later peer relationships, we adopted a simultaneous model approach (SMA) in MPlus Version 7 (Muthèn & Muthèn, 2012). In doing this we followed Iacobucci and colleagues' recommendations, according to which SMA performs better than separated regressions, especially in the case of a small sample size (e.g., $N = 30$). The standard errors for the coefficients, indeed, are larger when the separated regression approach is used (Iacobucci, Saldanha, & Deng, 2007).

Specifically, we adopted a hypothesis-driven approach and tested a model in which ToM at Time 1 predicts social anxiety at Time 2, which, in turn, predicts peer nominations at Time 3. Furthermore, to account for longitudinal stability in the mediator and in the outcome variable, as well as to account for the confounding effects of verbal ability (VA) and socioeconomic status (SES), we further regressed i) Time 2 social anxiety onto Time 1 social anxiety, VA and SES and ii) Time 3 peer nominations onto Time 2 peer nominations, VA and SES. Finally, to account for the direct effect of the initial variable on the outcome variable when testing mediation, we also included in our model the long-term effect from Time 1 ToM to Time 3 peer nominations.

Overall, the number of parameters to be estimated was 13, with an acceptable (Bentler & Chou, 1987; Brown, 2015) sample size-to-parameters ratio ($N:p$ – Jackson, 2003) of 5:1. Following recommendations by Hu and Bentler (1998), we used maximum likelihood-based fit indexes suitable for models with $Ns < 250$, specifically comparative fit index (CFI) and standardized root mean square residual (SRMR). Hu and Bentler suggest cutoffs of approximately $CFI > .95$ and $SRMR < .08$ to determine good fit. A non-significant χ^2 test was also considered as a further absolute index of the goodness of model fit. We conducted separate modelling analyses for predicting positive peer nominations and negative peer nominations in order to allow for distinct patterns related to peer acceptance and peer rejection.

Both the model predicting peer acceptance, $\chi^2(2) = 5.114, p = .08, CFI = .946, SRMR = .032$ (Figure 1), and the model predicting peer rejection, $\chi^2(2) = 5.614, p = .06, CFI = .961$ and $SRMR = .044$ (Figure 2), showed acceptable fit. Results showed that ToM at age 11 (Time 1) predicted lower social anxiety 5 months later. Moreover, children's level of social anxiety at 11.5 years (Time 2) predicted both lower social acceptance and higher social rejection within the peer group at age 12 (Time 3). This pattern of results was confirmed even when we accounted for shared variance between positive and negative peer nominations by including Time 3 peer rejection as a further predictor of Time 3 peer acceptance in the first model and Time 3 peer acceptance as a further predictor of Time 3 peer rejection in the second model. We next evaluated the indirect (mediated) pathways between Time 1 ToM and Time 3 peer nominations via Time 2 social anxiety using 10,000 bootstrap samples to estimate unstandardized indirect effects and confidence intervals. Results supported the mediation hypothesis for both models. Indeed, the indirect effect of Time 1 ToM on peer nominations, mediated by Time 2 social anxiety, was significant when predicting both peer acceptance, $B = .048$; 95% confidence interval [CI] = [.013, .112], $\beta = .074$, and peer

rejection, $B = -.028$; 95% confidence interval [CI] = $[-.079, -.003]$, $\beta = -.047$. Notably, examination of the modification indices for both models showed that adding the omitted paths between Time 1 social anxiety and Time 2 peer nominations and between Time 1 ToM and Time 2 peer nominations did not significantly improve model fit. In addition, further analyses incorporating Time 2 ToM and Time 3 social anxiety into the models did not reveal a significant short-term effect of Time 2 ToM on Time 3 social anxiety.

Finally, we also evaluated two alternative causal models. The first alternative model evaluated the mediating role of ToM (at Time 2) between early social anxiety (at Time 1) and later peer relationships (at Time 3). The second alternative model evaluated the mediating role of peer nominations (at Time 2) between early social anxiety (at Time 1) and later ToM (at Time 3). Again, separate modelling analyses were conducted for positive and negative nominations. For each model, we included auto-regressive paths, the long-term direct effect connecting the initial variable to the outcome variable and control variables following the same principles outlined above. Although each model showed an acceptable fit, $\chi^2(2) \leq 6.936$, $p \geq .03$, CFI $\geq .932$, SRMR $\leq .038$, none of the lagged paths connecting early social anxiety or peer nominations with later ToM were found to be significant.

Discussion

The present study is the first to explore the role of social anxiety as a mediator in the association between early individual differences in ToM and later children's peer relationships, in the critical period following the transition from primary to secondary school. Results showed that better ToM shortly after starting secondary school predicted lower levels of social anxiety over time, which, in turn, predicted higher levels of peer acceptance as well as lower levels of peer rejection one year later. Notably, this developmental pattern of associations was independent of individual differences in verbal ability and socioeconomic status, as well as of longitudinal stability in children's social anxiety and peer relationships.

Our results complement a small, but growing, body of evidence demonstrating the importance of ToM for children's peer relationships in the school context (Banerjee et al., 2011; Devine & Hughes, 2013; Slaughter et al., 2015); they add to the literature in at least three ways. First, our study shows that the benefits of advanced ToM skills for children's peer relationships can be extended to late childhood and, specifically, over the transition to secondary school, a demanding period for children's social and emotional adjustment. Second, the present study takes us forward by highlighting one of the possible mechanisms by which ToM benefits children's peer relationships, that is, by reducing social anxiety in a novel social environment. This finding fits with a multifaceted view of children's social competence (Rose-Krasnor, 1997), according to which social success depends on the interaction of several factors that include not only children's social behaviour (see Rubin, Bukowski, & Parker, 2006 for a review) but also their emotions and socio-cognitive abilities (Banerjee & Henderson, 2001; Caputi, Lecce, Pagnin, & Banerjee, 2012). Third, our study is the first to adopt a longitudinal design and to show how the interplay between ToM, social anxiety and peer relationships unfolds over time.

The outlined developmental association between ToM and later social anxiety is innovative and relevant and should be considered in the light of existing theoretical models, as well as contextualized in the period following the transition to secondary school. Cognitive models of social anxiety emphasize the interplay between children's appraisal of social threat and evaluation of their own coping resources to face the threat as being central to the experience of social anxiety (Beck & Clark, 1997). More specifically, children's emotional distress increases when they experience an ongoing social situation as overly threatening *and* perceive themselves as inadequately equipped. Notably, the transition to secondary school is a period of relational instability (Symonds & Galton, 2014) that increases children's social concerns and sensitivity to social threat (Sirsch, 2003) while also

challenging their coping skills (Grills-Taquechel et al., 2010; Williams & McGillicuddy-De Lisi, 1999). Although the present study did not focus on the mechanisms by which ToM affects social anxiety, and future research clearly is needed, it is plausible that ToM plays a role in both of these two core aspects: children's appraisal of social threat and coping skills and resources in novel situations. Existing studies indeed have showed that an individual's ability to reason about one's own and others' mental states, as well as to combine multiple perspectives, helps to form a subtler appreciation of what is going on inside and around the individual (Kinderman, Dunbar, & Bentall, 1998; Lagattuta et al., 2015), thus reducing feelings of uncertainty during early interaction with new peers (Schlenker & Leary, 1982) and helping children to regulate their emotions (Caputi & Schoenborn, 2018; Fonagy & Target, 2002; Sharp et al., 2011; Thomsen & Greve, 2013). Moreover, existing literature suggests that children's ability to take others' mental states into account may support the effective use of adaptive strategies to cope with social concerns in social situations (Banerjee, 2008). For example, Banerjee and Henderson (2001) have shown that children reporting higher levels of social anxiety not only scored lower than their less anxious peers on advanced ToM tasks (Banerjee & Henderson, 2001), but also showed poor performance on a deceptive self-presentation display task, in which children were required to appreciate how masking an emotion (e.g., not crying after getting hurt) could serve self-presentational motives, such as conveying a desired self-image (e.g., 'because he didn't want them to think he was a wimp'). Interestingly, in subsequent studies, Banerjee and Watling (2004, 2010) demonstrated that higher social anxiety was associated with a poorer ability to *use* (and not only appreciate) self-presentational strategies effectively (defined as behaviours intend to convey a particular image of the self to others - Leary, 1983, p. 99). More specifically, Banerjee and Watling (2010) showed that more anxious children were less able to adapt self-presentational tactics flexibly according to the known attributes and preferences of the

particular audience with whom they were interacting, suggesting that difficulties in social understanding may undermine children's ability to translate evaluative concerns into effective behavioural strategies (Banerjee, 2008).

Interestingly, the idea that ToM could help children in facing developmental challenges by supporting the translation of social concerns into positive developmental outcomes resonates with literature on children's understanding of criticism. For example, Lecce et al. (2011) showed that sensitivity to criticism at age 6 mediated the relationship between variation in ToM at age 5 and school achievement at age 7. In other words, children with better ToM were able to take teachers' criticism into account and to make sense of teachers' negative comments in order to increase their school success. Overall, then, ToM could be considered as a protective – rather than a risk – factor for social anxiety. Although we acknowledge that ToM may increase children's sensitivity to criticism, we argue that children with good ToM skills are not only more sensitive but also better equipped to face these negative comments in the long term (see also Hughes, 2011). Notably, results from the present study are robust in that they showed not only that advanced ToM skills predicted increased peer acceptance via reduced social anxiety, but also that poor ToM skills predicted higher levels of active rejection by peers when associated with increased social anxiety. Further longitudinal studies are needed to understand better how the interplay between ToM and social anxiety influences children's positive and negative peer relationships over time.

In addressing these issues, we think that future research could benefit from considering the insights and evidence from work based on the social information-processing framework (SIP – Crick & Dodge, 1994), and should try to integrate it with existing findings on ToM. Several studies have adopted the SIP model to explain the cognitive profile of anxious children (Beck & Clark, 1997, Daleiden & Vasey 1997) and emphasized the interplay between biased social cognition, negative self-evaluation processes and emotional

dysregulation in the maintenance of social anxiety (Beck & Clark, 1997; Crick & Dodge, 1994; Lemerise & Arsenio, 2000). According to this account, socially anxious individuals are hypersensitive to negative social stimuli and interpret ambiguous social situations as overly threatening (Beck & Clark, 1997; Muris et al., 2000). One possibility is that difficulties in ToM contribute to this inaccurate interpretation of social cues in complex situations.

Importantly, our data did not provide support for the alternative causal models according to which social anxiety predicts ToM development. We think that the lack of significant associations between early social anxiety or peer relationships and later ToM found in the present study may be related to the period of investigation in which children's peer relationships are not yet clearly established and children's levels of social anxiety may, at least in part, reflect normative fluctuation related to the transitional period itself (Symonds & Galton, 2014). Thus, whilst the transition to secondary school may represent a sensitive period to stress the role of ToM in children's social and emotional adjustment, it may not be equally informative with respect to the role of peer relationships and/or social anxiety in ToM development. Future longitudinal studies should address this issue by focusing on different developmental periods. A related direction for further longitudinal work also concerns the developmental timing of the associations between ToM and social anxiety, and between social anxiety and social relationships. We found that the developmental association between early ToM and later social anxiety was significant only between Time 1 and Time 2 and that the developmental association between early social anxiety and later peer relationships was significant only between Time 2 and Time 3. This pattern of results, together with descriptive analyses showing that social anxiety start to decrease linearly after secondary school entry, suggests that individual differences in ToM may be particularly relevant in the early phase of the transition, when children are facing emotional distress and evaluative concerns related to the new social encounters, rather than later on, when the social

structure may start to be established and the “newness has worn off” (Vernberg, Abwender, Ewell, & Beery, 1992, p. 190). On a related point, it would be interesting, in future studies, to evaluate the effect of ToM on children’s social anxiety by controlling for a more general level of anxiety. Here, the use of the revised (expanded) version of the Social Anxiety Scale for Children (La Greca & Stone, 1993), which includes a subscale tapping into generalized social avoidance and distress, would be useful.

Finally, it is interesting to note that, after accounting for the positive mediated pathway (via social anxiety) between Time 1 ToM and Time 3 peer acceptance, the direct effect of ToM on peer acceptance become negative and marginally significant (Figure 1). This pattern of results identifies, according to Zhao and colleagues (Zhao, Lynch, & Chen, 2010), a competitive mediation model and indicates that the independent variable (ToM) has opposite and competitive effects on the dependent variable (peer acceptance). In other words, although lower social anxiety at Time 2 accounts for a positive association between early ToM and later peer acceptance, at least one other unexplained variable might account for a negative effect of early ToM on later peer acceptance, as well. This result is interesting as it explains why we did not find a significant bivariate correlation between ToM and peer acceptance over a 1-year period. Moreover, it suggests that advanced ToM could bring both benefits and costs for children's social life after the transition to secondary school. Future studies addressing the developmental link between ToM and peer acceptance should consider negative mediators. For example, existing research suggests that advanced social cognitive skills are likely to ground children’s capability to display indirect forms of aggression (Sutton, Smith, & Swettenham, 1999) in middle childhood.

Caveats and Conclusions

The present study has several limitations that should be considered. First of all, the sample size of the present study is limited, and further research is needed to confirm and

generalize our results. A bigger sample size also will allow future studies to adopt a full cross-lagged design to test alternative causal hypotheses about the link between ToM, social anxiety and peer relationships (Selig & Little, 2012). Given the reduced sample size of the present study, we were not able to address this limitation and needed to test separate models rather than a single model incorporating all parameters for longitudinal associations.

A further limitation of the present study is our focus on a single self-report measure of social anxiety. Although existing research supports the validity of self-report measures of social anxiety in middle childhood (La Greca et al., 1988; Banerjee, 2008), social desirability may affect the measure's validity. Future studies should adopt a multi-informant approach to obtain a robust index of social anxiety. Adopting a multi-informant approach also would allow future research to reduce shared error variance among measures when these are obtained by a single source.

Finally, the focus of the present study on a typically developing sample raises questions about whether the benefits of ToM for children's social functioning generalize to clinical samples. Descriptive analyses on our data have shown that, as expected, the levels of anxiety of the children in our sample were quite low (La Greca et al., 1988). Whether any positive effects of ToM in predicting reduced social anxiety also are evident in children with medium to high levels of social anxiety remains an open question. Future research also should distinguish between different anxiety disorder subtypes in order to investigate whether the model here reported is specific to social anxiety or generalizes to other anxiety subtypes.

Notwithstanding these potential limitations, the present results make important theoretical contributions in terms of considering ToM as a protective factor that helps children to face relational challenges when facing new social contexts, thus serving a valid tool for promoting broader social and cognitive development.

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Table 1

Descriptive Statistics for the Study Measures

Measures	<i>M</i>	<i>SD</i>	Possible range	Actual Range
Time 1				
SES	7.02	1.64	0–9	4–9
VA	22.21	6.76	0–50	8–37
ToM	2.42	.55	0–4	1.10–3.63
SA	6.00	3.04	0–18	1–14
LM	2.92	2.28	–	0–9
LL	2.33	2.76	–	0–11
Time 2				
ToM	3.00	.48	0–4	1.60–3.83
SA	5.67	2.91	0–18	0–13
LM	2.94	2.29	–	0–8
LL	2.59	2.68	–	0–14
Time 3				
ToM	2.91	.47	0–4	1.70–3.83
SA	5.09	2.96	0–18	0–13
LM	3.14	2.34	–	0–11
LL	2.67	2.83	–	0–15

Note. SES = Socioeconomic status; VA = Verbal ability; ToM = Theory of mind; SA = Social anxiety; LM = Like-Most nominations (raw scores); LL = Like-Least nominations (raw scores)

Table 2

Correlations Between Study Measures Within and Across Time Points

Measures	1	2	3	4	5	6	7	8	9	10	11	12	13	14
T1 1. SES	–	.17	.29*	-.09	.33**	-.06	.41**	-.27*	.33**	.00	.44***	-.15	.16	.08
2. VA		–	.33**	-.12	.20	-.14	.32**	.03	.20	-.14	.20	-.06	.17	-.09
3. ToM			–	.12	.09	-.07	.51***	-.18	.23 ⁺	-.12	.29*	-.15	.01	-.14
4. SA				–	-.24*	.12	.04	.50***	-.14	.16	.09	.38**	-.39**	.31*
5. LM					–	-.36**	.14	-.27*	.74***	-.23 ⁺	.06	-.18	.73***	-.24*
6. LL						–	-.16	-.17	-.40**	.63***	-.01	-.06	-.41**	.61***
T2 7. ToM							–	-.08	.36**	-.11	.52***	-.06	.08	-.13
8. SA								–	-.04	-.09	-.16	.55***	-.25*	-.08
9. LM									–	-.30*	.12	.01	.54***	-.25*
10. LL										–	.00	.03	-.27*	.78***
T3 11. ToM											–	-.07	.01	.07
12. SA												–	-.12	.14
13. LM													–	-.32**
14. LL														–

Note. SES = Socioeconomic status; VA = Verbal ability; ToM = Theory of mind; SA = Social anxiety; LM = Like-Most nominations; LL =

Like-Least nominations. ⁺ $p \leq .10$. * $p \leq .05$. ** $p \leq .01$. *** $p \leq .001$.

Figure captions

Figure 1. Social anxiety (SA) at Time 2 (age 11.5) mediates the association between Theory of mind (ToM) at Time 1 (age 11) and Like-Most nominations (LM) at Time 3 (age 12). SES = Socioeconomic status; VA = Verbal ability. Dashed lines represent nonsignificant or marginally significant paths. $+p \leq .10$. $**p \leq .01$. $***p \leq .001$.

Figure 2. Social anxiety (SA) at Time 2 (age 11.5) mediates the association between Theory of mind (ToM) at Time 1 (age 11) and Like-Least nominations (LL) at Time 3 (age 12). SES = Socioeconomic status; VA = Verbal ability. Dashed lines represent nonsignificant or marginally significant paths. $+p \leq .10$. $**p \leq .01$. $***p \leq .001$.

Figure 1

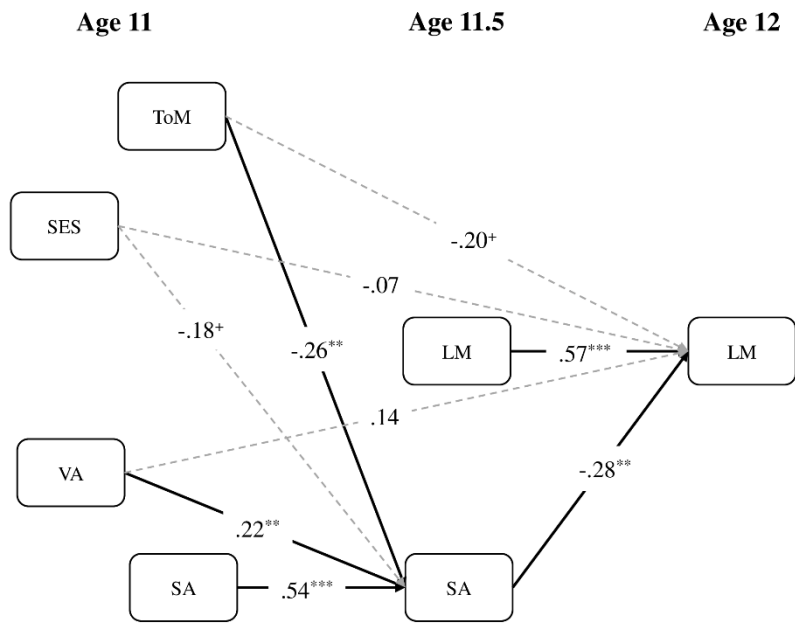


Figure 2

