

Theory of mind and loneliness: Effects of a conversation-based training at school

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Conversation-based training programmes are known to be effective in enhancing theory of mind (ToM). The possible consequences of such training programmes on the understanding of other constructs have rarely been investigated. The present research aimed to evaluate the effects of two different types of conversation-based training on ToM and loneliness. Two hundred and ten fourth and fifth graders (52% boys; Mage = 9.66 years, $SD = 0.85$), randomly divided into two groups (ToM and no-ToM training condition), were administered at a 5-week intervention. ToM and loneliness were measured before and twice after the intervention (1 week and 2 months later). Linear mixed-effects models showed that, soon after the intervention, children in the ToM training condition obtained significantly higher ToM scores and significantly lower loneliness scores compared to children in the no-ToM training condition. Nonetheless, at the follow-up, ToM and loneliness scores were not significantly different for the two training conditions. These findings suggest that a relatively short intervention based on group discussion of mental states is sufficient to improve mentalizing abilities and to tackle feelings of loneliness among fourth and fifth graders in the short but not in the long term.

Keywords: Theory of mind; Loneliness; Middle childhood; Training; Intervention.

Theory of mind (ToM) is the ability to recognise the existence of mental states in our own and in others' minds. Such an ability guides our behaviour and allows us to predict the behaviour of other people (Premack & Woodruff, 1978). Recent studies have shown that ToM can be enhanced in school-aged children with relatively short training programmes based on group conversations about mental states (Bianco, Lecce, & Banerjee, 2016; Ornaghi, Brockmeier, & Grazzani, 2014). However, ToM training programmes have so far proved effective mainly in enhancing ToM itself and have rarely been used to foster other abilities (for exceptions see Ding, Wellman, Wang, Fu, & Lee, 2015; Lecce, Bianco, Demicheli, & Cavallini, 2014).

The interest in the link between children's ToM and their social interactions has been widely demonstrated by developmental psychologists. Notably, from a social constructivist point of view, the understanding of mental states develops and acquires particular features *within* social interactions (Carpendale & Lewis, 2004).

Several longitudinal studies have focused on ToM (also described as mindreading skill) and social variables. Indeed, a developmental link has been found between ToM and several social constructs, such as peer acceptance and rejection (Lecce, Caputi, & Pagnin, 2015; Lecce, Caputi, Pagnin, & Banerjee, 2017). The socially adaptive value of mindreading skills and the theoretically meaningful interplay between the domains of social cognition and interpersonal relationships is also supported by the results of a recent meta-analysis (Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016): children with higher ToM behave more prosocially.

The present research, using a short-term longitudinal and experimental design, is the first aimed at training ToM in order to enhance ToM itself and also to reduce loneliness. Two basic considerations motivated the study of the specific relation between ToM and loneliness. The first is that ToM has been recently shown to play a crucial role also in socio-emotional functioning (Caputi, Pantaleo, & Scaini, 2017; Colonnese,

Nikolić, de Vente, & Bögels, 2017). The second is that socio-emotional difficulties—especially experienced within the context of unsatisfactory peer relationships during middle childhood—are likely to have negative long-term consequences on children’s health and adjustment (Matthews et al., 2018). Therefore, finding that a ToM training could possibly be able to reduce feelings of loneliness (and thus more broadly to improve socio-emotional functioning) might be crucial in terms of both fundamental and applied ToM research.

ToM in middle childhood

During middle childhood, ToM skills continue to develop, reflecting the gradually more complex cognitive and social situations that children come to experience. Many individual and external factors are likely to shape future ToM development and its social use. With respect to individual factors, the present article focuses on verbal abilities, which are still associated with ToM during middle childhood (Devine & Hughes, 2013). With respect to external factors, the present article focuses on both socio-economic background and also involvement in conversations about mental states. Previous research has highlighted a correlation between socio-economic background and ToM (Hughes et al., 2005). In addition, in keeping with a social constructivist view of ToM, a rich use of mental state talk by mothers has been found to favour ToM development in middle childhood (Paine, Hashmi, Roberts, Fyfield, & Hay, 2018). More interestingly, conversation-based training programmes proved effective in increasing children’s ToM in middle childhood (Bianco et al., 2016; Ornaghi et al., 2014).

Loneliness in middle childhood

Loneliness means dissatisfaction with one’s interpersonal relationships and is typically accompanied by sadness, emptiness and sorrow (Asher & Paquette, 2003). Experiencing intimate interpersonal relationships is a primary need for human beings (Baumeister & Leary, 1995). Such a need evolves over time, as children try to build ties also outside the family context. The desire of belonging to a group grows constantly and becomes crucial during adolescence, when individuals care very much about being accepted by peers (Goossens, 2018). Many studies have been conducted on feelings experienced when willingness to belong is not satisfied.

During the school-age, feelings of loneliness are often predicted by peer victimisation experiences (Zimmer-Gembeck, Nesdale, Webb, Khatibi, & Downey, 2016). Moreover, loneliness is generally found in combination with a scant number of friends and/or perceived low quality of friendships (Nangle, Erdley, Newman, Mason, & Carpenter, 2003).

Experiencing loneliness at some point in life is considered normal (Qualter et al., 2015). However, persistent and severe feelings of loneliness can have a negative impact on many areas of life. Indeed, consequences of feelings of loneliness have been found on socio-cognitive understanding (Caputi et al., 2017), academic success (Bek, 2017), interpersonal relationships (Lodder, Scholte, Goossens, & Verhagen, 2017) and physical health (Qualter et al., 2013). Moreover, feelings on loneliness can be transitory as well as permanent, leading to very different scenarios. Several studies looked at developmental trajectories of loneliness during middle childhood and adolescence. Overall, general stability of feelings of loneliness is reported from age 8 to age 15 (Schinka, van Dulmen, Mata, Bossarte, & Swahn, 2013). However, children reporting high levels of loneliness during middle childhood should be specifically monitored, as they could experience long-term consequences on physical health and sleep, even when loneliness is then found to decrease (Harris, Qualter, & Robinson, 2013).

ToM and feelings of loneliness in middle childhood

Recently, the relationship between ToM and loneliness has started gaining attention. This relationship is very likely to be mediated by peer variables. On one hand, having a friend, friendship quality and popularity can protect against loneliness (Nangle et al., 2003). On the other hand, peer rejection is able to directly predict higher levels of loneliness and social dissatisfaction (Asher & Paquette, 2003). These findings can be read in the light of research showing that ToM deficits are positively related to peer rejection and negatively related to popularity and friendship quality/quantity. In other words, mindreading abilities and loneliness could be intimately linked to one another. In confirmation of this supposition, a significant association between ToM and feelings of loneliness was recently found among 326 students attending primary and middle schools (Caputi et al., 2017) and among 146 adolescents (Bosacki, Moreira, Sitnik, Andrews, & Talwar, 2020). Interestingly, this association was stronger among girls in both studies, suggesting that among boys it could be masked by an indirect link through peer rejection or isolation. Such an interpretation would fit with Devine and Hughes’ results (Devine & Hughes, 2013), which showed an association between low ToM skills and high peer rejection in 8- to-13-year-old boys and low ToM skills and high loneliness in 8- to-13-year-old girls. The link between ToM and loneliness is further confirmed by Koerber and Osterhaus (2019), who found social reasoning (but not ambiguity nor recognising transgressions of social norms) to be related to perceived loneliness among 5- to 8-year-olds, and by putting together the results of two longitudinal studies conducted with community children. The first one found that ToM ability at 5 years

old predicts friendlessness 2 years later (Fink, Begeer, Peterson, Slaughter, & de Rosnay, 2015). The second one found that friendlessness at 7 years of age predicts loneliness 3 years later (Ladd & Troop-Gordon, 2003). Therefore, the earliest roots of loneliness in middle childhood might be better understood by looking at children's ToM performance.

ToM training programmes in middle childhood

A recent meta-analysis conducted by Hoffman et al. (2016) has shown that a substantial number of studies tried to improve ToM skills, concluding that ToM training programmes can effectively enhance ToM in children aged 2 to 16 years old. The enhancement of ToM, obtained via training, demonstrates that individual differences in such ability are not just the result of maturational changes or advances in cognitive processing, but can be influenced by socio-environmental inputs. A number of different interventions (e.g. specific language training programmes, exposure to certain types of pretend play, false belief and appearance-reality exercises, videos/conversations enriched with mental state terms) proved equally effective in improving ToM. Moreover, longer sessions and shorter training periods with greater numbers of sessions were associated with better outcomes.

Despite the growing interest in ToM interventions, their impact on other domains has not been systematically investigated. So far, researchers have been able to show an impact of ToM training on meta-memory (Lecce, Bianco, Devine, Demicheli & Cavallini, 2014) and on verbal deception (Ding et al., 2015). However, no causal evidence exists of the role played by ToM in loneliness. This has been specifically addressed in the present research.

Moreover, as far as middle childhood is concerned, very few studies have tried to develop ToM skills by employing a training programme (Bianco et al., 2016; Ornaghi et al., 2014). Overall, these studies targeted children aged 6 to 10 years old and the training condition was based on mental-state conversations. In all of the studies, the experimental group outperformed the control group in ToM tasks both after the intervention and after two (Bianco et al., 2016; Lecce, Bianco, Devine, Hughes, & Banerjee, 2014b) or even 6 months (Ornaghi et al., 2014).

Goals of the present study

The main aim of the present study was to assess the effects of two types of training (a ToM training and a no-ToM training) on feelings of loneliness of 9- and 10-year-old-children, 1 week after the intervention (post-test) and 2 months later (follow-up). No study has so far investigated such an indirect effect of a conversation-based training. The secondary aim was to

compare the effects of the above-mentioned types of training on ToM abilities, 1 week after the intervention (post-test) and 2 months later (follow-up). The efficacy of a conversation-based training in increasing ToM in middle childhood has already been demonstrated by several studies (Bianco et al., 2016; Lecce, Bianco, Devine, Hughes & Banerjee, 2014). Therefore, this secondary aim was an attempt to replicate earlier results in a different sample.

METHOD

Participants

Following an agreement with the Heads and teachers of two primary schools located in a city of Northern Italy, all the parents of fourth and fifth graders ($N = 244$) were asked to let their children take part in the present study. Criteria for inclusion were having written parental informed consent and not having cognitive/learning difficulties. Basing on these criteria, our final sample consisted of 210 children (110 boys and 100 girls; 113 fourth graders and 97 fifth graders), with a mean age of 9.66 years ($SD = 0.85$). Seven classes took part in the current study.

Measures

ToM. Children's ToM was tested using the Strange Stories task (Happé, 1994), which requires participants to interpret nonliteral statements. We administered five stories (persuasion, misunderstanding, white lie, irony/sarcasm and contrary emotions). After reading the stories, children were asked to explain the meaning of a character's sentence in a written format. In line with scoring guidelines, answers were rated using a 3-point scale. The total score ranged from 0 to 10.

Loneliness

Feelings of loneliness and social dissatisfaction were assessed through Asher and Wheeler's (1985) questionnaire, which contains 24 items (eight filler), on a 5-point scale. The total score ranged from 16 to 80, with higher scores indicating greater loneliness and social dissatisfaction.

Verbal ability

To assess children's verbal ability, the Vocabulary subtest of the Wechsler Intelligence Scale for Children-Revised (WISC-R; Italian version by Orsini, 1997) was used. Children were asked to define 32 words and scored 0 to 2 points for each definition. The total score ranged from 0 to 64.

Socio-economic status (SES)

SES was gathered through the Family Affluence Scale (Currie et al., 2008), which is a four-item measure of family wealth. The total score ranged from 0 to 9.

Procedure

The study was conducted according to the Declaration of Helsinki. Parental written informed consent and children's assent were obtained at the beginning of the study. The Heads and teachers of the contacted schools agreed to participate in the study. Each classroom was randomly divided into two groups: one was administered the ToM training and the other the no-ToM training by four trainers (Psychology interns specifically trained).

Children were tested in their classroom during school-time at the beginning of the school year (T1) and twice after the intervention (T2 and T3) by two experimenters blind to children's group membership. At T1, children completed the Strange Stories task (Happé, 1994), the Loneliness and Social Dissatisfaction Questionnaire (LSDQ—Asher & Wheeler, 1985), the Vocabulary subtest from the WISC-R (Italian version by Orsini, 1997) and the Family Affluence Scale (Currie et al., 2008). The intervention took place 1 week after T1 and lasted 1 month and a half (five weekly sessions during school-time). T2 took place 1 week after the end of the intervention, while T3 2 months after the end of the intervention. At T2 and T3, children completed the LSDQ (Asher & Wheeler, 1985) and the Strange Stories task (Happé, 1994) containing different stories on the same five topics (parallel version). The training was differentiated according to the condition (ToM vs. no-ToM). Both conditions were made up of five weekly sessions, each lasting 50 minutes and including a group discussion about two stories and two language exercises (one for each story). Following the indications by Lecce, Bianco, Devine, Hughes & Banerjee (2014) and Bianco et al. (2016), children were presented with a written story and asked to individually answer the story questions on paper. In the ToM training condition, children were presented with 10 *mentalistic* stories which were similar—for content, difficulty and length—to the *target* Strange Stories. Therefore, these stories contained a discrepancy in beliefs/knowledge/points of view between the characters and tapped the following topics: persuasion, misunderstanding, white lie, irony/sarcasm and contrary emotions. In the no-ToM training condition, children were presented with 10 *physical* stories which were similar—for content, difficulty and length—to the *control* Strange Stories. These stories involved human characters and described physical events, requiring a physical inference. Following this phase, children in both conditions participated in a group discussion on the story questions under the guide of a trainer. In the

ToM condition the trainer provided feedback aimed at expanding children's comments and facilitating the understanding of different perspectives; whereas in the no-ToM condition the trainer provided feedback aimed at explaining the reasons why their answers were right or wrong. At the end of the discussion, in both conditions the experimenter made a final comment highlighting the core message of each type of story. Children were then asked to imagine or recall an episode similar to the one told in the story and to share it with their classmates. Finally, following the indications by Lecce, Bianco, Devine, Hughes & Banerjee (2014) and Bianco et al. (2016), children were individually given a written language exercise, consisting of finding a synonym of a noun/verb taken from a sentence of the story (choosing among four alternatives). In the ToM condition, the language exercise involved mental-state noun/verbs and the experimenter used mental state lexicon within sentential complement constructions. While in the no-ToM training condition, the language exercise involved physical noun/verbs and the experimenter made no use of mental-state lexicon. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual adult participants included in the study; assent was obtained from children.

Statistical analysis

Linear mixed-effects (LME) models (Pinheiro & Bates, 2000) were applied to evaluate the effect of the two types of training (ToM and no-ToM) on the total score of Strange Stories and of LSDQ, exploring also the impact of gender, attended grade and verbal ability score. These models allow investigating longitudinal data, accounting for sources of unobserved heterogeneity due to the attended school, the trainer and child-specific effects. Backward selection procedures were then applied. Analyses were performed using R software (R Development Core Team, 2011) and the significance threshold was set at 0.05.

RESULTS

Of the 210 participants, 105 were assigned to the ToM training condition and 105 were assigned to the no-ToM training condition. The mean score of the verbal ability of the study participants was 30.38 ($SD = 8.16$), ranging from 3 to 51 points. The median score of the SES scale was 6 (range = 2–9). Descriptive statistics of the variables of interest at each time point are shown in Table 1.

The variables included in the models were gender (male or female), attended grade (fourth grade or fifth

TABLE 1
Descriptive statistics

<i>Measures</i>	<i>Type of training</i>	<i>M(SD)</i>		
		<i>T1</i>	<i>T2</i>	<i>T3</i>
Strange Stories task	no-ToM	4.96(1.72)	5.83(2.13)	6.44(1.51)
	ToM	5.42(1.66)	6.88(1.67)	6.98(1.56)
LSDQ	no-ToM	29.07(9.85)	28.17(9.01)	28.66(9.38)
	ToM	29.12(10.06)	27.42(9.34)	28.56(10.13)

TABLE 2
Linear mixed-effects model for Strange Stories task

	<i>Value</i>	<i>Std. error</i>	<i>p-value</i>
Intercept	2.5069	0.3466	.0000
Time (Ref. T1)			
T2	0.7115	0.2298	.0021
T3	1.5572	0.2318	.0000
Vocabulary	0.0804	0.0096	.0000
T1:ToM training	0.3420	0.2487	.1698
T2:ToM training	0.9055	0.2487	.0003
T3:ToM training	0.4405	0.2499	.0788
T1:Female	0.1373	0.2212	.5352
T2:Female	0.4915	0.2212	.0268
T3:Female	-0.0331	0.2226	.8818

grade), verbal ability score (on a continuum), type of training (ToM or no-ToM) and time points (T1, T2, T3). We also considered the interaction between gender and time and that between the type of training and time. Nested random effects were specified on the child's ID, on school and on the trainer to account for dependency structure among observations. The selected model for the Strange Stories is presented in Table 2.

Table 2 shows that Strange Stories scores significantly increased at T2 and T3 with respect to the baseline values (T1), with a larger increase at T3. At T2, children attending the ToM training showed higher ToM scores in comparison with children attending the no-ToM training. Moreover, at T2, females showed higher scores than males. We finally found a significant positive effect played by verbal ability.

The selected model for the total score of the LSDQ is presented in Table 3, which shows that loneliness scores significantly decreased at T2 with respect to the baseline values (T1) for children attending the ToM training. Moreover, we found a significant negative effect of verbal ability.

DISCUSSION

The present study contributes to the experimental evidence on ToM interventions conducted with school-aged children, still scant compared to evidence with preschoolers (Wellman, 2018). The main aim of the research project was to compare two types of a

TABLE 3
Linear mixed-effects model for LSDQ

	<i>Value</i>	<i>Std. error</i>	<i>p-value</i>
Intercept	3.4530	0.0794	.0000
ToM training	0.0544	0.0481	.3758
Vocabulary	-0.0050	0.0024	.0395
No-ToM training:T2	0.0033	0.0274	.9046
ToM training:T2	-0.0803	0.0271	.0032
No-ToM training:T3	-0.0024	0.0275	.9313
ToM training:T3	-0.0518	0.0269	.0545

conversation-based training, evaluating their effects on 9- and 10-year-old-children's feelings of loneliness. The secondary aim was to look at the effects of such a differentiated training on children's ToM abilities. To achieve these aims, 244 children attending Year 4 and 5 of primary school were recruited and randomly allocated to either the ToM training or the no-ToM training condition. While the efficacy of a conversation-based training to improve ToM abilities during middle childhood has been recently tested (Bianco et al., 2016; Lecce, Bianco, Devine, Hughes & Banerjee, 2014; Ornaghi et al., 2014), its efficacy in reducing loneliness has never been tested before. Therefore, the present study was the first one to simultaneously examine the effects of a ToM training on ToM itself and on a socially-related construct in school-aged children.

Our first main finding was that children belonging to the ToM training condition obtained significantly higher scores in the Strange Stories task at the post-test (T2) compared to children belonging to the no-ToM training condition. Such a result confirms findings obtained by previous researches using the same (Bianco et al., 2016; Lecce, Bianco, Devine, Hughes & Banerjee, 2014) or a similar (Ornaghi et al., 2014) methodology. Therefore, our result gives further support to the hypothesis of a conversational development of ToM (Slaughter & Peterson, 2012). According to this hypothesis, discussing mental states during social interactions helps to promote children's mindreading abilities. In the present work, during each of the five sessions, children were exposed to the different perspectives of the characters of the stories they read before the group discussion. Moreover, children were exposed to the different perspectives of their classmates during the group discussion, in which the experimenter encouraged the participation of each child. Being exposed to multiple views of the same situation and receiving feedback linking behaviours and mental states helped children to catch the representational nature of mental processes and the complexity of interpersonal relationships. Nonetheless, children in the ToM and no-ToM training conditions did not show significantly different scores in the Strange Stories at the later follow-up (T3). Such a finding could depend on the short range of time dedicated to the training: children in the ToM training condition

might need more time to internalise concepts learnt during the intervention. Another possibility is that children in the no-ToM training condition, albeit not discussing mental states, capitalised on the experience of a group discussion which boosts awareness of different points of view. It might be that this experience also led to a ToM improvement, albeit at a slower pace compared to the ToM training condition (and thus visible at T3 but not at T2). These speculations could be tested only if future works will be able to compare interventions of different duration and to compare the target condition not only with an active-control condition but also with a non-active control condition (e.g. waiting list).

The second main finding of the present study was that children in the ToM training condition obtained significantly lower scores at the post-test in the questionnaire measuring feelings of loneliness compared to children in the no-ToM training condition. Loneliness could be described as the product of perceived social isolation, which implies the awareness of unwanted social isolation (Laursen & Hartl, 2013). Previous longitudinal studies conducted on school-age children and preadolescents showed that loneliness feelings do not change in the same way for everybody (Harris et al., 2013). Therefore, as argued by Schinka et al. (2013), researchers need to remember that the developmental course of loneliness is heterogeneous. Based on recent evidence of a link between ToM and loneliness in a sample of 11-year-olds (Caputi et al., 2017), we decided to look at a possible change in feelings of loneliness modulated by a conversation-based intervention. As already said, we managed to reduce feelings of loneliness in children specifically trained on mental states by the time of the post-test. The reduction of loneliness among children in the ToM training group was probably due to the engagement in discussions about different perspectives; whereas children in the no-ToM training group discussed non-social stories. Nonetheless, the decrease in feelings of loneliness of children in the ToM training condition was no longer significant at T3. Therefore, it seems that the beneficial effect of a conversation-based ToM training on feelings of loneliness is short-lived. Despite this, the present study showed that group discussions about mental states had a positive effect on how children felt connected with their classmates. The reduction of feelings of loneliness recorded at T2 could be due to the effects of the intervention in terms of the individual way of thinking and behaving and in terms of group dynamics within the classroom. In other words, children at the post-test might have experienced less peer-network loneliness because the intervention specifically targeted the awareness of the difference between our and others' mental states, which could have produced more prosocial acts and less peer exclusion or other forms of bullying. This would also explain why at T3 the difference between children in the two conditions was no more significant:

children assigned to different interventions, except for the time dedicated to the five training sessions, were together for the rest of the time spent in the classroom. Therefore, the whole class might have profited over time from the ToM training beneficial effects even if this was specifically administered only to half of the students in each class.

Finally, it is noteworthy that children's verbal ability emerged as a significant predictor in both LME models. On one hand, higher vocabulary scores granted better ToM performances. The tight relationship between language and ToM is well known in children under age 7 (Milligan, Astington, & Dack, 2007). Our result suggests that such a relationship is still present in late elementary years and should be taken into account when planning ToM interventions. On the other hand, higher vocabulary scores predicted lower feelings of loneliness. This finding aligns with the conclusions of a recent meta-analysis conducted on children aged 2–11 showing that language competence is significantly related to social preference and peer acceptance (Troesch, Keller, & Grob, 2016). The protective role of language against high perceived loneliness should be kept in mind when studying children's well-being and peer relationships.

From a theoretical point of view, our main results fit with the social constructivist idea that ToM development is socially situated and basically relies on interpersonal relationships (Carpendale & Lewis, 2004). The notion that social exchanges are entwined with ToM abilities is consistent with the increasing importance of peers for children's perception of well-being during the school years. Putting together findings encompassing research conducted within the ToM framework, it is now clear that a normal ToM development significantly contributes to a healthy socioemotional development (Caputi et al., 2017). At the same time, since we are embedded in social interactions, our brain is shaped by other people (Hari, Henriksson, Malinen, & Parkkonen, 2015). Accordingly, bidirectional links are expected between social cognition and social functioning.

From a practical point of view, our findings have important implications for school practices and the design of preventive interventions. Indeed, the results of the present study cast new light on the possible effects of training sessions designed to improve ToM and social skills. A recent meta-analysis on ToM training studies showed that, overall, interventions were effective in improving children's ToM skills with a large average effect size (Hoffman et al., 2016). Common training procedures within this framework include the use of corrective feedback, the use of imagination, modelling techniques and role-play activities. Building on such promising results, the present findings speak to the potential utility of ToM training programmes for preventative purposes.

The main limitation of the present work is represented by the non-specificity of the training programme. Indeed, we borrowed a conversation-based intervention (Lecce, Bianco, Devine, Hughes & Banerjee, 2014) not specifically focused on loneliness-related issues. Children read and discussed stories talking about persuasion, misunderstanding, white lie, irony/sarcasm and contrary emotions. These topics were chosen as they were thought to elicit a fruitful discussion among fourth and fifth graders. However, we do not know whether specific aspects of ToM were particularly enhanced by the training programme. As argued by Koerber and Osterhaus (2019), not all aspects of advanced ToM predict loneliness. Therefore, future studies will clarify which mental circuits or pathways are more connected with social skills, in order to build targeted interventions.

The second limitation of this study concerns the length of the intervention. In the present work, for the first time, the efficacy of a conversation-based training was demonstrated both in enhancing ToM and in lowering the perception of loneliness within the classroom. Nonetheless, such beneficial effects appeared to be short-lived. It is therefore arguable that, if a ToM-based intervention was systematically integrated within the school curriculum and administered along the whole year, significant long-term effects might be appreciated in multiple areas of children's functioning.

A third limitation of the present work is constituted by the type of training materials. Both training conditions utilised paper-and-pencil tasks coupled with a group conversation launched and guided by the experimenter. All of the students were actively engaged and willingly joined the proposed activities. However, stronger and/or lasting effects might be produced by viewing short video clips instead of reading stories or by using role-playing instead of group discussion.

CONCLUSION

In sum, in line with previous findings (Bianco et al., 2016; Lecce, Bianco, Devine, Hughes & Banerjee, 2014), we showed that a relatively short intervention based on group discussion of mental states is sufficient to improve ToM abilities among fourth and fifth graders. Most importantly, our findings indicate that such an activity is also able to address children's socio-emotional functioning, because feelings of loneliness were indirectly tackled. Therefore, although more work is needed to identify the mechanisms responsible for children's well-being at school, interventions conducted within the classroom environment should be encouraged as the classroom represents a very meaningful context.

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