The relationship between theory of mind and peer acceptance in preschool children: A test of the counterfactual hypothesis in the social domain

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Abstract

Scientific literature indicates that theory of mind (ToM) is less strongly associated with peer acceptance (PA) in the case of boys and the case of negative nominations. This study hypothesizes that these two effects of ToM on PA could be an epiphenomenon of counterfactual reasoning (CFR). Fifty-three 3-5-year-olds participated in this study. The results confirmed the hypothesis. When the total sample nominated, ToM made a significant contribution to explaining positive nominations, but not negative nominations, beyond age, language, gender and CFR. When separately considering the gender of the nominators, ToM accounted for a significant variance in positive nominations only when girls, but not boys, nominated. Furthermore, CFR was a significant predictor of social rejection beyond age, language and gender when the total sample nominated, as well as when each gender nominated separately. This study could contribute to a better understanding of the socio-cognitive genesis of PA. Practical implications are discussed.

Keywords: Theory of mind; peer acceptance; counterfactual reasoning; pretend play; gender differences

By approximately the age of 4, children are able to solve false belief tasks (FBTs) (Wimmer & Perner, 1983) and, therefore, demonstrate the so-called Theory of Mind (ToM) (Wellman, 2017). Specifically, FBTs assess a child's ability to hold another's mistaken beliefs about reality. This is traditionally addressed by asking the child to predict – and to a lesser extent, explain - a character's behaviour from their beliefs and desires.

ToM has been considered a powerful social tool to the extent that it is a component of children's social intelligence (Osterhaus et al., 2020). Thus, ToM is significantly related to both social competence in peer interactions (Peterson, Slaughter, Moore, & Wellman, 2016) and popularity or peer acceptance (PA) (Slaughter, Imuta, Peterson, & Henry, 2015). PA refers to the degree to which a child is positively or negatively regarded by their peers and is measured sociometrically through peer nominations of likeability.

However, the evidence linking ToM and social relations is mixed at best (Hughes & Devine, 2015). In the specific case of popularity, the meta-analysis by Slaughter et al. (2015) found a meaningful but only modest effect size between ToM and PA ($r = .19$). Although this association is consistent, two relevant findings from this meta-analysis may need to be further understood to firmly advance the socio-cognitive genesis of PA. Thus, on the one hand, ToM is more strongly associated with positive nominations ($r = .23$) than with negative nominations ($r = .13$). On the other hand, a substantially larger effect size regarding the ToM-popularity relationship is obtained for girls than for boys ($r = .30$ versus .12, respectively). This study aims to shed light on these results by analysing the contribution of a precedent process that is closely linked to ToM: counterfactual reasoning (CFR). Counterfactuals consist of causal conditional structures that contain a false antecedent about past or present events. As a result, we create alternatives to reality by imagining how the past could have been different ('what if...') (Byrne, 2016). Thus, a child demonstrates their CFR ability in

tasks in which they must correctly infer a counterfactual outcome given a premise to be altered.

Why should a relationship between the CFR and PA be considered and how does it relate to ToM? Diverse evidence directly or indirectly supports the link between CFR and social adaptation. Thus, children's intelligence and mental maturity are empirically connected to social adaptation (Racz, Putnick, Suwalsky, Hendricks, & Bornstein, 2017) and social acceptance itself (Czeschlik & Rost, 1995). Specifically, counterfactuals actively help regulate the behaviour involved in social interactions (Epstude & Roese, 2008) in such a way that there is a link between CFR and social problem solving (Capage & Watson, 2001). Fundamentally, the fact that CFR underlies the false belief understanding (the so-called 'counterfactual hypothesis': 'the emergence of counterfactual thinking is critical for performance … on false belief tasks', Harris & Leevers, 2000, p. 83) presents the possibility that CFR has a role in the socio-cognitive genesis of social adaptation. Not surprisingly, solving the FBT requires ignoring a fact from our knowledge base and adopting a *false* state of affairs instead from which to *reason* so that a false belief is concluded. Thus, the classical Maxi's task (Wimmer & Perner, 1983) could be converted into a CFR one: 'If Mummy had not baked a cake, where would the chocolate be?' (Peterson & Riggs, 1999; Riggs, Peterson, Robinson, & Mitchell, 1998).

A robust and positive empirical relationship has been obtained between CFR and false belief (Guajardo, Parker, & Turley-Ames, 2009; Müller, Miller, Michalczyk, & Karapinka, 2007; Riggs et al., 1998), which does not necessarily mean an FBT is merely reducible to a CFR task. From an empirical and theoretical framework, there is a developmental precedence of CFR in relation to false belief (Perner, Sprung, & Steinkogler, 2004; Rasga, Quelhas, & Byrne, 2017). This is due to CFR being a prerequisite for false belief reasoning (Rafetseder, O'Brien, Leahy, & Perner, 2021) and it being easier than false belief (Müller et al., 2007;

Rasga et al., 2017; Riggs et al., 1998; see also Carroll, Blakey, & Simpson, 2021). In fact, children even entertain counterfactual possibilities typically by age 2 (Epstude & Roese, 2008).

In short, if CFR is a critical capacity for ToM in preschool years and, moreover, the ToM-PA relationship emerges in this period, it is, therefore, possible that CFR underlies this relationship. In other words, a large part of the ToM-PA connection could be a primarily counterfactual issue in preschool years, especially in less demanding social situations. The relationship between ToM and CFR with respect to PA has not been examined but has been implied subtly and indirectly through pretend play (Weisberg, 2015), which is closely linked to PA (Howe & Leach, 2018). Thus, ToM and CFR are, in fact, related to pretend play (Gopnik & Walker, 2013; Lillard, 2015; Saracho, 2014; Weisberg, 2015), and may relate differently to such play in terms of underlying representational capacity. In particular, the CFR-pretend play connection is explained as a function of a *somewhat more basic* capacity to operate independently of the content of the premise while the ToM-pretend play connection would do so specifically with mental states (Weisberg, 2015). Some empirical evidence appears to support this possibility. Thus, ToM is related to the *quality* of pretend play (Jenkins & Astington, 2000). Furthermore, it has been assumed that children can actively engage in pretend play without being aware of the mental processes underlying their actions (Lillard, 1993, 2015). This can be in such a way that they can enact scripted routines that are devoid of meta-representation (Lillard, 1993). The latter suggests that a pre-ToM skill, i.e., CFR, may actually be operating rather than ToM in such non-meta-representational pretend play. Ultimately, pretending is considered to be a 'zone of proximal development' for ToM (see Saracho, 2014, for a review).

In this context, we think that the 'counterfactual hypothesis' fits perfectly to explain the two findings noted above from the meta-analysis by Slaughter et al. (2015) concerning

the smaller effect obtained with boys and also with negative nominations. Firstly, regarding the weaker ToM-negative nominations relationship, Slaughter et al. suggested that behaviours associated with rejection (traditionally aggressive ones) 'have multiple antecedents besides a poor underlying ToM' (p. 1169). We suspect that one of these developmental antecedents could be CFR. Thus, in line with the above, peer rejection could be related to an incorrect deployment of CFR in terms of pretend play. If children reject and correct pretence that conflicts with general knowledge about the real world in a laboratory situation (Van de Vondervoort & Friedman, 2017), why not consider that rejection is more vividly generated in a natural context with peers? Furthermore, CFR may also be negatively related to rejection through its involvement in causal analysis with respect to social events. Thus, generating causal knowledge has traditionally been a function of CFR that has also been observed in children (Engle & Walker, 2021). Likewise, it is also known that children's peer rejection is related to deficits in social information processing, including the attribution of causes to social events (Crick & Dodge, 1994). Importantly, and additionally, it is even proposed that causal knowledge and learning are exercised through CFR in pretend play (Gopnik & Walker, 2013). Ultimately, this leads us to believe that the ToM-negative nominations relationship masks a genuine CFR-negative nominations relationship.

Secondly, regarding the weaker effect of the ToM-PA association for boys than for girls, we suspect that boys might *simply* value their peers' ability to design counterfactual courses rather than engage in a strictly mentalistic dynamic. Consistent with the observation of Slaughter et al.' (2015), girls' play and interactions certainly show more mentalistic competences than those of boys (Gibson, Fink, Torres, Browne, & Mareva, 2020; Gmitrova, Podhajecká, & Gmitrov, 2009; Holmes & Romeo, 2013; Jones & Glenn, 1991). Girls even deploy a more covert pretend play than boys (Carlson & Taylor, 2005) and it contains more subtle emotional components linked to understanding false beliefs, such as emotional

knowledge (Lindsey & Colwell, 2013). Similarly, girls refer more to the social and psychological aspects of play than boys and also use more mental state terms in their accounts of their own drawings of themselves playing (Bosacki, Varnish, & Akseer, 2008). Finally, it is not just that girls' play is more mentalistic. More importantly for this study, there is evidence that girls themselves associate it with popularity. Thus, interactive play predicts playmate choices in girls but not in boys (Mathieson & Banerjee, 2011). In summary, the weaker ToM-PA link in boys obtained by Slaughter et al. (2015) could be due to the fact that it is the counterfactual activity linked to socially relevant behaviours, such as pretend play, and not the strictly mentalist activity that underlies PA when boys nominate. Consequently, this study will test the 'counterfactual hypothesis' in the social domain and will do so by means of a sensitive assessment of all the variables involved, that is, ToM, CFR and PA.

Testing the 'counterfactual hypothesis' in PA: a sensitive assessment

In order to test the 'counterfactual hypothesis' in boys and girls, it seems reasonable to know specifically how, separately, boys and girls actively shape their relational world. Do boys and girls value the ToM of their peers differently when choosing them as playmates? The existing studies on this issue reaffirm that girls value the ToM of their peers more highly than boys when judging partner likeability (Carreras et al., 2014; Keenan, 2003). Consequently, in this study, nominations were considered with regard to the overall sample and to the elector sub-sample of boys and girls separately. In addition, the typical age-related gender segregation in early childhood is known: at the age of 4.5 years, children spend three times as much time with same-sex playmates (Hines, 2015). Therefore, the nominee's gender was controlled for when analysing the relationship between social cognition and PA according to the nominator.

Likewise, age and language were controlled for in this study as these variables are related to both ToM and social maturity/popularity (Milligan, Astington, & Dack, 2007; Rubin, Bukowski, & Parker, 2006; Troesch, Keller, & Grob, 2016).

Classic FBTs may be very different from real-world social interactions (Astington, 2003), with children who do not pass the standard FBT, nevertheless demonstrating the ability to connect mental states and actions in everyday life. In this respect, the implicit ToM could theoretically underlie the aforementioned *décalage* between failing FBTs and understanding the day-to-day mind-action relationship (Teglasi, Caputo, & Scott, 2022). However, an implicit ToM may not be a sufficiently sensitive measure in peer-interactive ecological contexts (Etel & Slaughter, 2019; Fink, Begeer, Peterson, Slaughter, & de Rosnay, 2015) nor may it be commensurate with the challenging and demanding nature of social relationships with peers (Rubin, Bukowski, & Bowker, 2015). Therefore, a sensitive assessment should only adequately and cautiously consider the role of the implicit ToM in social adaptation. In this respect, this study adopted some criteria to adequately combine the assessment of an explicit and somewhat more implicit mentalistic functioning. Specifically, a classic FBT focusing on a character's action was presented, followed by a belief attribution task (`Does Paul think...?´) such that successful performance on the latter was required to validate a correct response on the former. Moreover, this requirement of an explicit understanding of belief was not considered in terms of *all-or-nothing*, but rather, two sensitive criteria were applied to examine its gradual acquisition. On the one hand, when mentalistic tasks were failed, one or even two aids were provided that focused the children's attention on past relevant information to *implicitly* connect perception to belief. On the other hand, a successful initial mentalistic performance was validated when either an explicit ToM was shown to be possessed at the time or an initially implicit ToM was made explicit with the aids.

Furthermore, as far as the CFR is concerned, it might also be necessary to apply a fine-grained assessment through tasks that are truly counterfactual (Rafetseder, Schwitalla, & Perner, 2013) and by exploring the counterfactual process (Kominsky et al., 2021).

Consequently, in this study, the response options of the CFR task could not be easily chosen based on general assumptions. In addition, responses were asked to be justified with a why-question.

Research Questions and Hypotheses

Our research questions were as follows: Is there a developmentally parsimonious explanation for the ToM-PA relationship in those cases described by Slaughter et al. (2015) in which the ToM-PA relationship is weaker; in other words, in the case of boys and also in the case of rejections? In particular, is it the counterfactual component that ultimately underlies and actually explains the ToM-PA relationship in the case of boys and also in the case of rejections? The above theoretical-empirical arguments lead us to consider that, in these two cases, the effect of the ToM on PA could actually be an epiphenomenon of counterfactual activity. Specifically, we hypothesize that rejection might be a consequence of low levels in a simpler ability, that is, CFR, rather than in ToM. As such, we predict that ToM will not contribute significantly to the explanation of negative nominations beyond age, language, gender and CFR, but will contribute significantly to the explanation of positive nominations.

Likewise, we hypothesize that the gender differences in play and interaction patterns will result in boys demanding CFR rather than a ToM from their playmates. As such, we predict that ToM will not contribute significantly to the explanation of PA beyond age, language, gender and CFR when boys nominate, but will do so when girls nominate.

All these variables were included in a single design and, as a result of the design's complexity and the existing multiplicity of variables, the extent and time of experimental work increased, resulting in restrictions regarding the operative sample size.

Method

Participants

Fifty-three 3-5-year-old children participated in this study: 18 three-year-olds (10 males and 8 females; $M = 42.11$; $SD = 3.22$); 22 four-year-olds (12 males and 10 females; $M = 52.05$; $SD = 3.67$); and 13 five-year-olds (10 males and 3 females; $M = 65.15$; $SD = 2.82$). Participants were Spanish students at a state preschool and primary school in Madrid. Given the inequality in the number of boys and girls in the 5-year age group, which reflected the gender differences present in this school for this age group, the 5-year-old boys and girls were compared on the most cognitively complex ability of the study; ToM. This allowed us to test whether the mentalist-counterfactual balance in the explanation of PA might have a gender bias. This was not the case as the girls' performance in ToM did not differ significantly from that of boys: 1.5 and 2.1, respectively, $U = 11$, $p = .573$, two-tailed.

Design

Five tasks were administered to participants: one FBT, one for belief attribution, one test for CFR, one nomination sociometric interview and one test regarding the comprehension of grammatical structures (Mendoza et al., 2005). The first four tasks (FBT, belief attribution, CFR and sociometric interview, always in this order) were presented as a block and the comprehension of grammatical structures was administered either after this block or during a different session depending on the children's level of fatigue. Research began 4 months after the academic year started in order for peer relations to be defined and the sociometric interview to be valid.

In relation to the FBT, children were randomly assigned to either a prediction task (28 participants) or an explanation task (25 participants). These two versions of the FBT gain significance in the context of the broader study in which this work is included. However, both versions were equivalent in terms of difficulty (1.34 and 1.34, respectively, $U = 349$, $p = .984$, two-tailed); therefore, the FBT score considered them together.

All children were administered the same questions in the remaining tasks, i. e. in the belief attribution, CFR, sociometric interview and comprehension of grammatical structures tasks.

Procedure and materials

Approval was obtained from the Research Ethics Committee of the Faculty of Psychology, National University of Distance Education of Spain (13-PSI-2021). The children's parents in each of the 3 preschool classes (3, 4 and 5-year-olds) were notified of the possibility that their children would be participating in the study. The children's involvement in the study was subject to the parents' informed consent. The tests were carried out individually in a quiet room in the children's school. The FBT, belief attribution and CFR tasks were administered by acting out a story with Playmobile dolls and the sociometric interview was done by pointing out peers using photographs.

The scenario employed in evaluating the latter tasks was the same as in the work by Contreras and García-Madruga (2020).

In the story (for example, for the boys), Paul is in his bedroom with his friend John. Paul has been gifted an Ernie doll that sings and plays the guitar, and Paul and John are going to play with it in the bedroom. The doll works with batteries, but they are not included, so Paul is going to buy them. Then, he says to John: 'John, don't play with Ernie until I come back'. However, when Paul goes, John takes Ernie and plays with it all over the house. When he is playing in the dining room, he accidentally lets Ernie fall and the doll breaks. Then, John hides it in the dining room cabinet.

Some control questions were formulated (e.g., What does John do while Paul is buying the batteries?) and the story was repeated when a child failed one of the questions. Next, mentalistic and counterfactual tasks were formulated.

FBT and Belief Attribution

In the prediction task, children were asked where Paul would look for Ernie and why. Next, a belief attribution question was asked: Does Paul think Ernie is in the dining room or in his bedroom?

In the explanation task, the researcher caught Paul and took him to the bedroom. The children were asked why Paul was looking for Ernie in there. Next, the same belief attribution question as in the prediction task was given.

When the answers to the FBT (prediction or explanation version) or the belief attribution task were wrong, children were given one or two aids. These aids consisted of reminding the children of relevant facts, which made it easier for them to generate the false belief. Thus, the first aid was: 'Where was Ernie before Paul left to buy batteries?' and the second (if necessary) was: 'When Paul was buying batteries, did he realise that John had taken Ernie?' Accordingly, the researcher could confirm the children's correct answers and rectify the incorrect ones. After receiving each aid, the children were again given the prediction or explanation task and the belief attribution task.

A category system based on previous literature was adopted following Contreras and García-Madruga (2020) in order to decide whether a response to the 'why' question was correct or not. In particular, the categories of correct responses were as follows: false belief; absence of knowledge (ignorance); relevant facts regarding the story referring to a past situation with mental states easily inferred from those facts. The categories of incorrect responses included the following: responses that objectify the situation or refer to a logical and imminent consequence; reasonable solutions in the context of the story but clearly unsatisfactory in relation to solving the FBT; responses focused on an internal need of rebuilding the story; irrelevant and absurd responses; don't know or no response.

The FBT score ranged from 0 to 3, depending on whether the correct answer required no aid (3 points), one aid (2 points), two aids (1 point) or was not performed correctly despite

the help offered (0 points). In any case, the score of 1-3 was conditional on having solved the belief attribution task at some point during the interview.

Counterfactual Reasoning

Once the mentalistic tasks had been assessed, the counterfactual tasks were administered. In the story, Paul finally finds out Ernie is in the dining room and is broken. Next, three counterfactual questions were formulated, always in the same order:

If John had not played with Ernie, how would Ernie be now: broken or new? Why?

If Paul had not left his bedroom, how would Ernie be now: broken or new? Why?

If Ernie had had batteries, how would Ernie be now: broken or new? Why?

The order of the options (broken and new) was counterbalanced. Scores ranged from 0 to 3. A response was considered correct when the children provided minimal justification that was consistent with the response. Thus, it was sufficient for the children to refer to some change that would have altered the factual outcome, or even a reference to a previously formulated counterfactual antecedent was valid.

Language

The comprehension of grammatical structures test was administered. It consisted of 20 blocks or types of grammar constructions in Spanish. Each block contained four items regarding the linguistic description of some vignette drawings. The children's task was to point out, from among four drawings, the one that corresponded to the sentence said by the researcher. Due to the number of tasks applied in this study and the fact that we did not aim for a complete linguistic assessment, only 24 items were selected to provide a measure of linguistic control. The selection was based on the closest possible similarity of grammatical structures to those used in the story that was told with the purpose of assessing mentalistic and counterfactual issues.

Peer acceptance

A nomination sociometric interview following the methodology of Coie, Dodge, and Coppotelli (1982) was carried out. Children were asked to select photographs of up three children with whom they most liked to play and up to three children with whom they did not like to play. Cross-gender nominations were permitted. Following the method outlined by Coie et al., positive nominations and negative nominations were standardized with reference to the classroom. All other study variables (ToM, CFR, language and age) were also standardized for each classroom, thus optimizing the comparability of the social measures with the socio-cognitive and control measures.

Analysis plan

Pearson's correlation analyses, partial correlation analyses, a McNemar test and hierarchical multiple regression analyses were all performed, with the assumptions necessary to apply these statistics being met. The Pearson's correlation analyses were initially carried out to analyse the relationships between the control variables and the main variables (ToM, CFR and PA). Partial correlation analyses were used to test the ToM-CFR relationship, while controlling for age, language and gender. Moreover, the level of difficulty of both the FBT and the CFR task was compared using a McNemar test. This test was used because both variables had to be dichotomised to make them comparable since FBT was facilitated with aids (if necessary) but CFR was not. Thus, only the initial right or wrong answer given in the FBT was considered. In the case of the CFR task, the children were considered to have passed the task when any of the 3 questions were correctly solved. In addition, partial correlation analyses were conducted to test the relationship between PA and both ToM and CFR, while controlling for age, language and gender – as well as for CFR when analyzing the ToM-PA relationship. Hierarchical multiple regression analyses were also conducted to determine whether ToM contributed significantly to PA beyond age, language, gender and CFR.

Results

Descriptive statistics and preliminary analyses

Table 1 shows the means, standard deviations, and ranges for cognitive and social variables.

Place Table 1 about here

As expected, the FBT and CFR correlated significantly with both age and language (ranging from .44 to .60, $p < .001$). When controlling for age, language and gender, the FBT and the CFR task remained significantly correlated ($r = .52, p < .001$). In testing the differential difficulty of the two latter tasks, a McNemar test showed a difference between the two proportions of children: those who failed the CFR but passed the FBT (0%) and those who passed the CFR but failed the FBT (26%) ($p < .001$). Moreover, positive nominations, but not negative nominations, correlated significantly with age ($r = .31, p < .05$) and marginally with language ($r = .25, p = .07$). In other words, positive nominations are related to social maturity, but negative nominations are not.

ToM/CFR-PA relationship

Partial correlations, while controlling for age, language and gender (Table 2), showed a significant ToM-PA relationship: higher scores in the FBT are positively related to the number of positive nominations and negatively, although to a lesser extent, to the number of negative nominations. Regarding the gender of the elector, when boys nominate, the performance in the FBT of the nominees correlates significantly with the negative nominations received, but not with positive nominations. The opposite occurs when girls nominate: the performance in the FBT of the nominees correlates significantly with the positive nominations received, but not with negative nominations.

Place Table 2 about here

CFR showed significant correlations with PA in almost all cases. The magnitude of the correlation coefficients is higher with negative nominations than with positive

nominations and is higher when boys nominate than when girls do so. When controlling for CFR, as well as for age, language and gender, the initially significant ToM-PA correlations are no longer significant with the exception of the FBT-positive nominations correlation when both the total sample and the sub-sample of girls nominate (Table 2).

In testing the counterfactual hypothesis, hierarchical multiple regression analyses were performed (Table 3). In a first block, age, gender and language were entered; in a second and third block, CFR and the FBT were entered, respectively. The FBT contributed significantly to the explanation of positive nominations, but not negative nominations, beyond age, language, gender and CFR when both the total sample and the sub-sample of girls nominated. Likewise, CFR contributed significantly to explaining positive nominations beyond age, language and gender only when boys nominated. In terms of explaining negative nominations, CFR was a significant predictor beyond age, language, and gender in all cases.

Place Table 3 about here

Discussion

The meta-analysis of Slaughter et al. (2015) found a significant but weak ToM-popularity relationship. However, at the same time, it revealed some results that invite further investigation of this relationship. Thus, the ToM-popularity relationship is stronger in girls than boys and is also stronger with positive peer regard than with negative peer regard. Therefore, in response to the need for more research to further understand this relationship, this study aimed to explore the role of CFR in such a domain: Does CFR underlie the ToM-PA relationship in the two scenarios where such relationship is weaker, i.e., in the case of boys and the case of negative peer regard? Is PA in these two cases better explained in terms of a simpler activity, i.e., CFR? CFR, and not so much ToM, was expected to underlie both negative nominations and PA when it was the boys who nominated. These two hypotheses were supported.

The results reveal that the effect of ToM on positive nominations cannot be considered a simple epiphenomenon of counterfactual activity. ToM accounts for a significant variance in positive nominations beyond age, language, gender and CFR. On the contrary, ToM is not a significant predictor of negative nominations beyond these latter variables, but CFR is. Overall, these results would indicate that being accepted is socio-cognitively more demanding (i.e., adequate levels of ToM are required to be chosen) than not being rejected, which *only* requires being able to CFR. This statement is also consistent with the relationship obtained between positive nominations and age. In this line, skills linked to positive peer regard such as sensitivity, prosociality and effective communication seem to require a ToM (Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016; Slaughter et al., 2015) and, not surprisingly, children chosen as the favourite classmates may be those who display 'multiple skills simultaneously' (Caputi, Lecce, Pagnin, & Banerjee, 2012, p. 265). Likewise, such a statement is congruent with the documented relationship between ToM and friendship (Fink, et al., 2015; Peterson & Siegal, 2002), which reflects the cognitive *quality* of this social bond. This is even reinforced by the fact that in our study the ToM-positive nominations link is actually limited to the case in which girls nominate. Thus, the traditional relationship observed in girls between ToM and high-quality friendships could point to the fact that ToM contributes extraordinarily to the development of the *qualitative* aspects of girls' social lives, with girls developing greater sensitivity to disruptions or small transgressions in their friendships (Miller, Reavis, & Avila, 2018).

These results also suggest that rejections could be a consequence of a deficit in reasoning or, more specifically, of a developmental delay in deductive reasoning (Rieffe, Terwogt, & Cowan, 2005). Thus, it is possible that the mentalistic performance in studies finding a negative relationship between ToM and aggressive behaviour (Austin, Bondü, & Elsner, 2017) actually masks a more basic skill, CFR (Capage & Watson, 2001). Not

surprisingly, these rejected-aggressive children 'may have difficulty understanding the consequences of their behaviour for others' (Rubin et al., 2006, pp. 614-615) and certainly show deficits in processing social information (Crick & Dodge, 1994).

Assuming the influence of pretend play on popularity (Howe & Leach, 2018), these results cautiously point to a different cognitive demand underlying play activity that allows it to be chosen and not rejected. However, our results suggest that delving into the cognitive differences associated with acceptance- and rejection-generating pretend play seems to be relevant only for understanding the social network configuration of girls and not boys. Thus, the ToM of the nominees does not become a significant predictor of either obtaining positive nominations or avoiding negative nominations beyond their age, gender, language, and CFR when boys nominate. On the contrary, while girls reject peers based on their low levels of CFR, they select them based on their adequate ToM levels. It is essentially the playmates' counterfactual component, which is devoid of mentalistic activity, that underlies the choices made by boys, whereas girls demand *genuine* mentalistic activity in their choices. As noted above, this is an expected outcome according to the play and relationship patterns of each gender. We think that the female mentalist demand could be transferred to other social scenarios beyond pretend play. In this regard, the link between ToM and prosocial behaviour is stronger for girls (Imuta et al., 2016) and, in addition, empathy in girls has a positive impact on how popular their female peers rate them, but only when such empathy translates into *effective* help in resolving conflicts (Carreras et al., 2014).

In any case, the fact that boys choose their playmates based on CFR rather than on a ToM does not necessarily mean that boys do not have implicit knowledge of how mental states operate. In fact, it has been proposed that an implicit and not only explicit understanding of the mind takes place in pretend play (Lillard, 2015). Moreover, we do not really believe that boys and girls differ in terms of asking for a structurally –actually–

different meta-representational capacity in classmates. Rather, they do differ in functional terms. It should be noted that the boys and girls in our study did not differ significantly in their ToM levels. Therefore, when choosing playmates according to typical age-related gender segregation, boys would not have selected those with a lower ToM level. Rather, in line with the current interest in studying differences in the way boys and girls *apply* ToM in various domains, we think that our results reveal gender differences in the *pragmatic application* of ToM (Kolodziejczyk & Bosacki, 2015). Thus, it is possible that the type of play and interactions that are characteristic of each gender determine the type of cognitive process required to be enacted. Not surprisingly, peers encourage children to engage in gender-typical play (Hines, 2015) and boys are disliked by both genders when they display female-stereotyped behaviour (Rubin et al., 2006).

Practical applications and limitations

Despite the criticisms received, the results show that the FBT, which was implemented (as we have done) according to a sensitive and fine-grained assessment, is a useful measure when analysing the relation between ToM and real-world social consequences (Imuta et al., 2016; Osterhaus et al., 2020).

The fact that ToM, beyond CFR, becomes a significant predictor of positive nominations, has an unequivocal meaning: educational intervention in social competence should not be based on the *bureaucratised* teaching of social behaviours and routines. Children's mentalising abilities should not be undervalued (Bosacki et al., 2008) and educators should be aware of them.

The implications of the study are particularly novel in its consideration of CFR as a core factor in PA, especially for boys. For them, CFR becomes a powerful social attractor. Future research could reveal more information regarding specific behaviours linked to CFR that are responsible for levels of PA. Even though we have not assessed specific behaviours,

all indications are that pretend play might channel a good part of the CFR's action on PA. Empathy may also be a relevant factor in boys (Carreras et al., 2014). Regarding girls, they value mentalising abilities in playmates. It is necessary to consider these gender differences in the implementation of educational interventions aimed at improving children's social lives. Furthermore, both genders link social exclusion with CFR difficulty, which implies reinforcing cognitive and executive components linked to causal reasoning (Derksen, Hunsche, Giroux, Connolly, & Bernstein, 2018).

We are aware that the size of the sample is small and, as such, our results must be considered with caution. However, the initial and exploratory nature of this research offers results that are theoretically sound and congruent with the theoretical background underpinning the hypotheses. In any case, future research should notably increase the sample size.

In conclusion, this study advances our understanding of the cognitive components of popularity and, in particular, sheds light on those cases in which ToM shows a more attenuated relationship with PA. On the basis of the observed close developmental link between ToM and CFR, the 'counterfactual hypothesis' seems to be useful in clarifying the cognitive demands associated with PA.

The practical implications of our study are evident for those involved in preschool education. Programmes designed to treat deficits in social skills may benefit greatly from considering the gender-differentiated effects on shaping children's relational world. In any case, using a larger sample size, future research should analyse the developmental course and critical moments of the relationship of both CFR and ToM with peer relationships from an early age, clarifying whether the gender differences we found are related to the rate of acquisition or whether they are genuine qualitative aspects of boys and girls (Hughes & Devine, 2015).

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Table 1. Means (SD) [range] of age (in months) language, false belief task (FBT), counterfactual reasoning (CFR), positive nominations (PNs) and negative nominations (NNs)

	Total
Age	51.89 (9.37) [37 – 69]
Language	.65 (.17) [.23 - .91]
CFR	1.46 (1.38) [0 -3]
FBT	1.34 (1.46) [0 – 3]
PNs[1]	.18 (.13) [0 – .48]
NNs[1]	.12 (.14) [0 – .68]

[1] Scores reflect the number of nominations received by participants divided by the number of participants in each classroom.

Table 2. Partial correlations (controlling for gender, age and language) between peer acceptance (positive nominations, PNs, and negative nominations, NNs), counterfactual reasoning (CFR) and false belief task (FBT) [controlling for CFR]

		PNs	NNs
Total electors	FBT	**.40** [.32*]**	**-.33*** [-.17]
	CFR	.28	**-.40****
Male electors	FBT	.24 [.11]	**-.39**** [-.23]
	CFR	**.31***	**-.42****
Female electors	FBT	**.33* [.33*]**	-.19 [-.06]
	CFR	.10	**-.30***

*p < .05; **p <= .01; two-tailed.

Table 3. Hierarchical regression analyses predicting peer acceptance: Testing the counterfactual hypothesis

Total electors	PNs		NNs	
	β	ΔR^2	β	ΔR^2
1.		**.15***		.11
Language	-.18		.21	
Gender	.28		**-.47****	
Age	.24		-.05	
2. CFR	.13	.07	**-.48****	**.15****
3. FBT	**.38***	**.08***	-	
	$R^2 = .30$, $F(5, 47) = 3.97$, $p < .01$		$R^2 = .25$, $F(4, 48) = 4.01$, $p < .01$	
Male electors	PNs		NNs	
	β	ΔR^2	β	ΔR^2
1.		**.20****		.08
Language	-.01		.21	
Gender	**-.34***		**-.44****	
Age	-.03		.01	
2. CFR	**.34***	**.08***	**-.51****	**.17****
3. FBT	-		-	
	$R^2 = .28$, $F(4, 48) = 4.64$, $p < .01$		$R^2 = .25$, $F(4, 48) = 3.98$, $p < .01$	
Female electors	PNs		NNs	
	β	ΔR^2	β	ΔR^2
1.		**.50*****		.09
Language	-.18		.16	
Gender	**.71*****		**-.41****	
Age	.21		-.10	
2. CFR	-.08	.01	**-.36***	**.08***
3. FBT	**.32***	**.05***	-	
	$R^2 = .55$, $F(5, 47) = 11.59$, $p < .001$		$R^2 = .18$, $F(4,48) = 2.54$, $p < .10$	

Note. For gender analysis, boys were coded as 0 and girls were coded as 1.

β corresponds to the values produced in the final regression equation.

Age, gender, and language (first block) were entered with forced entry. CFR and FBT were not initially forced into the regression. However, when FBT entered the regression but CFR did not enter in the previous block, the analysis was repeated by forcing CFR.

Taking into account the gender preferences made by girls, it should be noted that no differences were found between girls and boys in performing the FBT (1.24 and 1.41, respectively, $U = 316$, $p = .681$, two-tailed)

Positive nominations = Positive nominations; NNs = Negative nominations; CFR = Counterfactual reasoning; FBT = False belief task.

*$p < .05$; **$p < .01$; ***$p < .001$