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ToM^2: Parental Perception of Theory of Mind Abilities in Autistic Children

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ABSTRACT

Understanding how parents perceive their children's abilities is crucial for family dynamics and intervention strategies, particularly in autism, where accurate parental assessment of social-cognitive capabilities can influence support approaches and developmental outcomes. This study introduces ToM^2, a novel measure examining parents' ability to predict their autistic child's Theory of Mind (ToM) performance, representing a form of mentalization that requires parents to evaluate how their child understands others' mental states. We recruited 54 parent–child dyads (43 included in final analyses) from families with children diagnosed with autism (ages 42–70 months). Children completed a six-task ToM scale, while parents predicted their child's responses to each task. ToM^2 accuracy was calculated based on the match between parental predictions and child performance. We examined the relationships between ToM^2 accuracy and family accommodation for restricted and repetitive behaviors, autism symptom severity, and parental broader autism phenotype characteristics using logistic mixed-effects modeling. Results revealed that parents with higher levels of family accommodation demonstrated significantly lower ToM^2 accuracy ($p = 0.030$), suggesting that higher accommodation is associated with reduced accuracy in perceiving social-cognitive abilities, consistent with bidirectional parent–child interaction patterns. Greater autism symptom severity showed a trend toward reduced ToM^2 accuracy ($p = 0.051$), possibly suggesting that more pronounced autism characteristics may present greater challenges for parental mentalization. Parental broader autism phenotype was not associated with ToM^2 accuracy. These findings suggest that ToM^2 represents a useful framework for parental mentalization in autism and may inform family-centered interventions targeting both accommodation behaviors and parental perception accuracy.

1 | Introduction

The way parents perceive and understand their children's abilities plays a crucial role in child development and family dynamics. Research has consistently demonstrated that parental expectations shape not only children's development but also their self-perception (Neuenschwander et al. 2007; Schunk and Pajares 2002). Expectancy-value theory highlights how parental expectations, as shaped by social contexts, influence children's achievements and self-understanding across various domains (Parsons et al. 1982). This relationship operates through multiple pathways: parents' expectations influence children's outcomes while simultaneously shaping their self-concept, which in turn affects performance. Longitudinal studies have revealed the bidirectional nature of these influences, with parent and child expectations mutually reinforcing each other and collectively predicting achievement outcomes (Zhang et al. 2011).

Among families of autistic children, parental perceptions and expectations take on particular significance. Research demonstrates that these expectations serve as powerful predictors of outcomes across various domains, from social participation to

Lay Summary

Understanding how accurately parents assess their child's abilities is important for providing proper support. This study looked at how accurately parents of autistic children predicted their child's performance on social understanding tasks. We asked 43 children and their parents to complete the same set of tasks that measure theory of mind—the ability to understand what others are thinking and feeling. Parents who less accurately predicted their child's abilities were also those that engaged in more family accommodation, referring to modifications designed to reduce their child's stress stemming from their autism symptoms. This suggests that when families adjust too much to help their child, parents might lose touch with what their child can actually do. These findings could help families and professionals find the right balance between supporting autistic children and encouraging their independence.

future employment prospects (Kirby 2016; Doren et al. 2012). A recent qualitative study examining how parents of autistic children form their expectations revealed several unique challenges (Kirby et al. 2020). Many of these parents report a complex dynamic where their belief in their child's inherent capabilities conflicts with perceived social and institutional barriers. This tension often manifests in educational settings, where misalignments between parental expectations and school resources or teaching approaches can create challenges (Bush et al. 2017; Russell 2005).

Moreover, for parents of autistic children, the accuracy of their understanding of their child's abilities has profound implications for how they structure support and modify their own behaviors. This relationship becomes particularly evident in the context of family accommodation, defined as the ways in which family members modify their behaviors to help their child avoid or alleviate distress related to disorder symptoms (Feldman et al. 2019; Lebowitz et al. 2014). In the context of autism, accommodation typically occurs around restricted and repetitive behaviors and social difficulties, and commonly includes participating in the child's restricted and repetitive behaviors, providing specific items the child requires, assisting in avoiding distressing stimuli, and modifying family routines or schedules (Feldman et al. 2019; Storch et al. 2015). While such accommodations may effectively reduce immediate anxiety or discomfort, research indicates they might reinforce symptom patterns over time and increase parental stress levels, creating a cycle of escalating accommodations (Lebowitz and Shimshoni 2018). These accommodation patterns likely reflect parents' perceptions of their child's social and cognitive capabilities, while simultaneously influencing how parents observe and understand their child's abilities.

When parents misjudge their autistic child's abilities, they may provide inappropriate levels of support. Conversely, parents who engage in extensive accommodation behaviors may become less attuned to their child's actual capabilities, as their focus shifts toward modifying environments and routines. This bidirectional relationship highlights the critical importance of accurate parental mentalization in autism. When parents accurately understand their child's social-cognitive abilities, they can calibrate their support strategies appropriately, providing scaffolding where needed while encouraging independence in areas of competence. Conversely, when parents engage in extensive accommodation, their repeated interactions with the child occur primarily in modified contexts, potentially reducing their exposure to the child's genuine abilities across varied situations and leading to less accurate perceptions over time. This reciprocal dynamic shapes daily parent–child interactions, influences intervention effectiveness, and may ultimately affect developmental trajectories.

The challenges in parental mentalization discussed above are especially significant when considering the social understanding of autistic children for several reasons. First, social communication and interaction difficulties represent core diagnostic features of autism spectrum disorder (American Psychiatric Association 2013), making social understanding one of the most functionally significant domains affecting daily interactions, relationship formation, and long-term outcomes. Second, these abilities are often less visible and more difficult to assess than other skills, making accurate parental perception particularly challenging yet crucial. Third, misalignment between parental perceptions and actual capabilities in this domain can lead to inappropriate support strategies, potentially exacerbating both the child's challenges and family stress.

While mentalization in autistic children has often been studied through Theory of Mind (ToM) tasks, consistently demonstrating that autistic individuals often show distinct patterns in ToM development, with challenges in mental state attribution compared to typically developing peers (Baron-Cohen et al. 1985; Baron-Cohen 2001; Erena-Guardia et al. 2024; Tager-Flusberg 2003). ToM refers to the ability to attribute mental states, such as beliefs, desires, and intentions, to oneself and others, and forms the foundation for social understanding and interpersonal interaction (Baron-Cohen et al. 1985; Wellman and Liu 2004; Flavell et al. 1968). ToM performance is particularly reduced in autistic children with language impairment, whereas autistic children with typical language abilities may show relatively stronger performance (Hadad and Segal 2025). At the same time, other evidence indicates that ToM challenges in autism cannot be fully explained by language ability alone (Schwartz Offek and Segal 2022), highlighting the multidimensional nature of social-cognitive functioning in autism.

Despite the extensive research on ToM abilities, we know surprisingly little about parents' ability to assess these capabilities in their children. This understanding is critical, as parents' perceptions directly shape their interventions, support strategies, and daily interactions. Misjudging a child's abilities can lead to either under- or over-accommodation, with downstream effects on stress, skill development, and autonomy. To address this gap, the current study introduces ToM^2—a novel measure examining how parents assess their child's social understanding. We refer to this construct as ToM^2, the specific metacognitive process through which parents employ their own ToM abilities to predict their child's performance on ToM tasks, representing a measurable component of the broader construct of parental mentalization. ToM^2 can be conceptualized as a specific form

of parental mentalization (Slade 2005), sharing theoretical foundations with established constructs such as parental reflective functioning (Fonagy et al. 1998) and parental insightfulness (Oppenheim and Koren-Karie 2002). However, ToM^2 differs from these approaches in its focus on accuracy, that is, on the parents' ability to correctly predict their child's performance on discrete ToM tasks, rather than assessing the complexity or depth of parental reflections about the child's mental states. This accuracy-based approach provides a direct measure of how well parents understand their child's current ToM capabilities.

To date, only one study (Tahiroglu et al. 2014) has explored similar questions, examining how typically developing children's ToM performance relates to their parents' perceptions. While they found significant positive correlations between parental reports and children's actual performance, their approach relied on parent-report questionnaires in which parents rated their child's general ToM-related behaviors and abilities across everyday situations. In contrast, our study employs a direct task-prediction method in which parents predict their child's specific responses to specific ToM items, providing a measure of parental accuracy in assessing their child's current ToM capabilities. Additionally, no research has explored this dynamic in families of autistic children, and the relationship between parental ToM assessment and other relevant factors.

Given the novel nature of ToM^2, our study examined how this measure relates to various child and parent characteristics in families of autistic children. Specifically, this study had three primary aims: (1) to examine the relationship between family accommodation behaviors and ToM^2 accuracy, (2) to investigate whether autism symptom severity relates to ToM^2 accuracy, and (3) to explore the relationship between parental BAP characteristics and ToM^2 accuracy.

Our primary hypothesis focused on family accommodation behaviors, predicting that parents who engage in higher levels of accommodation would demonstrate lower ToM^2 accuracy. As outlined above, accommodation patterns and parental perceptions may influence each other bidirectionally, with extensive accommodation potentially reducing parents' exposure to their child's genuine abilities, while inaccurate perceptions may lead to inappropriate accommodation levels. This suggests that ToM^2 accuracy may be a potentially important factor in understanding family accommodation dynamics.

Regarding parent characteristics, we considered the broader autism phenotype (BAP) of the primary caregiver, which refers to subtle autism-related traits that appear in relatives of autistic individuals (Piven et al. 1997). The relationship between BAP and ToM^2 might present two competing theoretical possibilities. Since assessing a child's ToM abilities requires parents to use their own ToM skills, studies showing that parents of autistic children sometimes demonstrate difficulties with ToM-related abilities (Cruz et al. 2013; Palermo et al. 2006; Gokcen et al. 2007) suggest that higher BAP might hinder accurate assessment. Conversely, the double-empathy perspective suggests that shared cognitive styles might actually facilitate understanding between similar individuals (Milton 2012; Milton et al. 2022). This framework proposes that communication challenges between autistic and nonautistic individuals are fundamentally reciprocal and bidirectional, with both groups potentially struggling to interpret each other's social signals and mental states (Mitchell et al. 2021). Research supporting this view shows better social understanding between people with similar ways of thinking (Crompton et al. 2020; Sheppard et al. 2016), and studies of siblings of children with special needs demonstrate enhanced cognitive empathy through regular interaction with neurodivergent individuals (Rum et al. 2022). These competing perspectives raise important questions about how parents' BAP characteristics might relate to their ability to accurately assess their autistic child's ToM abilities.

Regarding child characteristics, we examined whether autism symptom severity, as measured by ADOS-2 CSS (Lord et al. 2012), relates to ToM^2 accuracy. Research has established connections between autism symptom severity and both social functioning and ToM abilities (Tager-Flusberg 2003), suggesting that more pronounced social communication challenges might make parent–child understanding more complex. Other measures examined in this study included children's cognitive abilities, which were assessed and controlled for in our analyses.

To summarize, the current study introduces ToM^2 as a novel framework for understanding how parents assess their autistic child's social-cognitive abilities. Building on the literature reviewed above, we proposed several hypotheses: (1) Regarding family accommodation, we hypothesized a negative relationship between accommodation behaviors and ToM^2, with parents engaging in higher levels of accommodation demonstrating lower ToM^2 accuracy (2) For autism symptom severity, we hypothesized that as children exhibit more pronounced autism characteristics, it would likely make parent–child understanding more complex, and parents would demonstrate lower ToM^2 accuracy (3) Regarding parents' autistic traits, we considered two possible patterns: traditional ToM research suggests that parents with higher BAP might show lower ToM^2, while the double empathy perspective suggests they might actually demonstrate better ToM^2.

2 | Method

2.1 | Participants

Participants were recruited through the Autism Child & Family Lab at the Hebrew University of Jerusalem, who provide comprehensive evaluations for children between ages 2–4 when there is a reasonable suspicion of an autism diagnosis. Fifty four families were initially recruited for this study; however, 43 dyads (79% male) were included in the final analyses. Eleven dyads were excluded due to missing parent data: in six dyads, no documentation of FAS-RRBQ completion was found; in one dyad, no documentation of BAPQ completion was found; and in four dyads, the identity of the parent who completed the ToM^2 assessment was not recorded during data collection. In these four cases, the missing parent identification prevented matching their ToM^2 responses to their specific questionnaire data (both BAPQ and FAS-RRBQ), as both parents had completed the questionnaires. Comparisons between included and excluded participants revealed no significant differences in child age, $t(28.68) = 0.35$, $p = 0.732$; ADOS CSS, $t(16.02) = -0.14$,

$p = 0.889$; cognitive abilities, $t(11.77) = 0.49$, $p = 0.630$; adaptive functioning, $t(16.54) = -0.58$, $p = 0.571$; or gender distribution, $\chi^2(1) < 0.01$, $p = 1.00$, indicating that missing data did not reflect systematic bias.

Children were between 42 and 70 months of age (M = 52.67 months, SD = 8.67) and had a confirmed autism diagnosis based on: (1) meeting DSM-5 criteria, and (2) best clinical estimate by an expert developmental psychologist, informed by gold-standard assessment tools including the Autism Diagnostic Observation Schedule-2 (ADOS-2; Lord et al. 2012), administered by research-reliable clinicians (mean ADOS CSS = 6.81, SD = 1.85; See Table 1 for detailed characteristics of the participating children).

Children's developmental profiles were assessed using the Mullen Scales of Early Learning (Mullen 1995; $n = 32$, M = 89.69, SD = 19.25) or the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III; Wechsler 2002; $n = 11$, M = 99.09, SD = 15.88), depending on the child's age. Inclusion criteria required children to have age-appropriate cognitive abilities or, at minimum, cognitive skills typical of a 3.5-year-old. This ensured all participants could understand basic task instructions, avoiding confounds related to general cognitive or comprehension limitations, rather than difficulties specifically in ToM skills.

2.2 | Measures

2.2.1 | Theory of Mind Scale (Burnel et al. 2018; Wellman and Liu 2004)

The ToM scale used in this study was adapted from Wellman and Liu's (2004) scale, with modifications for children with potential language limitations (Burnel et al. 2018). The scale consists of six tasks arranged in order of increasing cognitive complexity, representing distinct stages in ToM development: (1) Diverse Desires, (2) Diverse Beliefs, (3) Knowledge Access, (4) Explicit False Belief, (5) Contents False Belief, (6) Real-Apparent Emotion.

Tasks were presented using toys and puppets in a story-based format to enhance engagement and comprehension. For each task, the experimenter told a story and asked the child a target question to assess their understanding of mental states. Control questions were included to verify story comprehension before scoring responses. Children could respond either verbally or by pointing to their chosen answer. A detailed description of each task, including materials, full scripts, target questions, control questions, and scoring criteria, is provided in Appendix A.

The scale has demonstrated strong psychometric properties across multiple developmental studies (Peterson and Wellman 2009; Peterson et al. 2012; Wellman et al. 2006), validating its effectiveness in capturing the hierarchical emergence of ToM abilities. Both the original version and our language-reduced adaptation maintain high reliability. As described in the procedure below, these ToM tasks were administered to both children and their primary caregivers, who were asked to predict their child's responses- an assessment we refer to as ToM^2.

TABLE 1 | Child clinical characteristics; ($N = 43$).

Age in months	
M (SD)	52.67 (8.67)
Sex	
% male (*n*)	79% (34)
ADOS CSS	
M (SD)	6.81 (1.85)
Cognitive score *n*; M (SD)	$N = 43$; 92.62 (18.81)
Mullen ELC	$n = 32$; 89.69 (19.25)
WPPSI FSIQ	$n = 11$; 99.09 (15.88)
ABAS GAC	
M (SD)	71 (15.68)

Note: ADOS CSS = Autism Diagnostic Observation Schedule-2; CSS, Calibrated Severity Score (Lord et al. 2012); Mullen ELC = Mullen Scales of Early Learning; ELC, Early Learning Composite (Mullen 1995); WPPSI FSIQ = Wechsler Preschool and Primary Scale of Intelligence; FSIQ, Full scale IQ (Wechsler 2002); ABAS GAC = Adaptive Behavior Assessment System- Third Edition; GAC, General Adaptive Composite score (Harrison and Oakland 2015).

2.2.2 | Autism Diagnostic Observation Schedule-2 (ADOS 2; Lord et al. 2012)

The ADOS-2 is a semi-structured diagnostic tool designed to diagnose and characterize autism. The assessment occurred during an interaction between the child and an examiner, consisting of standardized activities designed to elicit autism-relevant behaviors. These activities focus on various domains, including communication, social behavior, play, and repetitive behaviors, with particular emphasis on behaviors characteristic of autism. The tool yields a calibrated severity score (CSS) ranging from 1 to 10, which reflects the severity of autism symptoms. The ADOS-2 demonstrates strong psychometric properties, with excellent internal consistency (Lord et al. 2012) and robust inter-rater reliability across multiple studies (Hus and Lord 2014).

2.2.3 | Broad Autism Phenotype Questionnaire (BAP; Hurley et al. 2007)

The BAPQ was used to assess the expression of autism phenotypes in nonautistic relatives of autistic individuals. The questionnaire includes three subscales characterizing the BAP: Aloof personality, Rigid personality, and Pragmatic language difficulties. It contains 36 items in total, 12 for each subscale, with each item rated on a six-point scale indicating the frequency each described behavior. The questionnaire has demonstrated strong internal consistency ($\alpha = 0.95$ overall).

2.2.4 | Family Accommodation Scale for Restricted and Repetitive Behaviors (FAS-RRB; Feldman et al. 2019)

The FAS-RRB was used to assess family accommodation of restricted and repetitive behaviors (RRBs) among autistic children

via parent reports. The questionnaire includes 11 items: seven items regarding accommodation frequency, three items regarding the child's responses to a lack of accommodation from their parents, and one item regarding parental distress resulting from the accommodation. All items are rated from 0 (never) to 4 (daily) on a five-point Likert scale. The questionnaire has good internal consistency ($\alpha = 0.85$).

2.2.5 | Cognitive Assessments

Cognitive abilities were assessed using either the Mullen Scales of Early Learning (Mullen 1995) or the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III; Wechsler 2002), depending on each child's age and developmental level. The Mullen Scales assess cognitive functioning in young children across domains of visual reception, fine motor skills, receptive language, and expressive language. The WPPSI-III provides a comprehensive assessment of cognitive abilities in older preschoolers and includes verbal, performance, and full-scale IQ scores. The Mullen shows strong concurrent validity with other measures of early childhood development and good test–retest reliability (Bishop et al. 2011). The WPPSI-III demonstrates excellent internal consistency and test–retest reliability for the primary index scores (Wechsler 2002).

2.3 | Procedure

As part of the evaluation program, each family participated in three assessment points: initial assessment (T1), online questionnaires (T2), and 1-year follow-up (T3). The ToM^2 protocol was conducted during either T1 or T3, based on when the child first met eligibility criteria. Testing was conducted by trained research assistants in a quiet room at the Hebrew University of Jerusalem Autism Child & Family Lab. The study received approval from the Ethics Committee for Research Involving Human Subjects at the Hebrew University of Jerusalem (approval number 2023HLE015). Informed consent was obtained from all participating families.

2.3.1 | Evaluation Process

Children underwent comprehensive diagnostic evaluations conducted by research-reliable clinicians. The assessment included the ADOS-2 (Lord et al. 2012) to confirm the autism diagnosis and a developmental evaluation using either the Mullen (Mullen 1995) or the WPPSI (Wechsler 2002), depending on the child's age. For the current study, we included only children with a confirmed autism diagnosis and utilized the ADOS-2 Calibrated Severity Score (CSS) as a measure of autism symptom severity. Cognitive scores obtained from the Mullen or WPPSI-III were used to ensure that participants met the inclusion criterion.

2.3.2 | ToM Children Assessment

Children completed the six-task ToM scale (Burnel et al. 2018; Wellman and Liu 2004). Given the scale's Guttman structure, in which children rarely pass a later task without passing all preceding ones (Wellman and Liu 2004), testing was discontinued after two consecutive failed tasks. Children were thanked for each response regardless of correctness, and no additional feedback was provided. Responses were scored as 0 (incorrect) or 1 (correct), yielding a total score range of 0–6.

2.3.3 | ToM^2 (Parent Assessment)

The primary caregiver (defined as the individual who spent the most time with the child) completed the same ToM scale but was instructed to answer as they believed their child would respond, allowing assessment of their perception of their child's abilities. Unlike the children, parents completed all six tasks regardless of performance to yield a complete profile of their perceptions. This design ensures assessment of parental perceptions across the full range of ToM abilities, as parents' predictions are based on their general understanding of their child's ToM capabilities rather than direct observation of task performance. A parent who accurately predicts their child would fail more advanced tasks demonstrates insight into their child's limitations, while overestimating performance on unobserved tasks may indicate misalignment between parental perceptions and actual abilities. Responses were scored identically to the children's (0 or 1), and a total "ToM parent" score was calculated (range: 0–6) (Figure 1).

2.3.4 | ToM^2 Accuracy Estimation

To assess ToM^2 accuracy, we calculated a "match score" for each of the six tasks. Parents received 1 point when they correctly predicted their child's performance (either correctly predicting success or failure) and 0 points when the prediction was incorrect (predicting success when the child failed or vice versa). Each dyad therefore received six match scores, one for each task. The sum of these match scores (range: 0–6) represented the overall accuracy of the parent's ToM^2 ability.

2.3.5 | Questionnaire Administration

Both parents were asked to complete the BAP and FAS-RRB questionnaires online before their lab visit. For consistency, we only used data from the primary caregiver who completed the ToM^2 assessment.

2.4 | Data Analysis

The primary analysis utilized a logistic mixed-effects model to examine the relationship between ToM^2 accuracy (match scores) and our variables of interest: autism symptom severity (ADOS-2 CSS), parental BAP characteristics (BAPQ scores), and family accommodation behaviors (FAS-RRB), while controlling for task difficulty. Given the nested structure of the data, with six task responses per dyad, we included random intercepts for dyads to account for within-dyad dependencies. This approach allowed us to examine how these factors influence parents' ability to accurately predict their child's ToM performance while

accounting for the hierarchical nature of the data. All statistical analyses were performed using R (version 4.1.0; R Core Team 2021) with the lme4 package for mixed-effects modeling. Statistical significance was set at $p < 0.05$ for all analyses.

3 | Results

3.1 | Performance on the Theory of Mind Scale

Children's performance on the six hierarchically arranged ToM tasks varied considerably, with a mean total score of 1.86 (SD = 1.76). As expected, given the developmental nature of the scale, success rates declined with increasing task difficulty. 72.1% of children succeeded on the easiest task (Diverse Desires) while only 14.3% succeeded on the most difficult (Real-Apparent Emotion).

Parents' estimates of their children's abilities yielded a slightly higher mean score of 2.23 (SD = 1.53), suggesting a mild tendency to overestimate their child's ToM abilities. The parent participants included 26 mothers (60.5%) and 17 fathers (39.5%). ToM^2 accuracy, defined as the number of tasks on which parent predictions matched actual child performance, yielded an average of 3.96 (SD = 1.38) correct predictions out of six possible tasks (see Table 2).

3.2 | ToM^2 and Child and Parent Characteristics

We examined predictors of ToM^2 accuracy using a logistic mixed-effects model, with match score (accurate vs. inaccurate prediction) as the outcome and random intercepts for dyads to account for within-child dependencies (see Table 3 for complete model results).

Family accommodation, as measured by the FAS-RRB, was a significant predictor of lower ToM^2 accuracy (OR = 0.71, 95% CI [0.52, 0.97], $p = 0.030$). This suggests that parents who engage in more accommodation of their child's RRBs may be less attuned to their child's ToM abilities (see Figure 2A).

There was a trend-level association between autism symptom severity (ADOS-2 CSS) and lower ToM^2 accuracy (OR = 0.74, 95% CI [0.54, 1.00], $p = 0.051$). This suggests that as autism symptom severity increases, parents may demonstrate reduced ToM^2 abilities (see Figure 2B). In contract, BAP scores did not

FIGURE 1 | ToM^2 assessment: parent and child completing ToM tasks. The left panel shows a child participating in a Theory of Mind task. The right panel shows a parent predicting their child's responses to the same task.

TABLE 2 | Child performance, parent estimation, and ToM^2 match rates across ToM tasks.

Task	Level of difficulty	Child success rate (%) (*n*)	Parent estimation rate (%) (*n*)	ToM^2 accuracy (%) (*n*)
Diverse desires	1	72.1 (31)	53.5 (23)	58.1 (25)
Diverse beliefs	2	44.2 (19)	48.8 (21)	72.1 (31)
Knowledge access	3	30 (12)	32.5 (13)	60 (24)
Explicit false belief	4	14.0 (6)	27.9 (12)	58.1 (25)
Contents false belief	5	16.7 (7)	42.9 (18)	66.7 (28)
Real-apparent emotion	6	14.3 (6)	23.8 (10)	69 (29)
Total score M (SD)	—	1.86 (1.76)	2.23 (1.52)	3.96 (1.38)

Note: Child success = % of children passing each task; parent estimation = % predicting success; ToM^2 accuracy = % of accurate parent predictions. Total scores represent mean number of successful, predicted, and accurately matched tasks (out of 6).

significantly associate with ToM^2 accuracy (OR = 0.94, 95% CI [0.70, 1.26], $p = 0.699$).

4 | Discussion

The current study serves as a proof of concept, introducing ToM^2, a measure of parents' accuracy in predicting their autistic child's Theory of Mind capabilities. To our knowledge, this is the first investigation of parental mentalization specifically focused on ToM abilities in autistic children. We proposed three hypotheses, which received varying levels of support. First, our hypothesis regarding family accommodation was supported: parents with higher accommodation levels demonstrated significantly lower ToM^2 accuracy (OR = 0.71, 95% CI [0.52, 0.97], $p = 0.030$). Second, our hypothesis regarding autism symptom severity received partial support, with a trend-level association observed (OR = 0.74, 95% CI [0.54, 1.00], $p = 0.051$). Third, no significant association was found between parental BAP characteristics and ToM^2 accuracy (OR = 0.94, 95% CI [0.70, 1.26], $p = 0.699$).

TABLE 3 | Logistic mixed-effects model predicting ToM^2 accuracy (match scores).

Predictors	Odds ratio	95% CI	Statistic	*p*
Intercept	2.07	1.52–2.82	4.60	**< 0.001**
ADOS CSS	0.74	0.54–1.00	−1.95	0.051
BAP	0.94	0.70–1.26	−0.39	0.699
FAS-RRB	0.71	0.52–0.97	−2.17	**0.030**
Task difficulty	1.12	0.85–1.47	0.82	0.412
Random effects				
Parameter			Value	
σ^2			3.29	
τ_{00} dyad_number			0.16	
ICC			0.05	
N dyad_number			43	
Observations			252	
Marginal R^2/Conditional R^2			0.068/0.112	

Note: Significant *p* values ($p < 0.05$) are in bold.

Our findings revealed interesting associations with this new measure. First, family accommodation behaviors were significantly associated with ToM^2 accuracy, with parents who engaged in higher levels of accommodation demonstrating poorer ability to accurately assess their child's ToM abilities. We also observed a trend approaching significance, suggesting that greater autism symptom severity may be associated with ToM^2 accuracy, though this finding did not reach statistical significance, possibly due to sample size constraints. This trend suggests the possibility that as children exhibit more pronounced autism characteristics, parents may face greater challenges in accurately perceiving their social-cognitive understanding. Interestingly, parents' broader autism phenotype characteristics were not significantly related to ToM^2 accuracy. Collectively, these findings provide preliminary support for ToM^2 as a meaningful construct that may enhance our understanding of parent–child dynamics in autism.

The observed negative relationship between family accommodation behaviors and ToM^2 accuracy represents our most robust finding. Parents who reported higher levels of accommodation for their child's RRBs were more likely to demonstrate lower accuracy in assessing their child's ToM abilities. This finding

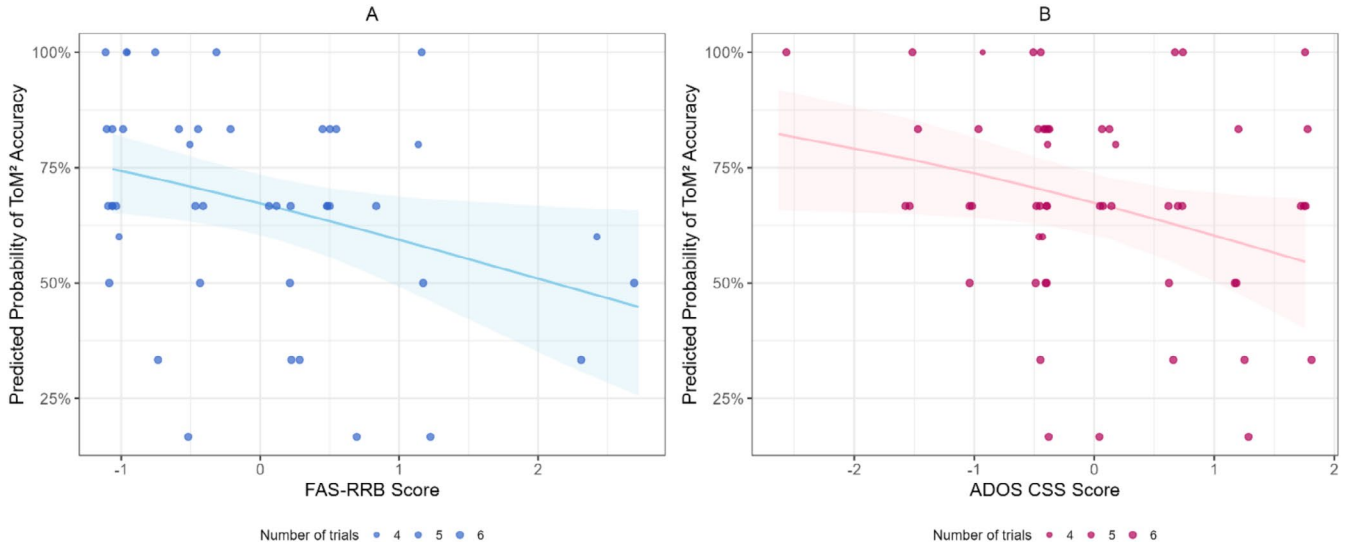

FIGURE 2 | Relationship between parent and child characteristics and ToM^2 accuracy. Panel A shows the significant negative relationship between family accommodation of restricted and repetitive behaviors (FAS-RRB) and ToM^2 accuracy ($p = 0.030$). Panel B shows the trend-level negative association between autism symptom severity (ADOS CSS) and ToM^2 accuracy ($p = 0.051$). Each point represents a parent–child dyad ($N = 43$). Higher scores on the *y*-axis indicate greater parental accuracy in predicting their child's ToM performance, reflecting smaller discrepancies between parent predictions and child performance. *X*-axis scores are standardized.

aligns with our hypothesis and can be interpreted through a bidirectional framework. First, parents who engage in extensive accommodation behaviors may become less attuned to their child's actual capabilities, as their focus shifts toward modifying environments and routines rather than observing how their child navigates social-cognitive challenges (Lebowitz and Shimshoni 2018). When parents primarily interact with their children in highly accommodated contexts, they have fewer opportunities to observe their child's genuine social understanding across varied situations.

Conversely, parents who less accurately perceive their child's ToM abilities may provide inappropriate levels of accommodation, as their support strategies are based on misaligned perceptions of their child's actual capabilities. This possibly bidirectional relationship suggests a potential cycle where reduced ToM^2 accuracy and increased accommodation behaviors reinforce each other over time. Our finding extends previous research on family accommodation in autism (Storch et al. 2015) by highlighting a specific cognitive mechanism: ToM^2 accuracy that may mediate the relationship between parental perceptions and behavioral responses to their child's challenges.

Additionally, our analysis revealed a trend between autism symptom severity and ToM^2 accuracy, suggesting that parents of children with more pronounced autism symptoms may experience greater challenges in accurately assessing their child's ToM abilities. Although this finding did not reach statistical significance, the observed trend is consistent with our hypothesis and deserves consideration, particularly given our relatively small sample size. This trend aligns with previous research indicating that increased autism symptom severity is associated with greater social communication challenges (Tager-Flusberg 2003) and more pronounced difficulties in parent–child interactions (Hudry et al. 2013). From a theoretical perspective, children with more severe autism symptoms may present with more atypical or subtle expressions of their social understanding, which can be associated with greater difficulty for parents in accurately interpreting their mental states. Additionally, children with more severe symptoms often experience greater challenges in explicitly communicating their thoughts and feelings (Baron-Cohen et al. 1985), potentially limiting parents' access to verbal cues that might otherwise facilitate accurate assessment of their child's ToM abilities. Future research with larger samples will be needed to establish whether this trend represents a robust association.

Contrary to our hypotheses, we did not find a significant relationship between parents' broader autism phenotype (BAP) characteristics and their ToM^2 accuracy. This null finding is particularly interesting given the competing theoretical perspectives we considered. On one hand, the traditional view suggests that parents with higher BAP might demonstrate lower ToM^2 accuracy due to their own ToM-related challenges (Cruz et al. 2013; Palermo et al. 2006; Gokcen et al. 2007). On the other hand, the double empathy perspective proposes that shared cognitive styles might actually facilitate understanding between individuals with similar neurocognitive profiles (Milton 2012; Crompton et al. 2020). One possible explanation for our null finding is that these opposing influences may have effectively counteracted each other in our sample. Some parents with elevated BAP traits may have experienced greater difficulty with the mentalization task, consistent with inherent ToM-related challenges, while others may have benefited from an enhanced ability to understand their autistic child's perspective precisely in line with their shared cognitive style. Additionally, our relatively small sample size may have limited our ability to detect more nuanced patterns. Future studies might explore interactions or nonlinear effects to determine whether BAP characteristics relate to ToM^2 accuracy in more complex ways than simple linear associations.

The present findings offer important theoretical and clinical implications while suggesting several avenues for future research. Theoretically, the introduction of ToM^2 expands our understanding of social cognition in autism by examining the metacognitive interface between parent and child understanding. While extensive research has documented ToM development in autistic children, our study shifts focus to how this capacity is perceived by parents—a critical but previously understudied dimension of parent–child dynamics. By focusing on the accuracy of parental predictions rather than the general quality of parental reflections, ToM^2 offers unique insights into the alignment between parental perceptions and children's actual ToM capabilities.

The significant relationship between family accommodation and ToM^2 accuracy highlights a potential mechanism through which parent–child interactions might influence developmental trajectories. Clinically, this suggests interventions targeting family accommodation behaviors such as the Supportive Parenting for Anxious Childhood Emotions program (SPACE; Lebowitz et al. 2014; Lebowitz et al. 2020), which has been adapted for autism (Rozenblat et al. 2023). ToM^2 accuracy may serve as both a mechanism of change and a potential moderator in such interventions, with improvements in parental accuracy facilitating appropriate accommodation levels, and baseline ToM^2 potentially predicting treatment response. Conversely, interventions designed to improve parental mentalization (Sharp and Fonagy 2008) could enhance ToM^2 accuracy, which may in turn facilitate reductions in inappropriate accommodation behaviors.

Future research should examine ToM^2 in longitudinal designs to understand its developmental trajectory and investigate its presence across broader age ranges and in diverse populations, including typically developing children and those with other neurodevelopmental conditions, to establish the generalizability of the ToM^2 construct beyond the current autism sample with a relatively narrow age window. Importantly, while the current cross-sectional design limits causal interpretation, intervention studies targeting family accommodation (e.g., SPACE; Lebowitz et al. 2014; Rozenblat et al. 2023) or parental mentalization (e.g., Sharp and Fonagy 2008) could test the causal mechanisms suggested by our correlational findings and potentially lead to more effective family-centered approaches for supporting autistic children.

Several limitations should be considered when interpreting the current findings. First, our relatively small sample size ($N = 43$) may have limited statistical power, particularly for detecting smaller effect sizes, or complex associations such as, potentially, both negative and positive effects of BAP. This sample

size reflects the considerable challenges in recruiting clinical populations, particularly families of young autistic children who meet specific inclusion criteria (age range, sufficient cognitive and language abilities) for comprehensive lab-based assessments. Second, our sample included an imbalance in parent gender, with 60.5% mothers and 39.5% fathers completing the ToM^2 assessment. Research has documented differences between mothers and fathers in parental mentalization capacities (Charpentier Mora et al. 2023; Trepiak et al. 2025), as well as in coping strategies and support needs in families of children with autism (Hartley and Schultz 2015). Therefore, parent gender may potentially influence ToM^2 accuracy in ways not examined in the current study. Future research should investigate potential gender-specific patterns in parental assessment of children's ToM abilities. Third, the lack of a comparison group of parents with typically developing children prevents us from determining whether the observed patterns are specific to autism or reflect more general parent–child dynamics. Fourth, our measure of ToM^2 relied exclusively on parents' predictions of their child's performance on structured ToM tasks in a laboratory setting, which may not fully capture how parents understand their child's mental states in everyday, naturalistic contexts. ToM^2 as measured here, captures parents' explicit understanding of their child's ToM abilities on specific tasks, but may not fully reflect the implicit ToM^2 processes that occur during spontaneous daily interactions (e.g., a parent inferring whether their child understands that a sibling is upset, or recognizing when their child is misreading a social situation). Future research incorporating naturalistic observations could provide a more comprehensive understanding of ToM^2 in real-world contexts.

Finally, several factors limit the generalizability of these findings. The study was conducted in Israel. Cultural norms may shape both how parents respond to their child's behaviors and how autism characteristics are expressed and recognized. Specifically, cultural beliefs about expected behaviors and family roles may influence accommodation patterns (Lansford 2022), while cultural definitions of typical versus atypical behavior may affect whether certain autism characteristics are identified (de Leeuw et al. 2020). Together, these cultural factors may influence parents' perceptions of their child's Theory of Mind capabilities. Additionally, we did not collect systematic demographic data on parental education or socioeconomic status. Given possible associations between SES and accommodation behaviors, variability in these demographic factors within our sample may have contributed to the observed relationships between family accommodation and ToM^2 accuracy. For example, differences in parental education or financial resources may influence both parents' access to information about child development and the stress levels that affect accommodation patterns. Future research conducted in diverse cultural contexts and including comprehensive demographic characterization would strengthen the generalizability of these findings.

5 | Conclusions

This initial proof-of-concept investigation introduces ToM^2 as a novel framework for understanding how parents assess their autistic child's social-cognitive abilities. By examining the metacognitive dimension of parent–child interactions, our findings reveal meaningful associations between parents' ability to accurately assess their child's Theory of Mind and established clinical variables, particularly family accommodation behaviors. This approach bridges social cognition research with family dynamics in autism, offering new insights into how the reciprocal interplay between parental support strategies and mentalization accuracy (specifically, ToM^2) may shape developmental trajectories. It is important to note that ToM^2 is designed to complement established parental mentalization constructs such as reflective functioning (Fonagy et al. 1998) and parental insightfulness (Oppenheim and Koren-Karie 2002). While these frameworks assess the depth and complexity of parental reflections, ToM^2 provides a complementary accuracy-based measure that captures how well parents' perceptions align with their child's actual ToM capabilities. This distinct focus on prediction accuracy offers a unique window into parent–child correspondence that can inform both research and clinical practice alongside existing mentalization measures. Future investigations building on this foundation may enhance our understanding of the complex bidirectional relationships in families of autistic children and inform more effective, family-centered interventions.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in Open Science Framework (OSF) at https://osf.io/dq74b/, reference number dq74b.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table S1:** Correlations among study predictors. **Table S2:** Comparison of logistic mixed-effects models: individual predictors versus full model. **Table S3:** Logistic mixed-effects model with cognitive scores as covariate. **Table S4:** Logistic mixed-effects model with BAP subscales.

Appendix A

Theory of Mind Full Protocol

This appendix provides the complete administration protocol for all six Theory of Mind tasks used in this study. For all tasks, responses were scored as 1 (correct) or 0 (incorrect). For tasks that included control questions, both the target question and control question(s) had to be answered correctly for the child to receive a score of 1. Tasks were administered in Hebrew. The scripts provided here are English translations of the original Hebrew protocol. The Hebrew version is available from the corresponding author upon request.

Diverse Desires

Materials:

- Plastic cookie
- Plastic carrot
- Guy doll

Administration script:

Take the plastic cookie, carrot, and Guy the doll, and show them to the child.

"Here's Guy (point). **Guy wants to eat. Guy can choose either a carrot** (show-and-pick-up) **or a cookie** (show-and-pick-up). **Which snack would you like best? A carrot** (point) **or a cookie** (point)**?"**

Continue according to the child's answer:

If the child chooses cookie: **"Well, that's a good choice, but Guy really likes carrot. He doesn't like cookies**." Wait a moment to make sure the child understands.

If the child chooses carrot: **"Well, that's a good choice, but Guy really likes cookie. He doesn't like carrots**." Wait a moment to make sure the child understands.

Target Question: **"So, what will Guy** (point) **choose? A carrot** (point) **or a cookie** (point)**?"**

Control Question: None.

Correct Response: The food opposite to the child's preference (verbal or pointing).

Say: **"Thank you for your answer. Now I have another question for you."**

Diverse Beliefs

Materials:

- Bushes (plastic plant pot)
- Garage (designed box)
- Roni dull

Administration script:

Take the bushes, garage, and Roni the doll, and show them to the child.

"Here's Roni (point). **Roni wants to find her cat. Her cat might be hiding in the bushes** (point) **or in the garage** (point). **Where do you think the cat is? In the bushes** (point) **or in the garage** (point)**?"**

Continue according to the child's answer:

If the child chooses the garage: **"Well, that's a good idea, but Roni thinks her cat is in the bushes** (point)." Wait a moment to make sure the child understands.

If the child chooses bushes: **"Well, that's a good idea, but Roni thinks her cat is in the garage** (point)." Wait a moment to make sure the child understands.

Target Question: **"So, where will Roni** (point) **look for her cat? In the bushes** (point) **or in the garage** (point)**?"**

Control Question: None.

Correct Response: The location opposite to the child's guess (verbal or pointing).

Say: "**Thank you for your answer. Now I have another question for you**."

Knowledge Access

Materials:

- Drawer (with a toy dog hidden inside)
- Dana doll

Administration Script:

Take the drawer (which has the dog inside) and show it to the child. Do not take out Dana the doll yet.

"Here's a drawer (point). **What do you think is inside the drawer?"**

Open the drawer.

"Let's see... It's really a dog inside (pick up the dog)**!"**

Close the drawer.

"Okay, what is in the drawer (point)**?** (Memory check. If the child answers wrong, show him the dog one more time.)

Introduce Dana only after the drawer is closed.

"Here is Dana (point). **Dana has never seen inside this drawer** (point)."

Target question: **"So, does Dana** (point) **know what is in the drawer** (point)**?"**

Correct response: no.

Control question*:* **"Did Dana** (point) **see inside this drawer** (point)**?"**

Correct response: no.

Say: "**Thank you for your answer. Now I have another question for you**."

Explicit False Belief

Materials:

- Backpack
- Toy closet
- Zachi doll

Administration script:

Take the backpack, the closet and Zachi the doll, and show them to the child.

"Here's Zachi. (point) **Zachi wants to find his mittens. His mittens might be in his backpack** (point) **or in the closet** (point). **Zachi thinks his mittens are in the closet. But really, Zachi's mittens are in the backpack** (point and pause)."

Target question*:* **"So, where will Zachi** (point) **look for his mittens? In his backpack** (point) **or in the closet** (point)**?"**

Correct response: closet (verbal or pointing).

Control question*:* **"Where are Zachi's** (point) **mittens really? In his backpack** (point) **or in the closet** (point)**?"**

Correct response: backpack (verbal or pointing).

Say: "Thank you for your answer. Now I have another question for you."

Contents False Belief

Materials:

- Band-Aid box (with a toy cat hidden inside)
- Yael doll

Administration Script:

Take the Band-Aid box and show it to the child.

"Here's a Band-Aid box (point). **What do you think is inside the Band-Aid box?"**

Open the box.

"Let's see... It's really a cat inside (pick up the cat)**!"**

Make sure the child sees the cat. Close the box.

"Okay, what is in the Band-Aid box (point)**?"** (Memory check. If the child answers wrong, show him the cat one more time).

Take Yael the doll and show it to the child. Show Yael only after the box is closed.

"Here is Yael (point). **Yael has never seen inside this Band-Aid box** (point)."

Target Question**: "So, what does Yael** (point) **think is in the Band-Aid box** (point)**? Band-Aids or a cat?"**

Correct response: Band-Aids.

Control Question: "**Did Yael** (point) **see inside the Band-Aids box** (point)**?"**

Say: "Thank you for your answer. Now I have another question for you."

Real—Apparent Emotion

Materials:

- Paper with drawings of three faces: happy, sad, and okay (neutral)
- Danny doll

Administration Script:

Take Dani the doll and paper with drawings of faces and show them to the child.

"This story is about Danny (point). **Danny can feel happy** (point), **he can feel sad** (point), **or he can feel not happy and not sad, just okay** (point)**."**

"Can you point to me the face that is: sad? okay? happy?" (Explain again if the child is incorrect).

"I'm going to ask you about Danny's real feelings, and how he looks on his face. He might really feel one way inside but look a different way on his face. Or might really feel the same way inside as he looks on his face."

"Here is Danny (point). **Danny's aunt returned from a vacation and brought him a present. Danny wanted a toy car. Danny's aunt brought him a book. Danny doesn't like books** (slow your rate). **What Danny really wants is a toy car. But Danny must hide the way he feels, because if his aunt knew how he really feels, she wouldn't buy him a present again."**

"What did Danny's aunt bring him?" "What will Danny's aunt do if she knows how Danny really feels?" (Memory check questions. If incorrect, repeat the story).

Target Questions:

1. **"How did Danny** (point) **really feel when his aunt gave him the book—happy, sad, or okay** (point each one)**?"**
2. **"How did Danny** (point) **try to look on his face when his aunt gave him the book—happy, sad, or okay** (point each one)**?"**

(Make sure not to show any emotion when asking)

Correct response: The child's answer to Question 1 (real feeling) must be more negative than their answer to Question 2 (facial expression). For example, Feeling "sad" or "okay" inside, but looking "happy" or "okay" on his face (verbal or pointing).