

Authoritarian Parenting Received from Mothers Reveals Individual Differences in Preschooler's False-belief, but not in Advanced Theory of Mind

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Abstract—Remarkable changes, like the progress in the ability to understand others' minds, can be identified in several socio-cognitive dimensions between age four and seven. Recently, the parenting attitudes have been considered as one of the potential extrinsic modifiers of these important developmental aspects. The aim of present study is to explore the relationship among authoritarian parenting attitudes and individual differences in Theory of Mind performance. The study included ninety-two Costarrican preschoolers. Six False-belief tasks, an Advanced Theory of Mind test and the Parenting Attitudes Inventory were used. The results demonstrate that participants with high and low Authoritarian Parenting Received differ in their performance on First and Second Order False-belief tasks, but not in Advanced Theory of Mind tasks. Theoretical considerations about possible explanations regarding these results are discussed and methodological limitations are considered to shed light over future directions.

Keywords—Authoritarian parenting, cognitive development, False-belief, individual differences, Theory of Mind, parenting.

I. INTRODUCTION

PREVIOUS studies evidence that the preschool period is crucial in terms of children's socio-cognitive development [1]. Remarkable changes can be identified in several socio-cognitive abilities between age four and seven, like progresses in the ability to understand others' minds [2]. These changes help children to deal with the classroom social environment, where preschoolers face challenging interpersonal tasks as they have to coordinate their actions with others' reactions and vice versa. Among others, variables such as socio-economic status, nutrition or particular genetic polymorphisms can modulate the developmental pathways of this socio-cognitive development in children [3], [4], [5].

Recently, the parenting attitudes have been considered as one of the potential extrinsic modifiers of this important development dimension. Research evidences shows that the

parenting attitudes are in fact critical for the unfolding of social playing abilities, school readiness, and prosocial behavior [6], [7], [8]. Therefore, plenty investigations are trying to describe the specific characteristics of parenting styles that influence the children's performance on different socio-cognitive assessments [9], [7]. A subset of these works is focused on how parenting influences Theory of Mind.

Theory of Mind is defined as the "ability to predict and explain others' behavior based on their internal mental states" [10]. The development of this ability is fundamental for the children's performance in social or academic settings, and there already exists evidence showing that children from 3 to 5 years old and with permissive mothers (a particular parenting attitude), had moderate advantage on scores in first order False-belief tasks when compared with children of authoritarian mothers [9]. The first order False-belief task is the most used paradigm to assess Theory of Mind [2]. In another study, Guajardo [7] also demonstrated how specific parenting practices (e.g. imitation and praising) predict understanding of first order False-belief tasks.

Despite these evidences, there are not studies analyzing the relations between parenting attitudes and more complex aspects of Theory of Mind like second order False-belief, or the so called Advanced Theory of Mind [11]. For this reason, the present study seeks to explore the relation among authoritarian parenting attitudes and different abilities of Theory of Mind. Six False-belief tasks are used: three first order False-belief tasks and three second order False-belief tasks [12], [13]. In order to evaluate Advanced Theory of Mind, the Strange Stories Test [11] was also introduced as part of our assessments, and the Spanish version of the Parenting Attitudes Inventory [9] was applied to assess low or high authoritarian parenting. Finally, socio-demographic data (e.g., mother's educational level, number of older siblings) and verbal ability measures were included as control variables.

II. METHOD

A. Participants

A total of ninety two preschoolers (45 boys and 47 girls) and their mothers were included in the study. They ranged from 58 to 74 months ($M = 65$ months, $SD = 3.9$ months). All the participants were enrolled in public preschools located in San José, Costa Rica. Parental consent was obtained in all

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cases. Informed consent and procedures were approved by the Ethics Committee of the University of Costa Rica.

B. Measures

- First order False-belief tasks: three tasks that assess first order False-belief were included in the study. These tasks evaluate the child's ability to predict the mental states of a character in a given story. As an example, after listening to a particular history, the child should answer correctly to a question like: "Where is Bob going to look for his pencils?" Our tasks include a false *location* task [14], a false *content* task [15] and a false *activity* task [16]. All the procedures were applied following the Spanish translations that appeared in Padilla et al.[13]. Participants receive 1 point for their success in every task or 0 points in case of failure.
- Second Order False-belief Understanding: three tasks that assess first order False-belief were included in the study. These tasks evaluate the child's ability to predict the mental states that a character has about the mental states of another character. As an example, after listening to a particular story, the child should respond correctly to a question like: "Where does Bob think that John is going to look for his pencils?" Our tasks include the *ice-cream* task [17], the *birthday* task [17] and the *letter* task [18]. All the procedures were applied following the Spanish translations that appeared in Padilla et al [19]. Participants receive 1 point for their success in every task or 0 points in case of failure.
- Advanced Theory of Mind: twelve stories from the original version of Strange Stories Test by Francesca Happé [11] were used to assess Advanced Theory of Mind. Those stories were selected based on the criteria of O'Hare [20], who take into account the difficulty of every item, for a sample around five-years-old. The Strange Stories items assess the ability to correctly attribute mental states related to sarcasm, irony and other complex mental states. As an example, after listening to a story where a little girl's experiment a strong cough episode, the participant have to identify the reason why a father says to his daughter: "dull the frog that lives in your throat!" Participants receive 1 point for their success in every item or 0 points in case of failure.
- Parenting Attitudes: the Spanish version of the Parenting Attitudes Inventory [9] was used in the present study. The scale is composed of 20 items that assess authoritarian parental attitudes. The mothers of participants fulfill the inventories at home or as part of a meeting in the preschool institution. Some items present sentences like: "My child should not tell me I'm wrong" or "Children should do as they are told without questioning their parents". Mothers should answer to every item using a 5 point liker-scale, from strongly disagree (0 points) to strongly agree (5 points).
- Verbal ability: Three subtests from the WPPSI-II (Vocabulary, Arithmetic and Understanding) were included as an index of general verbal ability. These subtests were chosen given that recent literature confirms their validity as appropriate indicators of verbal ability in preschoolers [28], [19].
- Socio-demographic variables: mother's educational level and child's number of older siblings were obtained through telephone interviews with parents. Educational level were categorized as 'Primary School or less' or 'Secondary or higher degree', while the categories for the number of older siblings were 'None' or 'One or two'.

C. Procedure

The children were recruited according to their parental consent. Parents participated in a meeting where they obtained information about the tests and objectives of the study, and gave socio-demographic information relative to their families through a telephone interview. Mothers collaborated by filling the Parenting Attitudes Inventory. Children were assessed in three sessions of about 15 to 20 minutes each. In the first session the child was evaluated with the first and Second Order False-belief tasks. Then, the Advanced Theory of Mind Test was applied in the second session and the verbal ability measures in the third one. In order to avoid fatigue, each child worked for no more than one session per day. The assessment took place in rooms specifically adapted for this purpose in the preschools institutions. For the False-belief tasks, support material such as puppets and toys were used and, to make the assessment process more attractive and entertaining for children, a picture flipchart was used for the stories of the Advanced Theory of Mind task.

III. RESULTS

A. Theory of Mind tasks

All the first order False-belief tasks demonstrated positive correlations between each other. The *content* task revealed correlations of 0.36 ($p < 0.01$) and 0.39 ($p < 0.01$) against the *location* and the *activity* tasks respectively. The *location* task and the *activity* task showed a reciprocal correlation of 0.39 ($p < 0.01$). Based on that evidence, these three individual scores were aggregated as a new variable named First Order Battery Score (with 0 points as minimum and 3 points as maximum). The Second Order False-belief tasks also showed positive correlations among each other. The *letter* task revealed correlations of 0.23 ($p < 0.05$) and 0.21 ($p < 0.05$) with the *ice-cream* and the *birthday* tasks respectively. The *ice-cream* task and the *birthday* task showed a correlation of 0.29 ($p < 0.01$). The scores of these three tasks were also unified as an aggregated score named Second Order Battery Score (0 points as minimum and 3 points as maximum). As recommended elsewhere [21], the aggregated score for Advanced Theory of Mind was calculated by adding the scores of the twelve stories. This variable was named Advanced Theory of Mind

Score (0 points as minimum and 24 as maximum). Table I shows means and standard deviations for all the aggregated scores.

TABLE I
DESCRIPTIVE STATISTICS FOR THE THEORY OF MIND,
AUTHORITARIAN AND VERBAL ABILITY SCORES

	Mean	SD	Min	Max
First Order Battery Score	1.72	1.14	0	3
Second Order Battery Score	1.15	1.01	0	3
Advanced Theory of Mind Score	7.20	3.96	0	24
Authoritarian Score	26.30	6.90	0	50
Verbal Ability Score	45.20	10.8	19	67
Vocabulary	20.30	6.40	0	33
Understanding	15.60	4.80	1	23
Arithmetic	9.30	2.50	4	18

n = 92, SD = Standard Deviation, Min = Minimum, Max = Maximum

The Pearson correlations among the aggregated scores of First order, Second order and Advanced Theory of Mind, revealed positives moderate correlations between each other (See Table II). The First Order Battery Score and the Second Order Battery Score evidenced a reciprocal correlation of 0.48 ($p < 0.01$). Also, both batteries demonstrated significant positive correlations against the Advanced Theory of Mind Score (0.42 ($p < 0.01$) and 0.44 ($p < 0.01$) for the first and second order batteries respectively).

TABLE II
PEARSON CORRELATION AMONG THEORY OF MIND
AND THE AUTHORITARIAN AGGREGATED SCORES

	First Order Battery Score (1)	Second Order Battery Score (2)	Advanced Theory of Mind Score (3)	Authoritarian Score (4)
1	-	0.48**	0.42**	-0.25*
2		-	0.44**	-0.14
3			-	-0.18
4				-

n = 92, **p < 0.01, *p < 0.05

B. Parenting Attitudes Inventory: the Authoritarian Indicator

An Exploratory Factor Analysis was performed for the Parenting Attitudes Inventory. Principal component extraction method and oblimin rotation were used. The KMO value was 0.60, which confirmed that the data were appropriate for the analysis. Similarly, the sphericity Bartlett's was significant ($p < 0.001$). The Exploratory Factor Analysis identified one unique component that fulfilled the Stevens [22] criteria of factor identification. Ten out of 20 items of the Parenting Attitudes Inventory showed loads higher than 0.35 in this first factor. These 10 items demonstrated good reliability ($\alpha = 0.69$) while the factor explained 16.7% of the total variance exhibited by the instrument. Given the fact that all items make clear reference to an authoritarian parenting attitude, an

aggregated score named Authoritarian Score was created by adding the individual scores of the 10 items related with the first factor. The mean for the score was 26.3 ($SD = 6.9$, see Table I). Pearson correlations among the Authoritarian score and both Theory of Mind aggregated scores are reported in Table II.

Then, using an individual differences approach [23], the participants were categorized as high in Authoritarian Parenting Received (if their Authoritarian Score was superior to one standard deviation above the mean) or low in Authoritarian Parenting Received (if their Authoritarian Score was inferior to one standard deviation below the mean). Accordingly, 14 cases were classified as low in Authoritarian Parenting Received level and 12 were classified as high in Authoritarian Parenting Received.

C. Socio-demographic data and Verbal Ability Score

Socio-demographic characteristics of participants with low and high Authoritarian Parenting Received were evaluated to estimate the necessity of their introduction as control variables in posterior analysis. Nevertheless, neither the mother's educational level (66% versus 58% mothers with 'Secondary or higher degree' for high and low participants respectively, $p > 0.05$, Fisher's exact test) nor the number of older sibling (50% versus 34% children with 'One or two' older siblings for high and low participants respectively, $p > 0.05$, Fisher's exact test) were significantly different between both groups. Therefore, these variables were excluded for posterior analysis.

An Exploratory Factor Analysis was performed with the three verbal abilities scales. Principal component extraction method and oblimin rotation were used. The KMO value was 0.60, which confirmed that the data were appropriate for the analysis. Similarly, the sphericity Bartlett's was significant ($p < 0.0001$). The Exploratory Factor Analysis identified one unique component that explains the 56.5% of variance, which confirms the possibility to establish an aggregated score. The Verbal Ability Score was created by the addition of the three separated scores from each verbal ability scale. Table 1 shows descriptive statistics for each verbal scale and the resulting aggregated score. Posterior independent sample t-test showed that participants with low and high Authoritarian Parenting Received did not differ on the Verbal Ability Score, $t(24) = 1.58$, $p > .05$. Given these results, Verbal Ability Score were not included in subsequent analysis.

D. Relations between Authoritarian Parenting Received and Theory of Mind

To analyze the possibility of differences between participants with high and low Authoritarian Parenting Received in terms of their performances on Theory of Mind tasks, a multivariate analysis of variances was applied.

The MANOVA was executed with low or high Authoritarian Parenting Received as the independent variable and First Order Battery Score, Second Order Battery Score and Advanced Theory of Mind Score as dependent variables (Box's M , $p > 0.05$). A significant difference was found for the

First Order Battery Score, Wilk's $\Lambda = 2.81$, $F(1,22) = 4.74$, $p < .05$, $\eta^2 = 0.17$, and for the Second Order Battery Score, Wilk's $\Lambda = 2.81$, $F(1,22) = 5.49$, $p < .05$, $\eta^2 = 0.19$, but not for the Advanced Theory of Mind Score, Wilk's $\Lambda = 2.81$, $F(1,22) = 3.03$, $p > .05$, $\eta^2 = 0.11$. Participants with low Authoritarian Parenting Received evidenced a better performance in First and Second Order Battery Scores. On the other hand, the result for the Advanced Theory of Mind Score shows a tendency in the expected direction, but did not reach the statistical significance level (See Table III).

TABLE III
MANOVA RESULTS COMPARING PARTICIPANTS WITH LOW
AND HIGH AUTHORITARIAN PARENTING RECEIVED
ON THEORY OF MIND TASKS

	Authoritarian Parenting Received	Mean	F-test	Sig (2-tailed)
First Order Battery Score	Low	2.14	4.74	0.04*
	High	1.08		
Second Order Battery Score	Low	1.50	5.49	0.02*
	High	0.58		
Advanced Theory of Mind Score	Low	7.38	3.03	0.95
	High	5.00		

n = 26, *p < 0.05

IV. DISCUSSION

This study reveals a negative correlation between authoritarian parenting and first order False-belief understanding. Moreover, the study is the first that shows: (a) a similar trend in the association between authoritarian parenting and second order False-belief performance, and (b) a tendency in the expected direction, but not statistically significant, between authoritarian parenting and Advanced Theory of Mind. In addition, the study goes beyond the traditional correlational analysis by using an individual differences approach.

Statistical associations among the tasks used for the assessment of Theory of Mind (first order False-belief, second order False-belief and Advanced Theory of Mind) showed the expected results in every analysis. But this was not the case for the Parenting Attitudes Inventory. Based on the performance of an American and Korean descendent sample [9], the original factorial structure for this instrument was established as a three-factor structure [9]: an authoritarian centered factor, an autonomy centered factor and a self-learning centered factor. Nevertheless, based on a Costarrican sample, the analysis for the Parenting Attitudes Inventory allows the identification of a single factor: an authoritarian centered factor. This factor fulfilled the Stevens criteria [22] for factorial interpretation and evidenced a good internal reliability [24]. Through the use of the extracted authoritarian indicator, it was possible to identify 14 participants with low Authoritarian Parenting Received and 12 participants with high Authoritarian Parenting Received. As always [23], this kind of individual differences approach imposes an important reduction in the number of cases for the analysis, but despite

that, the sample size was enough to reach the statistical significance.

Here, using an individual differences approach, it was verified what other researchers have proposed based on the evidence of correlational associations [7],[9], which is that participants with less Authoritarian Parenting Received showed a better performance in measures of first order False-belief, a representative assessment of the socio-cognitive dimension in preschoolers. The present results also extend this evidence to the domain of second order False-belief performance, and given the individual differences approach, the data of this study can represent a departure point to the establishment of cognitive and behavioral profiles of children with particular parenting antecedents. Some authors have suggested that the nature of the associations between parenting attitudes and Theory of Mind derives from the way in which high levels of authoritarian parenting are also related with less opportunity to dialogue between parents and children, less promotion of autonomy and other characteristics that do not facilitate the socio-cognitive development of preschoolers [25], [26]. If that is true, then the discovery of dissimilar levels in second order False-belief highlights the subject and opens new options to study this kind of individual differences in later stages of development.

Participants with high and low Authoritarian Parenting Received does not demonstrated statistically significant differences in their performance on the Advanced Theory of Mind assessment, but the mean tendencies of every group followed the expected direction (See Table III), and importantly, the Advanced Theory of Mind Score also exhibit significant associations with the two others False-belief aggregated scores. So, given that this is the first study that tries to analyze those constructs together, it is difficult to determine if this particular result can be a by-product of our sample size or a trustworthy fact associated to preschoolers' socio-cognitive development. Plus, there exist the chance to explore the result in detail, by taking into account the specific characteristics of the Advanced Theory of Mind construct as proposed by the original author [21]. The Advanced Theory of Mind was defined as: "Attribution of mental states such as desires, belief or intentions, and sometimes higher order mental states such as sarcasm" [21]. Accordingly, some items included in the Advanced Theory of Mind task seek to measure desire understanding, sarcasm understanding, and so on. Thus, the addition of other kind of mental states in such a heterogeneous way, could have introduced considerable noise in the analysis. These and other considerations need to be explored by future works.

Also, it is important to regard that in the present study, parenting attitudes scores were obtained from mothers. Despite recent changes in their structure and functional system, Costarrican families are still characterized by having mothers as primary caregivers in the majority of family units [27], and that is why mother's scores can be a good referent to explore specific nurture traits in the home environment. Nevertheless, it has been recognized that other family members and acquaintances can exert significant influences on

the children development [29], and therefore, future approaches should make a special effort to acquire scores for the attitudes of other family members or even important external acquaintances (e.g., teachers, tutors). This kind of complementary criteria may help us to improve our knowledge about the influences around the socio-cognitive development of preschoolers.

Finally, the academic environment is another relevant setting to discuss about the implications of the present results. The disadvantages exhibited by children with high Authoritarian Parenting Received in their performance on the socio-cognitive tasks, can be seen as an indicator of a poor ability to predict and explain the dynamics of interactions in social environments. As a matter of fact, poor performances on Theory of Mind tasks have been associated with negatively connoted characteristics that may promote difficulties in the adaptation of children to the school setting (e.g., peer rejections, low empathy) [28],[30]. Thus, in the academic framework, high Authoritarian Parenting Received may be considered as both, a tentative dimension to screen for the identification of detrimental developmental influences, or a target dimension to improve the child socio-cognitive development by working through clinical interventions that includes particular identified children and their parents [31],[32].

A detailed characterization of cognitive and behavioral profiles of children with high and low Authoritarian Parenting Received can be a relevant issue to explore in the near future. In this context, the identification of certain patterns of socio-cognitive development associated with developmental disadvantages can help to assure the well-being of children exposed to risky conditions related to poor parental practices. This study provides evidence that could be used to improve these kind of profiles by recommending new measures and constructs to take into account, and by showing statistically significant differences related to children's who are exposed to a particular dimension of parental attitudes. As seen in the present results, participants classified as low in Authoritarian Parenting Received, showed a better understanding of first and second order False-belief than participants with high Authoritarian Parenting Received. Future works should confirm these results and extend the profiles by assessing bigger samples through the use of similar and alternative methodologies.

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