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Correlation between symptoms of autism in children and personality traits in parents

Correlação entre sintomas de autismo em crianças e traços de personalidade em pais

Correlación entre síntomas de autismo en niños y rasgos de personalidad en padres

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ABSTRACT

Parents of children with autism spectrum disorder may be more likely to have a mental disorder, both due to genetic and environmental reasons. A cross-sectional study involving 161 children, 161 mothers and 108 fathers. Diagnosis followed the criteria established in DSM-5. Symptom severity was evaluated using the Childhood Autism Rating Scale. The Factorial Personality Inventory served to evaluate parents' personality traits. Several correlations were found between mothers and fathers personality traits and children symptoms. In both parents, personality traits associated with greater intransigence/less flexibility and fewer social skills were those associated with more severe autism symptoms in the children.

KEYWORDS:

ASD; parents; personality traits, ADHD, Hyperactivity

RESUMO

Os pais de crianças com transtorno do espectro do autismo podem ter maior probabilidade de ter um transtorno mental, devido a razões genéticas e ambientais. Estudo transversal envolvendo 161 crianças, 161 mães e 108 pais. O diagnóstico seguiu os critérios estabelecidos no DSM – 5. A gravidade dos sintomas foi avaliada usando a Escala de Classificação do Autismo na Infância. O Inventário Fatorial de Personalidade foi utilizado para avaliar os traços de personalidade dos pais. Várias correlações foram encontradas entre traços de personalidade de mães e pais e sintomas de crianças. Em ambos os pais, os traços de personalidade associados a maior intransigência / menor flexibilidade e menos habilidades sociais foram os associados a sintomas mais graves de autismo nas crianças.

PALAVRAS-CHAVES:

TEA; Pais; Traços de Personalidade; TDAH; Hiperatividade

RESUMEN

Los padres de niños con trastorno del espectro autista pueden ser más propensos a tener un trastorno mental, tanto por razones genéticas como ambientales. Se trata de un estudio transversal con 161 niños, 161 madres y 108 padres. El diagnóstico siguió los criterios establecidos en el DSM-5. La gravedad de los síntomas se evaluó mediante la Escala de calificación de autismo infantil. El Inventario Factorial de Personalidad sirvió para evaluar los rasgos de personalidad de los padres. Se encontraron varias correlaciones entre los rasgos de personalidad de las madres y los padres y los síntomas de los niños. En ambos padres, los rasgos de personalidad asociados con una mayor intransigencia / menor flexibilidad y menos habilidades sociales fueron los asociados con síntomas de autismo más severos en los niños.

PALABRAS CLAVE:

TEA; Padres; Rasgos de personalidad; TDAH; Hiperactividad

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The parents of children with ASD may be more likely to have some form of mental disorder, either due to genetic or environmental reasons (Machado Júnior, Celestino, Serra, Caron, & Pondé, 2016). Since this is a genetically inherited neurodevelopment disorder, the parents may have characteristics of their child's disorder, even if only mild traits, which are referred to as broader autism phenotype. Studies have suggested that some autism traits may be present in the form of personality traits in unaffected parents and siblings of individuals with ASD. Parents of autistic children were more likely to be socially withdrawn, more emotionally detached, demonstrated less reciprocity in friendships, showed greater personality rigidity or less flexibility, perfectionism, little interest in new situations, and paid greater attention to details (Bolton et al., 1994; Cannone et al., 2017; Murphy et al., 2000; Narayan, Moyes, & Wolff, 1990; Piven, Palmer, Jacobi, Childress, & Arndt, 1997). The personality trait *exhibition* was less likely to be present in mothers of more

severely ASD children, thus revealing a greater tendency towards social withdrawal in this group (Cannone et al., 2017). The effect of genetics on variations in personality traits is around 40% to 55% (Bouchard & McGue, 2003). Studying parents' personality traits could help direct research into the genetic and biological bases of the etiology of autism, and may also provide guidance for parents on how best to stimulate their children, considering their own difficulties. The objective of the present study was to identify correlations between parents' personality traits and groups of symptoms of ASD in the children.

Methods

Study population

The target population consisted of children attending a specialist school for individuals with ASD, children who were on the waiting list for a place at that school, and patients attending selected private specialist clinics. The parents of the children enrolled at the school were personally invited to participate in the study, while those whose name was on the waiting list were invited by telephone. The parents identified at the private clinics selected for the study were invited to participate in person by the attending psychiatrist/neurologist. Any parents who refused to participate in the study, adoptive parents and those who answered the questionnaires inappropriately were excluded from the study. The final sample consisted of 161 children, 161 mothers and 108 fathers. The data were collected between April 2014 and April 2016. The internal review board of the BAHIANA School of Medicine and Public Health approved the study protocol on March 12, 2014 under reference 551.381.

Evaluation instruments

Psychiatrists and a pediatric neurologist with extensive experience in the diagnosis and treatment of disorders of neurodevelopment evaluated the children. To increase the reliability of the diagnoses, the study coordinator personally trained all the professionals involved in the study. The children's diagnoses were made in accordance with the criteria established in the Diagnostic and Statistical Manual of Mental Disorders – DSM5 (APA, 2013), with the Childhood Autism Rating Scale (CARS) being applied to provide a better characterization of the symptoms of ASD in the patients. CARS is an observational scale that can be used for children of two years of age or more. A trained observer evaluates the child's behavior in 15 domains

affected by autism and attributes scores ranging from 1 to 4 for each item, with higher scores reflecting more inappropriate behavior (Schopler, Reichler, & Renner, 1988). The factorial personality inventory (FPI) was the instrument used to evaluate personality traits in the parents. This consists of a self-report, structured questionnaire that is based on an adaptation of a modified version of the Edwards Personal Preference Schedule (EPPS) (Araújo, 2008). This tool was elaborated and validated in Brazil with 3,399 subjects (33% men and 67% women), the majority (49.5%) consisting of university students from 11 states in Brazil (Pasquali, Azevedo, & Ghesti, 1997). The test consists of the evaluation of 15 personality traits, with each trait being evaluated through nine items. Possible responses range from 1 to 7, with 1 indicating that the item is considered “not at all characteristic” and 7 “completely characteristic”. The result for each trait is divided into percentiles in accordance with the scores, with high, moderate and low scores corresponding, respectively, to $\geq 70^{\text{th}}$ percentile, between the 69^{th} and 31^{st} percentiles and \leq the 30^{th} percentile. The 15 traits measured in the inventory are: *Nurturance* expresses desires and feelings of kindness, compassion and tenderness in which the subject wishes to be sympathetic to and fulfill the requirements of someone in need; *intraception* describes individuals who are dominated by a search for happiness, by fantasy and by imagination; *succorance* represents a search for support and protection; *deference* is related to respect, admiration and reverence to others; *affiliation* signifies giving and receiving affection from friends; *dominance* refers to feelings of self-confidence and the desire to control others; *abasement* is the tendency to submit passively to an external force, to be resigned to fate; *achievement* refers to ambition and endeavor, the desire to do something difficult; *exhibition* refers to vanity, to the desire to impress, to be heard and to be seen; *aggression* reflects anger and hate, individuals that like to fight, argue and attack; *order* represents a tendency to keep things clean, organized, balanced and precise; *endurance* expresses the ability to continue to perform a task that has been started no matter how difficult it may seem; *change* reflects the enjoyment of new things, not fearing things outside the individual’s normal routine; *autonomy* is independence, acting freely according to the individual’s own impulses; and *heterosexuality* refers to the desire to have relationships, including romantic and sexual relationships, with individuals of the opposite sex (Pasquali et al., 1997). The trait *heterosexuality* was not taken into consideration in the analysis, since it was deemed

inappropriate in the validation studies and removed from the subsequent version of the inventory (Araújo, 2008).

Data Analysis

The data collected using the evaluation instruments were entered into the SPSS statistical software package, version 22 and analyzed by descriptive and inferential analyses. For the analysis of the factorial personality inventory (FPI), the overall scores for each personality trait were added together. In the inferential analysis, bivariate Spearman's correlation was used to identify positive or negative correlations between the scores for the personality traits in the parents, based on the FPI, and the scores for the symptoms of the children diagnosed with ASD, as according to the CARS. In the CARS, the higher the score given by the evaluating physician, the higher the symptom score. In the FPI, the higher the score, the greater the expression of the personality trait reported by the parents.

Results

The 161 mothers in the sample ranged in age from 19 to 68 years, with a mean age of 36.2 ± 7.6 years (\pm SD). The 108 fathers in the sample were aged from 27 to 67 years, with a mean age of 40.9 ± 8.7 years. Family income ranged from 1 to 50 minimum salaries per month, with a mean of 4.8 ± 7.2 minimum salaries per month. Regarding the individuals with ASD, 128 were male and 33 were female. They ranged in age from 1 to 29 years, with a mean age of 6.01 ± 5.41 years.

Correlation between personality traits in the mothers and the children's symptoms

As shown in Table 1, a positive and statistically significant correlation was found between *endurance* as a personality trait in the mother and the symptom *imitation* in the child ($r = 0.189^*$). A negative and statistically significant association was found between the personality trait *succorance* in the mother and the symptom *adaptation to change* in the child ($r = -0.184^*$), the personality trait *exhibition* in the mother and the *overall ASD severity* in the child ($r = -0.179^*$) and the personality trait *aggression* in the mother and the symptom *verbal communication* in the child ($r = -0.192^*$).

Table 1. Spearman correlations between the factorial personality inventory (FPI) in the mothers and the Childhood Autism Rating Scale (CARS) items in the children.

CARS/FPI	Nur	I	Succ	Def	Affl	Dom	Ab	Ach	Ex	Agg	O	End	M	Aut	Het
Item 1 – Interpersonal relationship	-.028	-.008	-.020	.013	.047	-.056	-.159	-.019	-.061	-.079	-.029	.121	-.058	-.011	-.259**
Item 2 – Imitation	.032	.103	.098	.144	.101	.002	-.044	.024	.000	-.082	.043	.189*	.091	-.056	-.116
Item 3 - Emotional response	-.133	-.093	-.160	-.014	-.097	-.128	-.102	.001	.022	-.103	.064	.004	-.106	-.090	-.214*
Item 4 - Body use	-.007	.100	-.153	.012	.027	-.086	-.029	-.014	-.042	-.153	-.007	-.037	-.031	-.085	-.123
Item 5 - Use of objects	.011	.081	-.054	.052	.020	-.070	-.074	.025	-.142	-.167	.078	.055	-.036	-.008	-.138
Item 6 - Adaptation to change	.046	.008	-.184*	.061	-.021	-.119	-.043	.000	-.061	-.150	.130	.024	-.032	-.005	-.196*
Item 7 - Visual response	.060	.018	.050	.005	.048	.051	-.103	.019	-.080	-.085	-.001	.120	.031	.026	-.111
Item 8 - Auditory response	-.001	-.043	-.064	-.013	.036	-.052	-.094	.068	-.116	-.142	.014	.048	-.060	-.063	-.179
Item 9 - Taste, smell and touch	.069	.168	-.037	.039	.098	-.109	.057	.016	-.008	.040	.036	.067	-.057	.129	-.166
Item 10 - Fear or nervousness	.058	-.108	-.163	-.026	.008	-.136	-.029	.047	-.061	-.144	-.028	.058	-.022	-.009	-.218*
Item 11 - Verbal communication	.041	.047	.029	.093	.099	-.120	-.087	.079	-.143	-.192*	.050	.123	.038	-.018	-.180
Item 12 – Non-verbal communication	-.049	-.079	.101	.029	-.016	.022	-.082	.096	-.096	-.077	.047	.030	.011	-.042	-.131
Item 13 - Level of activity	-.009	-.055	-.105	.066	.086	-.086	.022	.001	-.017	-.004	.003	.046	-.025	-.072	-.043
Item 14 - Intellectual response	-.007	-.108	.035	.071	.054	.071	-.053	.009	.030	-.068	.070	-.017	-.003	.004	-.001
Item 15 - General impressions	-.019	-.062	-.104	-.019	.035	-.167	-.164	.062	-.179*	-.161	.057	.114	-.052	-.058	-.269**
CARS Total	.002	-.026	-.079	.034	.045	-.111	-.106	.039	-.128	-.164	.028	.072	-.022	-.043	-.228*

Nurturance (Nur), dominance (Dom), order (O), abasement (Ab), intraception (I), achievement (Ach), exhibition (Ex), heterosexuality (Het), affiliation (Affl), change (C), endurance (End), aggression (Agg), deference (Def), autonomy (Aut) and succorance (Succ).

Correlations between personality traits in the fathers and symptoms in the children

As shown in Table 2, a negative correlation was found between the personality trait *change* in the fathers and the symptoms *interpersonal relationship* ($r = -0.246^*$), *imitation* ($r = -0.242^*$), *inappropriate use of objects* ($r = -0.248^*$) and the *overall ASD severity* in the children ($r = -0.217^*$). There was a negative correlation between the personality trait *achievement* in the fathers and the symptoms *inappropriate use of objects* ($r = -0.231^*$) and *sensorial symptoms* in the children ($r = -0.228^*$). A negative correlation was found between the personality trait *affiliation* in the fathers and the symptom *adaptation to change* in the children ($r = -0.273^*$). There was a positive correlation between the personality trait *aggression* in the fathers and the symptom *hyperactivity* in the children ($r = 0.232^*$) and between the personality trait *succorance* in the fathers and the symptom *body use* in the children ($r = 0.256^*$).

Table 2. Spearman correlations between the factorial personality inventory (FPI) in the fathers and the Childhood Autism Rating Scale (CARS) items in the children.

CARS/IFP	Nur	I	Succ	Def	Affl	Dom	Ab	Ach	Ex	Agg	O	End	M	Aut	Het
Item 1 – Interpersonal relationship	-.039	-.127	.092	-.088	.042	.044	-.136	-.150	-.049	-.005	.062	.021	-.246*	.023	-.147
Item 2 – Imitation	.089	-.021	-.007	-.079	.062	-.055	-.061	-.038	-.102	-.079	.091	.072	-.242*	.070	-.179
Item 3 - Emotional response	-.020	-.026	.200	.010	-.028	.125	.163	.011	.045	.087	.169	.072	-.007	.127	-.120
Item 4 - Body use	.192	.047	.256*	.002	.110	-.019	.078	-.039	.180	.043	.087	-.032	-.071	.101	.061
Item 5 - Use of objects	-.110	-.106	.075	-.182	-.107	-.048	.063	-.231*	.115	.056	.083	.027	-.248*	.077	.123
Item 6 - Adaptation to change	-.141	-.103	.058	-.216	-.273*	-.100	.091	-.118	-.056	-.078	-.020	-.037	-.153	-.028	-.163
Item 7 - Visual response	.150	.061	.184	.061	.120	.114	.002	.147	-.040	-.003	.169	.012	-.067	.063	.053
Item 8 - Auditory response	-.040	-.096	.012	-.199	-.086	-.019	-.192	.043	-.086	-.100	-.034	.023	-.101	-.003	-.008
Item 9 - Taste, smell and touch	.087	-.061	.012	-.114	.069	-.153	.128	-.228*	-.044	-.014	.020	-.011	-.100	-.091	-.104
Item 10 - Fear or nervousness	.010	.029	.081	-.045	.011	-.011	.001	.047	.077	.071	.020	-.059	.004	-.027	-.022

Item 11 - Verbal communication	.105	̄ .006	.107	̄ .013	.078	̄ .024	̄ .126	-.097	̄ .085	-.083	.050	.109	̄ .230*	̄ .013	̄ .070
Item 12 – Non-verbal communication	.072	̄ .085	.104	̄ .138	.116	.030	̄ .161	-.086	̄ .084	-.040	.045	̄ .006	-.073	.003	̄ .095
Item 13 - Level of activity	̄ .010	.158	.018	̄ .006	.084	.001	.200	.011	.069	.232*	.088	.086	-.008	.112	̄ .024
Item 14 - Intellectual response	.129	.151	.204	.046	.186	.071	.082	.206	.203	.038	.166	.139	.022	.066	.046
Item 15 - General impressions	.008	̄ .067	.191	̄ .091	.126	.064	̄ .104	-.020	.061	.039	.125	.112	̄ .217*	.082	̄ .125
CARS Total	.066	.012	.191	̄ .108	.073	.038	.032	-.054	.006	.059	.123	.082	-.163	.050	̄ .090

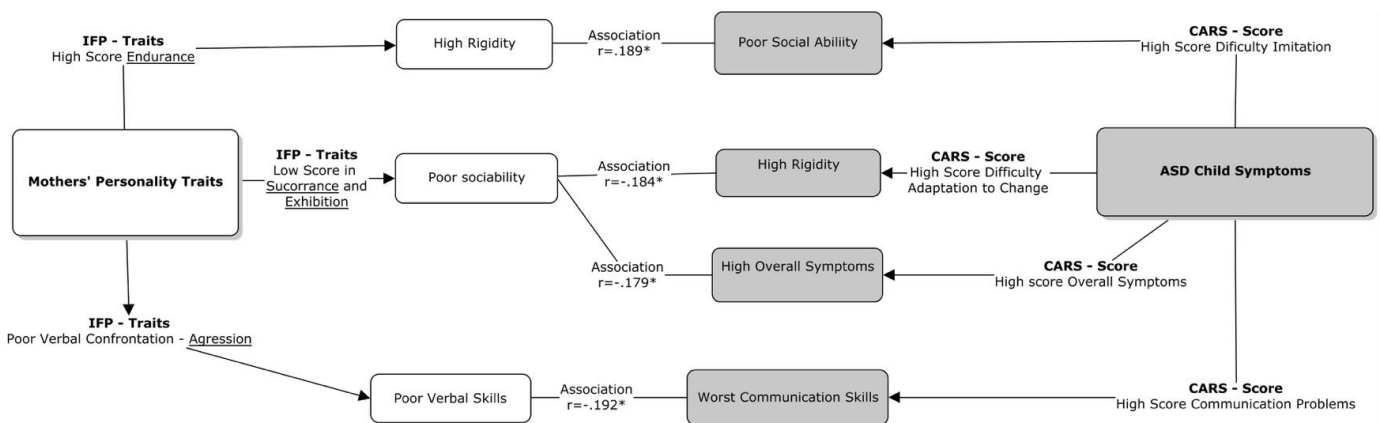
Nurturance (Nur), dominance (Dom), order (O), abasement (Ab), intraception (I), achievement (Ach), exhibition (Ex), heterosexuality (Het), affiliation (Affl), change (C), endurance (End), aggression (Agg), deference (Def), autonomy (Aut) and succorance (Succ).

Discussion

Some of the personality traits in the parents, evaluated using the FPI, correlated significantly with symptoms of autism in the children, while others did not. For the mothers, there was a statistically significant and positive correlation between the personality trait *endurance* and the symptom *difficulty with imitation* in the children. *Endurance* is a personality trait that may be associated with perseverance and rigidity, thus revealing a trait associated with rigid behavior in the broader autism phenotype in the mothers. A greater prevalence of limited interests, more rigid personalities, perfectionism and little interest in new situations have already been described in the parents of children with ASD (Murphy et al., 2000). The new finding the present study brings to light is the positive correlation between children with ASD who are less able to imitate and mothers who are more persistent. This result may indicate a genetic approximation between endurance/rigidity in the mothers and the children's difficulty in imitating behaviors or learning by imitation, that is related with poor social ability (de Guzman, Bird, Banissy, & Catmur, 2016; Santiesteban et al., 2012). A negative correlation was found between some of the personality traits in the mothers and symptoms in the children: *succorance* and *adaptation to changes*; *exhibition* and the *overall severity of ASD*; *aggression* and *verbal communication*. *Succorance* and *exhibition* are personality traits related to sociability. *Succorance* refers to an active search for help and protection in another person, while *exhibition* refers to the desire to be

seen socially. Other studies have reported altered social behavior in the parents of individuals with ASD (Yucel et al., 2014), as well as affective distancing and less reciprocity in friendships (Bolton et al., 1994; Piven et al., 1997). The novel finding in the present study refers to a possible genetic correlation between poor sociability in the mothers (lower score of *succorance* and lower score of *exhibition*) and less *adaptations to changes* in the child, which is related to rigid behavior. The negative correlation between *Aggression* in the mothers and *verbal communication* in the children indicates that a low level of *Aggression* in the mothers is associated with *worst linguistic development* in the children, which is an unexpected finding. None of the nine items of the factorial personality inventory (FPI) included under the domain *aggression* refers to aggression against individuals, but rather to aggression in an attitude of verbal confrontation (*I am not afraid to tell people that I don't like them; I like to confront points of view that oppose mine; I like to make fun of people who do things I consider stupid; I want to get my own back when someone insults me; I feel like telling people to shut up when I disagree with them; sometimes I get so irritated that I feel like throwing things and breaking them; I blame others when things go wrong for me; I'm not afraid to criticize someone in public when they deserve it; I like to read or watch news items about murders and other forms of violence*). In this respect, in the FPI, low score of *aggression* in mothers reveals individuals who tend to be less verbally confrontational, and *less verbal skilled* correlates with children with worst *verbal communication skills*. To the best of our knowledge, there are no other references in the literature reporting this association.

Figure 1 - Summary correlations between mothers' personality traits and child ASD symptoms.



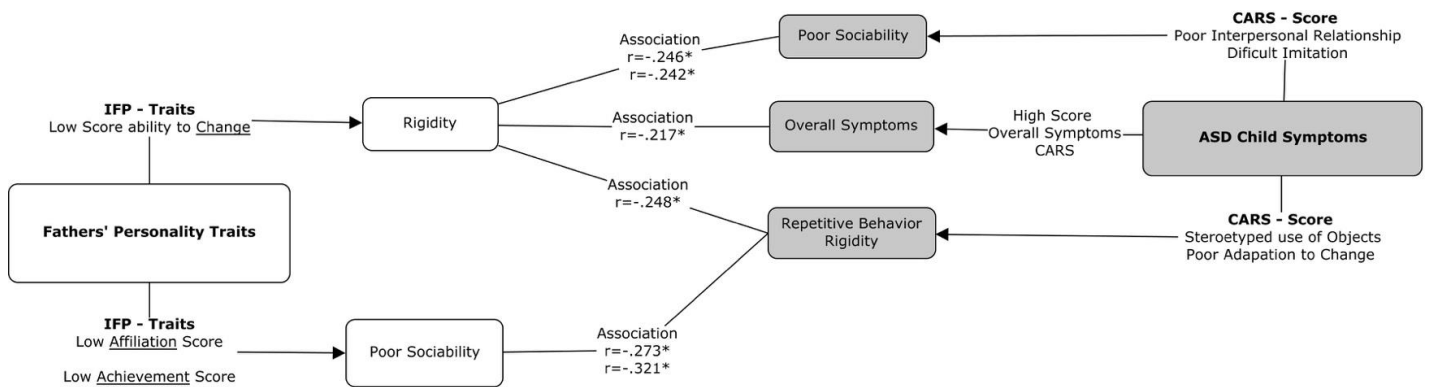
A poorer expression of the trait *change* in the fathers, a proxy of rigidity, was correlated with child's worst sociability (symptoms of worst *interpersonal relationship*), poor social ability (symptoms *difficulty with imitation*), repetitive behavior (symptoms of *inappropriate and stereotyped use of objects*), and greater *overall severity* of ASD. Previous studies have also shown that the fathers of individuals with ASD tend to have problems with change, an indication of the broader autism phenotype in the fathers (Bishop et al., 2004; Ruta, Mazzone, Mazzone, Wheelwright, & Baron-Cohen, 2012; Wheelwright, Auyeung, Allison, & Baron-Cohen, 2010). The finding in the present study refers to a possible genetic correlation between rigidity/inability to change in the fathers (lower score of *change*) and worst sociability, and repetitive behavior in the child.

The correlation between a poor expression of *achievement*, a proxy of difficulty with socialization and social adaptation, and the *inappropriate use of objects* (related to repetitive behavior) and *sensorial symptoms* in the children may also point to a genetic association between these traits. The negative correlation between the personality trait *affiliation*, a proxy of difficulty with socialization, in the parents and *adaptation to changes* in the children suggests a genetic association between poorer social skills in the parents and greater rigidity in the children with ASD. These correlations may indicate the presence of traits associated with the broader autism phenotype in the parents, which is in agreement with other references in the literature (Kose et al, 2013).

The present study suggests that *rigidity* (low expression of the trait *Change*) in the fathers was associated with a greater severity of symptoms regarding sociability, repetitive behavior and the severity of the overall symptoms of ASD in the child, thus indicating *rigidity* (difficulty with *Change*) as a possible endophenotype of ASD in the fathers. Other authors have discussed the hypothesis that parents of individuals with ASD also have a rigid personality, with little interest in new situations and difficulties in dealing with routine changes (Bernier, Gerdts, Munson, Dawson, & Estes, 2012; Hurley, Losh, Parlier, Reznick, & Piven, 2007). Poor sociability in the parents is related with repetitive behavior, sensorial symptoms and rigidity in the child. Sung et al. (2005) also found that traits of sociability and rigidity in the parents are indicative of

greater heritability in relation to ASD, with a greater genetic correlation compared to traits such as expressiveness in social communication, communicative skills and the start of verbal communication.

Figure 2 – Summary correlations between fathers’ personality traits and child ASD symptoms.



In summary, both for the mothers and for the fathers, personality traits associated with greater rigidity and less flexibility, and personality traits associated with fewer social skills, corresponding to symptoms of the broader autism phenotype, were the traits that correlated more closely with the more severe symptoms of autism in the children.

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