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Abstract

This project is part of our ongoing research focusing on the strengths and weaknesses in the decision process of high functioning adults with Autism Spectrum Disorder (ASD). In our two recent studies of decision making in adults with ASD we used two different methodologies - in-person sessions and interviews with small sample size (Study 1) and online surveys (MTurk) with large sample size (Study 2). Converging evidence across studies revealed that persons with ASD compared to age-matched controls were less responsive to social/emotional cues, were less intuitive, and had more difficulty with everyday decisions, but were comparable in cognitive skills. Study 2 also showed that persons with ASD were particularly risk averse in the social domain and experienced more difficulties with social relations at school, home and work.

Introduction

In these two studies we demonstrate how traditional decision making tools and tasks can be used to uncover strengths and weaknesses within a growing population of adults with autism spectrum disorder (ASD). In Study 1 we extended accounts of autistic behavior such as those derived from "theory of mind" (Baron-Cohen et al., 1985) to predict key components of decision making (Levin et al., 2015; see Handout). A battery of tests was administered to 15 high-functioning college students with ASD, focusing on Decision Making Competence (Parker and Fischhoff, 2005). Data from this group were compared to data from unselected college students. First, as a test of a key social deficit associated with autism, the target group scored much lower on the Empathy Quotient scale (Baron-Cohen & Wheelwright, 2004). Traditional elements of DMC such as Numeracy, application of decision rules, and framing effects were comparable across groups. However, there were differences in thinking style based on Pacini and Epstein's (1999) Rational-Experiential Inventory, with the ASD group showing lesser engagement in intuitive thinking. For comparisons within the ASD group, autobiographical reports concerning individual lifestyles and outcomes were used to derive a scale of Social Functioning. The lowest scoring individuals showed the lowest levels of intuitive/experiential thinking, the lowest perceived levels of others' endorsement of socially undesirable behaviors, and the lowest ability to discriminate between "good" and "bad" risks. Because Study 1 has now been published, (Levin, I.P.,2015) we provide reprints as handouts and we focus here on Study 2.

In Study 2 we selected the most promising tasks and measures from Study 1 to design for the first time with ASD an online survey administered through MTurk, a nation-wide network of persons who complete surveys for compensation. A specific call was sent out for persons over the age of 18 who self-identified with ASD. This allowed us to greatly expand our sample of persons with ASD but with need to verify self-reports. A set of screening items based on clinical diagnostic criteria was included to eliminate respondents with unsubstantiated self-reports. Responses to these screening items were highly correlated with scores on the EQ scale. Furthermore, we used the transcripts obtained in Study 1 to create a series of questions that could be administered online dealing with inter-personal problems at school, relations at work, living arrangements, and friendship networks.

Goals

Our over-arching goal for this presentation is to motivate members of the JDM community to use their expertise in measuring and modeling decision-making processes to help understand special groups of decision-makers. Here we focus on persons with ASD.

Methods: Study 2

Participants

Adults over age 18 were recruited for online Mturk surveys using the Iowa Screener Test. To verify self-diagnosis, this test focuses on self reports of behaviors such as not maintaining eye contact, which are clinical symptoms of Autism. This resulted in a sample size of 72 in the ASD group and 70 in the control group.

Tasks and Measures

Basic measures include: the Rational-Experiential Inventory (REI) of decision style and the Empathy Quotient scale designed to assess deficits in the processing of social information among persons with ASD. To assess social functioning, a series of questions were added concerning satisfaction with relationships at home, school and work.

Tasks and Measures (Cont.)

Other scales were included to assess decision making experiences and real-world consequences. "Bad consumer behavior" measures the frequency of negative consequences in the consumer domain such as "buying products that don't get used" or "missing a rent payment". "Decision difficulty" was assessed by asking participants to rate how important and how difficult everyday decisions were for them, including: when to go to bed, what clothes to wear, what to eat, and what medications to take.

To further understand the comparative attitude toward risks of persons with ASD and controls, the DOSPERT multi-domain scale of risk-taking (Blais and Weber,2006) was added. To better understand self-perceptions of persons with ASD and controls, the Life Satisfaction Index (Diener It Al,1985) was included.

Results

In terms of decisions made in everyday life as reported in Tables 1 and 2, the ASD group reported significantly greater difficulty with everyday decisions concerning food, clothing and bedtime as well as with consumer decisions such as purchasing items that were never used and experiencing consumer debt.

Table 1: Group comparisons of Difficulty In Everyday Decisions Mean (SD)

	ASP (N=72)	Control (N=68)	Difference test
When to go to bed	6.26 (2.87)	8.60 (2.28)	P<.0001
When to wake up	6.40 (2.95)	7.89 (2.25)	P<.0100
What clothes to wear	6.17 (2.86)	8.03 (2.29)	P<.0001
What to eat	4.83 (2.31)	6.43 (2.30)	P<.0001
When to shower	6.61 (2.73)	8.93 (2.05)	P<.0001
What and when to take medications	7.08 (2.76)	8.78 (2.01)	P<.0001
When to pay bills	5.94 (2.80)	7.25 (2.69)	P<.0100
Making and keeping medical appointments	5.90 (2.70)	6.99 (2.80)	P=.0200

*Scale was 1=Extremely Difficult to 10= Not Difficult.

Table 2: Significant Group Comparisons of Bad Decision Outcomes

	ASD	Control	Difference
Rented movie unwatched	3.26 (3.08)	1.18 (2.21)	**P < .0001**
Bought clothes never worn	3.79 (3.24)	1.99 (2.69)	**P < .001**
Quit a job after a month	2.03 (2.96)	0.35 (1.31)	**P < .0001**
Spent at least $500 to fix car	2.04 (3.02)	0.15 (0.89)	**P < .0001**
Kicked out of an apartment	1.64 (2.90)	0.09 (0.73)	**P < .0001**
At least 2 weeks late on a rent payment	2.50 (3.42)	0.69 (1.97)	**P < .0001**
Had a check bounce	1.59 (2.61)	0.22 (1.09)	**P < .0001**
Loan that was not paid back	2.85 (3.40)	0.78 (2.28)	**P < .0001**
Borrowed money	3.33 (3.27)	0.81 (1.89)	**P < .001**
Use emergency credit	3.07 (3.45)	1.16 (2.45)	**P < .001**

Scale was "In the last year, have you ….". Using 0 to 10 scale.

Table 3 compares the groups on our measures of social functioning and Table 4 compares them on dispositional measures such as Thinking Style, and Attitude Towards Risk in different domains and overall life satisfaction. First and foremost, the ASD group reported greater problems and less satisfaction in almost all of our measures of social functioning. This includes getting along with fellow workers and supervisors, roommates, students, and teachers, as well as with their current living arrangement. By adding the DOSPERT multi-domain scale of risk-taking, we were able to isolate extreme risk-aversion by the ASD group in the domain of social risks (e.g., disagreeing with an authority figure), but less risk-aversion in the ethical domain (e.g., cheating on an exam). The ASD group was lower on both engagement in intuitive/experiential thinking style and rational ability. The groups did not differ in overall Life Satisfaction.

In addition to examining group differences between the ASD and control groups, we looked at individual differences based on their screener score within the ASD groups. Those scoring more extremely autistic in the Iowa Screener tended to score relatively low on Experiential Ability and Experiential Engagement, but higher on Rational Ability and Rational Engagement, meaning that they were less intuitive and more analytic, with a tendency toward lower experiential ability. The extreme scorers on the screener also expressed lower levels of Life Satisfaction.

Table 3: Group Comparisons of Social Functioning: Means (SD)

	ASD	Control	Difference
Satisfied with schooling	5.26 (2.58)	6.65 (2.01)	P < .001
Get along with teachers	5.73 (2.65)	7.75 (1.40)	P < .0001
Get along with fellow students	4.18 (2.44)	7.21 (2.13)	P < .0001
Satisfied with employment	6.31 (2.36)	6.65 (2.53)	NS
Get along with supervisors	6.46 (2.13)	7.77 (2.19)	P < .01
Get along with fellow workers	5.75 (2.04)	7.95 (1.81)	P < .0001
Satisfied with living arrangement	6.81 (2.60)	7.86 (2.53)	P =.02
Get along with people you live with	6.80 (2.96)	8.33 (2.52)	P < .01
Satisfied with friendship network	6.18 (2.85)	6.57 (2.87)	NS

Scale was 0 to 10.

Table 4: Group Comparisons on Dispositional Measures: Means (SD)

	ASD	Control	Difference
Empathy Quotient Index (EQ)	20.49 (10.4)	39.93 (11.28)	P < .0001
Rational/ Experiential Inventory (REI) (Scale: 1-5)			
Rational Ability	3.66 (0.81)	3.97 (0.68)	P=.02
Rational Engagement	3.61 (0.88)	3.73 (0.89)	NS
Experiential Ability	2.93 (0.97)	3.21 (0.88)	P=.07
Experiential Engagement	2.76 (0.83)	3.11 (0.88)	P =.02
DOSPERT Index (higher numbers represent greater risk)			
Social Risks	1.66 (7.57)	5.35 (6.55)	P<.01
Financial Risks	-7.44 (7.65)	-8.65 (7.73)	NS
Recreational Risks	-7.52 (8.46)	-8.65 (7.56)	NS
Ethical Risks	-8.15 (7.78)	-12.40 (4.38)	P< .0001
Health/Safety	-6.62 (8.23)	-7.59 (6.51)	NS
Life Satisfaction Index	18.69 (6.98)	20.10 (8.86)	NS

Conclusions and Future Research

Adults on the autism spectrum in our studies have difficulties in social situations and they also have difficulties making decisions in everyday life. Interestingly though, they don't perceive their Life Satisfaction as any different from controls.

Persons on the spectrum show different decision styles, relying less on intuition and personal experience in making decisions. They are also less prone to taking risks in the social domain.

The dispositional differences perhaps underlie their difficulties in decision making. Individual differences in the ability to function in everyday life represent a balance of domain-specific demands on social and intellectual skills.

Identifying these individual differences can inform the tailoring of interventions for individuals on the autism spectrum.

The JDM community can contribute to better understanding of how the strengths of persons with autism can be identified and used to improve their lives.

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