

# **Social Networks of Autism in Costa Rica**

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# Previous studies: Autism in California

Liu, K-Y., M. King, & P. Bearman 2010. "Social influence and the autism epidemic." *American Journal of Sociology* 115(5):1387-1434.

Abstract: Despite a plethora of studies, we do not know why autism incidence has increased rapidly over the past two decades. Using California data, this study shows that **children living very close to a child previously diagnosed with autism are more likely to be diagnosed with autism. An underlying social influence mechanism involving information diffusion drives this result**, contributing to 16% of the increase in prevalence over 2000-2005. We eliminate competing explanations (i.e., residential sorting, environmental toxicants, and viral transmission) through seven tests and show that information diffusion simultaneously contributed to the increased prevalence, spatial clustering, and decreasing age of diagnosis.

# Autism in Costa Rica

Is there a **social influence mechanism** (i.e., information diffusion) in Costa Rica that contributes to increased prevalence, spatial clustering, and decreasing age of diagnosis of autism?

# Autism in Costa Rica: Background

-Autism arrived in Costa Rica in approximately 1999 when Dra. Jimenez began identifying autistic behaviors

-In 2002, Dra. Jimenez began formally diagnosing autism with the ADOS (Autism Diagnostic Observation Schedule), and she began searching for new cases for a genetic study (McInnes, Jimenez, Manghi, et al. 2005)

# Autism in Costa Rica: Background

- There are currently 600-800 diagnosed children in Costa Rica (a proper prevalence estimate is complicated)
- Recent prevalence studies have found rates as high as 2%, and there is no reason to think that autism behaviors should vary across populations
- Which means that there are thousands of children in Costa Rica who would be diagnosed with autism if they were assessed with the ADOS
- An increased prevalence of autism in Costa Rica is underway

# Autism in Costa Rica: Background

**McInnes, L.A., P.J. Gonzalez, E.R. Manghi, et al. 2005. "A genetic study of autism in Costa Rica: Multiple variables affecting IQ scores observed in a preliminary sample of autistic cases." *BMC Psychiatry* 5(15).**

Results: To date we have obtained clinical evaluations on over 76 cases of possible autism referred to our study and report data for the initial 35 complete cases. The mean age of the probands is 6.7 years, and 31 of the 35 cases are male. **Twenty-one of the cases have IQs < 50 and only 6 cases have IQs ≥ 70. Over half of the mothers had complications during pregnancy and/or delivery.**

# Autism in Costa Rica: The present study

- Interviews with parents of children who were diagnosed with autism by Dra. Jimenez
- Reviews of medical files of interviewee children and children who are known by the interviewees (all medical appointments at the Hospital Nacional de Niños are recorded)
- Interviews last 30-60 minutes and are conducted at the hospital
- 44 interviews have been completed to date

# Interview questions for social networks

(two mechanisms: parents → others and others → parents)

- ¿Cuándo se dio cuenta de que había algo diferente en su hijo(a)?
- ¿Recuerda la primera vez que llevó a su hijo(a) a un doctor o EBAIS para esos problemas? (Cual doctor, donde, qué dijo el doctor, y si alguien le sugirió ir)
- ¿Cómo se dio cuenta que su hijo(a) tenía autismo?
- ¿Con quién ha hablado sobre el autismo?
- ¿Alguna vez le ha sugerido a alguien que lleve a su hijo al hospital para un diagnóstico de autismo?
- ¿Ha visto niños con posibles síntomas de autismo?  
(¿Que hizo usted hablo con sus padres?)
- Piense antes que su hijo fue diagnosticado con autismo. En ese momento, ¿quién más sabía usted que tenía el autismo?



# Autism in Costa Rica: Questions

-Does knowing other children with autism increase your child's risk of being diagnosed with autism?

-10 out of 32 parents knew someone with autism before their child was diagnosed, including

- 1 physiotherapist who had had patients with autism
- 2 parents whose children were in special education before being diagnosed
- 2 parents who had an older child with autism
- 3 parents who knew relatives with autism
- 1 parent who knew a child at daycare
- 1 who knew a child of a coworker

-but most of these parents knew very little about autism, and all but 2-3 of them sought help for their child for reasons unrelated to autism

-a dummy variable for knowing other children with autism is not correlated with age of diagnosis or time between symptom recognition and diagnosis

# Autism in Costa Rica: Questions

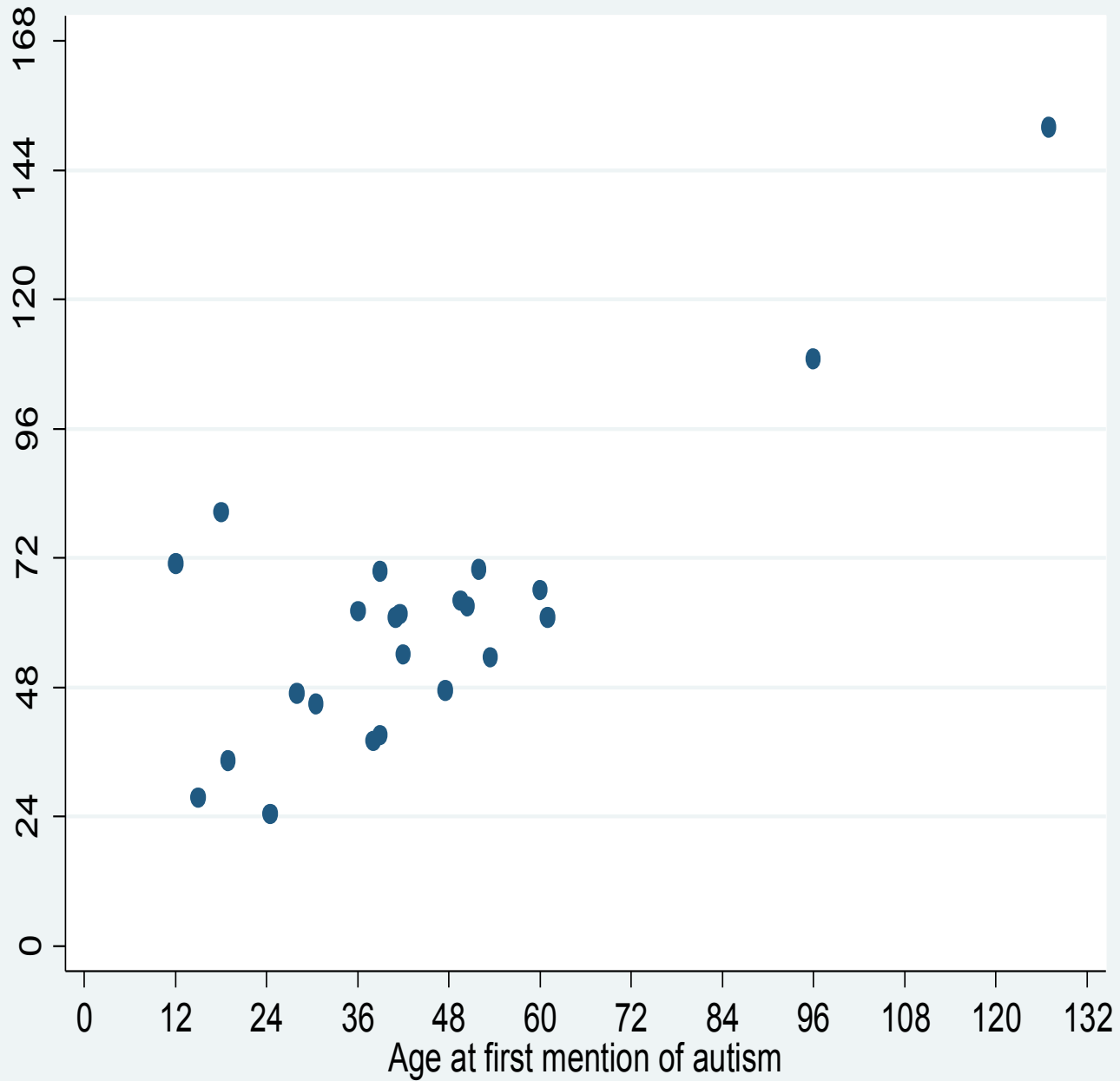
-Does knowing other children with autism increase your child's risk of being diagnosed with autism?

-Why does knowing other children appear to not matter?

The Rain Man effect

# Autism in Costa Rica: Questions

- Does knowing other children with autism increase your child's risk of being diagnosed with autism?
- How much of the increased prevalence can be attributed to information diffusion, and how and to whom is the information being diffused?
- only 1 parent reported seeing a physician because somebody suggested autism
- most often, seeing the right physician, often for unrelated problems, is what leads to a referral to the HNN
- one particular neurologist was seen by 7 out of 32 patients
- physicians are often reported as being the first to mention autism



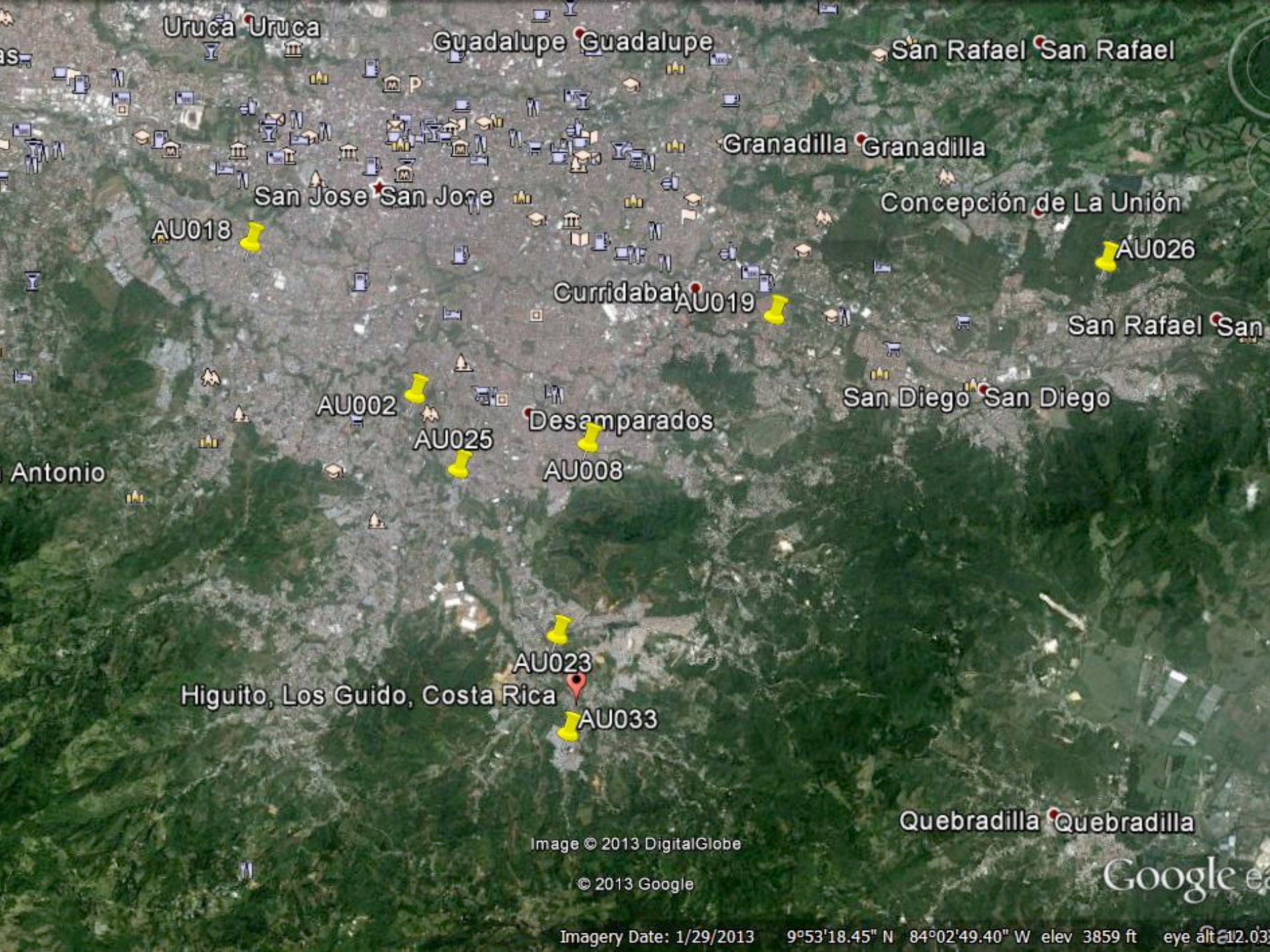
# Autism in Costa Rica: Questions

- Does knowing other children with autism increase your child's risk of being diagnosed with autism?
- How much of the increased prevalence can be attributed to information diffusion, and how and to whom is the information being diffused?
- Is there evidence of spatial clustering of cases of autism?

Is there evidence of spatial clustering of cases of autism?



San José Province



Uruca Uruca

Guadalupe Guadalupe

San Rafael San Rafael

Granadilla Granadilla

San Jose San Jose

Concepción de La Unión

AU018

AU026

Curridabat AU019

San Rafael San

AU002

San Diego San Diego

AU025

Desamparados

AU008

Antonio

AU023

Higuito, Los Guido, Costa Rica

AU033

Quebradilla Quebradilla

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Google ea

Imagery Date: 1/29/2013 9°53'18.45" N 84°02'49.40" W elev 3859 ft eye alt 212.03

Is there evidence of clustering at the level of district? (713 births)

$$SE = \sqrt{p * (1 - p) * \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

$$SE = \sqrt{.041 * (1 - .041) * \left(\frac{1}{21} + \frac{1}{17,199}\right)}$$

$$SE = .0433$$

$$z = \frac{(p_1 - p_2)}{SE}$$

$$z = \frac{(.190 - .041)}{.0433} = 3.44$$

$$p < .001$$



Is there evidence of clustering at the level of cantón? (3,375 births)

$$SE = \sqrt{p * (1 - p) * \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}$$

$$SE = \sqrt{.196 * (1 - .196) * \left(\frac{1}{21} + \frac{1}{17,199}\right)}$$

$$SE = .0031$$

$$z = \frac{(p_1 - p_2)}{SE}$$

$$z = \frac{(.333 - .196)}{.0867} = 1.58$$

**$p = .114$  (two-sided)**

# Autism in Costa Rica: Questions

- Does knowing other children with autism increase your child's risk of being diagnosed with autism?
- How much of the increased prevalence can be attributed to information diffusion, and how and to whom is the information being diffused?
- Is there evidence of spatial clustering of cases of autism?
- What variables decrease the age of diagnosis?

Table 1. Correlations, means, and standard deviations for selected characteristics of Costa Rican families of children between 0-10 years old who have been diagnosed with autism, 2008-2012; [N = 42].

Variable	Household income	Maternal age	Maternal education	Paternal education	Age at symptom	Age at diagnosis
Household income		.147	.426	.705	.075	-.207
Maternal age at birth			-.062	-.030	-.501	.149
Maternal education				.558	-.103	.091
Paternal education					.146	-.029
Age at symptom recognition						.355
Mean	258.000	28.1	5.1 <sup>1</sup>	4.6 <sup>2</sup>	19.8 <sup>3</sup>	59.3 <sup>3</sup>
SD		5.9	2.6	2.6	14.1	23.6

<sup>1</sup>Colegio (high school) incomplete.

<sup>2</sup>Secundario (middle school) complete.

<sup>3</sup>Months.

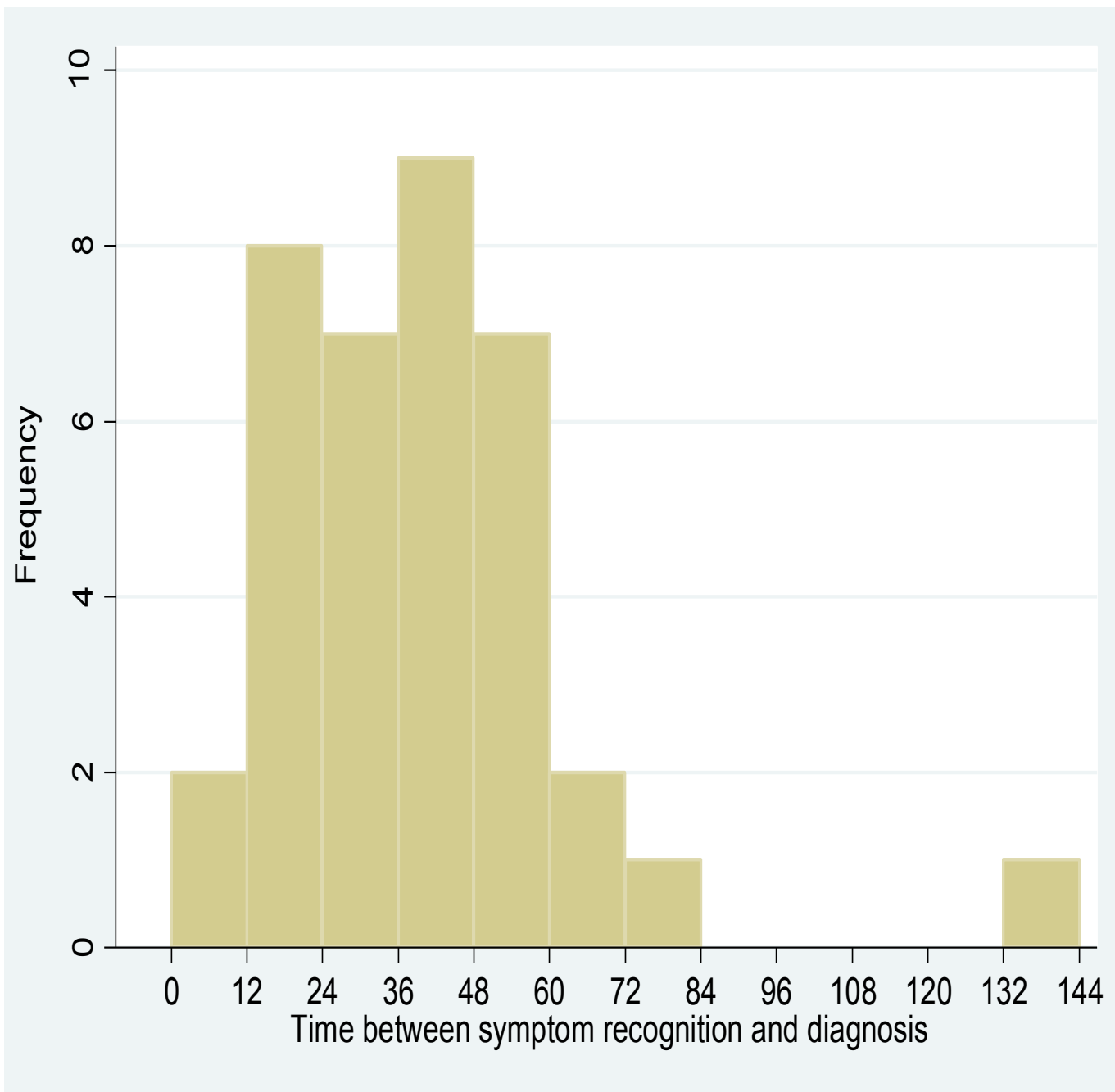


Table 2. Net regression coefficients for various models of the effect of income, maternal age at birth, and maternal education on the time between symptom recognition and a formal diagnosis of autism, Costa Rican children between 0-10 years old, 2008-2012 (standard errors in parentheses); [N = 42].

Variable	Model 1	Model 2	Model 3	Model 4
Household income	-3.75 (2.83)	-5.74 (3.02)	-7.70** (2.66)	-7.57** (2.68)
Maternal education		2.84 (1.77)	3.47* (1.54)	-3.12 (7.83)
Maternal age at birth			2.13** (.644)	1.00 (1.47)
Maternal ed*Maternal age				.233 (.271)
Intercept	57.35 (11.16)	50.44 (11.71)	-6.01 (19.77)	25.66 (41.89)
R <sup>2</sup>	.057	.136	.386	.403

# **Social Networks of Autism in Costa Rica**

Questions and suggestions?