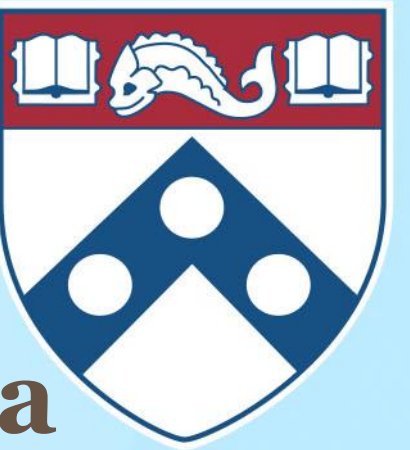# Referral Rates after Failed Screening for Autism Spectrum Disorder in Toddlers in a Large Primary Care Network

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BACKGROUND

- AAP Guidelines emphasize screening for autism spectrum disorder (ASD) in early childhood.
- Failed ASD screen should result in simultaneous referral for Early Intervention (EI), audiology, and diagnostic evaluation
- Outcomes are improved when children are identified and intervention is initiated early
- Despite guidelines, disparities exist in age of diagnosis with ASD and receipt of early intervention for children from black, Hispanic, and non-English-Speaking households

- **CHOP Primary Care Network**:
  - Includes: 32 sites, rural, urban, and suburban
  - Universally administers the Modified CHecklist of Autism in Toddlers (M-CHAT) at 18 and 24-month well-child visits
  - Serves over 240,000 children

Study Objective: To determine whether demographic-based differences exist in the likelihood of referral after a failed MCHAT in our large primary care network.

METHODS

- **Inclusion Criteria:**
  - Child between 16 and 30 months of age
  - Presenting for Well-Child Care between 1/1/2013 and 12/31/2016 within the CHOP Primary Care Network
  - Received both general developmental screening (using the Survey of Wellbeing in Young Children, SWYC) and the M-CHAT
  - Failed the M-CHAT
  - If 2 or more M-CHAT screenings completed, only the 1st was included
  - Child not currently receiving Early Intervention Services

- **Independent Variables/Co-variates:**
  - Demographic factors: sex, self-reported race, ethnicity, languages
  - Practice Site
  - Home address and census tract
  - Referrals made during the visit
  - Median household income based on census tract-level data
- **Dependent variable:** 1) referred to Early Intervention, or 2) not referred

- Manual chart review confirmed electronic data with >90% agreement
- Final sample: **N=2,122**

RESULTS

Sample Characteristics, N=2,122		
		Mean (SD)
Patient Age in Months		20.1 (2.95)
Median Household Income		$56,641.11 ($30,147.20)
M-CHAT Score		4.4 (2.4)
		Percent
Sex:	Male	54.4%
Race:	White	25.5%
	Black	39.8%
	Asian	10.6%
	Other	24.0%
Ethnicity:	Hispanic	12.7%
Primary Language:	English-only	86.5%
	Non-English/Multiple Languages	13.5%
Insurance Payor:	Private	34.1%
	Medicaid	64.1%
SWYC Fail		42.3%
Referred to:	EI	42.0%
	Audiology	10.3%
	Other Evaluation	8.8%
	All 3 referrals	4.0%

Logistic Regression Analysis: Nested by Practice Site Dependent Variable: Referral to Early Intervention during visit with M-CHAT fail				
	OR	**Beta Coefficient**	**95% Confidence Interval**	**p value**
SWYC Failure	**12.37**	**2.52**	**9.75-15.70**	**<0.001**
M-CHAT Score	**1.13**	**0.58**	**1.07-1.19**	**<0.001**
Male	**1.61**	**0.48**	**1.28-2.02**	**<0.001**
English Language*	**1.93**	**0.45**	**1.30-2.87**	**<0.002**
Black Race**	**0.68**	**-0.38**	**0.47-0.98**	**<0.04**
Asian Race**	0.72	-0.21	0.46-1.11	<0.14
Other Race**	0.89	-0.10	0.63-1.27	<0.63
Hispanic Ethnicity	0.85	-0.11	0.56-1.29	<0.45
Median Household Income	1.00	-0.12	1.00-1.00	<0.49
Private Insurance	0.82	-0.19	0.62-1.09	<0.18
Age in months	0.98	-0.12	0.94-1.02	<0.31
Days from study start	1.00	-0.15	0.99-1.00	<0.21

*Language categorized as English-only vs non-English/multiple languages
** White race as reference

Male sex, concurrent failure of SWYC, higher M-CHAT score, English-language, and non-black race associated with higher rate of EI referral after failed M-CHAT

CONCLUSIONS

- Despite AAP recommendations and nearly universal screening in our large primary care network, referrals made in response to failed ASD screening are inconsistent
- Differences in referral based on a child's socio-demographic factors may contribute to disparities in the age and rates of ASD diagnosis in minority patients
- Under-identification and delayed referral for intervention can impact long-term outcomes and psycho-social functioning
- Further study should examine pediatrician decision-making in response to failed screening to guide interventions to ameliorate this disparity