

# Intellectual Disability amongst Individuals with ASD

## A Systematic Review and Meta-Analysis

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### Objectives

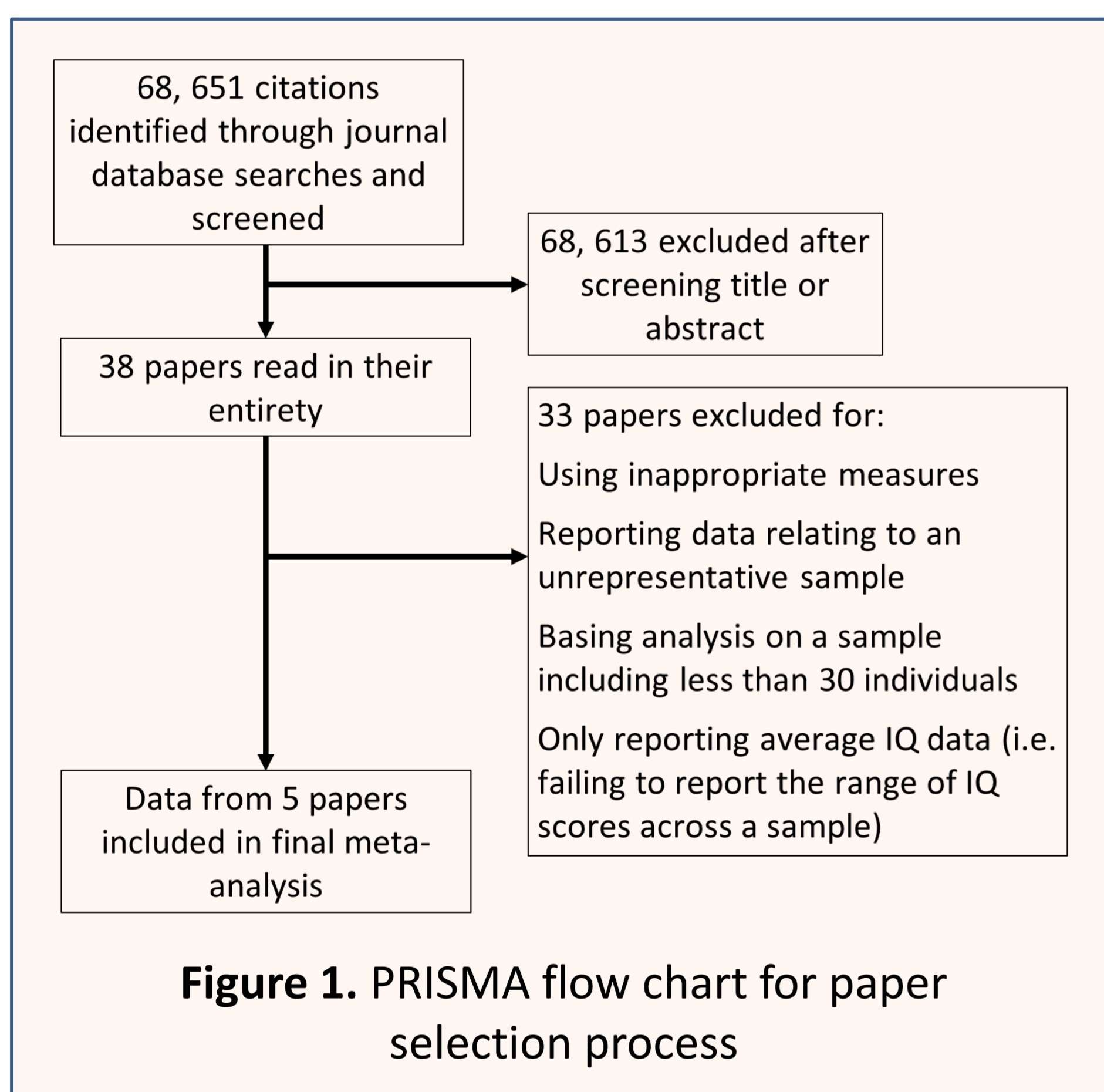
Research has consistently shown IQ to be a strong predictor of adult outcome amongst individuals with ASD<sup>1,2</sup>. The aim of this investigation was to systematically review the ASD literature and to calculate a robust estimate of the number of ASD individuals living with an additional intellectual disability (ID) that could be used to inform an economic analysis of the costs of ASD and planning of future service provision in Scotland.

### Method

#### Systematic Review

Three online databases (MedLine, PsychArticles and PsychInfo) were searched using key terms relating to ASD and IQ (or ID) to identify English-language, peer-reviewed papers which made at least one mention of IQ (or ID) in relation to ASD and had been published since December, 2002.

These searches returned a total of 68, 651 citations, which were subsequently scrutinised to establish their relevance and quality; this process has been described in figure 1. Five of the papers were considered to have reported reliable primary IQ/ID data collected using high quality methodologies and were included in the final meta-analysis.



#### Meta-Analysis

Random effects meta-analyses using the method of moments<sup>3</sup> were carried out on weighted logit-transformed event rates of ID.

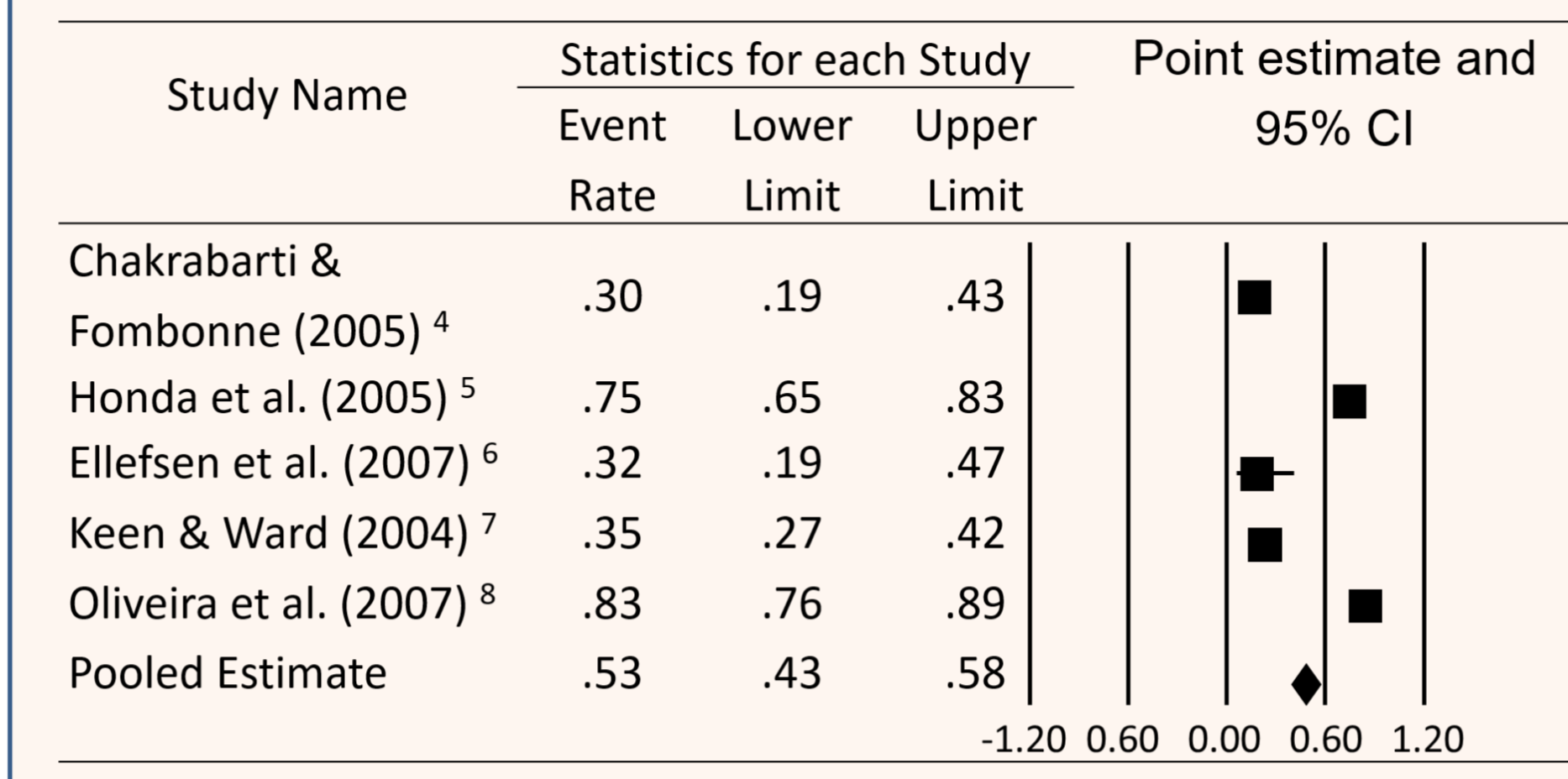
### References

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- <sup>2</sup>Henniger, N.A. & Taylor, J.L. (2013). Outcomes in adults with autism spectrum disorders: A historical perspective. *Autism*, 17(1), 103-116.
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- <sup>6</sup>Keen, D., & Ward, S. (2004). Autistic spectrum disorder: A child population profile. *Autism*, 8, 39-48.
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- <sup>8</sup>Oliveira, G., Ataíde, A., Marques, C., Miguel, T. S., Coutinho, A. M. (2007). Epidemiology of autism spectrum disorder in Portugal: Prevalence, clinical characterization, and medical conditions. *Developmental Medicine and Child Neurology*, 49, 726-733.

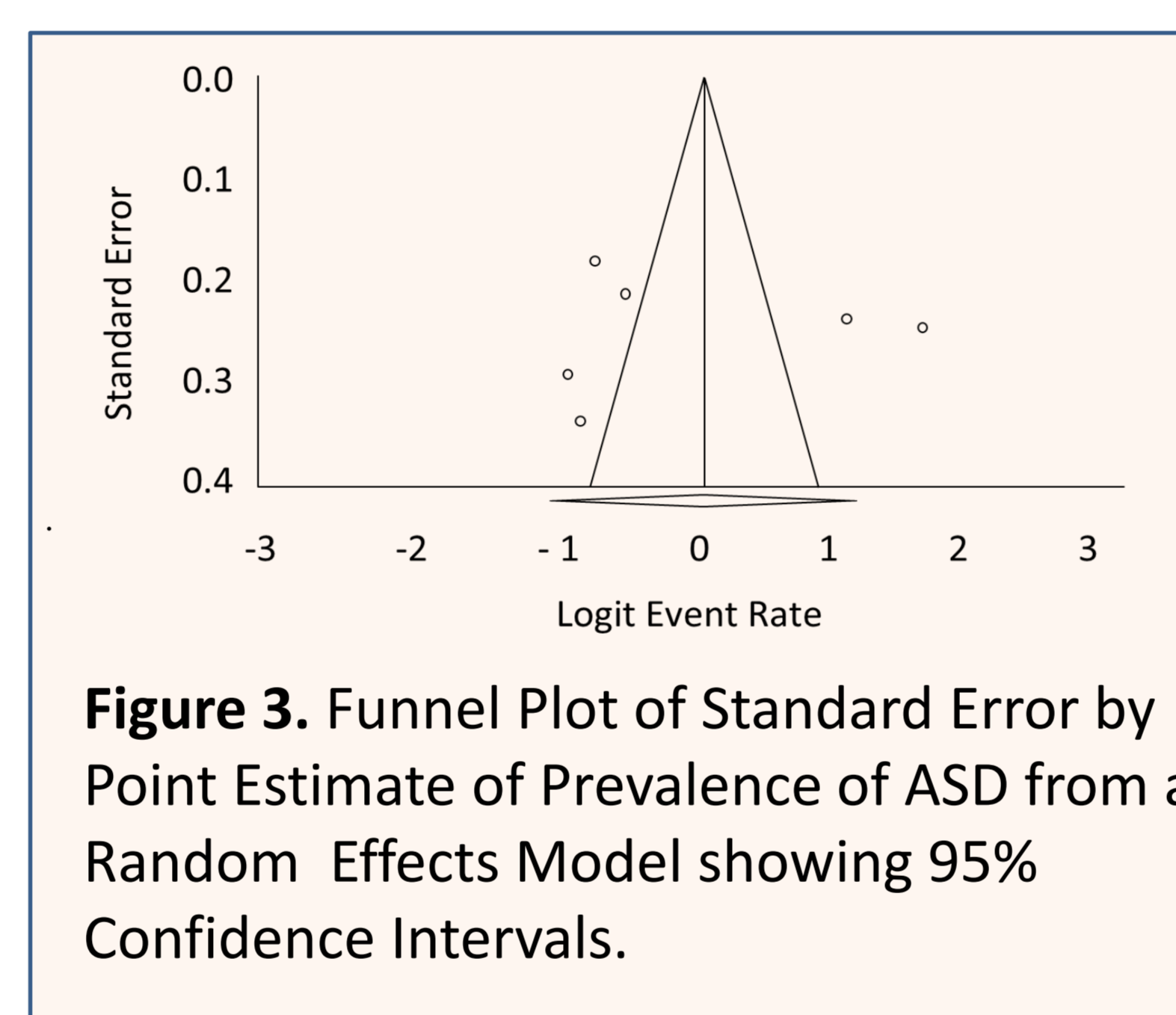
### Results

Figure 2 shows the forest plots (point estimates of the proportion of individuals in each study with ID and 95% confidence intervals) which shows the level of variability in the estimate for each of the studies.

**Figure 2. Summary of random-effects meta-analysis of ID event rates (5 final studies)**



The results revealed an overall pooled ID event rate of .53 (95% CI .43 - .58) based upon a weighted logit analysis. However, high levels of heterogeneity were observed ( $Q = 90.87$ ,  $df = 4$ ,  $I^2 = 95.99$ ,  $\tau^2 = 1.32$ ). A funnel plot (see Figure 3) revealed no indication of publication bias (all  $p$ -values  $> .80$ ).



A moderator analysis was carried out to investigate the heterogeneity. A comparison of two studies which focused on individuals with autism (or closely related diagnoses) with the three studies which analysed samples more representative of the whole autism spectrum was carried out (see Table 1 for further information on the nature of the sample involved in each study). The findings revealed a significant difference ( $Q = 88.14$ ,  $df = 1$ ,  $p = .000$ ) between a pooled mean ID event rate of 79.2% (95 CI 73.2 – 84.2) for the studies focusing on those with autism and related diagnoses, and a pooled mean ID event rate of 32.7% (95 CI 27.0 – 38.9) for those studies focusing on the whole autism spectrum.

### Results (Cont.)

**Table 3. Summary of samples assessed by final five studies**

Study	Sample Size (n)	Diagnoses Included in Sample (n)			Age Range of Sample	Measures of IQ used
		Autism	Aspergers	PDDNOS		
Chakrabarti & Fombonne (2005)	64	25	12	27	2-7	WPPI & Merrill-Palmer
Honda et al. (2005)	95	95	-	-	8-17	WISC-R & VABS
Ellefsen et al. (2007)	35	9	17	9	0-5	Stanford-Binet
Keen & Ward (2004)	191		191		6-9	Griffiths, WISC-III
Oliveira et al. (2007)	120	120	-	-	0-17	BAS, WISC-III & WPPI

### Discussion

The studies included in this meta-analysis met rigorous standards in regards of diagnostic criteria, diagnostic procedures, sample size, statistical analysis and all other relevant aspects of methodology. There were some limitations to the investigation, however. The final sample size of papers was small, which impacted on the statistical power and generalisability of the moderator analyses. There may have been additional relevant papers which were not included in the databases searched. In addition, the paper selection process focused only on English language papers, and it is possible that there were additional relevant papers published in other languages or in non-peer reviewed sources. Further, our final analysis only included studies from 4 countries (England, the Faroe Islands, Japan and Portugal). However there was no evidence to suggest that there were regional variations in the prevalence estimates associated with ASD.

### Conclusion

In conclusion, the estimate of the percentage of individuals with ASD and a comorbid diagnosis of ID of 32.7% (95 CI 27.0 – 38.9) best takes into account the representativeness of the sampling across the autism spectrum of the included studies in this review.

However, by way of caveat, it should be noted that this rate is based upon data from a small number of individuals and sources and much of the research identified through our systematic review reported IQ only as part of small-scale study.

Given that IQ is a strong predictor of outcomes for individuals with ASD, and the implications for planning and service provision, there is a need for further large-scale research studies of the comorbidity of ID and ASD.