

Meta-analysis of the prevalence of attention-deficit hyperactivity disorder in prison: A comment on Fazel and Favril (2024) and reanalysis of the data

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Abstract

Background: Fazel and Favril presented a reanalysis of our previously published systematic review and meta-analysis on the prevalence of attention deficit hyperactivity disorder (ADHD) in prison.

Aims: The current paper addresses some of the criticisms of Fazel and Favril on our meta-analysis and presents a reanalysis of the data, focusing on adult detained persons.

Methods: We conducted a meta-regression on 28 studies ($n = 7710$) to estimate the pooled prevalence of ADHD.

Results: This reanalysis yielded a pooled estimate of 22.2% for the prevalence of ADHD (95% confidence interval [CI]: 15.7; 28.6), which disagrees with the estimate given by Fazel and Favril (8.3%, 95% CI: 3.8; 12.8).

Conclusion: We argue that the ADHD prevalence provided by Fazel and Favril was an underestimate due to their use of too restrictive exclusion criteria and suboptimal analysis methods. Our reanalysis on detained adults suggests a higher ADHD prevalence, which highlights the need to diagnose and treat ADHD in prison.

KEYWORDS

attention deficit-hyperactivity disorder, detention, meta-analysis, prevalence, psychiatric disorder

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Fazel and Favril (2024) presented a reanalysis of our meta-analysis of the prevalence of attention deficit hyperactivity disorder (ADHD) in prison (Baggio et al., 2018). Their main criticism was that the pooled prevalence of 26.7% (95% confidence interval [CI]: 22.7; 30.7) we obtained was overestimated. In contrast, they found a prevalence of 8.3% (95% CI: 3.8; 12.8) in their reanalysis, using a subsample of the previous meta-analysis as well as an update. They argued that meta-analyses should use 'clear and consistent inclusion criteria' to provide an accurate estimate of the prevalence of ADHD in prison. While we appreciate the effort put into their reanalysis, we would like to address some points of contention regarding their critique of our meta-analysis (Baggio et al., 2018): on the redefinition of inclusion/exclusion criteria and on the methods they used to exclude studies from their reanalysis. We also provide a reanalysis of our previous meta-analysis only including adult samples.

1 | THE NEED TO CAREFULLY DEFINE INCLUSION AND EXCLUSION CRITERIA

Fazel and Favril (2024) sought to investigate the prevalence of ADHD in the 'general prison population' by conducting a reanalysis that excluded what they termed 'selected samples'. These excluded samples included participants selected based on self-reported ADHD scores, having a primary diagnosis of another psychiatric disorder, involved in violent offending or referred for psychiatric care. We acknowledge the importance of sample selection, as an unrepresentative sampling may lead to a biased estimation of prevalence. For example, if participants were selected based on the presence of other psychiatric disorders or a positive ADHD screening test (what Fazel and Favril (2024) called a 'two-stage' approach), the prevalence of ADHD would probably be overestimated. However, we argue that the exclusion of samples on people with violent offending or referred to psychiatric care may lead to an underestimation of true prevalence. These exclusion criteria limit the reanalysis to a subset of detained persons with less serious offences or those with less severe (or undiagnosed) psychiatric disorders, who may be less likely to have ADHD, leading to an underestimation of the true prevalence. In fact, ADHD is often associated with comorbid psychiatric disorders, particularly substance use disorders, mood disorders, anxiety disorders and personality disorders (Choi et al., 2022). In addition, these incarcerated individuals are part of the 'general prison population', and therefore the prevalence estimated by Fazel and Favril (2024) is not reflective of the whole prison population.

Moreover, Fazel and Favril (2024) decided to only include randomly selected samples. However, this strategy led to the exclusion of some studies that invited all detained persons from a prison to participate, sometimes with a high response rate. It should be obvious that including almost all detained persons in a prison is better than including a random sample thereof, and we see no other methodological reason to exclude these studies from the meta-analysis.

We would also like to draw attention to the exclusion criteria of the studies themselves. Some studies analysed in Baggio et al. (2018) and in Fazel and Favril (2024) excluded participants with mental health problems or disruptive behaviour. While this is understandable, as it may be difficult to interview these detained persons, it could lead to an underestimation of the true prevalence of ADHD. This issue was not considered by Fazel and Favril (2024), who only focused on the risk of overestimating the ADHD prevalence.

2 | ON THE META-ANALYSIS METHODS

We would also like to challenge Fazel and Favril's (2024) analytical approach to (1) moderators and (2) outliers. First, they argued that if a factor shows evidence to moderate prevalence in a subgroup analysis, it is inappropriate to pool the evidence across groups without providing any reference or further justification. Meta-analyses aim to pool results from different studies with different settings and methods to achieve a higher level of empirical

evidence. While it is important to assess the impact of sampling methods, we think that the significance level in meta-regression should not be used to decide on whether to pool subgroups or not. The usual approach in meta-analysis is to pre-specify the inclusion criteria in a way that matches the research question, that is, the target population (in this case detained adults), and then pool the identified studies. Subgroup analyses can be used to explore and possibly explain the observed heterogeneity and should also be prespecified. In some extreme cases, pooling prevalence across subgroups may indeed be meaningless (e.g. if the two groups correspond to two distinct sub-populations, and they have very different prevalence estimates, in which case pooling can be thought of as a case of mixing apples with oranges). However, such a decision should not be based on a dichotomisation of the *p*-value from a subgroup analysis, but rather on a careful reconsideration of the research question, the clinical background, as well as the estimated prevalence in the subgroups and their corresponding uncertainty. If there was an a priori reason to expect that the two-stage sampling strategy was biased, these studies should have been excluded before the meta-analysis was performed. Post-hoc exclusion of data without sound a priori justification is bound to introduce bias.

Second, Fazel and Favril's (2024) decision to remove one study ($n = 390$) from the meta-regression 'after visual inspection' of the forest plot is problematic. Excluding a study post hoc based on a visual inspection of the forest plot alone with no other justification and without using any kind of predefined criteria is suboptimal as it is likely to introduce bias and possibly distort the conclusions of the study. Generally, there are more advanced methods to identifying and handling outliers in meta-analysis (e.g. Baker & Jackson, 2008; Gumedze & Jackson, 2011).

3 | REANALYSIS OF BAGGIO ET AL. (2018)

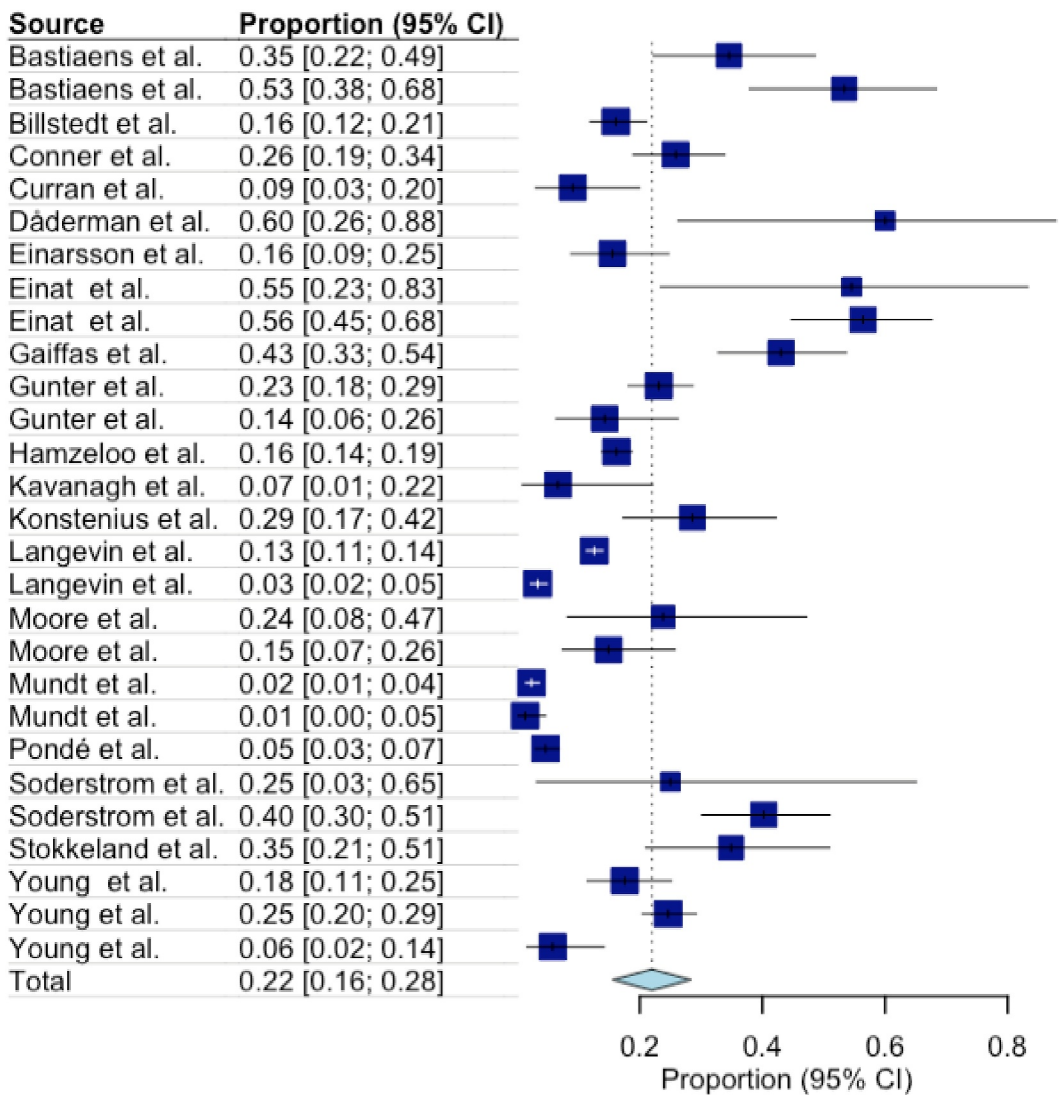
3.1 | Methods

We conducted a reanalysis of our previous meta-analysis. To match what Fazel and Favril (2024) did, we focused on adult samples (22 articles, resulting in 28 studies, with a total sample size of 7710 detained persons) and did not exclude any 'outlier' study. Instead, we first conducted a simple meta-analysis to estimate the ADHD prevalence and then conducted a subgroup analysis based on sample selection. Rather than using the same criterion as Fazel and Favril (2024), who used the presence of a 'two-stage' approach (i.e. if participants were included after a first round of selection, for example using an ADHD screening tool), we included studies in which the sample was randomly selected or if all detained persons in the prison facility were invited to participate. We excluded studies using a two-stage approach, a convenient sampling strategy or an unclear sampling strategy. We believe this criterion is broader and more accurate than focusing on the two-stage approach, which does not account for other forms of selection bias, such as convenience sampling strategies. These analyses were performed using R 4.3.3 and the metaphor package version 4.2-0.

3.2 | Results

The pooled prevalence estimated through our reanalysis was 22.2% (95% CI: 15.7; 28.6). The forest plot is displayed in Figure 1. While slightly lower than the prevalence we reported in 2018 (26.7%, 95% CI: 22.7%–30.7%) in which youths were included, the 95% CIs overlapped. Our result was also consistent with the results of an older meta-analysis, which reported a prevalence of 25.5% (Young et al., 2015).

When only studies with a random selection or using all detained persons in the prison were included, the prevalence estimate was 20.2% (95% CI: 9.2; 31.2). Even when we limited our analysis to the studies with a random



Heterogeneity: $\chi^2_{27} = 731.46$ ($P < .001$), $I^2 = 96\%$

FIGURE 1 Forest plot for the prevalence of ADHD in adult detained persons. ADHD, attention deficit hyperactivity disorder; CI, confidence interval. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1111/jcpp.15111)]

sample, including all detained persons, the prevalence estimate did not change much. The corresponding forest plot is displayed in Figure 2.

4 | CONCLUSION

In this short letter, we argue that the estimate of ADHD prevalence provided by Fazel and Favril (2024) is likely underestimating the prevalence of ADHD among adults in prison. Our reanalysis on detained adults suggested an ADHD prevalence of 22.2% (95% CI: 15.7; 28.6), which is likely a more precise estimate and highlights, again, the need to diagnose and treat ADHD in prison.

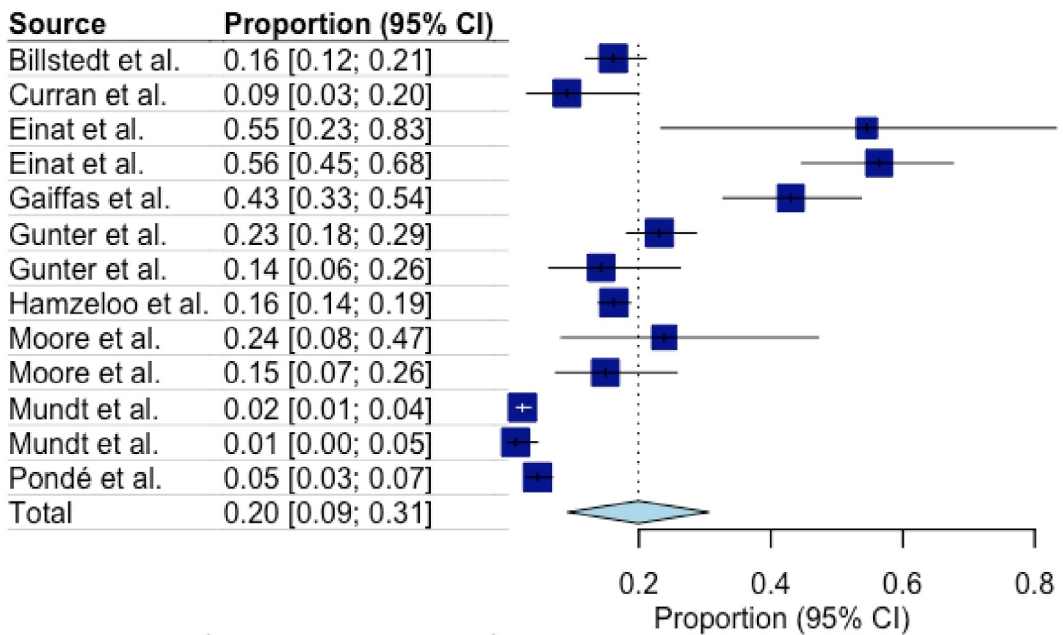


FIGURE 2 Forest plot for the prevalence of ADHD in adult detained persons, studies with a random sample, including all detained persons. ADHD, attention deficit hyperactivity disorder; CI, confidence interval. [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com/doi/10.1002/dam.2347)]

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[Correction added on 26 June 2024, after first online publication: Universitat Bern funding statement has been added.]

CONFLICT OF INTEREST STATEMENT

The author reports no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data used in this reanalysis are available as a supplementary file.

ETHICS STATEMENT

Not applicable.

PATIENT CONSENT STATEMENT

Not applicable.

PERMISSION TO REPRODUCE MATERIAL FROM OTHER SOURCES

Not applicable.

CLINICAL TRIAL REGISTRATION

Not applicable.

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