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Reliability of ADHD in Prison Populations: A Response to Murphy and Appelbaum

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Murphy and Appelbaum (2017) ask: How reliable are the high prevalence rates of ADHD among prison inmates in U.S. and foreign prisons? They answer that because of various methodological shortcomings in the way ADHD is assessed in the studies estimating prevalence, "no one knows for sure what the true prevalence rate is in the overall prison population" and "we believe that the true prevalence rates of attention-deficit/hyperactivity disorder (ADHD) in the prison population could be significantly lower than what is suggested in the current literature," that is, perhaps as high as 50% (Murphy & Appelbaum, 2017, pp. 2, 4). We offer the following response that will first briefly review the substantial literature that establishes ADHD as a major risk factor for the development of criminal behavior. Second, the *ideal* methodology proposed for assessing ADHD prevalence rates will be examined. Third, the reliability of prevalence rates of ADHD in prisons will be directly addressed. Last, a recommendation for a diagnostic protocol for ADHD in prisons will be presented.

ADHD IS A MAJOR RISK FACTOR FOR CRIMINALITY

Self-regulation can be defined as the ongoing, dynamic, and adaptive modulation of behavior, emotion, and cognition (Nigg, 2017a). Voluminous research has established that impaired self-regulation/self-control (constructs that are frequently used interchangeably, although self-control is best understood as a narrower construct than self-regulation, Nigg, 2017a) is of "almost unparalleled importance to mental health" (Nigg, 2017a, p. 361) and may be the single most important variable in explaining developmental origins of antisocial behavior (Moffitt, 2012; Moffitt et al., 2011). Numerous studies have shown that impaired self-control is linked to juvenile and adult criminal behavior (DeLisi, 2015; DeLisi & Vaughn, 2014; Mohr-Jensen, & Steinhausen, 2016; Vazsonyi, Milkuska, & Kelley, 2017), and impaired self-control has been shown to be more important than socioeconomic status or IQ in predicting crime (Poulton, Moffitt, & Silva, 2015). Self-control theory has been proclaimed the Tyrannosaurus rex of criminology that is poised to devour criminal justice theorizing (De Lisi, 2011). "In terms of empirical tests of its theoretical ideas, citations, [and] influence on the field, self-control theory is peerless" (DeLisi, 2011, p. 103).

The paramount importance of self-control to mental health, antisocial behavior, and criminology is crucial

Contents

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to appreciating that ADHD is widely conceptualized as a disorder of self-regulation (Barkley, 2015; Nigg, 2016, 2017a, b; Willcutt, 2015; Zisner & Beauchaine, 2016). Indeed, Nigg (2016, p. 593) declared ADHD to be "paradigmatic of problems in the domain of self-regulation." In addition, abundant research summarized in the numerous publications of Beauchaine and colleagues (Beauchaine, 2015; Beauchaine, Hinshaw, & Pang, 2010; Beauchaine & McNulty, 2013; Beauchaine, Zisner, & Sauder, 2017; Neuhaus & Beauchaine, 2017) has identified a developmental pathway that begins with the hyperactive/impulsive and combined presentations of ADHD, which, in interaction and transaction with various environmental adversities, progresses through the subsequent stages of oppositional defiant disorder, early-onset conduct disorder, and substance use disorder, culminating in the antisocial behaviors of juvenile delinquency and adult criminality. "This developmental pathway may account for most individuals who engage in lifelong delinquent behavior" (Beauchaine et al., 2017, p. 345). Consequently, it comes as no surprise that a systematic review and meta-analysis of 11 prospective studies (n = 15,442) found that childhood ADHD was significantly associated with increased risk for adolescent and childhood arrests (RR: 2.2, 95%, CI: 1.3–3.5), convictions (RR: 3.3, 95%, CI: 2.1–5.2), and incarcerations (RR: 2.9, 95%, CI: 1.9–4.3) (Mohr-Jensen & Steinhausen, 2016). Individuals with childhood ADHD also had a younger age of onset of antisocial behavior and increased risk of criminal recidivism. Similarly, a review of 18 prospective studies (n = 5,501) showed that ADHD with and without comorbid conduct disorder was a strong predictor of later development of antisocial personality disorder (Storebe & Simonsen, 2016).

In conclusion, extensive research has established that the hyperactive/impulsive and combined presentations of ADHD are a major causal risk factor for the development of criminal behavior. Hence, there is every reason to expect that the prevalence rates of ADHD in prisons are greater/much greater than rates in the general population. If this proves not to be the case, then this prediction from vast swaths of research would inexplicably have been proven to be false.

METHODOLOGY FOR ASSESSMENT PREVALENCE RATES OF ADHD

Murphy and Appelbaum proposed that the most reliable estimate of ADHD prevalence in prisons, and presumably also in general populations, can be obtained through the implementation of an *ideal* protocol that has the following components: (a) a thorough clinical interview; (b) input from collateral informants; (c) reliable establishment of onset of symptoms and impairment, at least by early adolescence; (d) inspection of available historical records; (e) employment of valid DSM–based ADHD symptom rating scales; and (f) a thorough diagnostic interview and history-taking conducted by a qualified doctoral-level professional. Murphy and Appelbaum then proceeded to critique the reliability of prison studies of the prevalence of ADHD when measured against this ideal protocol. Therefore, prior to examining the prison studies of ADHD themselves, this ideal protocol requires scrutiny, as their critique pivots on the use of this ideal as the standard to judge the accuracy of the prison prevalence of rates of ADHD. We will make four points.

First, it should be noted that most of the studies in meta-analyses of prevalence rates of ADHD in the general population that provide the basis for a widely accepted estimate of approximately 7% in juveniles (male/female ratio of 3:1) typically lack many of the components of the ideal protocol (Nigg, 2017b; Owens, Cardoos, & Hinshaw, 2015; Polanczyk, Willcutt, Salum, Kieling, & Rohde, 2014; Thomas, Sanders, Doust, Beller, & Glasziou, 2015; Willcutt, 2012)—namely, most studies were based on ratings by parents or teachers alone (Roberts, Milich, & Barkley, 2015; Thomas et al., 2015 Willcutt, 2012), and therefore they typically failed to measure up to the ideal in several ways: (a) measures of impairment were typically lacking or unreliable (Willcutt, 2012); (b) no thorough clinical interview; (c) no inspection of historical records; and

(d) no examination by a qualified doctoral-level professional. For example, regarding "b" and "d," Thomas and colleagues (2015) reported that of the 175 studies in their meta-analysis only 55 studies reported "clinician involvement," whatever that means. Similar departures from the ideal protocol are evidenced in the most comprehensive study of ADHD prevalence of adults to date in the United States (Kessler et al., 2006). The study used a nationally representative sample of 3,199 18- to 44-year-old adults who were initially screened for ADHD using a lay-administered diagnostic interview followed by blinded clinical interviews by doctoral-level psychologists for those who screened positive. The study, which reported a current prevalence of ADHD of 4.4% (3.2% female, 5.4% male), failed to inspect historical records or use collateral input. In conclusion, since even the best studies of ADHD prevalence in the general population fail to adhere to many of the components of the ideal protocol, Murphy and Appelbaum's judgment of the prison prevalence studies must hold for the findings of the general population prevalence of ADHD, that is, no one knows for sure what the true prevalence of ADHD is. Further, this agnosticism holds true for every community prevalence/epidemiological study of psychopathology because of various methodological limitations and complexities (Wolpert & Ford, 2015), as well as every measure of every variable in psychology, as all contain some measurement error (Hogan & Tushima, 2016). Hence, the critical criterion for a prevalence estimate is not perfection, but sufficient reliability to yield important information for one of the several goals of a prevalence estimate, that is, provide a solid basis for plans for the provision of services (Wolpert & Ford, 2015). As the authors of the most current, comprehensive systematic review of community prevalence of ADHD concluded, despite the methodological shortcomings of the various studies, their meta-analysis yielded a reliable, albeit not perfect "benchmark" that "matters to professionals and public alike" (Thomas et al., 2015, p. e1000). It will subsequently be argued that a comparable meta-analysis of studies of the prevalence rate of ADHD in prisons will yield a comparable reliable benchmark estimate that will matter to professionals and public alike, as it will provide a solid basis for the provision of services.

Second, the importance of *input from collateral informants* cannot be overestimated since exclusive reliance on self-report can lead to a vast underreporting of symptom severity by young adults (Barkley, 2016; Molina & Sibley, 2014). For example, in the Milwaukee longitudinal study of child clinic cases of ADHD (n = 158) (Barkley, Murphy, & Fischer, 2008) found that by age 21 only 4% of the probands reported enough current symptoms to qualify for a DSM-IV diagnosis. However, use of parent report on the same criteria found that a "whopping 10 times more still met criteria for the disorder" (i.e., 46%) (Barkley, 2016, p. 7). The reliability of the parent-report over the adult self-report in providing an estimate of current ADHD symptoms was supported by its far greater association with various concurrent measures of impairment (Barkley et al., 2008). The study also found that the probands could not accurately recall age of onset of their symptoms. The underreporting of past symptoms probably accounts for the conclusion in some studies that ADHD onset can occur in adulthood (Faraone & Biederman, 2016), and suggests that "patients should not be denied services because DSM-5 requires an earlier onset" (p. 655). Similarly, in the most recent follow-up (age 25) of the landmark Multimodal Treatment Study of Children with ADHD, there was a vast discrepancy between self- and parent-reported ADHD symptoms, with parent-reported symptoms being 40–137% higher than self-report (depending on the number of factors used to classify cases) and correlating well with functional outcomes (Roy & Hechtman, 2017; Sibley et al., 2017). Additional impressive support for the importance of parental report comes from a meta-analysis of prevalence studies by Willcutt (2012), who reported that when 20 of the 86 studies in his meta-analysis used a "best estimate diagnostic procedure in which a team of experienced clinicians evaluated all available clinical information to reach a consensus diagnosis" (p. 492), the findings on prevalence were almost identical to those based exclusively on parent report alone: 6.1% parent ratings; 5.9% best estimate diagnoses. Thus, there is the rather remarkable finding that ratings based solely on parent report are virtually identical to those based on *best estimate* protocols, which would seem to encompass all 6 components of the MA ideal protocol.

Third, regarding the use of DSM–based ADHD rating scales, the criteria should be based on DSM-5, not DSM-IV, because the failure to do so will result in a significant underestimate of true prevalence as the following research has found. The extension of the age-of-onset criterion from 7 to 12 in DSM-5 can impact the prevalence rate. Vande Voort, He, Jameson, and Merikangas, (2014) compared the prevalence of DSM-IV versus DSM-5 ADHD in a nationally representative sample of 1,894 participants 12 to 15 years of age in which trained lay interviewers conducted a structured interview with parents. The study found an increase in prevalence from 7.38% to 10.84% (14.10 male; 7.57 female). The children whose onset was between the ages of 7 and 12 years were not systematically different in terms of severity and comorbidity when compared to children whose onset occurred before the age of 7 years. A study of adults which pooled the results of two general population surveys in the United States reported a prevalence rate of 8.2% (approximately the same for both males and females) based on DSM-5 criteria (Ustan et al., 2017). This finding is almost double the 4% prevalence reported just over 10 years earlier by the same group using similar approaches (Kessler et al., 2006; Shaw, Ahn, & Rapoport, 2017).

Finally, a further consideration regarding DSM-5 that is relevant to estimating true prevalence is the little noticed, if not totally ignored diagnostic category which applies to presentations where symptoms characteristic of ADHD that cause significant impairment are below the threshold of 5 or 6 criteria: "Other Specified" or "Unspecified" ADHD. The importance of this

subthreshold diagnosis is that it reflects the fact that "overwhelming research evidence indicates that most forms of psychopathology reflect extreme expressions of continuously distributed traits" (Beauchaine & Klein, 2017, p. 49), including ADHD. There is a robust, if not unanimous, consensus that the presentations of ADHD are best understood as representing two distinct, albeit highly related spectra or dimensions of inattention/disorganization and hyperactivity/impulsivity on which individuals differ (Ahmad & Hinshaw, 2016; Nigg, 2016; 2017b; Roberts et al., 2015; Tharpar, 2016). Juveniles and young adults with subthreshold ADHD often have impairments comparable to those who met full criteria (Guelzow, Loya, & Hinshaw, 2017; Hayden & Mash, 2014), and subthreshold ADHD in childhood is predictive of full threshold ADHD in adolescence (Lecendreux, Konofal, Cortese, & Faraone, 2015).

PREVALENCE OF ADHD IN PRISON POPULATIONS

In their article, Murphy and Appelbaum refer to several studies reporting prison prevalence rates of ADHD ranging from 9% to 50% that mirror the wide variation in prevalence rates typically found in studies of the general population (Polanczyk et al. 2014; Thomas et. al., 2015; Willcutt, 2012). And, as with studies of the general population, the best solution to such variability is to conduct a systematic review and meta-analysis of prison studies of ADHD prevalence in order to arrive at a reliable estimate. Such an estimate was provided by a meta-analysis of 42 international studies (Young, Moss, Sedgwick, Fridman, & Hodgkins (2015) that Murphy and Appelbaum did not review. This meta-analysis found a prevalence of 21.7%. It also found that youth prevalence rates were not significantly different from estimates for adults, nor were there any significant differences for gender. However, this latter finding may not be reliable, as there were only a few data sets reporting on female prevalence. The estimate was based on the typical protocol used in the studies of ADHD prevalence in the general population, that is, standardized interviews conducted by trained interviewers. Thus, the standard that justifies the general acceptance of the general population prevalence estimate of 7% as a reliable benchmark warrants the acceptance of the 21.7% as a reliable benchmark.

Further, it can be argued that the methodological shortcomings suggesting that the rate of 21.7% may be an overestimate are more than offset by the shortcomings suggesting it may be an underestimate. On the one hand, traumatic life events, comorbidity, and substance use disorders can mimic ADHD symptoms, which even trained interviewers who are not professionals may misinterpret as ADHD. On the other hand, ADHD symptoms/impairments have undoubtedly been underestimated (perhaps, vastly so) because of the failure to use input from collateral informants and because inmates may be less likely to report ADHD symptoms and impairments since the "structure, routine, and predictability of their daily schedule" reduces the likelihood of their occurrence (Murphy & Appelbaum, 2017, p. 4). The additional shortcomings of using the less sensitive criteria of the older DSM iterations and the failure to consider subthreshold ADHD would also tend to deflate a prevalence estimate.

CONCLUSION

Murphy and Appelbaum concluded their article by observing that if the prevalence rate is as high as 50% or more, the implications are dramatic. This estimate is of course an outlier/straw man that is certainly not endorsed by us or by any credible authority we know. What we maintain as true is that the voluminous research that would predict that the prevalence rates of ADHD in prisons are greater/much greater than rates in the general population has received strong confirmation from a current meta-analysis that provides an estimate of 21.7%, that is, a rate approximately 3 times the population rate. And, as the previous discussion has contended, the methodological shortcomings of studies that may have the effect of speciously inflating this rate are more than offset by the shortcomings that would have the opposite effect. The implications of such a rate are important since what Thomas and colleagues (2015) noted regarding the significance of the ADHD prevalence estimate in the community is equally applicable to an ADHD prevalence estimate in prisons. Namely, if a disorder is common, then a clinician will be alert to considering it as a possible diagnosis. It is therefore abundantly clear that regardless of the exact decimal point, there are high rates of ADHD among offenders. Therefore, since an accurate diagnosis is "arguably the single most important thing a clinician can do for patient" (p. e1001), this is of no small importance. In short, the bottom-line conclusion is that the prevalence rate of ADHD in prisons is clearly high enough to warrant clinicians being alert to considering it as a possible diagnosis and the necessary prelude to treatment. The benefits of treatment have been strikingly illustrated in a correlational study using data from the Swedish registry which found that the crime rate (including violent crime) was reduced by around one-third when people with ADHD received treatment with stimulant medication (Lichtenstein et al., 2012). This study therefore documents, perhaps as well as any study can, the importance of diagnosing ADHD in incarcerated populations. We conclude by proposing the following *pragmatic* protocol for diagnosing ADHD in an incarcerated population, prescinding from a discussion of treatment either within prisons or the community, which would require another paper. *Pragmatic* refers to the necessity of balancing the most important components of an assessment against the constraint of time and personnel in prison systems for conducting an ideal, rigorous assessment.

The protocol is informed by the prior discussion, by Murphy and Appelbaum's (2017) protocol, and by what is arguably the best study to date to provide guidelines for optimizing sensitivity and specificity in diagnosing ADHD in young adults (Sibley et al., 2017). The first step is to accurately screen for ADHD. In this regard, Murphy and Appelbaum ask, "Do we need to develop new normed rating scales or other instruments for use with prison populations?" (p. 4). The answer is a

resounding yes! Murphy and Appelbaum do not appear to be aware of the screen (B-BAARS) that was empirically developed from data of male offenders and which reports excellent specificity and sensitivity. This screen is only 6 items and is therefore a feasible and acceptable tool to administer in this setting (Young et al., 2016). It can be downloaded for free from www.psychology-services.uk.com.

If the inmate screens positive, the second step would be to have a qualified doctoral-level professional conduct an assessment using a well-normed ADHD rating scale, a thorough diagnostic interview, and history-taking informed by collateral input preferably, if possible, from a parent. Given the previously discussed findings of Willcutt (2012) as well as the importance of parental input as being an effective way to detect malingering (Sibley et al., 2017), this component is of paramount importance. It also provides a pragmatic approach in that it substitutes as much as possible for the time-consuming efforts to garner all historical records. This second step should also be guided by the findings of Sibley and colleagues (2017) who noted that the rating scale has superior symptom detection properties, whereas the semi-structured interviews may be particularly helpful for detecting symptoms when collateral informants are not available. Also, a semi-structured interview allows clinicians to explore the presence of symptoms/impairments when the interviewee provides ambiguous or incomplete information. If either informant reports a symptom or impairment, it should be counted as present.

Third, the clinician should evaluate all the data in terms of DSM-5 criteria, keeping in mind the following refinements. First, Sibley and colleagues (2017) reported that a norm-based threshold (i.e., a threshold according to the presence of impairment or elevated symptomatology when compared to control-group norms) of 4 symptoms rather than the 5 required by DSM-5 criteria optimized sensitivity and specificity in diagnosing ADHD. This finding provides impressive support for considering DSM "Other Specified" or "Unspecified" ADHD diagnoses. Second, if collateral input is not available, and if ADHD symptoms and ADHD–related impairments are clearly present, failure to meet the DSM-5 age of onset criterion should be viewed with some skepticism (Faraone & Biederman, 2016). This coheres with Appelbaum's (2009) recommendation regarding the DSM-IV (which is equally applicable to the DSM-5) of allowing "this criterion to be met with a relatively low threshold of documentation…because of the understandable difficulty some inmates have in providing childhood data" (p. 47).

Finally, and most importantly regarding pragmatism, it is instructive to note that Appelbaum's 2009 recommendation that the protocol required psychological testing for cognitive and attention problems by a doctoral psychologist, despite its "labor-intensive" requirement and the recognition that such testing "might have limited diagnostic validity for ADHD" (p. 27) was dropped in the 2015 update (Appelbaum & Murphy, 2015). We are in full agreement with this deletion. Such neuropsychological testing lacks ecological validity (Barkley, 2015b), and evidence establishing its incremental validity is scant to nonexistent as far as the authors know.

In sum, although "much remains to be done to *better* [italics added] understand, assess, identify, and treat" inmates with ADHD (Murphy & Appelbaum, 2017, p. 4), we already know enough to warrant routine screening for ADHD as the first step in diagnosis. The preponderant burden of future research falls on the subsequent steps in the assessment process and decisions regarding treatment.

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