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Antisocial Behavior and Executive Functions in Young Offenders☆

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ABSTRACT

Antisocial behavior is related to the injury of the prefrontal cortex and a growing body of research points to the executive dysfunction as a risk factor for the onset, maintenance and abandonment of delinquency. Due to the complexity of the study of executive functions and the diversity of methodologies used for the study of this relationship, the empirical evidence is divergent. The aim of this paper is to clarify the relationship between delinquency and executive dysfunction in juvenile samples. For this purpose, a meta-analysis is performed with 33 published articles until 2014. The results of the meta-analysis support the existence of an executive alteration in young offenders. The magnitude of this alteration could be influenced by the age and the type of test used to evaluate executive functions.

Conducta antisocial y funciones ejecutivas de jóvenes infractores

Palabras clave:
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RESUMEN

La conducta antisocial se relaciona con la lesión del córtex prefrontal, y un cuerpo creciente de investigaciones señala la disfunción ejecutiva como factor de riesgo para el comienzo, mantenimiento y abandono de la conducta delictiva. Debido a la complejidad del estudio de las funciones ejecutivas y a la diversidad de metodologías utilizadas para el estudio de esta relación, las evidencias empíricas son divergentes. El objetivo de este trabajo es clarificar la relación existente entre la conducta delictiva y la disfunción ejecutiva en muestras juveniles. Para ello se realiza un metaanálisis con 33 artículos publicados hasta 2014. Los resultados del metaanálisis apoyan la existencia de una alteración de las funciones ejecutivas en la población juvenil con conducta antisocial penada, y señalan que la magnitud de esta alteración puede verse influida por la edad y por el tipo de prueba utilizada para la evaluación de las funciones ejecutivas.

Introduction

Executive functions (EF) are defined as a set of high-level cognitive abilities that are involved in readjustment or adaptation of behavior in order to meet complex objectives requiring a novel, creative approach (Gilbert & Burgess, 2008). While there are numerous definitions that emphasize their participation in different cognitive processes (flexibility, attention, decision making, planning, fluency, inhibition and processing speed, etc.), executive functioning in short refers to a number of mechanisms involved in resolving complex situations (Friedman et al., 2008; Tirapu, Muñoz-Céspedes, & Pelegrín, 2002). Thus, EFs make it possible consider both the immediate consequences and the medium- and long-term repercussions of one's behavior (Bechara, Damasio, & Damasio, 2000), and to exercise adequate cognitive and emotional regulation (Barkley, 2001; García-Fernández, González-Castro, Areces, Cueli, & Rodríguez Pérez, 2014; Tirapu-Ustárroz, García-Molina, Luna-Lario, Roig-Rovira, & Pelegrín Valero, 2011). Two types of functions are described: "cold" EF, that is, metacognitive functions involved in processes like problem solving, planning and concept formation; and "hot" EF, those that coordinate cognition with emotion/motivation (Ardila & Ostrosky, 2008; Steinberg, 2005, 2007). Although EFs are primarily associated with the prefontal cortex (PFC), other brain areas involved in the circuits that

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connect with this area (gray nuclei, thalamus and cerebellum) also intervene in proper EF functioning (Masterman & Cummings, 1997). Consequently, the complexity of the functions, structures and connections incorporated in this concept make assessment especially challenging for researchers in this area (Flores, Ostrosky-Solís, & Lozano, 2008). It also explains why EFs are involved in the appearance of several disorders: dysexecutive syndrome (DS), autism spectrum disorders (ASD), Tourette's syndrome, attention deficit disorder (ADD), attention deficit with hyperactivity disorder (ADHD) and behavior disorders. In relation to antisocial behavior (ASB), the study of EFs cannot be simplified.

With regard to the onset and persistence of ASB, several theories and many authors indicate a number of risk factors that may increase its likelihood of appearing; these include school failure or dropout, peer influence, drug use, the neighborhood, family structure, parenting style, socioeconomic level, personal traits, opportunity and certain genetic and biological factors. In this line, Moffitt's taxonomy (1993) differentiates between factors involved in ASB that is typical of the adolescent stage, and factors involved in persistent ASB; she indicates that the presence of neurocognitive deficits from an early age is a key characteristic in individuals whose ASB appears early and persists throughout their life. It is also known that individuals with frontal damage tend to present significant impairments in behavior, in regulating their mood, in thought and in social behavior (Stuss & Levine, 2002), and that EF competency is key for optimal, socially adapted functioning (Lezak, 2004). It is therefore suggested that certain neuropsychological deficits, especially executive dysfunction, can be related to aggressiveness. Furthermore, the current rise in neuroscientific disciplines favors the study of biological, genetic and neuropsychological mechanisms involved in development of violent behaviors, and there is evidence that supports Moffitt's theory, with results in favor of the association between ASB and executive dysfunction (Price, Beech, Mitchell, & Humphreys, 2014; Tung & Chhabra, 2011).

There have been two attempts to date to clarify the relationship between ASB and EF: the Morgan and Lilienfeld (2000) meta-analysis and the Ogilvie, Stewart, Chan, and Shum (2011) meta-analysis. The former analyzes 39 studies with a total sample of 4589 participants, and its results yield a difference of 0.62 standard deviations between EF measures in antisocial groups and EF measures in the comparison groups. Moreover, of the 39 studies analyzed, 79% present an effect size indicating poorer test performance in the antisocial samples. However, results are heterogeneous depending on the ASB group and the type of EF measure used. More sizable effects were found in the group of adult delinquents ($d = 1.09$) and young delinquents ($d = 0.86$) and in the qualitative score on the Porteus Maze Test ($d = 0.8$). The Ogilvie et al. (2011) meta-analysis includes 126 studies and 14,786 subjects in the sample; its results show a mean effect of 0.44 under the fixed effects model, and 0.53 under the random effects model. Just as in the first study, the effects vary according to the ASB group and the type of EF measure used: the greatest effects are found in the group of delinquent adults ($d = 0.61$), the group of individuals with behavior disorder ($d = 0.54$), the group of psychopaths ($d = 0.42$); and on the SOP task (self-ordered pointing) ($d = 0.83$) and the Porteus Maze Test ($d = 0.71$). Therefore, although both meta-analyses find a robust relationship between ASB and poor performance on tasks that involve EF, the effect varies as a function of the groups and of the type of measure used. Consequently, it seems essential to analyze the relation between EF and ASB in more homogeneous antisocial groups, in order to outline the characteristic deficits in each subgroup.

For this reason, starting from a broad description of ASB—practicing behaviors that are not socially approved (Rutter, 2003)—these behaviors may or may not lead to psychopathologies related to antisocial personality disorders, dissocial disorder or behavior disorder, or to psychopathological personality traits (Hare, 1996). However, in our study we focus on a more specific ASB that can be operationalized in legal terms. Commonly known as delinquent behavior, we prefer to call it sanctionable antisocial behavior (S-ASB) in an attempt to unify terminologies from the fields of psychology, education and criminology. S-ASB refers to antisocial acts that break or transgress the law, that is, a classification established at any given time by the penal code, where some kind of sanction applies (García, Zaldívar, de la Fuente, Ortega, & Sainz-Cantero, 2012).

Finally, we study relations between EF and S-ASB during the stage of youth, based on certain criteria. On one hand, the population of minors found in the Juvenile Justice Services fits into this stage, as defined by the World Health Organization (WHO, 2001), who consider the stage to be a transition between childhood and adulthood, spanning the ages of 10–24 years, and having three periods: puberty or early adolescence, ages 10–14 years; middle adolescence, ages 15–19; and full youth, ages 20–24. On the other hand, the WHO (2003) indicates that crime, delinquency and juvenile violence are a public health problem typical of this life stage, and have severe social repercussions, increasing the cost of healthcare, social and judicial services, reducing productivity and devaluing goods, although in most countries, special juvenile penal systems hold young people responsible between 12–14 and 18 years of age, with measures in effect until full youth.

Therefore, the objective of this study is to quantify the relationship between EF and S-ASB in the specific group of young offenders, using the technique of meta-analysis.

Method

Article search and inclusion

The database search was performed between September and December 2014, using the key words shown in Chart 1. In addition, Figure 1 shows the search process that was followed, consisting of analyzing the prior meta-analyses that addressed studies related to the present task, and reinforcing the 2010–14 search. The studies taken into account span the period of 1942 to 2014.

The following criteria were used to select studies for this paper: (a) the sample used to study the relation between EF and ASB falls within the stage of youth; (b) the criterion for an ASB classification is behavior prohibited by the applicable penal system, in other words, the antisocial groups in the sample of each study are drawn from the systems and resources of Juvenile Justice, to ensure that we are addressing S-ASB; (c) EFs are measured using batteries, tests and standardized neuropsychological measures designed for this purpose; (d) the study includes a non-antisocial comparison group; (e) the results of the studies allow calculation of effect size, and (f) the language of publication is English or Spanish.

Codifying the information

After the selection of studies, an information collection template was prepared in Excel. In addition to the substantive variables of executive functions and S-ASB, any possible moderating variables were recorded, as well as the type of measure used to assess executive functions, gender (measured as the percentage of females in the sample), average age of the total sample, average age of the S-ASB group, average IQ of the sample, IQ of the S-ASB group, and study quality, measured on a 4-point Likert scale. Codification was carried out by two members of the research team, average agreement index for variable extraction was obtained with a Kappa estimate of 0.886 and ranging between 0.851 and 0.903. Nonetheless, final agreement was resolved with consensus from all the authors, after