



NEUROPSYCHOLOGICAL CORRELATES OF SELF-REPORTED IMPULSIVE AGGRESSION IN A COLLEGE SAMPLE

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(Received 24 March 1997)

Summary—The present study examined the neuropsychological correlates of impulsive aggression/violence using a population which is considered to be functioning 'normally' by societal standards, college students. Subjects were 12 college students classified as impulsive aggressive by self-report and 12 nonaggressive matched controls. All impulsive aggressive subjects reported a lifetime history of physical aggressive outbursts. The neuropsychological findings suggest that impulsive aggressives share a pathological focus involving specific executive control processes: impulse control and verbal strategic processing. These findings are consistent with the neuropsychological and psychophysiological findings in impulsive aggressive incarcerated criminals and support the notion of a specific behavioral syndrome associated with spontaneous aggressive outbursts. © 1997 Elsevier Science Ltd. All rights reserved

Key-Words: impulsive aggression, neuropsychology, self-report.

INTRODUCTION

Violence is one of the most predominant problems in society today causing untold human suffering and costing millions in tax dollars. Of homicides committed in the United States annually, approximately 29% are of an 'impulsive' nature (National Institute of Justice, 1994). Individuals who display impulsive aggression or episodic rage outbursts present a serious danger to themselves, their families and society at large. These individuals display intermittent aggressiveness grossly out of proportion to any precipitating psychosocial stressors. The intensity of these outbursts can vary from verbal aggressiveness to homicide. An understanding of the neural substrates which mediate the loss of behavioral control seen in impulsive aggression is critical if effective treatments and interventions are to be developed.

Within the literature on aggression, several neuropsychological and brain-imaging studies have implicated frontal/executive dysfunction in violent individuals (Pontius, 1987; Volkow & Tancredi, 1987; Raine, Buchsbaum, Stanley, Lottenberg, Abel & Stoddard, 1994). While the results of these studies indeed suggest that anterior and frontal areas are involved in violence, the studies cited tend to treat violence as a homogeneous construct combining premeditated and impulsive aggressive individuals into a single group. Furthermore, most of the *Ss* are either incarcerated prison inmates or neuropsychiatric patients referred for evaluation. Such research ignores the large number of individuals in the general population who commit nontrivial acts of violence yet have not come in contact with the criminal justice or mental health systems. These two sampling problems greatly inhibit the usefulness of the results in the development of interventions and treatments for reducing specific forms of violence.

The present study was designed to assess impulsive aggression in a population of individuals considered to be functioning 'normally' by societal standards, college students. It was hypothesized that *Ss* classified as impulsive aggressive, using self-report information, would show neuropsychological deficits characteristic of executive dysfunction.

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METHOD

Subjects

The original sample consisted of 499 students attending a state university who received credit toward a course requirement in return for their participation. All screening data were collected during regular class time. Ss were asked to complete the Anger Attack Questionnaire (Fava, Rosenbaum, McCarthy, Pava, Steingard & Blass, 1991) and the Buss–Durkee Hostility Inventory (BDHI; Buss & Durkee, 1957). The students ranged in age from 17 to 53 years old ($M = 23.01$, $S.D. = 6.21$); 67% were female. Of the original sample, 37 (7%) were classified as IA (see below). The six male and six female IA Ss with the highest number of aggressive incidents in the previous month were selected. Twelve age- and sex-matched control Ss were selected from among the 259 Ss (52%) classified as nonaggressive (NC; no reported temper outbursts in the previous six months). No Ss presently taking medication were included in the study.

Ss classified as impulsive aggressive (IA) met the following four criteria: (1) over the past six months, the S identified episodes where he/she became angry and enraged with other people in a way that was excessive or inappropriate to the situation; (2) at least two impulsive aggressive episodes occurred during the previous month; (3) during at least one of these episodes, the S physically attacked another person and/or destroyed objects; and (4) the S scored an eight or greater on the Irritability subscale of the BDHI. Previous research has demonstrated that Ss who score eight or greater on the Irritability subscale consistently present with chronic aggression control problems (Stanford, Greve & Dickens, 1995).

All Ss were interviewed to obtain information concerning temper control and past aggressive behaviour. Information concerning head injuries was also obtained. A S was rated positive for a head injury if he/she had been knocked unconscious for any period of time, had been diagnosed with a concussion by a physician or had suffered trauma to the head severe enough to require medical attention.

Neuropsychological and impulsiveness measures

Ss were administered the following neuropsychological and impulsiveness measures: Wisconsin Card Sorting Test (WCST; Heaton, Chelune, Talley, Kay & Curtis, 1993), controlled oral word association test (COWAT; Lezak, 1995), design fluency (Jones-Gottman & Milner, 1977), Trail Making Test (Trails A and B; Reitan, 1958), and the Barratt Impulsiveness Scale Version-11 (BIS-11; Patton, Stanford & Barratt, 1995). The WCST was administered and scored in accordance with Heaton *et al.*, 1993, except that all 128 cards were sorted rather than discontinuing the test after the completion of six categories. All protocols were scored blind to the S's group membership.

RESULTS

Group analyses

All 12 impulsive aggressive Ss described a lifetime history of physical aggression towards others. Nonaggressive controls reported that they had no problem controlling their temper and had never had an aggressive outburst. Six of the impulsive aggressive Ss described the most common target of their aggression as family members while the impulsive aggressive outbursts of the others were more generalized. Five of the impulsive aggressive Ss (42%) and two of the nonaggressive controls (17%) met criteria for a head injury. This difference was not statistically significant ($\chi^2 = 2.84$ [Yate's corrected], $P > 0.05$). Mean scores and ANOVA results for group differences on the cognitive neuropsychological measures are presented in Table 1. Errors on the Trail Making Test were analyzed using the chi-squared test. The two groups differed significantly on Trails B errors ($\chi^2 = 6.40$ [Yate's corrected], $P < 0.05$) while no significant differences were observed for Trails A ($\chi^2 = 0.56$ [Yate's corrected], $P > 0.05$).

Single-subject and qualitative analyses

Because group analyses can obscure important findings, the performances of the Ss in both groups were individually examined. Raw scores were converted to z-scores based on appropriate

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