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ASSESSMENT OF MEASURES OF IMPULSIVITY IN HEALTHY MALE VOLUNTEERS

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Summary—The current study evaluated the relationship between self-report and behavioral measures of impulsivity in 98 young adult male subjects. Principal components analysis of the self-report measures revealed four primary factors: the first demonstrated significant loadings with Eysenck's Impulsivity and Nonplanning scales and all subscales of the Barratt Impulsivity Scale, the second with Eysenck's Venturesome, Thrill and Adventure Seeking and Experience Seeking Scales, the third with the Boredom Susceptibility and Disinhibition subscales of Zuckerman's Sensation Seeking Scale, and the fourth with Zuckerman's State Sensation Seeking and the Kipnis Scale. The relationship between scores on these primary factors and performance on four behavioral measures of impulsivity, the Draw a line Slowly, Matching Familiar Figures, the Porteus Maze, and Go/No Go Discrimination tasks, was investigated. Only the fourth primary factor demonstrated a positive relationship, with errors of commission on the Go/No Go Task, and with the Q score in the Porteous Maze. The fourth factor was the only one that was independent of educational level, age and IQ. Of the behavioral tasks, the Go/No Go task is an operationalization of impulsivity as defined by Gray, Owen, Davis & Tsaltas (*Biological Bases of Sensation Seeking, Impulsivity, and Anxiety*, 1983) and may not be subject to demand characteristics found in the other behavioral and paper and pencil measures of impulsivity. Increased understanding of impulsivity is needed, and the fourth factor we defined, and the Go/No Go task, may hold promise for future research on one type of impulsivity.

INTRODUCTION

Interest in the evaluation of impulsivity has increased due to the association of impulsivity with aggressive behaviors and because of the suggestion that specific neurotransmitter abnormalities may underlie impulsive behaviors. Impulsivity is central to a number of psychiatric disorders either as a principal diagnostic feature (i.e. histrionic, antisocial, borderline personality disorders) or as a feature commonly associated with a diagnostic category (i.e. conduct, narcissistic personality and compulsive personality disorders). Impulsivity may also be an important precipitant of aggression (Valzelli, 1984; Roy, Adinoff & Linnoila, 1988) and suicide (Roy, Virkkunen & Linnoila, 1990; Brown, Ebert, Goyer, Jimerson, Klein & Bunney, 1982), and has a genetic component (Roy, 1983; Plutchik & van Praag, 1986). It is believed that low levels of the central nervous system neurotransmitter serotonin (5-hydroxytryptamine, 5-HT) may be related to impulsivity, which in turn may be the common link between behavioral acts such as suicide and violent assault, and the impulsive behavioral components of other psychiatric disorders (Soubrie, 1986; Linnoila, Virkkunen, Scheinin, Nuutila, Rimon & Goodwin, 1983; Lidberg, Tuck, Asberg, Scalia-Tomba & Bertilsson, 1985). However, very few clinical studies have measured impulsivity directly. Rather the role of impulsivity is typically inferred from behavioral psychopathology (i.e. suicide attempts, violent assaultive behavior).

Major issues in the study of impulsivity are the definition of this personality construct and its measurement in controlled laboratory settings. The definition of impulsivity varies across studies, including the failure to evaluate a situation as risky or dangerous (Eysenck & McGurk, 1980), acting without thinking (Barratt & Patton, 1983), the inability to plan ahead (Barratt & Patton, 1983; Eysenck & Eysenck, 1977; Buss & Plomin, 1975), the tendency to respond quickly to stimuli rather than inhibiting responses (Barratt & Patton, 1983; Prior & Sanson, 1986; Buss & Plomin, 1975), and the failure to withhold a response that will lead to punishment or a deficit in passive avoidance learning (Gray, Owen, Davis & Tsaltas, 1983). In a clinical setting, impulsivity is generally defined by deviant behaviors in the life history of an individual. For example, Glueck and Glueck (1968) stated that impulsivity is identified by the repetition of the deviant behavior and not the uniqueness of deviant behavior. Similarly, Oas (1983) defined chronic impulsivity as a persistent tendency to emit

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inappropriate or pathological behavior characterized by a lack of reflectivity and delay. The DSM-IV characterizes impulse-control disorders as the failure to resist an impulse, drive, or temptation to perform an act that is harmful to the person or to others (American Psychiatric Association, 1994). These latter definitions do not allow for the evaluation of impulsivity in normal control *S*s. Further, the measurement of impulsivity should be separate from the clinical diagnostic categories.

Within the laboratory, the assessment of impulsivity can be accomplished by several paper-and-pencil questionnaires: Eysenck's impulsivity questionnaires (Eysenck & Eysenck, 1977; Eysenck & McGurk, 1980), the Kipnis questionnaire (Kipnis, 1971), and Barratt's Impulsivity scale (Barrett & Patton, 1983). Impulsivity also appears to be a component of psychopathy (Hare, 1991) and sensation seeking (Zuckerman, 1979). However, the subscale of Thrill and Adventure Seeking obtained from the Sensation Seeking Scale appears to be associated with risk-taking behaviors that are often carefully planned to minimize physical danger as found in mountain climbers (Zuckerman, 1993). Thus the subscale of Thrill and Adventure Seeking may be conceptually different from other self-report measures of impulsivity. Behavioral measures of impulsivity have been constructed in order to measure different components of impulsivity. These include the inability to plan ahead (i.e. Porteus Maze, Trails A and B), tests measuring speed of response and number of errors (i.e. Matching Familiar Figures Test, reaction time tests), ability to inhibit responding or passive avoidance learning (i.e. Go/No Go discrimination tasks), and ability to inhibit motor control (i.e. "Draw a line slowly" or "Walk a line slowly").

The purpose of the present study was to examine the relationship between behavioral measures of impulsivity and first and second order factors derived from paper-and-pencil measures of impulsivity. We hypothesized that factors related to impulsivity would be associated with increased errors and speed of response, whereas factors associated with thrill and adventure seeking would be associated with decreased errors and speed of response.

METHOD

Subjects

A total of 101 English speaking males were recruited via a newspaper advertisement in the metropolitan area of Montreal. *S*s were between the ages of 18 and 35 yr, denied any current psychopathology or psychiatric history (e.g. affective disorders, assaultive violent behavior), and medical problems (e.g. cardiovascular disease, diabetes, gastrointestinal problems). Each *S* completed a battery of paper-and-pencil questionnaires and behavioral tasks.

Assessment procedure

Paper-and-pencil questionnaires. The following paper-and-pencil questionnaires were completed by *S*s: Barratt Impulsivity Scale [BIS, version 11 (Barratt & Patton, 1983)] with subscales measuring Motor, Nonplanning and Attentional impulsivity obtained from 34 items scored as a 0 = 'rarely' to 3 = 'almost always'. Several scales are derived from Eysenck's questionnaires which include narrow Impulsivity (Eys-Impulsivity) and Venturesomeness (Eys-Venturesome) (Eysenck & McGurk, 1980), risk-taking (Eys-Risktaking) and non-planning (Eys-Nonplanning) (Eysenck & Eysenck, 1977). The Kipnis scale (1971) is derived from 56 autobiographical items relevant to activities during childhood and adulthood. The Sensation Seeking Scale (SSS) (Zuckerman, 1979) consists of the subscales entitled Boredom Susceptibility, Disinhibition, Experience Seeking and Thrill and Adventure Seeking. These latter subscales are measured each by 10 items in which *S*s choose between two statements. State sensation seeking (States) was measured by 15 adjectives rated for the current time period and scored from 1 = 'not at all' to 5 = 'very much' (Zuckerman, 1979). The Hare psychopath checklist consists of 29 items scored on a five-point Likert scale from 'Strongly disagree' to 'Strongly agree' (Hare, 1991).

*S*s also completed the Beck Depression Inventory (Beck & Steer, 1987), a 21 item scale in which the *S* chooses one out of four statements which best described his mood during the past 1–2 weeks. Furthermore, the Vocabulary subtest of the Wechsler Adult Intelligence Scale—Revised (WAIS-R) was administered. Raw scores were converted to scaled scores, and the intelligence quotient (IQ) equivalent score was determined by the appropriate age group. Previous research on the WAIS-R has