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Different Personality Patterns in Non-Socialized (Juvenile Delinquents) and Socialized (Air Force Pilot Recruits) Sensation Seekers

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Abstract

Young delinquents are known to be sensation seekers. Not all sensation seekers become delinquents: many engage in socially accepted activities, such as mountaineering or parachute jumping. The present study compares 47 juvenile delinquents (mean age 17 years) with 18 Swedish air force pilot recruits (mean age 23 years) and 19 conscripts (mean age 18 years) as a control group. Sensation-seeking behaviour, impulsiveness, and psychiatric/psychological vulnerability were measured by the Zuckerman Sensation-Seeking Scales (SSS), the Karolinska Scales of Personality, and the Eysenck Personality Questionnaire. Two separate multivariate analyses of variance were performed, followed up by stepdown analyses to identify those personality scale scores that contributed uniquely. In order to clarify the relationships, the pooled within-group correlations among scales were computed. Juvenile delinquents and pilot recruits were both high in sensation seeking, but on different subscales. Delinquents were high in impulsiveness, somatic anxiety, and extraversion–sociability, and low in socialization, suggesting psychiatric/psychological vulnerability. The findings may have implications for the treatment of juvenile delinquents. Copyright © 2001 John Wiley & Sons, Ltd.

INTRODUCTION

Biopsychology and violence

Much research on human violence has focused on neurochemistry and personality traits related to psychopathy (e.g. impulsiveness and sensation seeking). Sensation seeking has been defined by Zuckerman (1979, p. 10) as 'the need for varied, novel, and complex

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sensations and experiences, and the willingness to take physical and social risks for the sake of such experiences'. Sensation seeking has emerged as an important explanatory construct for many kinds of deviant behaviour, including the use of alcohol, illegal drugs, and criminality. The question of why some sensation seekers become well socialized, and engage in socially accepted thrills and adventures, while others become socially delinquent is of both theoretical and general interest for the understanding of problems associated with deviant groups.

Sensation seeking, impulsiveness, and serotonin

Together with traits such as extraversion and impulsiveness, and to some degree aggression, sensation seeking has been related to low levels of platelet monoamine oxidase (MAO) (Stålenheim, von Knorring and Oreland, 1997), which is a stable marker with a predominant genetic component (Pedersen, Oreland, Reynolds and McClearn, 1993), assumed to reflect central serotonergic activity (for reviews see Oreland, 1993, and Oreland and Hallman, 1995).

Low central serotonergic turnover, supposedly indicated by low platelet MAO activity or by low concentration of 5-hydroxyindoleacetic acid (5-HIAA) in the cerebrospinal fluid, is found in patients who have committed or attempted violent suicide (Åsberg, Träskman and Thorén, 1976), psychopaths diagnosed by Cleckley's (1976) psychopathy concept (Lidberg, Modin, Oreland, Tuck and Gillner, 1985), and also in impulsive violent subjects (Brown, Ballanger, Minichiello and Goodwin, 1979). Low central serotonin levels can also predispose individuals to acute breakdown in the presence of stress or somatic disease (Virkkunen *et al.*, 1994). However, persons with socially acceptable sensation-seeking behaviour, such as mountain climbers and pathological gamblers, have also been found to have low MAO levels, suggesting low serotonergic activity (Carrasco, Saiz-Ruiz, Hollander, Cesar and Lopez-Ibor, 1994; Fowler *et al.*, 1980). Thus the serotonin system seems to be involved in impulsive violent acts and sensation-seeking behaviour, while also indicating a specific type of psychiatric/psychological vulnerability.

Psychopathy profiles

Psychopathy is an important clinical construct and refers to a relatively stable personality. It is likely that personality traits and behaviours that define adult psychopathy are established in childhood (Lahey and Kazdin, 1990; Robins, 1966; Robins and Rutter, 1990). Cleckley's psychopathy concept is reflected in a 20-item symptom-construct rating scale, the Psychopathy Checklist—Revised (PCL-R; Hare, 1991). The PCL-R has been divided into two factors: factor 1 describes interpersonal characteristics of *egocentricity, lack of remorse, and callousness*, while factor 2 reflects *impulsiveness and antisocial or unstable lifestyle* (Harpur, Hare and Hakstian, 1989). Factor 1 differentiates psychopathy from ordinary criminality.

Recent research among forensic patients shows that subjects who score high on PCL-R factor 1 also have high scores on impulsiveness, monotony avoidance, verbal aggression, and suspicion, and that they have low scores on social desirability. Interestingly, the socialization scale from the Karolinska Scales of Personality (see below) had no relationship with factor 1 in male forensic psychiatric patients (Dåderman and Jonson, submitted; Stålenheim and von Knorring, 1998). Moreover, af Klinteberg, Humble, and Schalling (1992) showed that criminal psychopaths have high scores on psychoticism (i.e. emotional coldness, low empathy, high hostility, and inhumanity) and neuroticism in the

Eysenck Personality Questionnaire (see below). It seems likely that the PCL-R factor 1 is related to psychoticism. The psychoticism scale has been found to depict traits close *not* to psychosis, but rather to psychopathy (Robinson and Zahn, 1985).

Research suggests that psychopathy-related personality dimensions are stable over time and situations in both non-patient (Gustavsson, Weinryb, Göransson, Pedersen and Åsberg, 1996), and patient samples (Perris, Eisman, Eriksson, Jacobsson, von Knorring and Perris, 1979); and also in males admitted to forensic psychiatric assessment (Stålenheim, 1997).

Sensation seeking in criminal males

Our previous personality study in male juvenile delinquents (Dåderman, unpublished BSc thesis) was the first to investigate sensation-seeking traits in Swedish criminals on the basis of Zuckerman's sensation-seeking concept. The juvenile delinquents displayed high scores on all the Zuckerman sensation-seeking scales, with the exception of the more socially accepted thrill and adventure-seeking (TAS) scale, reflecting interest in sports and activities involving some physical danger. This finding is congruent with previous research in Finnish prison inmates (Haapasalo, 1990). Recent research among the present group of juvenile delinquents and normal young males shows that the juvenile delinquents displayed notably higher scores than the normal subjects on psychopathy-related personality scales, reflected in high scores on impulsiveness, monotony avoidance, verbal aggression, and suspicion, and in low scores on socialization, as well as degree of conformity, reflected in low social desirability and in high psychoticism (Dåderman, 1999).

Personality profiles of socialized sensation-seekers

In earlier research, a group of air force pilot recruits (af Klinteberg, Oreland, Hallman, Wirsén, Levander and Schalling, 1991, af Klinteberg, Hallman, Oreland, Wirsén, Levander and Schalling, 1992) were found to have higher scores in the two sensation-seeking scales, namely TAS and the disinhibition scale, as compared to conscripts. They also scored high on some psychopathy related KSP scales, namely, impulsiveness, monotony avoidance, and verbal aggression, and had low degrees of conformity, reflected in low social desirability and in high psychoticism scores. However, the air force pilot recruits did not have low MAO activity; and in neuropsychological tests they showed high levels of performance and lack of disinhibitory tendencies, which is why it was suggested that they, although they had high scores on sensation-seeking, did not show 'risk-taking' behaviour, which might be more closely linked to low MAO (af Klinteberg, Hallman, Oreland, Wirsén, Levander and Schalling, 1992).

Aim of the study

Both juvenile delinquents and air force pilot recruits have shown high risk-taking and sensation-seeking behaviour. Both groups also displayed high scale scores in some psychopathy related personality traits. However, the air force pilot recruits did *not* have the low MAO activity as had been found in other groups of sensation seekers.

The primary aim of the present study was to compare the personality profiles for these two groups (i.e. non-socialized and socialized sensation-seekers), and for normal control subjects. We hypothesized that *specific* differences in personality profiles could be found between these groups of sensation-seekers, where some indicators of psychiatric/

psychological vulnerability, *not* present in the air force pilot recruits, could point to the mechanisms behind delinquent behaviour.

METHOD

The male group of juvenile delinquents

Forty-seven adolescent males with a mean age of 17 years (SD 1.2 years, range 14 to 20 years), with IQ within normal range, and with a mean education of 8.2 years (SD 1.4 years), were recruited from four representative Swedish national correctional institutions for severe juvenile offenders. The investigated institutions consisted of a total of five closed emergency and evaluation departments (maximum security), two closed correctional departments, and four open correctional departments. The Uppsala University Ethics Committee approved the study. In addition, the heads of the institutions and the juvenile delinquents gave their permissions. The group has previously been studied in other regards (Dåderman, unpublished BSc thesis, 1999; Dåderman and Lidberg, 1999; Dåderman, Törestad, and Wennberg, submitted). Information about offences committed by subjects from age 15 was supplied by the Swedish National Police Board. This data covered all offences leading to public prosecution and conviction. Altogether the 47 subjects had been convicted of more than 700 crimes prior to our assessments. Approximately 80 per cent of the subjects were violent offenders. Furthermore, around 75 per cent had a high rate of alcohol and drug abuse. Almost all were tobacco smokers. More than 60 per cent abused alcohol, which was involved in almost all of their crimes. About 40 per cent abused flunitrazepam. Almost half of them used cannabis every day. About 30 per cent had symptoms of dyslexia.

The air force pilot recruits and the normal male adolescent subjects

The group of air force pilot recruits ($n = 18$), all male, with a mean age of 23 years (range 22–24 years) belonged to a class receiving pilot education, and had passed the selection procedure of the Swedish Royal Air Force. The control group of normal-IQ male adolescents ($n = 19$) with a mean age of 18.1 years (range 17 to 19 years) with a minimum education of 9 years was randomly selected conscripts, who had been tested for one day for entry into compulsory military service. Both air pilot recruits and conscripts have previously been studied by our group (af Klinteberg *et al.*, 1991, af Klinteberg, Hallman, Oreland, Wirsén, Levander and Schalling, 1992). In contrast to other high risk-taking groups, for example, mountain climbers, the group of air force pilot recruits did not have lower platelet MAO activity than the conscripts. The air force pilot recruits had, however, above average serum levels of adrenal androgen steroids (dehydroepiandrosterone sulphate, DHAS), which may be reflecting aggressiveness/assertiveness and 'super-male' behaviour.

Psychiatric, neuropsychological, and biochemical screenings were performed on all subjects by trained clinicians (JH, psychiatrist; AWM, neuropsychologist).

Personality inventories

The following three personality inventories were administered in order to measure personality traits.

(i) *The Zuckerman Sensation-Seeking Scales (SSS)* (Zuckerman, 1979). The SSS form V consists of 40 forced-choice items (ten items for each scale). This version was used in juvenile delinquents. The group of air pilot recruits and conscripts were administered the Zuckerman SSS form IV, which consists of 72 forced-choice items. Results in both versions were transformed into T scores, taken from a group of normal subjects (Zuckerman, 1979), and are thus comparable. The SSS measures the general factor (G in form IV; the sum of the four subscales is expressed in a total score in form V) of sensation seeking, and four specific factors: thrill and adventure seeking (TAS), experience seeking (ES), disinhibition (Dis), and boredom susceptibility (BS). Dis, ES and, to some extent, TAS scales are particularly important for the present study. High scores on the Dis scale reflect disinhibited behaviour in the social sphere, for example by partying and seeking variety. ES indicates a tendency to seek novel sensations and experiences through the mind and senses. Typical examples are the sensations found in listening to arousing music, and through social non-conformity, for example, association with groups on the fringes of conventional society. High scores on the TAS scale indicate a tendency to do things that are a little frightening. These items express a desire to engage in physically risky activities or sports (such as parachuting, scuba diving, or downhill skiing) that provide unusual sensations of speed or the defiance of gravity. Cross-cultural reliability and validity studies show good results (for a review, see Zuckerman, 1994).

(ii) *The Karolinska Scales of Personality (KSP)* (Schalling, Åsberg, Edman and Oreland, 1987). This included a socialization scale based on items from the Gough Delinquency scale (Gough, 1960). A role-taking theory of psychopathy was the basis for the construction of the scale. It was assumed that the scale reflects the capacity to view oneself as a social object, from the standpoint of others, and internalize social norms. The scale reflects negative childhood experiences, poor school and family adjustment, and general dissatisfaction. In a series of studies, the scale differentiated between delinquents and non-delinquent groups and between groups of first offenders and recidivists. According to Hare and Cox (1978), this scale is useful for identifying psychopathic persons. Thus, psychopaths and delinquents are considered to be less socialized and lack the psychological ability to observe oneself from the viewpoint of another. The KSP consists of 135 questions grouped into 15 scales, and into four main constructs (see e.g. Schalling *et al.*, 1987). The KSP scales are not intended to cover 'the whole personality' but rather to measure certain vulnerability factors underlying aspects of psychopathology.

(iii) *The Eysenck Personality Questionnaire (EPQ)* (Eysenck and Eysenck, 1975). The EPQ-I version was used. This includes an impulsiveness scale from the Impulsiveness–Venturesomeness–Empathy (IVE) inventory (Eysenck and Eysenck, 1978). The EPQ-I consists of 114 true/false questions, which are classified into five scales: extraversion, neuroticism and psychoticism, as well as a lie scale and the impulsiveness scale. The extraversion scale measures a higher order factor of extraversion, two of the most important components of which are sociability (a preference for company) and impulsiveness (a tendency to act impulsively on the spur of the moment) (Schalling and Åsberg, 1985). Subjects high on psychoticism tend to be solitary, inhumane, insensitive, and hostile to others, and to enjoy upsetting and 'making a fool' of other people, rather than being prone to psychotic disease.

In the Swedish population, psychopathy-related traits, as assessed by the KSP or EPQ-I, are not related to IQ (Bergman, Bergman, Engelbrektson, Holm, Johannesson and Lindberg, 1988).

Earlier research in normal subjects shows that some of the KSP scales show inter-correlations and that the KSP scales have specific relations to the EPQ factors (Schalling *et al.*, 1987). The patterns of correlations between the KSP, EPQ-I, and SSS-V scales in the present group of juvenile delinquents was recently reported (Dåderman, 1999).

Treatment of data

To detect the mean differences between groups (juveniles and air force pilot recruits versus normal adolescent males) multivariate analyses of variance (MANOVAs) were carried out. In the presence of multicollinearity (i.e. very high correlation among dependent variables (DVs)) MANOVA is more powerful than the separate univariate tests (Tabachnick and Fidell, 1996). It protects against type I error (i.e. to erroneously conclude the presence of a significant difference) due to multiple tests of (likely) correlated DVs. The pooled within-group correlation matrix was provided by SPSS MANOVA. Finally, Roy–Bargmann stepdown analyses identified those DVs that contributed uniquely. Appropriate corrections for unequal sample size in our groups were made.

Two forms of the Zuckerman SSS were used (see above). For this reason, the mean personality scores for the groups were transformed into age and sex-adjusted T scores taken from a normal population (for a description of the normative sample, see Zuckerman, 1979).

DVs were mean T scores (SSS) (or mean raw scores (EPQ-I and KSP)) on personality scales. Two separate MANOVAs were performed, one on the SSS and another on the selected scales from EPQ-I and KSP.

RESULTS

Zuckerman Sensation-Seeking Scales

In accordance with the general aim of the study, a 3 (groups) $\times$ 4 (scales) MANOVA was first performed on four DVs: TAS, ES, Dis, and BS from the Zuckerman SSS. Independent variables (IVs) were three groups (see above). There were no univariate or multivariate within-cells outliers at $p < 0.001$ (two-tailed tests). Results of evaluation of assumptions of normality, homogeneity of variance–covariance matrices, linearity, and multicollinearity were satisfactory.

With the use of Pillais' criterion, the combined DVs were significantly affected by group, $F(8, 158) = 8.34$; $p < 0.0001$.

Because MANOVA showed a significant effect, it was appropriate to investigate further the nature of the relationship among the IVs and DVs. The degree to which DVs are correlated provides information as to the independence of personality traits. Pooled within-cell correlations among DVs, adjusted for IVs, are shown in Table 1.

The correlations among BS, ES, and Dis were 0.25–0.47 so it was considered appropriate (cf. Tabachnick and Fidell, 1996) to follow up the MANOVA by a Roy–Bargmann stepdown analysis to identify those DVs that contributed uniquely. All DVs were judged to be sufficiently reliable to warrant stepdown analysis. For this study, the following priority order of DVs was developed: TAS, ES, Dis, and BS, that is, the same rank-order position in both forms of the SSS. This was done with the hope that the

Table 1. Pooled within-cell correlations among four dependent variables (values in mean personality scale scores in the Zuckerman SS scales, presented as T scores), for the combined groups of juvenile delinquents ($n = 47$), air force pilot recruits ($n = 18$), and randomly selected conscripts, the latter representing normal adolescent subjects ($n = 19$). Standard deviations are reported on the diagonal

	TAS	ES	Dis	BS
Thrill and adventure seeking (TAS)	9.55			
Experience seeking (ES)	0.29	9.50		
Disinhibition (Dis)	0.21	0.25	6.94	
Boredom susceptibility (BS)	0.08	0.33	0.47	9.62

proposed ordering, given by Zuckerman (1994), may be used by other researchers over repeated sampling with further empirical studies. Moreover, this ordering was the most logical when previously obtained results on the SSS from the studied groups were accounted for (Dåderman, 1999; af Klinteberg, Hallman, Oreland, Wirsén, Levander and Schalling, 1992).

A unique contribution to predicting differences between groups was made by the TAS scale, stepdown $F(2, 81) = 3.82$, $p < 0.05$. As expected (see Introduction), the mean of T scores for air force pilot recruits was high, 54.9 (SD = 7.4), while the mean of T scores for juvenile delinquents on this scale was 48.0 (SD = 9.1), and for control subjects 47.6 (SD = 47.6). After the pattern of differences measured by the TAS was entered, a difference was also found on the ES scale, stepdown $F(2, 80) = 15.24$, $p < 0.0001$. The juvenile delinquents had higher mean T scores on the ES scale than the other two groups. The mean T score for juvenile delinquents on this scale was 59.6 (SD = 10.5), whereas for air force pilot recruits it was 50.8 (SD = 6.5). A difference was also found on the Dis scale, stepdown $F(2, 79) = 13.65$, $p < 0.0001$; both the juvenile delinquents and air force pilot recruits had higher mean T scores than the conscripts on this scale, suggesting the hedonistic pursuit of pleasure through extraverted activities in the social sphere. The mean T score for juvenile delinquents on the Dis scale was 60.3 (SD = 7.3), whereas the mean T score for air force pilot recruits was 58.2 (SD = 7.3). The mean T scores for conscripts on all sensation-seeking scales were, in general, close to 50. This supports the assumption that they constitute a random sample of young men.

Mean personality scale scores transformed into T scores (see the 'Method' section) for the group of juvenile delinquents, the group of air force pilot recruits, and the group of normal male adolescents (conscripts), are shown in relation to the mean T scores for a normal population (Figure 1).

From Figure 1, it can be seen that juvenile delinquents and pilot recruits were both high in sensation seeking, but on different subscales.

Karolinska Scales of Personality and scales from the Eysenck Personality Questionnaire

In order to find *specific* differences in personality profiles between these groups of sensation-seekers, that is, whether the juvenile delinquents are high (or low) in some personality traits, indicating a psychiatric/psychological vulnerability, which negatively affects a more socially approved choice of channel for the sensation-seeking behaviour, a 3 (groups) $\times$ 10 (scales) MANOVA was performed on ten DVs, selected from the EPQ-I and KSP inventories: impulsiveness (I), somatic anxiety (SA), socialization (So),

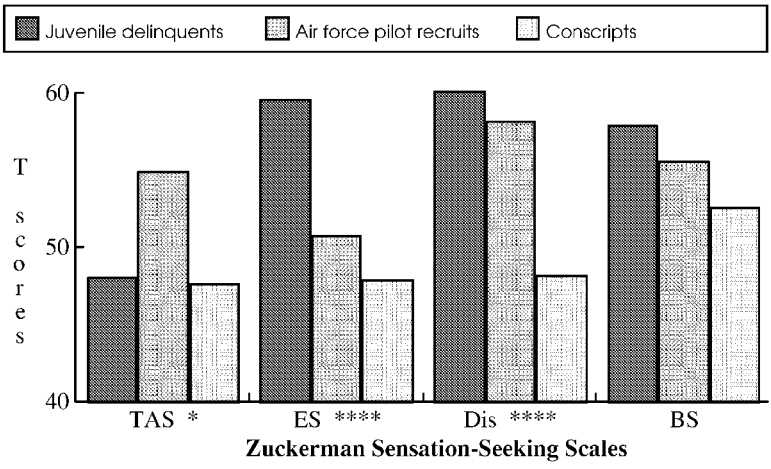

Figure 1. Comparison of mean personality scale scores on the Zuckerman Sensation-Seeking Scales, presented as T scores for the groups of juvenile delinquents ($n = 47$), air force pilot recruits ($n = 18$), and randomly selected conscripts ($n = 19$), the latter representing normal juvenile subjects. Results from MANOVA, followed up by Roy-Bargmann stepdown analyses, are reported (significance levels: $*p < 0.05$; $****p < 0.0001$); TAS, thrill and adventure seeking; ES, experience seeking; Dis, disinhibition; BS, boredom susceptibility

extraversion–impulsiveness (E_i), extraversion–sociability (E_s), monotony avoidance (M), psychic anxiety (PA), verbal aggression (VA), psychoticism (P), and lie (L). For this study, the above listed priority order of DVs was developed. According to Tabachnick and Fidell (1996) 'choice of variables is also a question of logic and research design rather than of statistics', 'In addition to choice of number and type of DVs is choice of the order in which DVs enter a stepdown analysis of Roy-Bargmann priority is usually given to more important DVs or to DVs that are considered causally prior to others in theory' (p. 380). A description of our strategies leading to choice of a set of the DVs is presented below.

When MANOVA is used, it is necessary to have more cases than DVs in every cell. Thus, the analysis allows us to select not more than 17 DVs. Our first strategy was to choose those DVs which, in the largest cell (i.e. juvenile delinquents), were the most reliable. Using recently reported results regarding psychometric properties of the KSP (Dåderman *et al.*, submitted), based on the present juvenile delinquent group, which were also confirmed – at least on some of the aggressiveness-related scales – by results in other groups of healthy subjects (Gustavsson, unpublished PhD thesis), we excluded eight out of 15 DVs from the KSP. The excluded DVs show low reliability in terms of internal consistency (i.e. with Cronbach's alpha lower than 0.60). The following DVs were excluded from the analysis: psychasthenia, indirect aggression, irritability, suspicion, guilt, social desirability, detachment, and inhibition of aggression. Scales from the EPQ-I show generally good reliability in healthy subjects as well as criminals (for a review see Eysenck and Gudjonsson, 1989); all DVs (including all extraversion components) from the EPQ-I, were initially included. When correlations among DVs are high, the usual solution is deletion of the related DV. On the basis of correlation analyses between all DVs within each cell, we considered additional deletion of the following DV from the KSP: muscular tension (showing high positive correlations with somatic anxiety); and the following DVs from the EPQ-I: IVE-I (correlations with, among other things, the impulsiveness scale from the KSP), neuroticism (correlations with anxiety-related scales from the KSP), and also extraversion (total scale), leaving a total of ten DVs (see the above listed DVs).

Prior to analysis, the ten DVs were examined, using various SPSS procedures, for accuracy of data entry, and to agreement of their distributions to the assumptions of multivariate analysis. One case (a juvenile delinquent) with extremely high *z*-scores on SA, another one (also a juvenile delinquent) with extremely low *z*-scores on So, and one (a control subject) with extremely high *z*-scores on E_s were found to be univariate outliers; one of these cases was identified through Mahalanobis distance as a multivariate outlier with $p < 0.001$. This multivariate outlier (a control subject) was deleted, leaving 83 cases for analysis. After this deletion, an additional case (a juvenile delinquent) with extremely low *z*-scores on E_i, another case (also a juvenile delinquent) with extremely high *z*-scores on PA, and also a case (a control subject) with extremely low *z*-scores on MA, were found to be univariate outliers; none of these cases was, however, identified through Mahalanobis distance as a multivariate outlier with $p < 0.001$. Results of the evaluation of assumptions of normality, homogeneity of variance–covariance matrices, linearity, and multicollinearity were satisfactory.

With the use of Pillais' criterion, the combined DVs were significantly affected by group, $F(20, 144) = 5.11$; $p < 0.0001$. Pooled within-cell correlations among DVs, adjusted for IVs, are shown in Table 2.

Many of the correlations among DVs exceeded 0.30 so again MANOVA was followed up by a Roy–Bargmann stepdown analysis to identify those DVs that contributed uniquely. All DVs were judged to be sufficiently reliable to warrant stepdown analysis. In the stepdown analysis each DV was analysed, in turn, with the highest-priority DV considered causally prior to others in theory or in previous research. A goal of this MANOVA was to identify and interpret *specific* differences in personality profiles between these groups of sensation-seekers, where some indicators of psychiatric/psychological vulnerability *not* present in the pilot recruits, in connection with sensation seeking, could point to the mechanisms behind delinquent behaviour. We assumed that the ordering used in this study (i.e. I, SA, So, E_i, E_s, M, PA, VA, P, and L) represents a meaningful ordering when psychopathy, violent behaviour, and use of heavy drugs were accounted for. (The rank-order position of a given DV in a system of DVs may change when new DVs are added to the system. Hence, a conclusion regarding the goodness of a DV subset must be made with some caution.)

Table 2. Pooled within-cell correlations among ten dependent variables (mean personality scale scores from selected scales from the Karolinska Scales of Personality (KSP) and Eysenck Personality Questionnaire (EPQ)), for the combined groups of juvenile delinquents ($n = 47$), air force pilot recruits ($n = 18$), and randomly selected conscripts, the latter representing normal adolescent subjects ($n = 18$). Standard deviations are reported on the diagonal

	I	SA	So	E_i	E_s	MA	PA	VA	P	L
Impulsiveness (I), KSP	4.76									
Somatic anxiety (SA), KSP	0.22	4.80								
Socialization (So), KSP	−0.013	−0.46	8.34							
Extraversion–impulsiveness (E_i), EPQ	0.41	0.27	−0.14	1.80						
Extraversion–sociability (E_s), EPQ	0.19	0.06	−0.02	0.36	1.11					
Monotony avoidance (MA), KSP	0.36	0.23	−0.16	0.41	0.19	4.28				
Psychic anxiety (PA), KSP	0.13	0.54	−0.45	0.14	−0.09	0.06	4.02			
Verbal aggression (VA), KSP	0.40	0.29	−0.24	0.30	0.24	0.37	0.01	2.74		
Psychoticism (P), EPQ	0.28	0.21	−0.36	0.23	−0.04	0.13	0.13	0.34	3.12	
Lie (L), EPQ	−0.36	−0.07	0.02	−0.21	−0.19	−0.10	−0.03	−0.29	−0.30	3.68

A unique contribution to predicting differences between groups was made by the KSP impulsiveness (I) scale, the highest priority DV, stepdown $F(2, 80) = 5.45$, $p < 0.01$. The juvenile delinquents had higher mean raw scores than each of the other groups on this scale. The mean raw score for juvenile delinquents was 28.3 (SD = 5.1), while the mean raw score for air force pilot recruits was 24.6 (SD = 3.9), and for control subjects 25.0 (SD = 4.5). After the pattern of differences measured by I was entered, a difference was also found on the KSP somatic anxiety (SA) scale, stepdown $F(2, 79) = 6.25$, $p < 0.01$; the juvenile delinquents had higher mean raw score than the air force pilot recruits and conscripts. The mean raw score for juvenile delinquents on the SA scale was 20.2 (SD = 5.6), while the mean raw score for air force pilot recruits was 14.9 (SD = 2.3), and for control subjects 16.2 (SD = 4.1). A difference was also found on the KSP socialization (So) scale, stepdown $F(2, 78) = 35.0$, $p < 0.0001$. The juvenile delinquents showed lower socialization (the mean raw score for juvenile delinquents was 46.7.0 (SD = 9.7)) than air force pilot recruits ($M = 68.2$; SD = 6.7) and control subjects ($M = 64.6$; SD = 5.4). With differences due to I, SA, and So from KSP already entered, the extraversion–sociability component (E_s) from EPQ-I made a unique contribution, stepdown $F(2, 76) = 5.7$, $p < 0.01$.

Thus, compared to air force pilot recruits, juvenile delinquents were high in impulsiveness, somatic anxiety, and extraversion–sociability, and low in socialization. This indicates a psychiatric/psychological vulnerability in juvenile delinquents that was *not* found in sensation-seeking pilot recruits.

DISCUSSION

The purpose of this study was to compare groups known to be high in sensation seeking, and to try to identify the specific traits that differ between socialized and non-socialized sensation seekers. The two contrasted groups chosen, juvenile delinquents and air force pilot recruits, seem to represent the extremes of groups with sensation-seeking behaviour, one with high social status and high demands on vocational skill and one expressing a socially unacceptable behaviour.

As reflected in the TAS scale, the juvenile delinquents, in contrast to the air force pilot recruits, were *not* interested in more socially desirable forms of sensation seeking. Interestingly, Mellstrom, Cicala and Zuckerman (1976) showed that TAS is negatively related to fear of physical harm (i.e. phobic situations involving exposure to heights, snakes, and darkness). Thus, risky but exciting sports are *not* to be considered as possible channels for high sensation-seeking juvenile delinquents. This is of interest, because attempts to use TAS-related activities as treatment of young delinquents have not been very successful.

The results from the other Zuckerman SSS suggest instead that juvenile delinquents are seeking sensation through the mind and the senses, in social drinking, drug use, and nonconforming life style. Compared to the air pilot recruits, as well as to the control subjects, the juvenile delinquents showed a strong tendency to seek novel sensations and experiences through the mind and senses, as in arousing music and drugs, reflected in high scores in the ES. Interestingly, almost one-quarter of the juvenile delinquents in our group often abused lysergic acid diethylamide (LSD) and ecstasy (once/week or more often at so-called 'rave parties'), and more than one out of ten abused these drugs occasionally (once or twice/month) – also at rave parties (Dåderman, unpublished BSc thesis).

Moreover, 40 per cent of the juvenile delinquents were flunitrazepam (a sedative–hypnotic benzodiazepine) abusers (Dåderman, unpublished BSc thesis; Dåderman and Lidberg, 1999). Calhoum, Wesson, Galloway and Smith (1996) and Schwartz and Weaver (1998) are among researchers who have reported that students at high schools and colleges in the USA at rave parties use flunitrazepam to obtain a euphoric 'high', similar to alcohol intoxication.

Both juvenile delinquents and air force pilot recruits were higher than conscripts in Dis, suggesting a hedonistic pursuit of pleasure through extraverted activities in the social sphere (Zuckerman, 1979, 1994). Zaleski (1984) studied a group of Polish men working in risky occupations (firemen, mountain rescue men, and mine rescue men). Only the Dis (high scores) distinguished them from a control group.

In a previous study, the juvenile delinquents differed from a group of normal young males in accordance with prior expectations (Dåderman, 1999). Thus, their personality profile was similar to the personality profile in adult criminal psychopaths (e.g. Lidberg, Levander, Schalling and Lidberg, 1978) and early-onset alcoholics who have a high degree of genetic vulnerability (type II; see e.g. von Knorring, Bohman, von Knorring and Oreland, 1985; Rydelius, 1983). They also had relatively low scores (close to mean) on the psychic anxiety scale (Dåderman, unpublished BSc thesis, 1999). (High psychic anxiety, reflected in worrying, anticipatory anxiety, and rumination, is not often seen in psychopathic subjects.) The high impulsiveness in combination with high somatic anxiety and relatively lower (normal) cognitive–social anxiety is related to 'narrow' impulsive behaviour, for instance, acting on the spur of the moment, making quick decisions, showing deficient inhibitory functioning, and displaying difficulties in foreseeing the negative effects of one's own behaviour. Moreover, high scores in somatic anxiety, reflecting autonomic overactivity and panic feelings, are highly correlated with muscular tension and psychastenia (Dåderman, 1999), reflecting low energy. Fatigue and insecurity and tenseness, in combination with low psychic anxiety, indicates a high vulnerability for the development of certain psychosocial disorders, for instance, alcohol and drug abuse. Interestingly, one out of four of our delinquent subjects from the study were amphetamine and/or cocaine abusers, which may imply self-medication to decrease symptoms of somatic anxiety.

The results further showed that juvenile delinquents had lower degrees than the air force pilot recruits and the conscripts in role- and perspective-taking ability, which was reflected in low scores in socialization. As previously noted, the socialization scale is useful for identifying psychopathic subjects (Hare and Cox, 1978). Juvenile delinquents from a youth prison, with high ratings in psychopathy, had higher scores on the Gough Delinquency scale, indicating lower socialization, than juvenile delinquents with low ratings in psychopathy (Schalling and Rosén, 1970). This association is, however, yet to be investigated. Interestingly, Stålenheim and von Knorring (1998), as well as Dåderman and Jonson (submitted), found, in series of forensic males, that socialization has no relationship with PCL-R factor 1. May Lindgren (personal communication, 1998) showed that Swedish unemployed juvenile subjects with dyslexia were lower in socialization than subjects without dyslexia. Also, in the present group of juvenile delinquents, subjects with dyslexia were lower than the other subjects in socialization (Dåderman, unpublished BSc thesis). These results suggest that, rather than indicating psychopathy, the socialization scale may reflect negative childhood experiences, poor school and family adjustment, social isolation, and current general dissatisfaction. All of these factors may be associated with more fundamental problems, such as unidentified dyslexia and/or hyperactivity disorder.

Clinical implications

The main finding of the present study is that although juvenile delinquents and air force pilot recruits share (to some degree) the trait of being impulsive sensation seekers, they differ as regards the kind of sensations they seek, and also by the fact that juvenile delinquents are high in many traits associated with psychiatric/psychological vulnerability, as well.

As previously mentioned, one out of five juvenile delinquents have had previous contact with a child/adolescent psychiatric or psychological clinic (Dåderman, unpublished BSc thesis). These contacts/assessments usually resulted in insufficient interventions. The measures we used in this study would be useful in an early identification of adolescents at high risk of becoming juvenile delinquents. These adolescents might be rescued from a criminal career by early and intense treatment, pharmacological and/or cognitive, at a great benefit for both the adolescent and society.

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