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A test of Eysenck's antisocial behavior hypothesis employing 11–15-year-old students dichotomous for PEN and L

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Abstract

This study examined the strongest form of Eysenck's antisocial behavior hypothesis. The hypothesis predicts that high scores on the P, E, and N traits combined with a low score on the L Scale from Eysenck's personality instrument is a profile that holds the greatest risk for the development of antisocial behavior. Ninety-four 11–15-year-old participants were selected from a pool of 763 potential participants. Participants in the study were divided into two groups of 47 matched by age and gender. One group consisted of participants who met the at-risk profile and the second group had the opposite profile. All participants were administered a self-report scale that assessed externalizing conduct behavior. An ANOVA was used to test the dichotomous categorization of the participants. All differences between the groups on the traits comprising the independent variable were highly significant. An independent *t*-test was used to test the difference between the groups on the dependent variable. This difference was highly significant in the predicted direction and yielded a very large effect size. A regression analysis determined that three of the four scores used for categorizing participants best predicted the dependent variable. Further, the analysis indicated a significant interaction between P and E. The results are discussed as well as suggested directions for future research.

Keywords: Temperament; Personality; Antisocial behavior; Children and adolescents; Research methods; Theory

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1. Introduction

The problem of children and adolescents exhibiting antisocial behavior (ASB) in public school programs has been widely discussed (Kamps & Tankersley, 1996; Maag & Howell, 1991; Nelson, Center, Rutherford, & Walker, 1991; Nelson, Rutherford, Center, & Walker, 1991; Skiba, Peterson, & Williams, 1997; Sprague & Walker, 2000; Vance, Fernandez, & Biber, 1998). There are many factors that contribute to the development of conduct problems (McMahon & Wells, 1998; Sprague & Walker, 2000), including a number of biological factors (Chess & Thomas, 1987; Niehoff, 1999). One clearly articulated theory that addresses biological factors in ASB is the biosocial theory of Eysenck (1997a). Eysenck's temperament-based theory is sometimes referred to as a three-factor model of personality in which the three factors are Extraversion (E), Neuroticism (N), and Psychoticism (P).

The Extraversion (E) trait is represented by a bipolar scale that is anchored at one end by sociability and stimulation seeking and at the other end by social reticence and stimulation avoidance. Extraversion is hypothesized to be dependent upon the baseline arousal level in an individual's neocortex and mediated through the ascending reticular activating system (ARAS) (Eysenck, 1967, 1977, 1997a). The difference in basal arousal between introverts and extraverts is evident in research on their differential response to drugs. Claridge (1995) reviewed drug response studies that demonstrated introverts require more of a sedative drug than do extraverts to reach a specified level of sedation. This finding is explained by the higher basal level of cortical arousal in introverts.

The Neuroticism (N) trait is anchored at one end by emotional instability and spontaneity and by reflection and deliberateness at the other end. This trait's name is based on the susceptibility of individuals high on the N trait to anxiety-based problems. Neuroticism is hypothesized to be dependent upon an individual's emotional arousability due to differences in ease of visceral brain activation, which is mediated by the hypothalamus and limbic system (Eysenck, 1977, 1997a).

The Psychoticism (P) trait is anchored at one end by aggressiveness and divergent thinking and at the other end by empathy and caution. The label for this trait is based on the susceptibility of a significant sub-group of individuals high on the P trait to psychotic disorders (Eysenck & Eysenck, 1976). Psychoticism is hypothesized to be a polygenic trait (Eysenck, 1997a). Polygenic refers to a large number of genes each of whose individual effect is small. Each of these "small effect" genes is additive, so that the total number inherited determines the degree of the P trait in the personality. When the small effect genes are found in combination with large effect genes associated with susceptibility to psychotic disorders, there is a significant increase in the risk for developing a psychosis.

Eysenck's theory predicts that individuals high on the P trait will be predisposed to developing antisocial behavior (Eysenck, 1997a). Further, an individual high on both the P and E traits will be predisposed to developing antisocial, aggressive behavior. Aggressive behavior is associated with low cortical arousal (high E) because a person with a relatively under reactive nervous system does not learn restraints on behavior or rule-governed behavior as readily as do individuals with a higher basal level of cortical arousal. Further, when such an individual is high on the N trait as well, this will add an emotional and irrational character to behavior under some circumstances.

Finally, antisocial individuals typically score lower than others on the Lie (L) Scale in Eysenck's personality questionnaire. The L Scale is a measure of the degree to which one is disposed to give

socially expected responses to certain types of questions. A high score on this scale suggests that the respondent is engaging in impression management. A low score suggests indifference to social expectations and is usually interpreted as an indication of weak socialization. The strongest form of Eysenck's antisocial behavior (ASB) hypothesis would be high P, E, and N with low L.

Center and Kemp (2002) conducted a meta-analysis of Eysenckian studies examining personality differences in children with and without behavior problems. This analysis found a large effect size (ES) (Cohen, 1988) for P (ES = 0.89), a low intermediate effect size for N (ES = 0.43), a small effect size for E (ES = 0.20) and an intermediate effect size for L (ES = −0.51). In this meta-analysis it became clear that what the prior studies had failed to do was examine the interactive effects of the traits in Eysenck's ASB hypothesis. The reason for this was that the prior studies employed Eysenck's personality traits as dependent variables and behavior as the independent variable.

Eysenck clearly views his personality traits as a psychometric approach to assessing antecedents (Eysenck, 1997b). His traits are psychometric constructs that provide a conceptual interface between the distal and proximal antecedents for behavior and outcomes or proximal and distal consequences. Conduct behavior should be classified as a distal consequence of various antecedents including temperament-based personality traits. The PEN traits serve as a conceptual interface between antecedents and consequences. Thus, they should be used as independent variables rather than distal consequences as has been the case in most studies. It is only by using the PEN traits as independent variables that the interactive effects can be explored. There presently appear to be only two studies that have used Eysenck's traits as independent variables in a test of one of his hypotheses (Jackson & Center, 2002; Jackson, 2003).

Eysenck (1976) proposed a hypothesis concerning good behavior and the development of conscience, which will hereafter be referred to as the morality hypothesis. In the morality hypothesis, Eysenck (1976) proposed that good conduct could be the result of socialization that establishes a system of conditioned inhibitions on behavior. Eysenck's hypothesis was that individual differences in susceptibility to conditioning result from the interaction of two temperament traits: Extraversion (E) and Neuroticism (N). Persons high on E are less responsive than persons low on E to the conditioning of operant and respondent responses. High N adds an emotional character to behavior, which often leads to an over reaction. Eysenck hypothesized that individuals who are low to average on both the E and N traits will be more likely to acquire an effective system of inhibitions or conscience. An effective system of behavioral inhibitions would, in turn, lead to a pattern of behavior likely to be characterized as good conduct.

Jackson and Center (2002) conducted an initial test of the morality hypothesis by organizing a sample of students into three groups according to their Eysenckian trait scores. One group was above the mean on both E and N; a second group was below the mean on both E and N, and the third group was mixed. All of the students had also completed the Externalizing Scale from the Youth Self-report Scale (YSR) (Achenbach, 1991). A significant difference ($p < 0.05$) was found between the groups defined as being either above the mean or below the mean on both the E and N traits and in the predicted direction. Jackson (2003) improved on the earlier study by using two groups of equal size and matched by age and gender of which one group was above the mean on both the E and N traits and the other group was below the mean on both traits. In addition, the effects of the P trait were controlled for by requiring that each participant's P score had to be within the range of normal variation. The combined effect of E and N were assessed for moral

reasoning as well as externalizing behavior. Moral reasoning was assessed using the Defining Issues Test (Rest, 1986) and externalizing behavior was assessed using the YSR. Statistically significant differences were found for both dependent variables at the 0.01 level and in the expected directions.

The current study examined the strongest form of Eysenck's ASB hypothesis. This hypothesis proposes that the interaction of P, E and N when all are high and combined with low L will create the greatest susceptibility to the development of antisocial behavior. To test the hypothesis participants who were low on P, E and N and high on L served as the contrast group.

2. Method

2.1. Participants

In order to get a sample of participants large enough to do a meaningful test of the ASB hypothesis data on a large pool of potential participants was collected. Participation was solicited from school systems located in a large metropolitan area in the southeastern United States. Participation was solicited by seeking approval from school systems' Protection of Human Subjects Review Boards to conduct the study. Participation of middle and high schools within those systems providing approval was then sought. Eleven to fifteen year old students in the schools agreeing to participate were then solicited. Each student agreeing to participate was then required to sign a consent form and to obtain a signature on a parent consent form from one of his or her parents. The study procedures and the consent form had been approved by a university's Protection of Human Subjects Review Board prior to soliciting students to participate. Consent and data were obtained on 763 students.

2.2. Instrumentation

Two instruments were administered to the participants: the Junior Eysenck Personality Questionnaire (JEPQ) (Eysenck & Eysenck, 1975) and the Externalizing scale of the Youth Self-Report (YSR) (Achenbach, 1991). The JEPQ was used to assess personality traits and the Externalizing scale of the YSR assessed conduct behavior.

The JEPQ is a child version of the adult EPQ and consists of 81 items. The JEPQ is intended for use with children up to age 15. Respondents answer each item with a yes or no response. The JEPQ is designed to measure the P, E, and N personality traits and is based on extensive research (Eysenck & Eysenck, 1975). Test–retest reliabilities over one month reported in the manual for the JEPQ ranged from $r = 0.55$ to 0.89 on the P, E, N, and L Scales for 11–15-year-old children. Internal consistency is also in the moderate to high range with reliabilities ranging from $r = 0.61$ to 0.85 (Eysenck & Eysenck, 1975).

The YSR employs two broadband scales for problem behaviors one of which is for externalizing behavior. The hypothesis tested in this study pertains to antisocial and aggressive behavior and the Externalizing Scale of the YSR was the most applicable. The YSR Externalizing Scale consists of 33 items to which students respond on a Likert scale with a rating of 0 through 2, with 2 indicating a high level of the behavior. A few sample items include: "I argue a lot, I am mean to

others, I get in many fights, I cut classes or skip school.'' The YSR is viewed as a highly reliable and valid instrument and the procedures used to develop it are considered exceptional (Christenson, 1992). Test–retest reliability is reported as having a median of $r = 0.81$. The Externalizing Scale of the YSR has a demonstrated ability to differentiate children and adolescents with behavioral problems from those who do not have problems (Elliott & Busse, 1992).

2.3. Selection of participants

Participants were selected from the pool of students on the basis of their meeting personality profiles consistent with Eysenck's ASB hypothesis. First, a composite mean and standard deviation for the JEPQ scales were developed using the norms for 11–15-year-olds in the manual (Eysenck & Eysenck, 1975). The composites were computed using statistical procedures considered appropriate for aggregating such values (Hedges & Olkin, 1985).

The aggregates were computed for boys and for girls across the ages of 11–15. The aggregate mean was computed by multiplying the n value times the mean value for each age group for boys and girls separately (e.g., $220 \times 3.81 = 838.2$). These values were summed across age groups and divided by the sum of n across age groups to obtain an aggregate mean for each gender for ages 11–15. To obtain an aggregate SD, the variance for each age level for each gender was computed by using SD squared. The value for variance was then multiplied by $n - 1$ where n was the number of age groups. The resulting values were summed across age groups and divided by the cumulative n minus the number of groups. The square root of the resulting value provided the aggregate SD. In males the composite means and standard deviations were for P ($M = 4.42$, $SD = 3.11$), for E ($M = 18.81$, $SD = 3.79$), for N ($M = 10.18$, $SD = 5.0$), and for L ($M = 6.11$, $SD = 3.48$). In females the composite means and standard deviations were for P ($M = 2.48$, $SD = 2.16$), for E ($M = 18.41$, $SD = 3.62$), for N ($M = 11.86$, $SD = 4.87$), and for L ($M = 7.69$, $SD = 3.46$).

The participant pool was screened using a conditional test that identified participants, using separate criteria for gender, who were above the composite mean for P, E, and N and below the composite mean for L and conversely identified participants who were below the composite mean for P, E, and N and above the composite mean for L. All participants who met the screening criteria were then sorted by personality profile, gender and age. Finally, participants in the two personality profile groups were matched by gender and by age. Where participants had to be eliminated to produce a matched set of participants, they were removed randomly using selection by a random number generator. The final result was a matched sample with 47 participants in each group. There were 22 males and 25 females in each of the groups. The mean age for the participants was 13 years and 8 months.

3. Results

Statistical analysis was done using the Statistical Package for the Social Sciences (Version 11.0) for the PC. The first analysis done was an ANOVA to determine, if the screening procedure had selected two groups that were significantly different from one another relative to their respective personality profiles. The differences between the groups were statistically significant for P

Table 1
Means and standard deviations for each variable in each of the two sample groups

Variable	Group	*n*	Mean	SD
P	Low	47	1.17	1.01
	High	47	7.83	2.82
E	Low	47	14.51	3.86
	High	47	21.32	1.25
N	Low	47	6.09	2.76
	High	47	15.32	2.35
L	Low	47	11.19	2.54
	High	47	3.45	2.02
YSR	Low	47	8.87	5.45
	High	47	27.47	9.17

($F = 232.011$ (1, 92), $p < 0.001$), for E ($F = 132.5.75$ (1, 92), $p < 0.001$), for N ($F = 305.277$ (1, 92), $p < 0.001$), and for L ($F = 267.434$ (1, 92), $p < 0.001$).

The test of the ASB hypothesis was performed using an independent samples *t*-test. The difference between the two groups on the Externalizing Scale of the YSR was statistically significant ($t = -11.948$, df = 92, $p < 0.001$). The mean and standard deviation for the low PEN and high L group on the YSR was $M = 8.87$ and SD = 5.45. The mean and standard deviation for the high PEN and low L group on the YSR was $M = 27.47$ and SD = 9.17 (see Table 1). The bias corrected effect size was 2.45, which is considered very large (Cohen, 1988).

The final analysis was a backward regression analysis of the four scale scores from the JEPQ on the dependent variable (YSR). This yielded a model that was highly significant ($F = 64.357$ (3, 90), $p < 0.001$). The adjusted *R* square for this model was 0.671. The three scales from the JEPQ retained in the model and their respective standardized Betas were P (0.367), E (0.166) and L (−0.368). The regression analysis also examined all possible combinations of PEN and L for interactions. The only interaction was between P and E and the model accounting for the most variance was PE with L ($F = 92.559$ (2, 91), $p < 0.001$). The adjusted *R* square for this model was 0.670. The standardized Betas were PE (0.435) and L (−0.424).

4. Discussion

The results of this study clearly demonstrate the power of employing personality trait scores as the basis for an independent variable. The obtained ES of 2.45, for the difference between two dichotomous personality profile groups defined by Eysenck's theory, is an exceptionally large ES. It appears that the interaction of the Eysenckian P and E traits in combination with the L score contributed to highly significant differences in participants' self-reported behavior. Almost all prior studies on antisocial behavior in children using Eysenck's theory have first sought participants either with known behavior problems (e.g., incarcerated delinquents) or with assessments indicating behavior problems (e.g., teacher rating scales or self-report scales). The groups so formed were then tested for differences on the scales measuring the Eysenckian traits.

The authors of this study knew nothing of the behavioral dispositions in the participants at the time they were selected for the study. Eysenck's ASB hypothesis proposes the PEN traits, as psychometric constructs related to distal and proximal antecedents, facilitate predictions about proximal and distal consequences. Thus, the path of influence would be from antecedents, represented by the trait constructs, to consequences (Eysenck, 1997a, 1997b). While pre-selecting participants by behavior and looking to see if the behavior is associated with the traits does demonstrate a relationship, the authors believe that it is a more powerful demonstration to identify participants with trait profiles based on theory and then test the prediction from theory that there will be differences in behavioral outcomes.

The regression analysis in this study relating the scores comprising personality profiles to the dependent variable helped to delineate the contribution of each to the behavioral outcome. The regression analysis showed that N did not play a significant role in the externalizing behavior scores of the participants, either alone or through an interaction with P, E or both. This result is consistent with Eysenck's (1997a) suggestion that E was more likely than N to be associated with antisocial behavior in youth. Interestingly, in a recent meta-analysis (Center & Kemp, 2002) of studies on Eysenck's traits and antisocial behavior in children, E had the smallest overall ES (0.20) and N had an ES (0.43) more than double that for E. In the aggregate, prior studies indicated that E was weaker than N in its association with antisocial behavior in children. The current study employing trait profiles rather than behavior as the independent variable confirmed Eysenck's belief that E made a greater contribution in youth than did N.

Future research on the ASB hypothesis as it relates to the contribution of personality traits to the development of antisocial behavior should address several issues. First, more studies are needed that employ personality traits as the independent variable and without pre-selecting subjects for expected outcomes to confirm the findings reported herein. Second, it would be useful to attempt to independently verify the behavioral characteristics reported by participants. This is difficult as the primary method available is verification through archival records, which has at least two limitations. One limitation is access. Even given access, what is known and recorded concerning an individual's conduct behavior may show nothing or represent only a shadow of actual behavior (Dunford & Elliott, 1984). Third, verification might be attempted by observation or the use of informant rating scales both of which have draw backs. Observation of a large number of children over sufficient time and settings is not likely due simply to logistics. Informant rating scales could be useful provided one can obtain permission to collect the data and the cooperation of the informants. Both of these methods suffer from the fact that adult observers and informants often have few opportunities to observe antisocial behavior because it is performed either in isolation or only in the context of the peer group, especially in older children and adolescents. Fourth, studies are needed to test the predictive validity of trait profiles. Participants are needed who exhibit both at-risk and typical trait profiles that have been obtained early enough so that there is no significant indication of antisocial behavior already present. Predictions should then be made about which participants will or will not exhibit significant discipline problems and perhaps referral for special services over an ensuing period of time (e.g., three years). If at-risk profiles permit good prediction, studies are needed that compare the effects of early preventive programming with the natural course of events to determine if identification and preventive treatment significantly improve outcomes.

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