# A FACTOR ANALYSIS OF TRAITS RELATED TO INDIVIDUAL DIFFERENCES IN ANTISOCIAL BEHAVIOR

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Male undergraduates and men from the local community completed questionnaires dealing with antisocial behavior, aggression, mating effort, and self esteem. An exploratory Maximum Likelihood factor analysis revealed three factors, labeled Aggressiveness, Mating Success, and Antisociality. No clear mating effort factor emerged. Number of sexual partners and Preference for Partner Variety loaded on Mating Success, but age at first intercourse loaded on Antisociality. The only significant correlation among the factors was between Aggressiveness and Antisociality. Variables from each of the 3 factors discriminated between individuals scoring at the extreme ends of the Childhood and Adolescence Taxon Scale-Self Report, a measure containing items previously shown to identify a discrete class of antisocial offenders.

A major difficulty in understanding individual differences in antisocial behavior is its large number of empirically determined correlates. These correlates in turn have complex relationships among

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themselves. Identification of causal influences in this embarrassment of riches has proven difficult (for a review, see Rogers, Salekin, Sewell, & Cruise, 2000). Whereas we may anticipate that causal chains will be identified in behavior, genetic, and longitudinal studies and eventually verified in experimental research, greater clarity concerning the relationships among the correlates of antisocial behavior would facilitate these efforts. Factor analysis was developed for this very purpose, to reduce a large number of variables to a more manageable number of factors and to determine the relationships among the factors so as to facilitate theory development. It is, however, unlikely that theoretical progress will be made until a theory can be constructed to specify more precisely the types of variables that should be relevant. There is no mathematical algorithm that will generate a theory from undirected observation. There are, however, well-established sex and age differences in antisocial behavior and well-established individual differences in the persistence of antisocial conduct. The pattern of these differences suggests that antisocial behavior is linked to developmentally important tasks and perhaps to life history strategies of the sort explained by Darwinian theories (e.g., Mealey, 1995; Wilson & Daly, 1985).

A life history strategy is a genetically determined program that determines the timing of and the absolute and relative amount of effort allocated to survival and reproductive tasks. Reproductive tasks involve mating effort (competing for, attracting, and maintaining reproductive partners) and parental investment. Life history strategies are termed obligate if they are invariant over environmental conditions or facultative if they are dependent on particular environmental contexts. Life history strategies may be identical over all members of a species or vary on account of genetic polymorphism or, in the case of facultative strategies, because of environmental variation.

Previous taxometric research on male offenders (Harris, Rice, & Quinsey, 1994; Skilling, Harris, Rice, & Quinsey, submitted) and primary school boys (Skilling, Quinsey, & Craig, in press) has identified a discrete natural class of individuals who persistently exhibit antisocial and aggressive behaviors. Items that identify this natural class come from the Diagnostic and Statistical Manual-IV Antisocial Personality Disorder and Conduct Disorder criteria (American Psychological Association, 1994), the Revised Psychopathy Checklist (Hare,

1991), and the Childhood and Adolescence Taxon Scale (Quinsey, Harris, Rice, & Cormier, 1998). In descending order of their relationship with the persistent antisociality taxon, the 16 best discriminators among adult offenders are as follows: Early behavior problems, juvenile delinquency, proneness to boredom, revocation of conditional release, violent criminal history, parasitic lifestyle, impulsivity, elementary school maladjustment, childhood aggression, an arrest before age 16, many marital relationships, shallow affect, suspension or expulsion from school, childhood lying, nonviolent criminal history, and parental alcohol abuse (Skilling et al., submitted). It is noteworthy that 7 of the 16 items identified among adult offenders exclusively concern childhood or adolescent behaviors.

Recently, Bugental (2000) has conceptualized the domains of social behavior as social algorithms used in life history strategies. Bugental argues on the basis of a literature review that there are five domains of social behavior: Attachment, Hierarchical Power (social dominance), Coalitional Groups, Reciprocity (negotiation of matched benefits), and, overlapping with these four, Mating. The central theoretical question with regard to these domains is the degree to which they are independent of each other.

To the extent that the correlates of persistent antisocial conduct are organized into traits that have functional significance in the sense of plausibly conferring fitness benefits in ancestral environments, support is given to the notion that such conduct reflects genetically based life history design rather than pathology. We might expect that, if persistent antisociality represents a life history strategy, it would be reflected in a particular pattern of social algorithms. In accord with Bugental's analysis, Quinsey, Harris, et al. (1998) have suggested that antisociality may be composed of three interrelated tactics: an aggressive approach to achieving interpersonal dominance, a duplicitous and nonreciprocating approach to social exchange, and high mating effort. The content of the items that have been successful in taxometric analyses clearly show that aggressiveness is a core trait of consistently antisocial individuals. However, only one item unambiguously concerns mating effort (many marital relationships) and only two reflect a nonreciprocating approach to social exchange (childhood lying and parasitic lifestyle). It is possible that traits relevant to these tactics have simply not been sampled or measured very well, and a different

picture might emerge if measurement error were reduced through scale development guided by factor analysis of a wider range of items.

In addition to determining whether the factor structure of traits related to chronic antisocial behavior might reveal some evidence of functional design, this study focused particularly on the relationship between measures of mating effort and other correlates of persistent antisocial behavior (future studies are planned to examine social exchange variables). Age at onset of sexual behavior is of particular interest in this connection. Twin studies show a genetic influence on age at first intercourse (Dunne et al., 1997), and precocious sexual behavior is known to be related to antisocial behavior in adolescence (e.g., Rosenthal, Smith, & de Visser, 1999). Rowe and his colleagues (Rowe & Rodgers, 1989; Rowe, Rodgers, Meseck-Bushey, & St. John, 1989) have provided presumptively genetic evidence of an association between antisocial conduct and precocity of sexual behavior in the form of correlations between the earliness of sexual behavior of one sibling and the antisocial conduct of another. Early onset of sexual activity is thus closely related to antisocial conduct. In Rowe's conceptualization, early onset of sexual activity appears to be heavily saturated by "d," a genetically based personality disposition to learn deviant behaviors, hypothesized to be an analog of "g," the single factor underlying various tests of intelligence (Rowe & Rodgers, 1989). Although a life history strategy conceptualization of antisociality suggests a pattern of social algorithms and thus correlations between domains, it remains unclear whether precocious sexual behavior is more a manifestation of antisocial conduct or mating effort. We attempted to resolve this issue in the present investigation by conducting an exploratory Maximum Likelihood Factor Analysis (MLFA) using measures of mating success (number of partners for sexually active year, age of first intercourse after puberty, and Partner Variety and Casual Sex Scale), aggression and delinquency (Childhood and Adolescence Taxon Scale-Self Report and the Physical Aggression, Verbal Aggression, Hostility, and Anger Subscales of the Aggression Questionnaire), and general and sexual/romantic self esteem (Self Esteem Scale and the Self Perceived Mating Success Scale) to examine the relationships between variables and to examine whether precocious sexual behavior is more aligned with antisocial conduct or mating effort.

## METHOD

### PARTICIPANTS

The total sample of 444 men for whom we had no missing data comprised 125 students recruited from introductory psychology classes at Queen's University and 319 men recruited by advertisement from the Ontario communities of Kingston ($N$ = 304) and Penetanguishene ($N$ = 15). Eight percent of the sample had not finished high school, 44% had graduated from high school, 28% had completed at least some postsecondary education, 16 had completed postsecondary education, and 2% had some postbaccalaureate education. Eighty percent of the sample had never been married nor lived in a common-law relationship. The average age was 23.7 ($SD$ = 4.9). Students were younger than nonstudents (19.4 (1.6) vs. 25.3 (5.2), $t(442) = -18.47$, $p < .001$).

### MEASURES

Variables pertaining to mating effort included number of sexual partners per sexually active year (the first sexually active year is the year at which subjects reported that they first had intercourse with a female partner, after puberty), age at first intercourse after puberty, and the Partner Variety and Casual Sex Scale. Variables pertaining to aggression and delinquency included the Childhood and Adolescence Taxon Scale-Self Report and the Physical Aggression, Verbal Aggression, Hostility, and Anger subscales of the Aggression Questionnaire. Variables pertaining to general and sexual/romantic self esteem were, respectively, the Self Esteem Scale and the Self Perceived Mating Success Scale. The scales are described in more detail below.

*Partner Variety and Casual Sex (PVCS).* The PVCS (Lalumière & Quinsey, 1996) is a measure of preference for short-term relationships with a reported alpha of .88. There are 10 items, 9 of them measured in a Likert format; for example, "I think that sex without love is OK." One additional item concerns how often the participant fantasizes about different sex partners, and another requests an estimate of the number of future sex partners in the next 5 years. Five items are from

the Sociosexuality Inventory (Gangestad & Simpson, 1991). The scoring method is available from the third author. Higher scores indicate a greater preference for short-term relationships.

*The Childhood and Adolescence Taxon Scale-Self Report (CAT-SR)*. Harris et al. (1994) established that eight variables describing childhood and adolescent delinquent and antisocial characteristics could identify members of a discrete natural class of persistently antisocial individuals among adult offenders. These variables pertained to childhood and adolescent history, specifically elementary school maladjustment, adolescent alcohol abuse, childhood aggression, suspension or expulsion from school, arrest younger than age 16, separation from natural parents, parental alcoholism, and childhood conduct problems. These childhood and adolescence taxon indicator items can be scored as a scale, the Childhood and Adolescence Taxon or CAT scale, from offender file data. The CAT-SR is a self-report version of the CAT (Lalumière & Quinsey, 1996; Seto, Khattar, Lalumière, & Quinsey, 1997). Its eight variables are each scored as 0 (*absent*), 1 (*perhaps present*), or 2 (*definitely present*) and summed to form a scale that ranges from 0 to 16.

*The Aggression Questionnaire (AQ)*. The 29 items of the AQ (Buss & Perry, 1992) are rated on a 5-point Likert scale from *extremely uncharacteristic* to *extremely characteristic* of the participant. Higher scores indicate higher levels of aggressive behavior (whole scale alpha = .89). There is evidence that the AQ is a valid assessment of aggression in offender populations (see Williams, Boyd, Cascardi, & Poythress, 1996), and the earlier version of this questionnaire predicts new sexual and violent offenses of sex offender inmates (e.g., Quinsey, Khanna, & Malcolm, 1998). The subscales are as follows: Physical Aggression (9 items), sample item, "If somebody hits me, I hit back"; Verbal Aggression (5 items), "I often find myself disagreeing with people"; Anger (7 items), "I flare up quickly but get over it quickly"; and Hostility (8 items), "I am sometimes eaten up with jealousy."

*Self Esteem Scale*. The Self Esteem Scale (Rosenberg, 1979) consists of 10 items presented in a 7-point Likert scale format. A sample

item is, "On the whole, I am satisfied with myself." This scale has satisfactory reliability and validity and is positively related to sexual history items, such as number of sexual partners, in men (Quinsey & Lalumière, 1995).

*Self Perceived Mating Success (SPMS).* The SPMS (Lalumière & Quinsey, 1996) measures the extent to which individuals believe that they are able to attract members of the opposite sex. Reported alpha for this scale is .83. There are eight items rated on a 7-point Likert scale from *strongly disagree* to *strongly agree.* A sample item is, "Members of the opposite sex notice me."

**PROCEDURE**

Participants were tested in small groups. The procedures to be used were explained, participants were promised confidentiality, consent forms were signed, and participants then filled out the questionnaires under anonymous conditions. Participants were then thanked and debriefed. Community participants were paid $10.00 for their participation and undergraduates were given partial course credit for Psychology 100.

**EXTRACTION**

Exploratory Factor Analysis was chosen as the most appropriate method of uncovering underlying or latent constructs. More specifically, an MLFA was employed. This analysis allows for significance testing of the fit of the model to the data, as well as giving an index of relative fit (Root Mean Square Error of Approximation or RMSEA). The advantage of the latter is that it takes sample size into account.

MLFA assumes approximate univariate and multivariate normality. Age at first intercourse was positively skewed and leptokurtic ($z_{skew}$ = 8.32; $z_{kurt}$ = 20.60), as was number of sexual partners per sexually active year ($z_{skew}$ = 26.15; $z_{kurt}$ = 59.96). Scores on the CAT-SR were positively skewed and mesokurtic ($z_{skew}$ = 7.68; $z_{kurt}$ = –1.69). Total scores on the Self Esteem Scale and SPMS were both normal ($z_{skew}$ = .67; $z_{kurt}$ = –2.60) and ($z_{skew}$ = –.043; $z_{kurt}$ = –.80), respectively. PVCS scores were slightly skewed in a positive direction and mesokurtic

($z_{skew}$ = 4.46; $z_{kurt}$ = –1.28). Two of the four subscales of the AQ met the univariate normality assumption (Physical Aggression: $z_{skew}$ = 3.81; $z_{kurt}$ = –2.43; Verbal Aggression: $z_{skew}$ = .73; $z_{kurt}$ = –2.62; Hostility: $z_{skew}$ = .69; $z_{kurt}$ = –2.78; Anger: $z_{skew}$ = 3.92; $z_{kurt}$ = –1.13). To check the robustness of the MLFA with respect to normality assumptions, the solution obtained by the MLFA was compared to a Principal Axis Factor Analysis performed on the same sample. The percentage of variance accounted for did not change between methods, and the loading patterns were almost identical. Where the loadings differed, the values were slightly higher in the Principal Axis Factor Analysis. Thus, the solution appeared to be stable.

#### NUMBER OF FACTORS

Three criteria were combined in determining the optimal number of factors. First, we examined factors with eigenvalues greater than 1.0. Three of the eigenvalues were above the cutoff (3.046, 1.715, and 1.248), suggesting the existence of three separate factors. Subsequent eigenvalues were below .916. Second, we examined the scree plot; the drop after the third eigenvalue indicated that retaining three factors was not unreasonable. The third criterion involved the interpretability of the solution. Because the pattern of loadings in the three-factor solution appeared readily interpretable, three factors seemed to be the appropriate solution.

#### CHOICE OF ROTATION

An oblique rotation was selected because theoretical consideration suggested the presence of correlated traits that are combined in life history strategies. More specifically, a direct quartimin rotation was employed. The use of rotations that permit intercorrelation also helps to identify higher order trait constructs, if present.

## RESULTS

Means, reliabilities, and intercorrelations among the measures are presented in Table 1. The means of the present sample were signifi-

**TABLE 1: Means, Standard Deviations, Alphas, and Intercorrelations Among All Measures**

| *Variable* | *Mean* | SD | ∀ | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Anger | 23.66 | 8.41 | .71 | .59 | .58 | .63 | .33 | –.13 | .02 | –.19 | .02 | .18 |
| 2. Verbal aggression | 21.87 | 6.12 | .77 | \ | .39 | .51 | .23 | –.13 | .17 | .04 | .06 | .18 |
| 3. Hostility | 30.00 | 9.63 | .80 | | \ | .44 | .33 | –.07 | –.13 | –.17 | –.02 | .08 |
| 4. Physical aggression | 33.57 | 11.48 | .78 | | | \ | .46 | –.26 | .13 | .00 | .11 | .25 |
| 5. Childhood and Adolescence Taxon Scale-Self Report | 5.19 | 4.23 | .75 | | | | \ | –.45 | –.06 | –.15 | –.07 | .16 |
| 6. Age at first intercourse | 16.45 | 2.84 | \ | | | | | \ | –.07 | .05 | .00 | –.25 |
| 7. Self Perceived Mating Success | 51.65 | 10.14 | .87 | | | | | | \ | .34 | .23 | .25 |
| 8. Self esteem | 51.78 | 8.91 | .93 | | | | | | | \ | .17 | .14 |
| 9. Number of sexual partners per year | 1.37 | 1.27 | \ | | | | | | | | \ | .01 |
| 10. Preference for Partner Variety and Casual Sex | 2.81 | 1.20 | .84 | | | | | | | | | \ |

NOTE: *r*s over .095 are significant at .05, two-tailed, and *r*s over .125 are significant at .01, two-tailed. *N* = 444.

**TABLE 2: Group Differences on Dependent Measures**

| *Variable* | *Group* | n | *Mean* | SD | p *value* |
|---|---|---|---|---|---|
| Anger | student | 125 | 22.36 | 8.75 | .04 |
| | community | 319 | 24.17 | 8.22 | |
| Verbal aggression | student | 125 | 22.81 | 5.57 | .04 |
| | community | 319 | 21.50 | 6.29 | |
| Hostility | student | 125 | 29.47 | 8.64 | .47 |
| | community | 319 | 30.21 | 9.99 | |
| Physical aggression | student | 125 | 34.48 | 11.20 | .30 |
| | community | 319 | 33.21 | 11.59 | |
| Childhood and Adolescence | student | 125 | 2.95 | 2.95 | < .01 |
| Taxon Scale-Self Report | community | 319 | 6.07 | 4.33 | |
| Age at first intercourse | student | 125 | 16.73 | 1.39 | .19 |
| | community | 319 | 16.34 | 3.23 | |
| Self Perceived Mating | student | 125 | 56.42 | 10.10 | < .01 |
| Success | community | 319 | 49.79 | 9.54 | |
| Self Esteem | student | 125 | 56.65 | 9.67 | < .01 |
| | community | 319 | 49.87 | 7.82 | |
| Number of sexual partners | student | 125 | 1.95 | 1.80 | < .01 |
| | community | 319 | 1.13 | .88 | |
| Preference for Partner | student | 125 | 3.03 | 1.03 | .02 |
| Variety and Casual Sex | community | 319 | 2.73 | 1.26 | |

cantly higher for the Physical, Verbal, Anger, and Hostility subscales of the Aggression Questionnaire than for the men in its construction sample (Buss & Perry, 1992).

As shown in Table 2, the 125 students were significantly higher than the 319 community participants on Verbal Aggression, sexual partners per year, Self Esteem, SPMS, and Preference for Partner Variety. They were significantly lower on the CAT-SR and Anger.

Turning to the factor analysis, communalities indicated that between 8.5% and 59.5% of the variance in each of the manifest variables was accounted for by the factors. The three factors together accounted for 60.1% of the total variance prior to rotation (30.5%, 17.2%, and 12.5%, respectively).

Table 3 presents the factor loadings. Only factor loadings above .250 were interpreted in accordance with the standard range of .2 to .4 (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Because the Anger, Verbal Aggression, Hostility, and Physical Aggression subscales of the Aggression Questionnaire loaded onto the first factor, it

**TABLE 3: Loadings of the Dependent Variables on the Three Factors**

| *Variable* | *Aggression* | *Antisociality* | *Mating Success* |
|---|---|---|---|
| Anger | **.928** | –.063 | –.059 |
| Verbal aggression | **.665** | –.023 | .200 |
| Hostility | **.634** | .034 | –.216 |
| Physical aggression | **.612** | **.272** | .143 |
| Childhood and Adolescence Taxon Scale-Self Report | .119 | **.771** | –.189 |
| Age at first intercourse | .059 | **–.596** | –.039 |
| Self Perceived Mating Success | .015 | .023 | **.668** |
| Self esteem | –.164 | –.018 | **.544** |
| Number of sexual partners | .050 | –.057 | **.316** |
| Preference for Partner Variety and Casual Sex | .116 | .220 | **.306** |

NOTE: Only loadings above .250 (in bold) were interpreted.

was named "Aggressiveness." The second factor can be interpreted as being antisociality, negatively scored. The sign of all loadings on this factor was therefore reversed for ease of interpretation. The CAT-SR, age at first intercourse, and Physical Aggression loaded on this factor, although Physical Aggression loaded rather weakly and was the only variable loading on more than one factor. The third factor was called "Mating Success." SPMS, Rosenberg Self Esteem Scale, number of sexual partners per sexually active year, and Preference for Partner Variety and Casual Sex loaded on this factor. The only significant correlation among the factors after rotation was between "Aggressiveness" and "Antisociality" ($r(442) = .392$, $p < .01$).

Although the model was not perfectly fitted to the data ($\Pi^2(18) = 32.06$, $p < .022$), the test of close fit (Fabrigar et al., 1999) was not significant ($p = .687$), indicating that the model fit the data quite well. Another indication of the appropriateness of the solution is the RMSEA that indicates the relative fit of the model to the data while adjusting for sample size. This value (RMSEA = .042, confidence interval: .016 to .065) confirms the findings of the test of close fit. All values in the confidence interval suggest that the factor solution was robust. Further support for the three-factor solution comes from comparing the RMSEA 90% confidence intervals (an index of the fit of the model to the data) for one- and two-factor solutions. The one-factor solution had an RMSEA ranging from .129 to .159, indicating poor fit

(Fabrigar et al., 1999). The two-factor solution was even worse, having an RMSEA ranging from .236 to .421. In contrast, the RMSEA for the three-factor solution indicated a good fit of the model to the data.

As mentioned in the introduction, there is considerable evidence for a discrete class of persistently antisocial men. This raises the issue of how the factors identified in this analysis are related to taxon membership. Hare (1996) has argued that less than 5% of the general male population are psychopaths. Skilling, Quinsey, and Craig (in press) found that 4% of an uncensored sample of elementary school boys were identified as members of an antisociality taxon by each of three sets of measures (the CAT-SR and DSM-IV Conduct Disorder items and Psychopathy Checklist-Youth Version items taken from a self report inventory), and 87% were never identified as taxon members by any of these measures. Individually, these three sets of measures yielded estimates of 8% to 10%. Given the nature of the community sample used here (students and primarily unemployed volunteers), it is not unreasonable to estimate that at least 5% of the sample would be likely to be antisociality taxon members. The 22 participants scoring 14 or more on the CAT-SR (5% of the total) were designated probable taxon members and the 227 scoring 4 or less (51% of the sample), probable members of the complementary class. A stepwise regression predicting taxon membership, excluding the CAT-SR, yielded an $R$ of .606 (adjusted $R^2$ = .357). Predictors entered in this order: Physical Aggression, age at first intercourse, SPMS, and Hostility, representing variables from each of the three factors. Both age at first intercourse and SPMS had negative beta weights, indicating that taxon members were younger at first intercourse but had lower SPMS scores. This finding underscores the different relationships that these two variables have with antisociality. Clearly, indicators that reflect success in attracting partners are not pure measures of the effort invested in obtaining them, and it is the latter that is more strongly related to antisocial conduct.

## DISCUSSION

As expected from theory and previous research, correlated factors of Aggression and Antisociality emerged. Similarly, the negative cor-

relation of both self reported anger proneness and hostility with self esteem observed in the present study was also reported by Buss and Perry (1992). Of most interest is the loading of age at first intercourse on the Antisociality factor rather than on Mating Success. In contrast, number of partners loaded, as expected, with the SPMS Scale, Preference for Partner Variety, and Self Esteem on the Mating Success factor. A pure mating effort factor, independent of self esteem, did not emerge.

A previous factor analytic study employing some of the same measures and a similar, but smaller, sample (Lalumière & Quinsey, 1996) found some converging results. Three factors emerged in the earlier study: Self Esteem, number of sexual partners, and SPMS loaded together, as in the present investigation. However, the CAT-SR and Preference for Partner Variety loaded together in the previous study, unlike the present investigation in which they loaded on separate factors. Nevertheless, in the present study, Preference for Partner Variety almost met the loading criterion for inclusion in the antisociality factor (.220), suggesting a link between the antisociality and mating effort domains. The third factor in the previous study was made up of measures of hostility and probably corresponds to the Aggressiveness factor found in the present study.

Although the fit of the model in the present investigation was quite good, it may not generalize to other samples. The young age of the sample and the small proportion of men who were married doubtless restricted the range of the mating effort measures. Mating effort might be expected to be more closely related to antisocial behavior where its manifestation is less age typical. We have seen that age at first intercourse functions in this way, being more closely related to antisocial conduct than other putative indices of mating effort. If this is the correct interpretation, we would predict that mating effort among older men would similarly be more closely related to antisocial conduct than it would among a group of late adolescent or young adult men. Another possible limitation of the generalizability of these results pertains to the limited variance in the aggression and antisocial behavior measures. These would be expected to have a great deal more variance in an offender sample. Notwithstanding these issues of restriction of range, the factors identified in our analyses may prove of assistance in examining the correlates of antisocial and aggressive behaviors in

nonoffender samples. In particular, it may prove possible to delineate pure measures of mating effort more accurately by determining the relationship that each of these measures has with antisocial conduct.

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