Article Author: Pulkkinen, Les, & Piikanen, Tuuli

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Shipping Address:
New River Community & Technical College
Greenbrier Valley Campus (NRCTC)
101 Church Street
Lewisburg, WV 24901

Fax: 304-647-6592
Ariel:
EMail: rooston@newriver.edu
Continuities in Aggressive Behavior From Childhood to Adulthood

Lea Pulkkinen and Tuuli Pitkänen

Department of Psychology, University of Jyväskylä, Jyväskylä, Finland

The study was part of the Jyväskylä Longitudinal Study on Social Development. The subjects (originally 173 females, 196 males) were studied at age 8, 14, 20, and 26. Stability of aggression from the age of 8 to 14 was as high for girls as for boys when peer nomination was employed, but lower for girls in teacher rating. For males, both peer nominations and teacher ratings on aggression at age 8 and 14 predicted criminality, arrests for alcohol abuse, and problem drinking as well as self-reports on aggression at age 26. The outcomes were most negative if aggression was patterned with other adjustment problems. For females, teacher ratings on aggression were biased by school adjustment, and they predicted arrests for alcohol abuse and problem drinking; peer nominations predicted self-reports on aggression. Developmental trajectories for physically aggressive girls differed from those for verbally and facially aggressive girls, the former being less oriented to education. Sex differences did not exist in the amount of aggression when measured with peer nominations, but boys were more aggressive when measured with teacher ratings. © 1993 Wiley-Liss, Inc.

Key words: longitudinal study, aggression, criminality, problem drinking, sex differences, rating methods

INTRODUCTION

Within the present longitudinal study, predictive validity of different measures for aggression was analysed in order to study the dependence of continuity in aggression on the methods used for its measurement. At early school age and adolescence, aggression was measured by peer nomination and teacher rating. In adolescence, self-ratings and parent ratings were also available. In adulthood, self-ratings on aggression and criminal records were used as criteria for the predictive validity of previous measures for aggression. The study concerned both boys and girls, and thus permitted the comparison of the findings on concurrent and predictive validity of aggression between the genders.

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Address reprint requests to Lea Pulkkinen, Department of Psychology, University of Jyväskylä, P.O. Box 35, 40351 Jyväskylä, Finland.

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Hyde [1984] has shown in the meta-analysis of a large number of studies that an average difference between the genders in the means of aggression variables is half a standard deviation. This means that although there are rather reliable gender differences, they are not large. The differences were larger when the method of measurement was peer report and smaller when self-reports or parent and teacher reports were used. Consequently, it was expected in the present study, concerning gender differences in aggression, that differences would be larger in peer nominations on aggression than in other measures of aggression.

Stability of aggression has been widely discussed [Olweus, 1979; Huesmann et al., 1984; Cairns et al., 1989; Huesmann and Eron, 1989]. There is a considerable stability in aggression with age, and differences between the genders in stability are smaller than generally expected, at least at school age. For instance, Cairns et al. [1989] found no gender differences in the stability of teacher-rated and self-rated aggression from grade 4 to grade 8; a slight trend toward a lower stability in girls’ aggression occurred for grade 9. On the other hand, Lefkowitz et al. [1977] found that peer-rated aggression was as stable for girls as for boys from the age of 8 to 19; the stability correlation was 0.47 for girls and 0.38 for boys ($P < .001$ for each).

According to Huesmann et al. [1984], stability of peer-nominated aggression from the age of 8 to the age of 30 was higher for men than women. Male aggression also predicts criminal convictions ($r = 0.24$), but, for women, only a marginal correlation ($0.10$) was obtained. A corresponding gender difference was obtained by Statin and Magnusson [1989] when aggression was measured at the age of 10 and crime at the age of 26 ($r = 0.34$ for men; $r = 0.12$ for women). When aggression was measured somewhat later, at the age of 13, the correlation was higher for women ($0.24; P < .001$); for men, the correlation remained at the same level. Other studies confirm that early aggressiveness is a significant antecedent of the later frequency of criminal offences, especially in men [Pulkkinen, 1983, 1987; Farrington, 1989; Loeber, 1990]. It was consequently expected that, at school age, the stability of aggression would be as high for boys as for girls and that male aggression would predict adult aggression and criminal convictions more highly than female aggression, especially when measured at an early age.

Cairns et al. [1989] suggest that the construct of aggression changes during an individual’s development noting that “Different developmental trajectories may be described for these separate domains of aggressive definition.” Different developmental trajectories also depend on how aggression is associated with other behavioral characteristics [e.g., Magnusson and Bergman, 1988; Pulkkinen, 1992a,b; Pulkkinen and Tremblay, 1992]. When aggressiveness is combined with restlessness, it does not predict antisocial behavior, but it does predict an educational career and a low arrest rate. The arrest rate was highest in the severely multi-problem boys who had poor peer relations, low school motivation, lack of concentration, and poor school success, and who also were aggressive and restless.

Correspondingly, Pulkkinen [1992b] has found that adult women who belonged to the Aggressiveness cluster were likely to have an educational career and fewer arrests than was expected. Other adjustment problems were untypical of this cluster. The arrest rate was highest in girls who had problems at school but who were only moderately aggressive. Perhaps the construct of aggression is different for boys and girls and aggression has different developmental implications for males and females. In the present
study, adult outcomes of highly aggressive individuals were analysed in detail in order to study possible differences in developmental trajectories.

**MATERIALS AND METHODS**

**Subjects**

The original sample of the Jyväskylä Longitudinal Study consisted of 173 girls and 196 boys, born in 1959. It was drawn in 1968 from second-grade pupils (8 to 9 years old) in the town of Jyväskylä. Six years later, when the subjects were 14 years old, 96.5% of the original sample (167 girls and 189 boys) were reached in a follow-up study.

A smaller sample of 77 girls and 77 boys and their parents (mostly the mothers) were also interviewed when the subjects were 14, and at age 20, 67 girls and 68 boys were reinterviewed. The numbers of girls and boys interviewed both at age 14 and 20 were, respectively, 59 and 56. The smaller sample was selected on the basis of peer nominations by using a model of an impulse control as a frame of reference. Subjects who had high scores for aggressive, aggressive-anxious, anxious, constructive, stable, and submissive behavior were traced for a follow-up study at ages 8 and 14. The distribution of the subjects into different categories has been presented elsewhere [Pulkkinen, 1982]. Half of the subjects did not belong to any extreme group at the age of 8, but they did belong to one of them at the age of 14.

At the age of 26, the whole original sample was traced for a follow-up study; 142 women (82% of the women) and 150 men (77% of the men) were interviewed. Criminal records were examined for the whole sample.

**Measures for Aggression**

The principal methods for data collection were peer nomination and teacher rating at 8 and 14. At the age of 8, 12 items for aggression were included in peer nomination and teacher rating of a total of 33 items [Pulkkinen, 1987]. In peer nomination, each subject was asked to name all the same-sex subjects in his/her class who displayed specific behaviors. For example, the subject was asked to identify anyone who may hurt another child when angry by hitting, kicking, or throwing something. The subjects were encouraged, if possible, to nominate at least three classmates. In the teacher rating, all subjects were rated on a scale from 3 to 0. Number 3 was to be given to those pupils in whom the characteristic in question was very prominent, and 0 to those pupils in whom the teacher had never observed the characteristic in question. The same aggression items were used in peer nomination and teacher rating. They included direct and indirect, defensive and offensive, and physical, verbal, and facial aggression. Sum scores of the aggression items were formed both for the peer nominations and teacher ratings after z-score transformations. Cronbach’s alpha for peer nominations (Agg-P8) was 0.94 for girls and 0.95 for boys, and for teacher ratings (Agg-T8) was 0.91 for girls and 0.92 for boys.

At age 14, peer nominations (Agg-P14) and teacher ratings (Agg-T14) on aggression were made on an item: Who attacks without reason, teases others, says nasty things? In addition, two variables for self-reports on aggressive behavior at the age of 14 were drawn from the subjects’ answers to the following questions presented in the interview of the smaller sample: “Do you tease other people?” and “Have you been involved in
fights?” A sum score of these variables was formed for self-reports on aggression (Agg-S14). Cronbach’s alpha was 0.70 for girls and 0.66 for boys. In addition, a parent report on the target child’s aggression was asked in the interview of the parent (mostly the mother). The parent was asked (Agg-Pa14), “Is your son/daughter of a fighting type?” All these answers were coded on a scale: yes, sometimes, no.

At age 20, a self-rating of aggressiveness (Agg-SR20) was made on a scale: “I get angry often and get easily involved in quarrels or fights; sometimes I try to pick a quarrel myself or I behave rudely.” In addition, a Self-Control Check List was presented to the subjects. A sum score for the following items on aggression was formed: aggressive, attacking, bossy, moody, quarrelsome, pugnacious, violent, and irritable. Cronbach’s alpha for Checklist Aggression (Agg-CL20) was 0.81 for women and 0.55 for men. A third measure (Agg-SCI20) was formed from the Self-Control Inventory as a sum score of four items on aggression (“Sometimes I get so angry or nervous that I can’t check my temper”; “When I get angry I want to hurt the other party”; “I pick fights and sometimes I begin them”; and “Sometimes I delight in the sufferings of other people.”) Cronbach’s alpha was 0.74 for women and 0.54 for men. Intercorrelations between these measures were higher for women than for men: Agg-SR20 correlated with Agg-CL20 by 0.45 ($P < .001$) for women and 0.17 (n.s.) for men, and with Agg-SCI20 by 0.50 ($P < .001$) for women and 0.27 ($P < .05$) for men. Correlations between Agg-CL20 and Agg-SCI20 were 0.70 ($P < .001$) for women and 0.31 ($P < .05$) for men. A single self-report measure (Agg-S20) was composed from all of these items (11) on aggressiveness at the age of 20, based on standardized scores. Cronbach’s alpha of Agg-S20 was 0.88 for women and 0.67 for men.

At age 26, data were collected by employing a mailed questionnaire and a semi-structured interview. A self-rating of aggression (Agg-SR26) was made on the following item presented in the interview: “I get angry often and I become easily involved in quarrels and fights.” In addition, an Aggression Scale (Agg-Sc26) was constructed on the basis of ten direct questions presented in the context of the interview (“Are you impatient?”; “Do you swear?”; “Do you think of revenge?”; “Do you get sulky with somebody?”; “Do you threaten other people?”; “Do you hit another person?”; “Do you argue with people?”; “Do you break things?”; “Are you brusque?”; and “Do you pick a quarrel with somebody?”). The answers were given on 3-point scales (never, sometimes, often). Cronbach’s alpha was 0.63 for women and 0.67 for men. Agg-SR26 and Agg-Sc26 correlated by 0.17 ($P < .05$) for women and 0.25 ($P < .01$) for men. A single self-report measure (Agg-Sc26) was composed from all of these items (11) on aggressiveness at the age of 26, based on standardized scores. Cronbach’s alpha of Agg-S26 was 0.60 for women and 0.78 for men.

Variables for Adult Social Adjustment

Criminal records were examined in two registers: the government register including information on offenses, the sentence for which was imprisonment, and the local less formal register for arrests, held by the police. The total number of arrests, arrests for alcohol abuse, and arrests excluding those for alcohol abuse were registered for each subject. Forty-eight percent of the men and 37% of the women had been arrested for some reason, and 36% of the men and 7% of the women for alcohol abuse. When the individuals were excluded who had been arrested for alcohol abuse (drunken behavior, drunken driving), the proportion of arrested individuals was 30% and 9% for men.
and women respectively. For data analysis, the number of arrests was classified in each variable into 5 categories: 0, 1, 2-6, 7-9, 10, 15, and 16 or more arrests.

Problem drinking was defined on a 3-point scale based on arrests for alcohol abuse and an alcoholism screening test, CAGE Questionnaire [Mayfield et al., 1974]. A problem drinker gave at least three affirmative answers to the four questions of the CAGE questionnaire or had been arrested for public drunkenness at least three times. The second category was for individuals with some drink problems, and the third category were individuals with no drink problems. There were only two women (1%, compared to 26% of the men) who met the criteria for problem drinkers. However, 15% of the women and 23% of the men fell into category 3.

For other adult outcomes, the following dichotomized variables drawn from the data collected at the age of 26 were also collected: 1) Education (obligatory school = 9 years; higher secondary school = 12 years); 2) Working career (unstable including many changes of work place, working conditions related to training, and periods of unemployment; stable); 3) Children (none vs. 1-5); Social network (large; small); and 5) Experiences of unemployment (never, occasional or more).

Variables for School Adjustment

At the age of 8, the teacher rating included a variable for disobedience toward the teacher and the teacher’s concern about the child’s behavior because of the onset of antisocial symptoms. They were rated on the same scale as aggressive behavior. At age 14, marks for grade point average and schooliness were collected in pupils’ reports in school archives. In addition, a variable problem behavior was composed from teacher ratings on punishments at school, hostility, smoking, drinking, and contacts with the police. Cronbach’s alpha was 0.60 for boys and 0.63 for girls.

Variables for Cluster Analysis

A variable-oriented approach was complemented by a person-oriented approach by using a clustering technique (WARD, SPSS package). Clustering variables and their sources have been explained elsewhere [Magnusson, 1992a,b]. The variables were aggressiveness, restlessness, poor concentration, work in test in school attendance, low school achievements, and poor peer relations. The variables were drawn from data collected at the ages of 8 and 14. A cluster analysis replicated the clusters obtained by Magnusson and Bergman [1988] and Magnusson [1992].

RESULTS

Gender Differences in Aggression

There were no gender differences in aggressiveness when peer nomination was employed, but teacher-rated aggressiveness was higher means for boys than girls, both at the age of 8 and 14 (Table 1). The teacher nominations at the level of individual items were compared to confirm whether gender differences existed in direct and indirect aggression as obtained by Lagerspetz et al. [1988], but no differences between the genders were obtained. Sub-scales for indirect and direct aggression did not differentiate between the genders.

In contrast, teacher ratings differentiated between the genders, boys being rated more aggressive. The difference was marginally significant for a standard deviation [d = 0.67 for age 8
and 0.64 for age 14; Hyde, 1984). Boys and girls differed also in the sub-scales for Indirect and Direct aggression ($P < .001$ for each). At the level of individual items, gender differences existed in all variables except those for facial aggression and sneaking (telling tales). No gender differences were evident in parent reports. In self-reports, women tended to rate themselves more aggressive than men.

**Stability of Aggression**

**Peer nomination and teacher rating**

**Ages 8 to 14.** Product moment correlation coefficients in Table II show that aggression was as stable for girls as for boys over this period when peer nomination was employed (0.37 for girls and 0.35 for boys). When aggression was measured by teacher rating boys proved to be more stable ($r = 0.42$ for girls and 0.37 for boys; $P = .01$ for the difference).

Peer nominations and teacher ratings on aggression at the age of 8 correlated more highly for boys (0.74) than for girls ($r = 0.46$) ($P < .001$ for the difference), but at the age of 14, the correlations were similar ($r = 0.59$ for boys and 0.41 for girls). Hence, teacher ratings on boy's aggressiveness had a higher predictive and concurrent validity than teacher ratings on girls' aggressiveness.

**Ages 8 to 26.** Peer-nominated aggression at the age of 14 correlated significantly with the composite measure for self-rated aggression at the age of 26 (Agg-S26) for men and women; the correlations were lower over a longer interval. Teacher ratings on boy's aggression had also some predictive validity for self-reports in adulthood, but teacher ratings on girls' aggression did not correlate significantly with self-reports (Table II).

When criminal behavior at the age of 26 was taken as a criterion for predictive validity, peer nominations and teacher ratings on male aggression at the ages of 8 and 14 correlated significantly with 1) the total number of arrests, 2) the number of arrests for alcohol abuse, and 3) the number of all arrests for alcohol abuse were excluded (Table 2). For women, the highest predictive correlations were obtained for teacher-
TABLE II. Intercorrelations of Aggression Variables From Age 8 to 26 and Their Correlations With Arrests and Problem Drinking (Females Above the Diagonal; Males Below the Diagonal)

<table>
<thead>
<tr>
<th></th>
<th>Agg-P8</th>
<th>Agg-T8</th>
<th>Agg-P14</th>
<th>Agg-T14</th>
<th>Agg-S26</th>
<th>Arr-T</th>
<th>Arr-A</th>
<th>Arr-NA</th>
<th>Prob-Dr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agg-P8</td>
<td>39***</td>
<td>37***</td>
<td>23**</td>
<td>13</td>
<td>12</td>
<td>16*</td>
<td>07</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Agg-T8</td>
<td>74***</td>
<td>18**</td>
<td>13</td>
<td>08</td>
<td>07</td>
<td>13*</td>
<td>-01</td>
<td>12*</td>
<td></td>
</tr>
<tr>
<td>Agg-P14</td>
<td>35***</td>
<td>31***</td>
<td>41***</td>
<td>20*</td>
<td>10</td>
<td>10</td>
<td>01</td>
<td>06</td>
<td></td>
</tr>
<tr>
<td>Agg-T14</td>
<td>34***</td>
<td>37***</td>
<td>48***</td>
<td>11</td>
<td>20**</td>
<td>21**</td>
<td>06</td>
<td>22**</td>
<td></td>
</tr>
<tr>
<td>Agg-S26</td>
<td>13</td>
<td>14</td>
<td>22**</td>
<td>16*</td>
<td>07</td>
<td>10</td>
<td>-01</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Arr-T</td>
<td>33***</td>
<td>33***</td>
<td>35***</td>
<td>24***</td>
<td>16*</td>
<td>-</td>
<td>84***</td>
<td>86***</td>
<td>74***</td>
</tr>
<tr>
<td>Arr-A</td>
<td>26***</td>
<td>28**</td>
<td>26***</td>
<td>19**</td>
<td>13</td>
<td>92***</td>
<td>-</td>
<td>59***</td>
<td>78***</td>
</tr>
<tr>
<td>Arr-NA</td>
<td>35***</td>
<td>33***</td>
<td>26***</td>
<td>17*</td>
<td>17*</td>
<td>85***</td>
<td>73***</td>
<td>-</td>
<td>47***</td>
</tr>
<tr>
<td>Prob-Dr</td>
<td>17***</td>
<td>22***</td>
<td>23***</td>
<td>20**</td>
<td>26**</td>
<td>65***</td>
<td>68***</td>
<td>45***</td>
<td>-</td>
</tr>
</tbody>
</table>

N for Agg-P14 and Agg-T14: 189 males, 165 females.
N for Agg-S26: 146 males, 140 females.
Agg-P8 and Agg-P14 = peer nominations on aggression at age 8 or 14;
Agg-T8 and Agg-T14 = teacher ratings on aggression at age 8 or 14;
Agg-S26 = self-reports on aggression at age 26;
Arr-T = total No. of arrests before age of 26, classified into 6 categories from 0 = no arrests to 6 = 21 arrests or more;
Arr-A = No. of arrests for alcohol-related offences;
Arr-NA = No. of arrests when alcohol-related offences were excluded.
Prob-Dr = problem drinking at the age of 26.
*P < .05; one-tailed; **P < .01; ***P < .001.

rated aggression at age 14. The correlation disappeared, however, when arrests for alcohol abuse were excluded from the total number of arrests. The aggressiveness of girls was correlated with arrests for alcohol abuse only.

The relationship between teacher-rated aggressiveness and alcohol abuse in women was confirmed by correlations with problem drinking. Peer-nominated aggression did not correlate with female problem drinking. For males, no differences due to the measurement techniques were obtained, both peer nominations and teacher ratings on aggression correlated with problem drinking.

Because of the differences in predictive validity of peer nominations and teacher ratings on girls' aggressiveness, the content of the ratings was analysed by correlating them with variables on school adjustment. The correlations showed (Table III) that teacher ratings on girls' aggressiveness at age 14 correlated more highly than peer nominations with one of the indices of school (marked in school reports) and poor school success (P < .005 for the difference in attentiveness and P = .02 for general point average). No such differences in correlations existed in boys. A bias in the same direction existed at age 8 with teacher ratings on girls' aggressiveness correlating more highly than peer nominations with teacher rating on, "What is the teacher concerned about because of the onset of antisocial symptoms?" (P = .005 for the difference). For boys, this difference did not exist. Hence, teacher ratings on girls' aggressiveness was more strongly biased than peer nominations to failure to adjust to school.

Self-reports and parent report. The selected sample, interviewed at ages 14 and 20, provided an opportunity to analyze the stability of self-reports and the parent reports on aggressiveness over 12 years. Table IV shows that the self-reports (Agg-S14) on male and female aggressiveness did not significantly correlate with self-reports over
TABLE III. Correlations of Peer Nomination and Teacher Rating on Aggression With Indicators of School Adjustment in 156 Boys, 62 Girls

<table>
<thead>
<tr>
<th></th>
<th>Age 8 Peer nom.</th>
<th>Age 8 Teacher rat</th>
<th>Age 14 Peer nomin.</th>
<th>Age 14 Teacher rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teacher concern</strong></td>
<td>F .17*</td>
<td>.42***</td>
<td>−.01</td>
<td>−.07**</td>
</tr>
<tr>
<td></td>
<td>M .5***</td>
<td>.65*</td>
<td>.15*</td>
<td>.19**</td>
</tr>
<tr>
<td><strong>Disobeys teacher</strong></td>
<td>F .2***</td>
<td>.41*</td>
<td>.12</td>
<td>.08</td>
</tr>
<tr>
<td></td>
<td>M .2***</td>
<td>.67*</td>
<td>.28***</td>
<td>.32***</td>
</tr>
<tr>
<td><strong>Age 14</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attention</strong></td>
<td>F −.18*</td>
<td>−.08</td>
<td>−.32***</td>
<td>−.56***</td>
</tr>
<tr>
<td></td>
<td>M −.2***</td>
<td>−.46***</td>
<td>−.47***</td>
<td>−.49***</td>
</tr>
<tr>
<td><strong>General point average</strong></td>
<td>F −.3</td>
<td>−.04</td>
<td>−.25***</td>
<td>−.47***</td>
</tr>
<tr>
<td></td>
<td>M −.1***</td>
<td>−.30**</td>
<td>−.30***</td>
<td>−.26***</td>
</tr>
<tr>
<td><strong>Delinquency</strong></td>
<td>F .77*</td>
<td>.12</td>
<td>.36***</td>
<td>.48***</td>
</tr>
<tr>
<td></td>
<td>M .3***</td>
<td>.60***</td>
<td>.51***</td>
<td>47***</td>
</tr>
</tbody>
</table>

*P < .05.  
**P < .01.  
***P < .001.

A long period of time, from age 14 to 26. However, significant correlations existed between self-reports in successive points of measurement: between the ages of 14 and 20 and between the ages of 20 and 26, the correlations were higher for women than for men. Parent reports did not correlate significantly with male self-reports 6 or 12 years later, although they did correlate with self-reports at the time of the measurement.

Male self-reports, especially at age 14, predicted the number of arrests for alcohol abuse at the age of 26, whereas female self-reports did not predict arrests. The number of arrests for alcohol abuse were also predicted by parent reports on the son's aggressiveness at the age of 14, but not on the daughter's aggressiveness; the latter predicted arrests for other reasons.

In the selected sample, correlations were generally stronger than in the whole sample as can be seen by comparing the correlations between, for instance, peer nominations and teacher ratings in the whole sample (Table II) and in the selected sample (Table IV). The predictive validity of self-reports and parent reports remained low, certainly lower than that of peer nominations and teacher ratings. The sample size was rather small in the selected sample which decreased the reliability of the correlations.

**Developmental Trajectories**

**Groups for aggression** The analysis of adult outcomes was made by classifying the subjects (girls and boys) separately into three categories (low, medium, high) both on the basis of peer nominations and teacher ratings at the age of 8 (PN and TR classification, respectively). The cut-off points were the 25th and 75th percentile. The groups were compared in the length of education, number of arrests, working career, problem drinking, parenthood, size of social network, and experience of unemployment. Differences existed in working career, social network, education, problem drinking, and the number of arrests.
<table>
<thead>
<tr>
<th></th>
<th>Agg-P8</th>
<th>Agg-T8</th>
<th>Agg-P14</th>
<th>Agg-T14</th>
<th>Agg-S14</th>
<th>Agg-Pa14</th>
<th>Agg-S20</th>
<th>Agg-S26</th>
<th>Arr-T</th>
<th>Arr-A</th>
<th>Arr-NA</th>
<th>Prob-Dr</th>
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<td>Agg-P8</td>
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<td>50***</td>
<td>37**</td>
<td>54***</td>
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<td>08</td>
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<td>12*</td>
<td>31***</td>
<td>13</td>
<td>24</td>
<td>-6**</td>
<td>7.6</td>
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<tr>
<td>Agg-P14</td>
<td>58***</td>
<td>46***</td>
<td></td>
<td>62***</td>
<td>65***</td>
<td>24</td>
<td>34**</td>
<td>17</td>
<td>22*</td>
<td>51**</td>
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<td>55***</td>
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<td>47***</td>
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<td>35**</td>
<td></td>
<td>72***</td>
<td>42**</td>
<td>01</td>
<td>07</td>
<td>18</td>
<td>02</td>
<td>15</td>
</tr>
<tr>
<td>Agg-Pa14</td>
<td>57***</td>
<td>37**</td>
<td>48**</td>
<td>37**</td>
<td>59***</td>
<td></td>
<td>26*</td>
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<td>16</td>
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<td>21</td>
<td>-</td>
<td>51***</td>
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<td>19</td>
<td>-02</td>
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See Table II for the explanation of Agg-P8, Agg-T8, Agg-P14, Agg-T14, Agg-S20, Arr-A, Arr-NA, and Prob-Dr.
Agg-S14 and Agg-S20 = self-reports on aggression at age 14 and 20;
Agg-Pa14 = parent reports on aggression at age 14.
Females, N = 59, above the diagonal; males, N = 56, below the diagonal.

*P < .05; one-tailed.
**P < .01.
***P < .001.
Highly aggressive boys had more often an unstable working career ($\chi^2 (167,2) = 9.89, P = .007$ for the PN classification; $\chi^2 (167,2) = 13.58, P = .001$ for the TR classification) than other boys. They also had a smaller social network ($\chi^2 (148,2) = 6.16, P = .046$ for the TR classification; $\chi^2 (148,2) = 6.16, P = .005$ for the PN classification). Female groups did not differ in these respects, but significant differences existed between the female groups as well as between the male groups in education ($\chi^2 (158,2) = 6.27, P = .044$ for females, and $\chi^2 (179,2) = 6.27, P = .045$ males; PN classification; non-significant for TR classification). The length of education was highest among Low-aggressive individuals, but not lowest among High-aggressive individuals; there was a J-shape relationship between the length of education and aggressiveness (Fig. 1).

Male groups differed in the total number of arrests and problem drinking in both classifications; the number of arrests and the proportion of problem drinkers were highest in High-aggressive group (number of arrests: $\chi^2 (196,10) = 27.10, P = .002$ for the TR classification, and $\chi^2 (196,10) = 25.18, P = .005$ for the PN classification; problem drinking: $\chi^2 (196,4) = 19.11, P = .0005$ for the PN classification, and $\chi^2 (196,4) = 11.57, P = .011$ for the TR classification). Female groups differed only in problem drinking for the TR classification ($\chi^2 (193,4) = 7.48, P = .024$).

The average number of arrests was highest in the High-aggressive group. Figure 2 demonstrates that the risk of criminal conviction did not differ in the Low- and Medium-aggressive groups, but the High-aggressive group differed from the rest. The total number of arrests was significantly higher among the male than women. On the other hand, Finnish girls attend higher secondary school more frequently than boys as can be seen in Figure 1.
To find possible subgroups among high-aggressive individuals, two methods were employed: 1) peer nominations at the age of 8 were later analysed (principal factor analysis and varimax rotation), and 2) the distribution of high-aggressive individuals into clusters for social treatment was investigated.

Factor analysis. Factors were extracted from aggression items for females [Nenonen, 1991]: verbal and facial aggression (quarrels, calls naughty things, keeps sneering and making faces, starts sulking), physical aggression (tees smaller and weaker peers, may hit another child, attack somebody without reason). Two factors were also extracted for males [Hämäläinen, 1986], namely, direct and indirect aggression (the latter included pushing behind one's back, taking furniture, and facial aggression). Two groups of girls and boys were composed on the basis of factor scores. Physically aggressive girls (N = 16) had the factor score (> 1 standard deviation) only in the factor for physical aggression, and verbally and facially aggressive girls (N = 23) only in the verbal factor. In the group of males, two clusters for direct and indirect aggression were reported, but the males grouped not either in the variables considered. In contrast, physical aggression and verbal-facial aggression implicated different developmental trajectories for girls: the high-aggressive group for girls included girls from both clusters.

A larger proportion of verbally and facially aggressive girls attended higher secondary school, compared to the physically aggressive girls. Indeed, 17% of the former entered university compared with none of the physically aggressive girls. Physically aggressive girls were less interested in music and dance at the age of 14 than verbally and facially aggressive girls, as rated in a test by an observer, which shows how probable it is that their value differs from a low value [I. Blevik, 1988], was 2.13. Correspondingly, physically aggressive girls generally finished their schooling after obligatory school (9 yr) without going to a vocational or higher secondary school. They were
more likely to do things verbally or facially aggressive girls (odds ratio 3.13). Physically aggressive girls were also younger at the time of the birth of the first child than verbally aggressive girls, and did not differ from non-aggressive girls (the mean age for physically aggressive girls was 20.8 and for verbally aggressive girls was 23.8, \( P = .035 \)).

The two groups did not differ in problem drinking, but physically aggressive girls had committed more crimes according to self-reports than verbally and facially aggressive girls (odds ratio 4.5). 29% of the former and 65% of the latter said that they had committed any crime and they had no record. The groups did not differ in registered crimes; 25% of the physically aggressive and 21% of the verbally and facially aggressive girls had been arrested.

Cluster analysis: The homogeneity of the High-aggressive group was also analyzed by comparing the distribution of individuals into the different clusters for adjustment. The clusters were originally obtained by Magnusson and Nygren [1988], but they were replicated in a present longitudinal study [Pulkkinen, 1992a,b]. The clustering variables were composed on a nine-point scale ranging from 1 to 5 [Pulkkinen, 1992a,b]. For instance, Aggression was coded on the basic peer nominations and teacher ratings at the age of 11, giving a score of 0 to individuals on which aggression was a pronounced characteristic both in peer nominations and teacher ratings.

The cross-tabulation of groups for aggression and clusters resulted in significant trends in distributions: men \( \chi^2(3, N = 12) = 11.1, P = .001 \) for the PN classification, and \( \chi^2(3, N = 12) = 9.73, P = .002 \) for the TR classification; in women \( \chi^2(3, N = 168.8) = 40.32, P = .001 \) for the PN classification, and \( \chi^2(3, N = 169.8) = 83.42, P = .001 \) for the TR classification. Table V presents how High-aggressive individuals were distributed in the clusters.

About half of the aggressive boys belonged to the clusters for Severe and Mild multi-problems (or Extroverted), i.e. they had problems in concentration, school motivation, school behavior, restlessness, peer relationships, and aggressiveness. Half of the rest of the five clusters was distributed among the rest of the five clusters which represented more specific problems: Poor motivation and aggressiveness, Poor interest in school, Restlessness and moderate aggressiveness, and Poor peer relations, or No problems. Education was shorter and the antisocial behavior was more common among multi-problem boys than among boys with a restricted problem [Pulkkinen, 1992b].

For girls, no clear-cut clusters for mild or severe multi-problem behavior were obtained [Pulkkinen, 1992b]. Aggressive girls belonged mostly to the cluster for Aggressiveness, especially for the classification based on the basis of teacher rating. The cluster for School Problems was formed by aggressive and non-aggressive girls. Problems, such as low motivation and low concentration, were on the cluster for School Problems. The single-fifth of the aggressive girls (almost twice as many as expected) belonged to the cluster for Arrest rate and broken family, and the highest and education was shorter. The cluster for Social Problems was most common for cases belonging to the cluster for Aggressiveness [Pulkkinen, 1992b].

**DISCUSSION**

The stability of the aggression from the age of 11 was as high for girls as for boys when peer nominations were employed, but highest for girls in teacher rating. The stabil-
<table>
<thead>
<tr>
<th>Clusters*</th>
<th>Males</th>
<th>T</th>
<th>Females*</th>
</tr>
</thead>
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<tr>
<td>No problems</td>
<td>4.3</td>
<td>4.3</td>
<td>18.6</td>
</tr>
<tr>
<td>Poor peer relations</td>
<td>7.5</td>
<td>(26.2)</td>
<td>(48.4)</td>
</tr>
<tr>
<td>Restlessness (and aggression)</td>
<td>5.7</td>
<td>(15.6)</td>
<td>(12.0)</td>
</tr>
<tr>
<td>Problems at school</td>
<td>1.0</td>
<td>8.1</td>
<td>9.3</td>
</tr>
<tr>
<td>Aggressiveness (and lack of concentration)</td>
<td>1.0</td>
<td>10.0</td>
<td>41.9</td>
</tr>
<tr>
<td>Mild multi-problems</td>
<td>1.9</td>
<td>26.0</td>
<td>17.4</td>
</tr>
<tr>
<td>Severe multi-problems</td>
<td>1.9</td>
<td>12.0</td>
<td>(100)</td>
</tr>
</tbody>
</table>

*See Pulkkinen (1992) for cluster means in clustering variables.
*N for Males = 43.
*N for Females = 43.
Classification into Low-, Medium-, and High-aggressive groups made on the basis of peer nomination at the age of 8.
*Classification made on the basis of teacher rating at the age of 18.

ity correlations of peer nominations was about .37. In the study of Lefkowitz et al. (1977), in which a method analogous to the present peer nomination was employed, the stability of aggression from the age of 12 to 18 was of the same size (0.38 for boys, 0.47 for girls). Correspondingly, the stability correlation of aggression in the study by Cairns et al. (1981) was 0.33 for girls and 0.45 for boys over 6 years, from grades 4 to 9. In that study, aggression was measured with teacher rating. In the present study, stability correlations for teacher rating of boys' aggression was of the same size (0.37), but insignificant for girls.

For boys, both peer nominations and teacher ratings predicted alcohol abuse and criminal convictions, but not without arrests for alcohol abuse. For girls, the results obtained by these methods failed. Teacher ratings are not a measure of aggressiveness at age 14 predicted crime at the age of 20, which supports the findings of Stattin and Magnusson (1989) who also used teacher ratings as a measure for aggression. Likewise, teacher ratings on aggression at ages 4 and 13 were predictive of both male and female alcohol abuse in this Swedish study (Åkerström and Magnusson, 1985). In the present study, the correlation between teacher-rated aggression and crime in females disappeared when arrests for alcohol abuse were excluded. Female aggression did not predict any criminality, but it did predict arrests for alcohol abuse. The significant correlation between female aggression and crime in the study by Stattin and Magnusson (1989) may also be caused by the inclusion of index offenses in the crime measure. Peer nominations on female
aggression did not predict arrests for alcohol abuse or problem drinking. Aggressiveness per se does not seem to predict negative outcomes, such as alcohol abuse, in females. Alcohol abuse is related to a failure to adjust to school which interferes with teacher ratings on girls' aggressiveness to a greater degree than peer nominations.

The number of females registered for alcohol abuse was similar in the present Finnish study as in the Swedish study, but twice as high for men in Finland than in Sweden. According to Magnusson [1988], 5.1% of females were registered at least once and 2.7% more than once. The corresponding figures for Finnish men were 6.9% and 4.1%. For men, Magnusson [1988, p. 125] states that “over the age period of 20, and 8.4% were registered on more than one occasion.” The corresponding figures for Finnish men were 35.7 and 18.3%.

Since boys' aggressiveness predicted arrests for any reason, whereas girls' aggression (rated by teachers) predicted only arrests for alcohol abuse, different categories for arrests are needed for obtaining differences in the continuity of aggression.

In several studies, Lefkowitz et al., 1973; Lagerspetz et al., 1988 in which peer nomination or peer rating methods were employed, sex differences in aggression have been found. In the study by Lefkowitz [1973], each subject named all the subjects he knew who displayed specific aggressive behaviors. When both sexes are at the subject's disposal, more boys than girls are named. In the study by Lagerspetz et al. [1988], ratings were made of same-sex classmates. The procedure differed, however, from peer nomination because classmates were rated on a four-point scale (from not at all to a great deal). This procedure resulted in sex differences where boys were rated as exhibiting more direct aggression and girls more indirect aggression. In the present study, peer nomination or peer rating, was employed. Girls named boys as many times as boys for each item and, consequently, no sex differences were evident. This method was adopted at the beginning of the longitudinal study to avoid a cumulation of negative nominations to boys and positive to girls. Each of the items consisted of 12 aggressive items and 21 non-aggressive items.

Developmental trajectories for physically aggressive girls differed from those for verbally and socially aggressive girls, that are having less success in school and education. Verbal and facial aggression, girls may be a protection of energy or a strong temperament which is needed for academic achievement. Whereas physical aggression probably indicates problematic adjustment; besides school education, physically aggressive girls self-report adjustment problems. For boys, the developmental outcomes of aggressiveness were most negative if aggressive were patterned with poor academic performance. Aggressiveness as an isolated problem may result in educational failure, especially when it is connected to intellectual capacities (Pulkkinen, 1992).

Cairns et al., 1997 concluded that the “developing aggression development required simultaneous continuity and asynchronicity of development changes among the aggressive girls and boys is the most often a trajectory of growth, development. The existing research has been done to the present study on the development of this concern. The existing research suggests that among the aggressive girls and boys diminishes the predictive power of aggressiveness for adjustment predictions. More predictive analyses would be needed to identify a variable in analysis, and at the same time, for the analysis of the construct of aggression.
REFERENCES


