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Factors Related to Delinquency of Boys in Lincoln, Nebraska

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FACTORS RELATED TO DELINQUENCY OF BOYS IN LINCOLN, NEBRASKA

by

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CHAPTER I

INTRODUCTION

Need for Study

Delinquency is a complex problem; its causes are many and varied, and it has no simple and easy solution. The prevention and treatment of the problem of delinquency involves every aspect of individual and community life.

Investigations of juvenile delinquency have shown that there are many factors associated with delinquency. For example, available evidence indicates that the heaviest concentration of juvenile delinquency occurs in the poorest districts. Areas of sub-standard housing, crowded by families in the lowest income brackets show the highest incidence of crime and delinquency.

Previous investigations by Wattenberg (8) brought to light factors indicating that a statistically reliable relationship was found to exist between age of father and delinquency of boys aged ten through sixteen. Boys who belonged to neighborhood gangs tended to have fathers over forty-five years of age; boys not in gangs, fathers under forty-five.

Topping (7) and Hewitt and Jenkins (4) had stressed that "pseudo-social boys" or "socialized delinquents," to use the terms those authors, respectively, applied to members of delinquent gangs, were likely to come from homes where there was laxness, neglect, or a low level of identification with parents by children. It seemed plausible that

older fathers, having less energy, might be poorer playmates for their sons and that the consequent weakness of the affectional ties might be an important factor behind the eventual membership.

There is a need for investigations to determine other possible factors related to juvenile delinquency. Three possible factors which may have some relationship to the incidence of delinquency are: the age of the fathers, the father's occupation, and the intelligence of the children.

A study of the sources of information available regarding delinquent boys and their families in Lancaster County, Nebraska indicated that the age of the boys, age of fathers, occupation of fathers, and I.Q.'s of all delinquent boys in the County could be obtained from records of the Juvenile Court of this County.

Statement of Problem

The problem in this study was to determine whether a selected group of delinquent and non-delinquent boys in Lancaster County, Nebraska, differed significantly in their I.Q., the ages of their fathers, and their fathers' occupations.

CHAPTER II

REVIEW OF THE LITERATURE

A review of studies concerning causal factors related to delinquency indicated that age of fathers was a significant factor. Edmundson (3) in a study of 102 delinquents coming to the attention of the juvenile court in Gary, Indiana, between October 1, 1912 and June 30, 1914, found that the modal age for fathers was 36-40; the average age, 42.1. She noted, "a comparatively large proportion are from 46 to 60 years of age - too old to sympathize with or appreciate the spirit of youth in their children."

More recently, the Public Welfare Council of Connecticut called attention to similiar statistics and, with somewhat more sophisticated working, a similiar argument. For their series of 2,581 cases, the median age of fathers was 44.55 for delinquents, which contrasted with 38.67 in neglect cases. Their summary on this factor: "The matter of age of parents has some implications. Parents between forty and fifty are themselves going through a period of adjustment - physical, social and psychological - at the same time their children are facing problems of their own."

Both of the above studies suffer from the same defect: no control group was used to check on the impression that the delinquent group's fathers were older than fathers of the general population of like-aged boys. This is not the case in the study by Baker, Decker, and Hill (1) of 84 boys

involved in theft. They compared their experimental group with a control group of boys paired on such factors as age and neighborhood. Although there was no significant difference between the groups in age of father at the birth of the boy, they also reported that several fathers in the experimental group were much older than in the control group. Again, the familiar note is sounded that this "suggests lack of ability to adjust to a level of child understanding and sympathy." Another study using a control group, that of Rheinhardt and Fowler (5) did find a difference in age, although the statistical significance is not clear. They compared forty unselected public school boys. The average age of fathers was 49.2 for the delinquents and 45.2 for the non-delinquent. The difference in age between father and son was 35.4 for the delinquent and 31.8 for the non-delinquents.

In only one report was there mention of a possibility that youthfulness in parents might be linked to unfavorable factors. Breckinridge and Abbott (2) noted that the parents of many delinquents had married at what seemed to be early ages; approximately 20 per cent of the mothers were 18 at marriage, and 10 per cent of the fathers under 20. They felt that in some cases this had led to irresponsibility or poor judgment in child-raising.

Direct measurement of the role of affectional relationships with parents in the development of delinquency has been attempted by Zucker (9). He used a variety of techniques on matched groups in New York. The strength of af-

fectional ties was assayed by means of a sentence completion test, nine cards in the TAT series, a direct questionnaire, and case history materials. With differences significant at the .02 level of confidence, he found that the delinquents more often expressed a desire that their father love them more. Both groups identified more strongly with their fathers than with their mothers. However, fewer delinquents show an affectional attachment to their fathers. Both disciplinary techniques and amount of companionship appear to be involved.

It appears that there have been very few studies of intelligence, father's age and father's occupation, as related to juvenile delinquency. The purpose of the present study is to get more information about the possible importance of these three factors. The next chapter contains a description of the procedures used in this study.

CHAPTER III

METHOD OF PROCEDURE

Two completely but complementary, series of data were secured and analyzed. Each involved an entirely different population. The first set of data were taken from the court files, in random order, of 160 boys aged ten through sixteen who had been classified by the courts as delinquents. They were boys who had been detained upon charges of delinquency during the calendar year of 1951-1952.

For purposes of comparison, a second group of 160 boys were selected in random order, from the files of the Board of Education, and analyzed. The criteria for selection of the "School attending group" were that the boy (1) must be in attendance at school (2) must be between the ages of ten through sixteen and (3) must live in Lancaster County with his father.

The cases were chosen in random order until 160 boys of each group had been obtained. It is thought that this sort of sampling is valid as the emphasis is not on the type of boy entirely, but rather on the factors relative to father and son.

The age and I.Q. of each boy and the age and occupation of each father were tabulated for the delinquent and non-delinquent groups. These data were then analyzed both descriptively and statistically.

CHAPTER IV

FINDINGS

In TABLE I is found the Range, Mean, and Standard deviation of the boys of both the non-delinquent and delinquent groups on the Otis Self-Administering Tests of Mental Ability.

TABLE I

Range, Mean, and Standard Deviation of I.Q.'s on the Otis Self-Administering Test of Mental Ability for Delinquent and Non-delinquent boys

Classification	Number	Range	Mean	S.D.
Non-delinquent	160	63-157	109.57	17.30
Delinquent	160	67-144	96.89	12.94

It may be seen that the range of I.Q.'s for the non-delinquent group is greater than that for the delinquent group and that the Standard deviation is also greater. This would indicate that the non-delinquent group is less homogeneous in intelligence level than is the delinquent group.

The mean I.Q. for the non-delinquent group is seen to be higher by almost 13 points than that of the delinquent group. In order to determine whether this difference was significant a t test was made. The formula for calculating the significance of difference between means of independent groups was applied to the data. This formula and a summary of the computations appears in the appendix of this report. A t value of 7.395 was obtained. With 300 degrees of free-

dom a value of only 2.592 is necessary for significance at the one per cent level of confidence. The obtained value indicated a difference between these means too great to be an accident of sampling. The mean intelligence quotient of the non-delinquent group is significantly higher than that of the delinquent group.

The data in TABLE II show that the Age range is the

TABLE II

Range and Mean Age of Delinquent and Non-delinquent boys

Classification	Number	Range	Mean
Non-delinquent	160	10-16	15.17
Delinquent	160	10-16	14.03

same for both the non-delinquent and delinquent group. This, however, was the criterion for controlling the manner in which the boys were selected as subjects from the Juvenile Court and from the Board of Education. The mean age scores indicate that of the two groups the non-delinquents mean age is slightly higher than that for the delinquents, although the range in age is the same.

A study of TABLE III reveals that the Age range of the fathers of the non-delinquent group is higher than those for the fathers of the delinquent group. It may be noted that the youngest father in the delinquent group is four years younger than the youngest father in the non-delinquent group. The oldest father in the non-delinquent group is likewise

TABLE III

Age range, Mean age, and Standard deviation of Fathers of Delinquent and Non-delinquent boys

Classification	Number	Range	Mean	S.D.
Non-delinquent	160	33-62	41.96	2.6
Delinquent	160	29-59	43.20	2.4

older than the oldest father in the delinquent group.

The above data takes on further significance when the mean age of the two groups is noted. Whereas the age range for the delinquent group is lower than that of the non-delinquent group the mean age is higher. A t test was made to determine the significance of the difference between these means. The formula and computations appear in the appendix of this report. A t value of 4.046 was obtained. A value of 2.592 is necessary for significance at the 1% level of confidence with 300 degrees of freedom.

It is thus evident that the mean age of fathers of delinquent boys is significantly higher than that of fathers of non-delinquent boys. This is in accord with previous studies.

An analysis of the influence of variables linked to occupational or socio-economic status was carefully considered in the research design. TABLE IV gives the various job classifications as they were listed in the Dictionary of Occupational Titles.

It may be noted that greater numbers of fathers in the

TABLE IV

Occupational Level of Fathers of Delinquent and Non-delinquent boys according to the Dictionary of Occupational Titles

Occupational Level	Non-delinquent	Delinquent	Total
I Professional	25	10	35
II Clerical and Sales	36	13	49
III Service	17	10	27
IV Agriculture	10	3	13
V Skilled	41	60	101
VI Semi-Skilled	18	25	43
VII Unskilled	10	26	36
VIII Unemployed	3	13	16

non-delinquent group appear in the higher occupational ratings while the greater numbers of fathers of the delinquent boys appear in the lower occupational classifications. To test the significance of these obtained frequencies the Chi-square test was applied to these data. The arrangement of the data and the computation of Chi-square is given in the appendix. A Chi-square value of 36.38 was obtained. This is far above the value of 18.47 necessary for significance at the one per cent level with seven degrees of freedom. It is thus seen that a significantly greater portion of the non-delinquent fathers are in the higher occupational classifications.

Since it was thought that the occupational factor might

be related to the intelligence factor the mean I.Q. of boys whose fathers were in each occupational grouping was calculated. TABLE V presents these findings for the delinquent and non-delinquent groups.

TABLE V

Mean I.Q. of Delinquent and Non-Delinquent Boys According to Occupational Classification of Fathers

Occupational Classification	Non-Delinquent	Delinquent
I Professional	114	113
II Clerical and Sales	108	106
III Service	113	107
IV Agriculture	110	116
V Skilled	106	89
VI Semi-Skilled	109	98
VII Unskilled	111	90
VIII Unemployed	78	90

It is seen that the mean I.Q.'s of the non-delinquent and the delinquent boys are at the same general level in the higher occupational groupings, but that the two groups differ in mean I.Q. at the lower levels in terms of occupational grouping of fathers. The latter discrepancy accounted for the significance of difference in mean I.Q. found between these two groups.

Terman and Merrill (6) in their 1937 revision of the Stanford-Binet Scales listed mean I.Q.'s for various occu-

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TABLE V

Mean I.Q. of Delinquent and Non-Delinquent Boys According to Occupational Classification of Fathers

Occupational Classification	Non-Delinquent	Delinquent
I Professional	114	113
II Clerical and Sales	108	106
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IV Agriculture	110	116
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VII Unskilled	111	90
VIII Unemployed	78	90

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Terman and Merrill (6) in their 1937 revision of the Stanford-Binet Scales listed mean I.Q.'s for various occu-

pational groupings for different age levels. TABLE VI presents these data for 10-14 and 15-18 age groups. Although

TABLE VI

I.Q.'s of Children 10 to 14 and 15 to 18 Years of Age According to Occupation of Fathers from the Standardization Data of the 1937 Revision of the Stanford-Binet Scale

Occupational Classification	Age 10-14	Age 15-18
I Professional	118	116
II Semi-professional and managerial	112	117
III Clerical, skilled trades and retail business	107	110
IV Rural owners	92	94
V Semi-skilled, minor clerical and minor business	103	107
VI Slightly skilled	101	96
VII Day laborers, urban and rural	97	98

the occupational breakdowns and the tests are different from those used in the present study close correspondence is apparent between the two listings at the higher occupational levels, and the present sample of both non-delinquent boys does not vary greatly in mean I.Q. from the Terman-Merrill figures on the low occupational classifications.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary

There have been numerous studies conducted in an attempt to shed light upon some of the underlying factors involved in juvenile delinquency. Many approaches made have been superficial and random - merely trusting to chance that some valuable datum or suggestion may turn up in the course of miscellaneous exploratory surveys, studies, or experiments. Some approaches made have been systematic, organized, exploratory, and have covered the broad field of delinquency adequately. Few approaches, however, have been penetrative and isolatory - a level of scientific research involving either experiments or statistics.

This study was designed to critically analyze a selected group of delinquent and non-delinquent boys in Lancaster County, Nebraska, in an effort to determine if these boys differed significantly in father's age, father's occupation, and I.Q. In an exploration of the dynamics of these factors involved in delinquency it was thought that the latter of the three above mentioned approaches would fulfill the purpose of supporting the study with a maximum of reliable and valid data.

Two groups of data were secured and analyzed. From the court files 160 boys were selected, in random order, aged 10-16. They were boys who had been brought to the court for

some anti-social behavior and had been judged delinquents.

For purposes of comparison a second group of 160 boys who were attending school in Lancaster County were selected, in random order, aged 10-16, from the files of the Board of Education.

According to results of the Otis Self-Administering Tests of Mental Ability it was found that the range of I.Q.'s was greater for the non-delinquent group than for the delinquent group. The mean I.Q. for the non-delinquent group was higher than that for the delinquent group by almost 13 points by means of comparison. This difference was found to be significant at the one per cent level, t being 7.395.

When the factor of age was considered, it was found that the mean age scores indicated the mean age for the non-delinquents was slightly higher than that for the delinquents. The range in age was the same.

A study of the age range of the fathers revealed that the age range of fathers of non-delinquent boys was slightly greater than that for the fathers of the delinquent boys.

Of further significance was the difference in mean age of the two groups. The mean age of fathers of the non-delinquent group proved to be significantly lower than that for the delinquent group. A t value of 4.046 was obtained.

Variables linked to occupational levels showed that greater numbers of fathers in the non-delinquent group appeared in the higher occupational level while the greater number of fathers of the delinquent boys appear in the lower occupational classification. This difference was found

to be statistically significant at the one per cent level with Chi-square being 36.38.

Conclusions

From the analysis of the data in this study the following conclusions appear justified:

1. The mean age of fathers of delinquent boys in the group studied was significantly higher than that for fathers of non-delinquent boys.

2. Fathers of the non-delinquent boys appear in significantly greater numbers among the higher occupational classification than do fathers of the delinquent boys.

3. The mean I.Q. of delinquent boys on the Otis Self-Administering Test of Mental Ability was significantly lower than the mean I.Q. of non-delinquent boys on the same test.

Suggestions for Further Research

To trace out the influences of father-son ties in relation to delinquency, well-designed longitudinal studies are needed. However, it would appear more fruitful to concentrate upon research into whole-family dynamics.

BIBLIOGRAPHY

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1. Baker, Harry J., Decker, Fred J. and Hill, Arthur S. "A Study of Juvenile Theft." J. Educ. Res. 1929, 20, 18-87.

2. Breckinridge, S.P., and Abbott, Edith. The Delinquent Child and the Home. New York: Charities Publication Committee 1912.

3. Edmundson, Edna N. Juvenile Delinquency and Adult Crime. Indiana Univ. Studies, 1921, 8, Study No. 49.

4. Hewitt, L.E. and Jenkins, R.L. Fundamental Patterns of Maladjustment. Springfield: State of Illinois 1946.

5. Reinhardt, James M., and Harper, Fowler V. "Comparison of Environmental Factors of Delinquent and Non-delinquent Boys." J. Juvenile Res. 1931, 15, 271-277.

6. Terman, L.M. and Merrill, M.A., Measuring Intelligence. New York, Houghton Mifflin Company, 1937.

7. Topping, R. "Treatment of the Pseudo-social Boys." Amer. J. Orthopsychiat., 1943, 13, 353-360.

8. Wattenberg, William W., and Balistriere, James J. "Gang Membership and Juvenile Misconduct." Amer. Sociolog. Rev., 1950, 15, 744-752.

9. Zucker, Herbert J. "Affectional Identification and Delinquency." Arch. Psych., 1943, 40, No. 286.

APPENDIX

ILLUSTRATIVE MATERIALS

Computation of t for independent groups using I.Q.'s of non-delinquent and delinquent boys

X_1 = I.Q.'s of non-delinquent boys

X_2 = I.Q.'s of delinquent boys

N_1 = Number of cases in non-delinquent group

N_2 = Number of cases in delinquent group

$N_1 = 160$

$N_2 = 160$

$\Sigma X_1 = 17531$

$\Sigma X_2 = 15502$

$\Sigma X_1^2 = 1968907$

$\Sigma X_2^2 = 1528746$

$\bar{X}_1 = \frac{\Sigma X_1}{N} = 109.569$

$\bar{X}_2 = \frac{\Sigma X_2}{N} = 96.887$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\left[\Sigma X_1^2 - \frac{(\Sigma X_1)^2}{N}\right] + \left[\Sigma X_2^2 - \frac{(\Sigma X_2)^2}{N}\right]\right)\left(\frac{N_1 + N_2}{N_1 \quad N_2}\right)}{N_1 + N_2 - 2}}$$

$$t = \frac{109.569 - 096.887}{\sqrt{\left(\left[1968907 - \frac{307335961}{160}\right] + \left[1528746 - \frac{240312004}{160}\right]\right)\left(\frac{320}{25600}\right)}{318}}$$

(Computation of t continued)

$$t = \frac{12.682}{\sqrt{\left(\frac{[1968907 - 1920850] + [1528746 - 1501950]}{318}\right)\left(\frac{320}{25600}\right)}}$$

$$t = \frac{12.682}{\sqrt{\left([48057] + [26796]\right)(.0125)}}$$

$$t = \frac{12.682}{\sqrt{\left(\frac{74853}{318}\right)(.0125)}}$$

$$t = \frac{12.682}{\sqrt{(235.3867924)(.0125)}}$$

$$t = \frac{12.682}{\sqrt{2.\ 94\ 23\ 34\ 90\ 50}}$$

$$t = \frac{12.682}{1.715} = 7.395$$

Computation of t for independent groups using Fathers Age of non-delinquent and delinquent boys

X_1 = Age of fathers of non-delinquent group

X_2 = Age of fathers of delinquent group

N_1 = Number of cases in non-delinquent group

N_2 = Number of cases in delinquent group

$N_1 = 160$

$N_2 = 160$

$\Sigma X_1 = 6713$

$\Sigma X_2 = 6911$

$\Sigma X_1^2 = 286777$

$\Sigma X_2^2 = 307666$

$$\bar{X}_1 = \frac{\Sigma X_1}{N} = 41.956$$

$$\bar{X}_2 = \frac{\Sigma X_2}{N} = 43.194$$

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{\left[\Sigma X_1^2 - \frac{(\Sigma X_1)^2}{N}\right] + \left[\Sigma X_2^2 - \frac{(\Sigma X_2)^2}{N}\right]}{N_1 + N_2 - 2}\right)\left(\frac{N_1 + N_2}{N_1 \quad N_2}\right)}}$$

$$t = \frac{41.956 - 43.194}{\sqrt{\left(\frac{\left[286777 - \frac{45064369}{160}\right] + \left[307666 - \frac{47761921}{160}\right]}{318}\right)\left(\frac{320}{25600}\right)}}$$

(Computation of t continued)

$$t = \frac{11.138}{\sqrt{\left(\frac{[286777 - 281653] + [307666 - 298513]}{318}\right)\left(\frac{320}{25600}\right)}}$$

$$t = \frac{11.138}{\sqrt{\left(\frac{[5124] + [14153]}{318}\right)}}$$

$$t = \frac{11.138}{\sqrt{\left(\frac{19277}{318}\right)\left(.0125\right)}}$$

$$t = \frac{11.138}{\sqrt{\left(60.6194968\right)\left(.0125\right)}}$$

$$t = \frac{11.138}{\sqrt{7.57\ 74\ 37\ 10}}$$

$$t = \frac{11.138}{2.753} = 4.046$$

Computation of Chi-square to determine significance of difference between occupational classification of father of non-delinquent versus delinquent boys

Non-delinquent	17.5	24.5	13.5	6.5	50.5	21.5	18	8	
	25	36	17	10	41	18	10	3	160
Delinquent	17.5	24.5	13.5	6.5	50.5	21.5	18	8	
	10	13	10	3	60	25	26	13	160
Total	35	13	10	13	101	43	36	16	320

* Value necessary for significance at 1% level of confidence = 18.475 w/7 d.f.

$$\text{Chi-square} = \frac{(o-e)^2}{e} + \frac{(o-e)^2}{e} + \frac{(o-e)^2}{e} + \cdots\cdots\cdots\cdots + \frac{(o-e)^2}{e}$$

$$= \frac{(25-17.5)^2}{25} + \frac{(36-24.5)^2}{36} + \frac{(17-13.5)^2}{17} + \frac{(10-6.5)^2}{10} + \frac{(41-50.5)^2}{41} + \frac{(18-21.5)^2}{18} + \frac{(10-18)^2}{10} + \frac{(3-8)^2}{3}$$

$$= 3.21 + 1.53 + .90 + 1.88 + 1.17 + .56 + 3.55 + 3.13$$

$$= 15.93$$

$$\text{Chi-square} = \frac{(o-e)^2}{e} + \frac{(o-e)^2}{e} + \frac{(o-e)^2}{e} + \cdots\cdots\cdots\cdots + \frac{(o-e)^2}{e}$$

$$= \frac{(10-17.5)^2}{10} + \frac{(13-24.5)^2}{13} + \frac{(10-13.5)^2}{10} + \frac{(3-6.5)^2}{3} + \frac{(60-50.5)^2}{60} + \frac{(25-21.5)^2}{25} + \frac{(26-18)^2}{26} + \frac{(13-8)^2}{13}$$

$$= 3.21 + 5.40 + .91 + 1.88 + 1.79 + .57 + 3.56 + 3.13$$

$$= 20.45$$

$$\text{Chi-square} = 36.38$$