Early conduct problems, school achievement and later crime: Findings from a 30-year longitudinal study

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Abstract

This study used data from a 30-year longitudinal study to examine the associations between early conduct problems, school achievement and later crime. The analysis showed that, even following extensive adjustment for confounding, both early conduct problems and later educational achievement made independent additive contributions to crime. The important applied implication of these observations is that interventions that increase the educational attainment of young people with early onset conduct problems may reduce the longer-term risks of antisocial behaviour faced by these young people. Further experimental research is required to ascertain the extent that: a) the educational achievement of young people with early-onset conduct problems can be improved; and b) the extent to which any such improvements translate into reductions in subsequent antisocial behaviour.

Keywords: conduct problems; formal educational qualifications; crime prevention; adult criminal behaviour; longitudinal study; New Zealand.

It has been well documented that children with early onset conduct problems are at increased risk for later crime and other adverse outcomes (Fergusson & Jakobsen, 2001; Fergusson, Jakobsen, & Ridder, 2005; Loeber, 1990; Loeber & Farrington, 2001; Stevenson & Goodman, 2001; Zara & Farrington, 2009). However, by no means all of those children with early onset conduct problems go on to develop later antisocial and criminal behaviours (Fergusson, Lyskey, & Jakobsen, 1996; Moffit, Caspi, Dickson, Silva, & Stanton, 1996). These observations suggest the presence of intervening factors and processes that may act to mitigate the long-term risk of some children with early onset conduct problems.

One factor that may act to mitigate the risks faced by children with early-onset conduct problems may be success and participation in the educational system. In particular, there is substantial evidence to suggest that processes of school dropout, educational underachievement and failure to attend school all act to increase young people’s participation in criminal behaviour. For example, Farrington (1989) used data from the Cambridge Study in Delinquent Development to examine different risk predictors. The study suggested that school failure was among the best predictors for adult violence and convictions. Tremblay et al. (1992) also found in longitudinal analysis a strong association between early disruptive behaviour and poor school achievement.

Conversely, it may be suggested that academic achievement could act as a factor which mitigates the risks of later crime faced by children with early onset conduct problems. In particular, success at school may set in train a series of processes that reduce the likelihood that children with early onset conduct problems will proceed
to later criminal offending. These processes may include: a) the increased occupational opportunities offered by academic achievement; b) the formation of relationships with pro-social peers; and c) increased self-esteem. All of these factors may combine to decrease later risks of crime. Viewed from this standpoint, success at school may act as what Rutter has described as a “turning point event” which has the potential to alter the developmental trajectory followed by children with early onset conduct problems (Rutter, 1990).

While there has been substantial research into the relationships between crime and both early conduct problems and school achievement, most of this research has focused on the adverse effects of educational underachievement. Few, if any, studies have examined the issue of the extent to which educational achievement offers a positive pathway which mitigates the risks of later crime faced by children with early onset conduct problems.

In this paper we address this issue using data gathered during the course of the Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of a birth cohort of 1265 children born in Christchurch in mid-1977. This cohort has now been studied on 22 occasions from birth to the age of 30. As part of this research, data have been gathered on: childhood conduct problems; school achievement; and later crime.

In this paper we use these data to examine the linkages between these variables taking into account other covariate factors. The aims of the study were:

1. To document the association between early conduct problems and rates of later criminal behaviour outcomes including involvement in property/violent crime, arrest/conviction and imprisonment;
2. To document the associations between leaving school with qualifications and later crime;
3. To develop regression models to examine the net effects of early conduct problems and school qualifications on later crime taking into account a wide range of covariate factors;
4. To use the results of the regression models to examine the extent to which educational qualifications may mitigate the association between early conduct problems and later crime.

Method

The data reported here were gathered by the Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of an unselected birth cohort of 1265 children born in the Christchurch (New Zealand) urban region over a four-month period in mid-1977. This cohort has now been studied at birth, four months, one year and annual intervals to age 16, and at ages 18, 21, 25 and 30 years using data gathered from a combination of sources including: parental interviews; self/reports; psychometric tests; teacher reports; medical and other official records (Fergusson & Jakobsen, 2001). All aspects of data collection have been subject to the signed consent of research participants, and all phases of the study have been subject to ethical review by the Canterbury Regional Ethics Committee. The present analysis is based on the sample of 1002 research participants for whom data were available.
on childhood conduct problems, attainment of high school qualifications and measures of adult criminal behaviours. This sample represented 81% of the surviving cohort at age 30 years. The following measures were used in the present analysis.

**Measures of criminal adult behaviours**

At ages 21, 25 and 30, sample members were questioned about their involvement in criminal offending behaviours using the Self Report Delinquency Inventory, SRDI (Elliott & Huizinga, 1989), supplemented by custom-written survey items to assess the frequency of offending behaviours for each 12-month period since the previous assessment. At the same time, participants were also questioned about the frequency and context of all official contacts with the Police or criminal justice system for each year since the previous assessment. This information was combined over the three reporting periods to construct three dichotomous measures of reflecting involvement in offending behaviours over the interval from age 18–30 years.

**Property/violent offending 18–30 years.** Participants were classified as property/violent offenders if they reported committing at least one property or violent offence over the period 18–30 years. Property offences were defined to include vandalism, fire setting, breaking and entering, shoplifting and other theft, possession of stolen goods and related offences; violent offences included assault, fighting, use of a weapon, use of force, threatening behaviour and related offences. Overall, 26.8% of the sample reported at least one property or violent offence.

**Arrest/conviction 18–30 years.** Participants were classified as having been arrested/convicted if they reported being arrested by the police or being convicted of any offence in court at any time from age 18-30 years: 21.2% reported at least one arrest or court conviction.

**Imprisonment 18–30 years.** Participants who reported receiving a prison sentence at any time from age 18 were classified as having been imprisoned: 2.6% of the sample reported receiving a prison sentence.

**Childhood conduct problems (7–9 years)**

When sample members were aged 7, 8 and 9 years, parental and teacher reports of the child’s tendencies to disruptive, oppositional and conduct-disordered behaviours were obtained using an instrument that combined items from the Rutter (Rutter, Tizard, & Whitmore, 1970) and Conners (1969, 1970) parent and teacher questionnaires. The selected items spanned a range of behaviours relating to disobedience and defiance of authority, fits of temper and irritability, aggression or cruelty towards others, destruction of property, lying, stealing and other similar behaviours, with these items being scored on a 3-point scale from not at all to a great deal. Confirmatory factor analysis of the selected items for each source (parents, teachers) suggested that, in each case, the items could be scaled as unidimensional scales representing the extent of child conduct problems as reported by parents and teachers (Fergusson & Jakobsen, 1993). Scale scores representing the extent of disruptive, oppositional or conduct disordered behaviour at age 7, 8 and 9 years
were created by summing parental and teacher items scores for each child at each age. These scales were then averaged over the 3-year period to provide an overall measure of the extent of conduct problems in middle childhood. The reliability of this scale, assessed using coefficient alpha, was .97. For the purposes of data display this scale was classified into four groups ranging from those with conduct problems in the least disturbed 50%, to those in the most disturbed 10%.

Leaving school with qualifications

At ages 18 and 21, sample members were questioned regarding their educational history, including the attainment of high school qualifications. Under the system of educational qualifications as it applied for this cohort, students could attain a range of high school qualifications, including: School Certificate, a national series of examinations attempted by most students in year 11; Sixth Form Certificate (year 12); Higher School Certificate (approximately equivalent to high school graduation in the US) and University Bursary (year 13). For the purposes of this study participants who reported leaving school by age 18 having attained at least one pass grade in one School Certificate subject, or attaining any higher school qualification were classified as leaving school with qualifications. A total of 81.4% of sample members met this criterion. This rate is comparable to reported rates of attainment of high school qualifications for New Zealand as a whole (Ministry of Education, 2002).

Measures of covariate factors

To control the associations between childhood conduct problems, attainment of high school qualifications and rates of adult criminal behaviours for the effects of other social, family or individual characteristics, a wide range of measures from the study database were considered for inclusion in the analysis. These factors included measures of: family socioeconomic circumstances (parental ages, parental education levels, family type, family socioeconomic status, family income, living standards); family functioning (changes of parents, interparental violence, quality of parental attachment, parental bonding); parental adjustment (parental criminality, alcohol problems, illicit drug use); childhood sexual and physical abuse; and individual characteristics and behaviour (gender, IQ, self-esteem, peer affiliations). Preliminary analysis of the wider range of potential covariates identified six factors as being significant covariates in the prediction of at least one of the three study outcomes. These measures are described in detail below.

Gender.

Family type (birth). This was assessed on the basis of whether the child entered a single parent family at birth (7.7%).

Parental history of criminality (0–15 years). When sample members were aged 15 years, their parents were questioned as to whether any parent had a history of criminal offending. The young person was classified as having a parental history of criminality if at least one parent had a history of offending (13.3%).

Inter-parental violence (0–16 years). At age 18, sample members were questioned using items from the Conflict Tactics Scale (Straus, 1979) to assess the extent to
which they had witnessed incidents of physical violence or serious threats of physical violence between their parents prior to age 16. Separate questioning was conducted concerning violence initiated by either parent. This information was used to construct two scale scores representing the extent of mother-initiated and father-initiated violence. The reliabilities of these scales ranged from to $\alpha = 0.77$ to 0.86 (Fergusson & Jakobsen, 1998b). For the purposes of the present analysis the mother and father scales were combined to create an overall measure reflecting the extent of inter-parental violence initiated by either parent during childhood.

Deviant peer affiliations (16 years). At age 16 years sample members were questioned on a series of items concerning the extent to which their best friend and other friends used tobacco, alcohol or illicit drugs, truanted or broke the law (Fergusson et al., 1996). This information was used to derive a scale measure reflecting the extent to which the young person reported affiliating with delinquent or substance using peers. The reliability of this scale was $\alpha = 0.74$.

Self-esteem (15 years). At age 15, sample members completed the Coopersmith Self Esteem Inventory (1981). The global self-esteem score, generated by summing of the four subscale scores (general, academic, social, and home), was used in the present analysis. The reliability of the full scale score was $\alpha = 0.87$.

Statistical methods

The analysis was conducted in three stages. In the first stage the joint associations between childhood conduct problems, leaving school with qualifications and later criminal behaviours were estimated (Table 1). To facilitate data display the measure of childhood conduct problems was quantised into four levels based on the distribution of the conduct problems score at age 7–9 years. These groups were: those with few or no problems whose scores placed them in the bottom 50% of the distribution (Group 1); those whose scores placed them in the 51st to 75th percentiles (Group 2); those whose scores placed them in the 76th to 90th percentiles (Group 3); and those with the highest conduct problems scores who fell into the 91st to 100th percentiles (Group 4). The significance of the associations in Table 1 was tested by fitting a series of logistic regression models in which the log odds of each criminal behaviour outcome was modelled as a linear function of the level of childhood conduct problems and the attainment of school qualifications. The fitted models were of the form:

$$ \text{Logit}(Y_j) = B_0 + B_1 X_1 + B_2 X_2 $$

where $Y_j$ was the jth offending outcome and $X_1$, $X_2$ were the measures of childhood conduct problems and leaving school with qualifications. These models were then extended to incorporate the multiplicative interaction of childhood conduct problems and school leaving qualifications to examine whether the strength of the association between childhood conduct problems and criminal outcomes varied with the attainment of high school qualifications. No significant interactions were detected.

In the second stage, the logistic regression models were further extended to control for a range of potential confounding factors reflecting the effects of other social,
family and personal characteristics known to be associated with childhood conduct problems or educational attainment that might also influence later criminal involvement (Table 2). Initially all covariates were included in the fitted models. The models were then successively refined using methods of forwards and backwards variable elimination to identify those covariates making significant contributions to the prediction of each outcome. The final models reported in Table 2 include only those covariates having a significant effect on at least one criminal behaviour outcome. Comparison of the adjusted associations of childhood conduct problems and school leaving qualifications with criminal behaviour outcomes from models that included all covariates with the adjusted associations reported in Table 2 showed that the two sets of coefficients were negligibly different.

Finally, the model parameters from the adjusted models in Table 2 were used to estimate the covariate adjusted rates of each adult criminal behaviour outcome for each level of childhood conduct problems and leaving school with qualifications (Table 3). The adjusted rates were calculated using the methods described by Lee (1981).

Sample size and sample bias

As noted above, the analyses reported here were based on the sample of 1002 participants who were observed on measures of adult criminal behaviour, childhood conduct problems and leaving school with qualifications. This sample represented 81% of the surviving cohort at age 30. Comparison of the sample included in the analysis with the remaining cohort members on a range of socio-demographic factors assessed at the time of birth showed that there were significant (p < .05) tendencies for the obtained sample to under-represent children from more socially disadvantaged families characterised by low maternal education, low socio-economic status and single parenthood. To examine the extent to which the analysis findings may have been influenced by the effects of selection bias due to the processes of sample attrition, the data were reanalysed using the data weighting method described by Carlin, Wolfe, Coffey, and Patton, (1999). These analyses produced essentially identical conclusions to the analyses reported here, suggesting that the findings were unlikely to have been influenced by selection bias.

Results

The joint associations between early conduct problems (ages 7–9), school leaving qualifications and crime (ages 18–30). Table 1 shows the associations between: a) early conduct problems (7–9 years); b) school leaving qualifications; and c) rates of crime (18–30 years). In these tables early conduct problems are represented by a 4 level variable which ranges from the 50% of the cohort who had no conduct problems to the 10% most disturbed individuals. In all cases the table shows:

1. Increasing conduct problems were associated with increasing rates of criminal behaviour outcomes.
2. Those leaving school with qualifications had lower rates of crime.
To test the significance of early conduct problems and attainment of school qualifications, logistic regression models were fitted to each table. The results of the logistic regressions are reported at the foot of each Table, and show that for all outcomes there were:

1. Significant (p < 0.001) associations between early conduct problems and later crime, taking into account school leaving qualifications;
2. Significant (p < 0.05) associations between school leaving qualifications and crime;
3. There were no significant conduct problems x school leaving qualification interactions, implying that the data fitted a main effects model.

### a) Property/Violent Offending (%)

<table>
<thead>
<tr>
<th>Left School with Qualifications</th>
<th>Conduct Problems (7-9 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 (1-50%)</td>
</tr>
<tr>
<td>No</td>
<td>25.0 (11/44)</td>
</tr>
<tr>
<td>Yes</td>
<td>17.7 (82/464)</td>
</tr>
</tbody>
</table>

Main effect of conduct problems B(SE) = 0.396 (0.074), p<0.001
Main effect of school qualifications B(SE) = -0.880 (0.182), p<.001
Test for conduct problems x school qualifications interaction LR$\chi^2$(1df) = 0.08, p = 0.78

### b) Arrest/Conviction (%)

<table>
<thead>
<tr>
<th>Left School with Qualifications</th>
<th>Conduct Problems (7-9 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 (1-50%)</td>
</tr>
<tr>
<td>No</td>
<td>22.7 (10/44)</td>
</tr>
<tr>
<td>Yes</td>
<td>9.7 (45/464)</td>
</tr>
</tbody>
</table>

Main effect of conduct problems B(SE) = 0.556 (0.080), p<0.001
Main effect of school qualifications B(SE) = -0.875 (0.192), p<.001
Test for conduct problems x school qualifications interaction LR$\chi^2$(1df) = 0.20, p = 0.66

### c) Imprisonment (%)

<table>
<thead>
<tr>
<th>Left School with Qualifications</th>
<th>Conduct Problems (7-9 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group 1 (1-50%)</td>
</tr>
<tr>
<td>No</td>
<td>0.0 (0/44)</td>
</tr>
<tr>
<td>Yes</td>
<td>0.4 (2/464)</td>
</tr>
</tbody>
</table>

Main effect of conduct problems B(SE) = 0.866 (0.216), p<0.001
Main effect of school qualifications B(SE) = -1.597 (0.471), p<.001
Test for conduct problems x school qualifications interaction LR$\chi^2$(1df) = 0.02, p = 0.89

Table 1. Associations between childhood conduct problems (7-9 years), leaving school with qualifications and rates (%) of adult criminal behaviour outcomes (18–30 years)
In general the results suggest that both early conduct problems and later school leaving qualifications made independent contributions to the risks of crime.

Adjustment for covariates

One explanation of the associations between conduct problems, educational achievement and crime is that these reflect the effects of third or confounding factors that are correlated with conduct problems or educational achievement. To address this issue the regression models described above were extended to include a series of covariate factors (see Methods). Table 2 shows the estimated parameters from the fitted regression models adjusting for potentially confounding covariates. The table shows that the adjusted associations between early conduct problems and later crime remained statistically significant for two of the three outcomes (arrest/conviction, imprisonment) and marginally significant for the third (property/violent offending). In all cases the associations between leaving school with qualifications and later crime remained statistically significant after adjustment for confounding.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Property/Violent Offending</th>
<th>Arrest/Conviction</th>
<th>Imprisonment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>p</td>
<td>B (SE)</td>
</tr>
<tr>
<td>Conduct problems (7-9 yrs)</td>
<td>.158 (.083)</td>
<td>.057</td>
<td>.337 (.091)</td>
</tr>
<tr>
<td>Left school with qualifications</td>
<td>-.433 (.203)</td>
<td>.011</td>
<td>-.673 (.225)</td>
</tr>
<tr>
<td>Covariate factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/two parent family at birth</td>
<td>-.927 (.294)</td>
<td>.002</td>
<td>-.623 (.332)</td>
</tr>
<tr>
<td>Inter-parental violence (0-16 yrs)</td>
<td>.122 (.034)</td>
<td>&lt;.001</td>
<td>.062 (.038)</td>
</tr>
<tr>
<td>Parental criminality (15 yrs)</td>
<td>.362 (.232)</td>
<td>.112</td>
<td>.744 (.256)</td>
</tr>
<tr>
<td>Self esteem (15 yrs)</td>
<td>-.045 (.014)</td>
<td>.002</td>
<td>.009 (.019)</td>
</tr>
<tr>
<td>Deviant peer affiliations (16 yrs)</td>
<td>.165 (.033)</td>
<td>&lt;.001</td>
<td>.181 (.037)</td>
</tr>
<tr>
<td>Female gender</td>
<td>-1.323 (.179)</td>
<td>&lt;.001</td>
<td>-2.182 (.229)</td>
</tr>
</tbody>
</table>

Table 2. Summary of fitted logistic regression models for measures of offending, arrest/conviction and imprisonment (18–30 years)

Note: Non-significant covariates considered but not included in final regression models (see Methods): parental ages, parental education levels, childhood family SES, family income, family living standards, changes of parents, parental alcohol problems, parental illicit drug use, parental attachment, parental bonding, exposure to child abuse, child cognitive ability, childhood attentional problems.

The effects of educational achievement on the association between early conduct problems and crime. An important deduction that may be made from the statistical models in Table 2 is that leaving school with educational qualifications is a factor that may mitigate the risks of crime faced by young people having early conduct problems. This feature is shown in Table 3, which shows the estimated associations...
between early conduct problems and crime for those leaving school with or without qualifications, after covariate adjustment. The table shows that in all cases, leaving school with qualifications leads to reduced rates of: property/violent crime; arrest/conviction, and imprisonment.

In general this analysis suggests that leaving school with qualifications acts as a main effects compensatory factor which may mitigate the risks of early conduct problems on risks of later crime.

### a) Property/Violent Offending (%)

<table>
<thead>
<tr>
<th>Conduct Problems (7-9 Years)</th>
<th>Group 1 (1-50%)</th>
<th>Group 2 (51-75%)</th>
<th>Group 3 (76-90%)</th>
<th>Group 4 (91-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left School with Qualifications</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>29.4</td>
<td>22.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>32.3</td>
<td>24.8</td>
<td>27.4</td>
<td>30.1</td>
</tr>
</tbody>
</table>

### b) Arrest/Conviction (%)

<table>
<thead>
<tr>
<th>Conduct Problems (7-9 Years)</th>
<th>Group 1 (1-50%)</th>
<th>Group 2 (51-75%)</th>
<th>Group 3 (76-90%)</th>
<th>Group 4 (91-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left School with Qualifications</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22.9</td>
<td>14.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28.0</td>
<td>18.5</td>
<td>22.9</td>
<td>28.0</td>
</tr>
</tbody>
</table>

### c) Imprisonment (%)

<table>
<thead>
<tr>
<th>Conduct Problems (7-9 Years)</th>
<th>Group 1 (1-50%)</th>
<th>Group 2 (51-75%)</th>
<th>Group 3 (76-90%)</th>
<th>Group 4 (91-100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left School with Qualifications</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>2.2</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3.3</td>
<td>1.2</td>
<td>1.8</td>
<td>2.7</td>
</tr>
</tbody>
</table>

**Table 3.** Associations between childhood conduct problems (7–9 years), leaving school with qualifications and rates (%) of adult criminal behaviour outcomes (18–30 years) after adjustment for covariates

### Discussion

In this paper we have used data from a 30-year longitudinal study to examine the role of the attainment of educational qualifications in reducing the risks of future crime amongst children with early onset conduct problems. The basic findings of this research confirm the findings of many previous studies, which have shown that both early conduct problems and lack of educational achievement are risk factors for later crime, even when multiple sources of confounding are taken into account (Caspi, Wright, Moffitt, & Silva, 1998; Fergusson & Jakobsen, 1998a; Hawkins & Farrington, 1998; Hawkins et al., 2005; Kim-Cohen et al., 2003; Masten et al., 2005; Nagin, 1999; Rutter, Kim-Cohen, & Maughan, 2006).

The present study has extended these findings to estimate the consequence of varying levels of educational achievement for reducing the risks of crime for children with early onset conduct problems. These findings (Tables 2 and 3) suggest
that the associations between early onset conduct problems, school achievement and crime are best described by an additive model. This model shows that increasing attainment of educational qualifications is effective in reducing the risks of future crime for all children, suggesting that school attainment is a compensatory factor (Henderson & Milstein, 2003; Rutter, 1990; Schoon & Bynner, 2003) that may mitigate the risks of crime amongst children with early onset conduct problems. For example, Table 3 shows that rates of crime, however measured, are between 78% and 38% lower amongst children with conduct problems who have achieved educational qualifications than amongst an equivalent group of children with no school qualifications, even after extensive adjustment for confounding.

These findings suggest that the provision educational support and assistance to children with early conduct problems may provide one pathway for mitigating the risks of future antisocial behaviours faced by these young people. This conclusion is consistent with a growing body of evidence showing that school-based interventions, such as the School Wide Behaviour Support and Check and Connect (Anderson, Christenson, Sinclair, & Lehr, 2004; Christenson, Sinclair, Thurlow, & Evelo, 1999; Horner & Sugai, 2002; Lassen, Steele, & Sailor, 2006) programmes that increase the young person’s attachment to the school environment are effective in reducing rates of conduct problems in young people.

While the findings of this study suggest that improving levels of educational achievement would have beneficial effects on mitigating the risks of later crime amongst children with early onset conduct problems and, indeed, other children, it is important to recognise that these conclusions are based on observational research. There is a clear need for further experimental research to examine: a) the extent to which school achievement can be improved amongst those with early onset conduct problems; and b) the extent to which such improvements are associated with reduced risks of future anti-social behaviour.

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