Adolescent Resiliency to Family Adversity

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Abstract

The factors associated with adolescent resiliency to childhood adversity were examined in a birth cohort of 940 New Zealand adolescents studied to the age of 16 years. Resilient teenagers were defined by: a) high exposure to family adversity during childhood and b) an absence of a wide range of externalising problems during adolescence including substance abuse, juvenile offending and school problems. Resilient teenagers were characterised by significantly higher IQ ($p<.001$), lower novelty seeking ($p<.01$) and lower affiliations with delinquent peers ($p<.005$) with these factors acting accumulatively to influence the probability of resilience to externalising problems.

Keywords: Resilience, adolescence, adjustment problems, longitudinal study.

IQ	Intelligence quotient
OR	Odds ratio
PBI	Parental bonding instrument
WICE-R	Wechsler Intelligence Scale for Children - Revised

Introduction

There has been a large amount of research into the social and familial correlates of childhood and adolescent problems and notably conduct problems, juvenile offending and substance abuse (for reviews see Farrington et al, 1990; Hawkins, Catalano & Miller, 1992; Loeber, 1988; 1990; Patterson, De Baryshe & Ramsey, 1989; Rutter & Giller, 1983). This literature has succeeded in identifying a wide range of childhood, family and parental characteristics that are associated with increased risks of a wide range of behavioural and mental health problems. A further feature of this literature has been that, typically, the associations between specific risk factors and outcomes have been modest with the result that single risk factors in isolation explain relatively little variation in outcome risks. There is, however, growing and clear evidence to suggest that what identifies high risk children and families is an accumulation of difficulties and adversities which may include poverty and economic difficulties, parental deviance or mental illness, impaired parenting and child rearing practices, abuse, family conflict and family change (Blanz, Schmidt & Esser, 1991; Fergusson, Horwood & Lynskey, 1994a; Shaw & Emery, 1988; Shaw, Vondra, Hommerding, Keenan & Dunn, 1994).

For example, Fergusson et al. (1994a) used prospectively collected data to examine the childhoods of a small group of adolescents studied as part of the Christchurch Health and Development Study who had developed multiple problem behaviours. This study suggested that the childhoods of these young people had been marked by a higher frequency of a wide range of social, economic, parental, child rearing and family adversities. The extent to which these adversities in combination may influence behavioural risk is well illustrated by the fact that Fergusson et al. (1994a) reported that children in the most disadvantaged 5% of their cohort had risks of becoming multiple problem teenagers that were over 100 times greater

than the risks for members of the most advantaged 50% of their cohort. They also noted that in families marked by a lack of adversity during childhood, multiple problem teenagers were rare.

While the childhood and family risk factors for adolescent problems have been well documented and the accumulative role of these factors in shaping risk has become increasingly recognised, it is not the case that all children raised in adverse circumstances experience mental health or adjustment problems. This issue has been ably reviewed by Rutter and Madge (1976) in their analysis of the cycle of disadvantage hypothesis in which they found that, while children reared under adverse circumstances were at increased risks, many children reared in highly adverse circumstances appeared to transcend the limitations of their environment and make a satisfactory adjustment. The finding that escape from childhood adversity is not uncommon has led, in turn, to a search for factors which may explain why some children escape the consequences of early family and childhood adversity. This literature has focussed on factors that may protect against or mitigate the effects of early disadvantage and thence confer resilience to children in high risk environments. The major findings of this literature are summarised below.

1. Intelligence and problem solving abilities. A finding that has emerged from several studies is that resilient young people appear to be characterised by higher intelligence or problem solving skills than their non-resilient peers (Herrenkohl, Herrenkohl & Egolf, 1994; Kandel et al, 1988; Masten et al, 1988; Seifer, Sameroff, Baldwin & Baldwin, 1992; Werner, 1989). For example, in a study of a sample of high risk children under welfare supervision Herrenkohl et al. (1994) found that resilient children were characterised by higher intelligence than their non-resilient peers. On the basis of this evidence they concluded that at least

average intellectual capacity was a necessary but not sufficient condition for adolescent resilience.

2. Gender. There have been a number of suggestions in the literature that gender may influence or modify responses to adversity. Specifically, a number of studies of the effects of marital discord or divorce have suggested that females may be less reactive to family stress than males (Emery & O'Leary, 1982; Hetherington, 1989; Porter & O'Leary, 1980; Wallerstein & Kelly, 1980). For example, Hetherington (1989) reported that girls exposed to parental divorce showed lower rates of adjustment problems than boys. However, not all studies have confirmed the conclusion that female gender is associated with greater resilience (Allison & Furstenberg, 1989; Amato & Keith, 1991; Fergusson, Lynskey & Horwood, 1994).

3. External interests and affiliations. A number of studies have suggested that children from high risk backgrounds who develop either strong interests outside the family or form attachments with a confiding adult outside their immediate family may be more resilient to the effects of family adversity (Jenkins & Smith, 1990; Werner, 1989). For example, Jenkins and Smith (1990) examined protective factors for childhood behavioural problems in a sample of 9-12 year olds. Their results suggested that a series of factors including a good relationship with an adult outside their family and involvement in an activity for which they received positive recognition may act as protective factors that reduce risks amongst children living in disharmonious homes.

4. Parental attachment and bonding. A further factor that may increase resiliency in children from high risk backgrounds is the nature of parent/child relationships. Specifically, it has been suggested that the presence of warm, nurturant or supportive relationships with at

least one parent may act to protect against or mitigate the effects of family adversity (Bradley et al, 1994; Gribble et al, 1993; Herrenkohl et al, 1994; Jenkins & Smith, 1990; Seifer et al, 1992; Werner, 1989; Wyman, Cowen, Work & Parker, 1991). For example, Seifer et al. (1992), in a longitudinal study of samples of high and low risk children studied to the age of 13 years, concluded that a series of aspects of early mother child interaction including maternal teaching style and expressed emotion acted as protective factors.

5. Early temperament and behaviour. There has also been some evidence to suggest that temperamental and behavioural factors may be associated with resilience to adversity (Werner, 1989; Wyman et al, 1990). For example, Werner (1989) reported that resilient teenagers were more likely to have been rated as having an easy temperament during childhood than their non-resilient peers.

6. Peer factors. A possible source of resilience to which relatively little attention has been paid is the nature and quality of peer relationships. It seems reasonable to assume that such relationships may provide positive role models and sources of support that may mitigate the effects of adverse family circumstances. In support of this view, Werner (1989) reported that resilient children in the Kaui longitudinal study were characterised by good peer relationships.

<u>Methodological and Conceptual Issues in the Study of Resilience</u>

The concept of resilience has frequently been associated with, or equated to, the concept of protective factors. There are, however, some important distinctions between the two concepts as they are commonly used in the literature. In a discussion of childhood resilience, Rutter (1985) drew a distinction between risk and protective factors and suggested that protective factors were those factors which reduce risks within a high risk group even though these

factors may not be generally related to risk throughout the population. This definition implies the presence of interactions between risk factors, protective factors and risks of adverse outcomes.

While Rutter's approach succeeds in distinguishing protective factors from conventional risk factors, it has a number of liabilities when applied to the study of resilience amongst high risk populations (Luthar, 1993). Specifically, it is not the case that all factors that lead to resilience amongst high risk individuals will meet the definition of protective factors suggested by Rutter. In a review of this issue, Luthar (1993) has examined both main effects and interactive models of resiliency and suggests that a distinction needs to be drawn between (interactive) protective factors and compensatory (main effects) factors that mitigate or reduce risk within high risk populations and other groups. At the same time, while the distinction between interactive and main effects models is of theoretical interest, there is perhaps more interest in the task of identifying the factors that increase resilience by either mitigating the risks faced by these groups or by acting in a specific protective role. Further, it seems plausible to assume that the factors associated with resilience amongst high risk groups are likely to include a mix of both protective and compensatory factors.

A second methodological issue in the analysis of resilience concerns the ways in which risk status is defined (Luthar, 1993). Most studies of resilience have identified groups of high risk children defined on the basis of statistical or empirical criteria. To a large extent the evaluation of resilience rests upon the extent to which such indices adequately represent risk status. Luthar (1993) suggests that the best approach to the identification of high risk may be through the use of summative indices which summarise a range of childhood experiences.

However, the use of summative indices, in turn, raises a methodological problem. Specifically, when high risk is defined by a cutting point on a continuous scale measure, there will be heterogeneity in the scores of those classified as high risk. This heterogeneity will reflect the fact that not all children within the high risk group will have been exposed to exactly the same adversities or the same extent of adversity. In turn, the presence of heterogeneity within the high risk group opens the way for possible statistical artefacts since one reason for some children in high risk groups appearing to be resilient may be that these children have had less exposure to risk factors than other high risk children. To address this issue it is clearly necessary to take account of heterogeneity in the extent to which children in high risk groups have been exposed to risks.

A further potential problem in the study of resiliency relates to the heterotypical expression of adolescent problems. In particular, a number of studies have examined the extent of resilience to a specific outcome (for example juvenile offending) and have contrasted high risk children who exhibit the outcome with those who do not. A potential limitation of this approach is that those who apparently escape showing a particular outcome may, in fact, show other consequences of early adversity and that the impression of escape from adversity could arise from limitations in the measurement of outcomes rather than from the fact that the individual has avoided the consequences of an unsatisfactory childhood (Fergusson et al, 1994a; Luthar & Zigler, 1991). For this reason, it is important that studies of resilience base the definition of resilience not upon the presence or absence of a single adolescent problem but rather on multiple measures that span a wide range of aspects of adolescent adjustment.

A final problem in the study of resilience in childhood has been that many studies have confined their attention to a relatively restricted set of factors that may contribute to

resilience. This practice of focussing on a relatively narrow range of resiliency factors has two potential liabilities. First, to the extent that resiliency factors may be correlated, the analysis of one class of factors in isolation from other factors may give rise to misleading estimates of the contribution of the factors of interest. Second, it seems likely that the origins of resiliency are many and varied and that what is likely to identify resilient children is not the presence or absence of a single resiliency factor but rather, the presence of an accumulation of such factors which act in combination to ameliorate the risk faced by the young person. These considerations suggest the need for studies of resilience to move away from a focus on single resiliency factors to a more detailed examination of the ways in which multiple sources of resilience may combine to reduce risks within high risk populations.

The Present Study

The present study is an attempt to examine the sources of resilience to family adversities using data collected during the course of a 16 year longitudinal study of a birth cohort of New Zealand children. The approach used in this study may be summarised as follows:

1. The cohort of children was first classified according to the extent of family and childhood adversity using a comprehensive 39 item family adversity index that was based on prospective data collected on a large number of aspects of childhood and family history. This index has been shown to be strongly prognostic of problem behaviours in adolescence (Fergusson et al, 1994a).

2. Cutting points were then placed on this scale to identify a high risk group.

3. Within the high risk group, children resilient to externalising behaviour were identified on the basis of an absence of a wide range of problems including substance use behaviours, conduct disorder, juvenile offending, truancy and school dropout at the age of 16 years.

4. Contrasts were then made between the resilient and non-resilient teenagers with respect to measures of intelligence, early behavioural adjustment, self esteem, personality, external interests and relationships, parent-child bonding and attachment and adolescent peer affiliations. In this analysis, the above factors were treated as possible sources of resilience but distinctions were not made between those factors that were protective and those factors which may have been compensatory.

5. Finally, a multivariate logistic model was fitted to the data to identify resiliency factors that had significant net associations with resiliency. In addition, a resiliency index was developed to illustrate the ways in which multiple risk factors summated to influence resilience within the cohort.

Method

The data reported here were collected during the course of the Christchurch Health and Development Study. The Christchurch Health and Development Study is a longitudinal study of a birth cohort of 1265 children born in the Christchurch (New Zealand) urban region during mid 1977. These children have been studied at birth, four months, one year and annual intervals to the age of 16 years. An overview of the study design has been given previously (Fergusson, Horwood, Shannon & Lawton, 1989). The data analysed in this report were measured in the following ways.

The Measurement of Family Adversity

To identify children who had been exposed to high risk family environments, a general index of family adversity was used. The construction of this index has been described in a previous paper (Fergusson et al, 1994a). The index was based on a series of 39 measures describing various aspects of family circumstances and parental behaviours including: family social and

economic disadvantage, parent-child interaction, parental behaviours, marital conflict and parental separation. This index was chosen because it had been found to be strongly prognostic of a wide range of externalising behaviours and there was a very clear gradient of risk of disorder across the scores of the index. This is shown in Table 1 which gives the distribution of the risk score divided into a number of classes, shows the percentages of the sample that fell into each class interval and shows the proportion of each class interval who developed severe multiple problem behaviours in adolescence (Fergusson et al, 1994a). The Table also shows a very strong risk gradient with children in the most disadvantaged 5% of the sample (score of 19+) having odds of severe multiple problem behaviours that were over 100 times those of the children in the most advantaged 50% of the sample (0-6 points).

INSERT TABLE 1. HERE

Assessment of Outcomes at Age 15-16 Years

To examine the extent to which the family adversity index was related to adolescent risk, a series of outcomes measured at ages 15-16 years was considered. These measures included:

1. Cannabis use at 15-16 years. At age 16 years teenagers and their parents were questioned, in separate interviews, about the young person's use of cannabis. Those with a self or parental report of cannabis use were classified as cannabis users whereas those with neither a parental nor self report of cannabis use were classified as cannabis non-users. On the basis of this definition 19.6% of the sample were classified as having used cannabis during the interval from 15-16 years.

2. Daily cigarette use at age 16 years. Both teenagers and their parents were asked a series of questions concerning the young person's use of cigarettes. On the basis of responses

to this questioning the young person was classified as a daily cigarette smoker if either the young person or their parent reported that the young person smoked cigarettes on a daily basis. On the basis of this questioning, 15.1% of the sample were classified as daily cigarette smokers at the age of 16 years.

    3. Alcohol misuse at 15-16 years. Teenagers were questioned on a series of measures of the frequency and amounts of alcohol consumed using a questionnaire based on that employed by Casswell and her associates (Casswell, Stewart, Connolly & Silva, 1991; Connolly, Casswell, Stewart & Silva, 1992). In addition, responses were obtained to a modified version of the Rutgers Alcohol Problem Index (White & Labouvie, 1989). Using data gathered on frequency of drinking, amounts consumed and alcohol related problems in the last year the sample was classified using techniques of latent class analysis to identify a group of teenagers who engaged in frequent, heavy or problem drinking. This method of classification identified 9.3% of the sample as prone to abusive or hazardous drinking at the age of 16 years. The construction of this method of classification has been described in detail in a previous paper (Fergusson, Horwood & Lynskey, in press).

    4. Conduct/oppositional defiant disorders at age 16 years. Parents and teenagers were questioned in separate interviews on measures of conduct disorder and oppositional defiant behaviours. Parental questioning was based on the Revised Behaviour Problem Checklist (Quay & Peterson, 1987) and the Self Report Early Delinquency Scale (Moffitt & Silva, 1988) whereas self-reports were obtained from responses to the Self Report Early Delinquency Scale (Moffitt & Silva, 1988) supplemented by custom written items for DSM-III-R (American Psychiatric Association, 1987) diagnoses of oppositional defiant disorder. These test items have been described previously (Fergusson, Horwood & Lynskey, 1994b). The young person was classified as having conduct disorder/oppositional defiant disorder if

s/he met DSM-III-R criteria for either disorder on the basis of parental or self reported behaviours.

5. Self report offending (15-16 years). Parents and teenagers were questioned about the young person's offending behaviours in the interval from 15 to 16 years using the Self Report Early Delinquency Scale (Moffitt & Silva, 1988). On the basis of parental and self report data the number of reported offences occurring during this period was estimated. Teenagers were classified as recurrent offenders if they reported or were reported as having committed five or more offences involving property or violence in the last year (7.7% of the sample were classified as having committed five or more offences in the last year).

6. Police contact (15-16 years). Information on official police contacts during the period 15-16 years was obtained from the Youth Aid Section of the New Zealand Police. Examination of police records revealed that 6.5% of the sample had been in official police contact in the last 12 months. In all cases, police records were obtained following signed parental consent for access to these records.

7. Frequent truancy (15-16 years). Parents and teenagers were questioned about the young person's frequency of truancy during the period from 15 to 16 years. Teenagers were classified as frequent truants if either the young person or his/her parents reported that the subject had truanted on 15 or more occasions in the last year: 7.4% of the sample were classified as frequent truants.

8. School dropout. Recent moves have raised the minimum school leaving age in New Zealand from 15 to 16 years. Despite these changes a number of sample members ceased school attendance before the age of 16 years. Any sample member who had left school before

the age of 16 was classified as a school dropout: 5.3% of sample members had dropped out of school by the age of 16 years.

Resiliency Factors

On the basis of the literature on resilient adolescents, a range of factors believed to be associated with resilience was included in the analyses.

1. Intelligence. This was assessed at the age of eight years using the Wechsler Intelligence Scale for Children - Revised (WISC-R; Wechsler, 1974). The full scale score was used in this analysis and this measure was found to have good reliability (α = .93).

2. Attention deficit (8 years). This was assessed using parental and teacher reports of restless, inattentive or hyperactive behaviours based on items derived from the Rutter (Rutter, Tizard & Whitmore, 1970) and Conners (Conners, 1969; 1970) parent and teacher questionnaires. These measures were combined to produce an overall measure of the extent to which the young person was reported to show restless, inattentive or hyperactive behaviours (Fergusson, Horwood & Lloyd, 1991). The reliability of this scale, as measured by coefficient alpha was .88.

3. Conduct problems (8 years). This was assessed using parental and teacher reports of conduct disordered or oppositional behaviours based on items derived from the Rutter and Conners parent and teacher questionnaires. These measures were combined to produce an overall measure of the extent to which the young person was reported to show conduct disordered or oppositional behaviours (Fergusson et al, 1991). The reliability of this scale, as measured by coefficient alpha was .93.

4. Anxiety/withdrawal (8 years). This was assessed using parental and teacher reports of anxious or withdrawn behaviours based on items derived from the Rutter (Rutter et al, 1970) and Conners (Conners, 1969; 1970) parent and teacher questionnaires. These measures were combined to produce an overall measure of the extent to which the young person was reported to show anxious or withdrawn behaviours (Fergusson & Horwood, 1993). The reliability of this scale, as measured by coefficient alpha (Cronbach, 1951) was .71.

5. Self esteem (10 years). This was assessed at age 10 years using the Coopersmith Self Esteem Inventory (Coopersmith, 1981). The full scale score was used in this analysis and was found to have good reliability ($\alpha = .89$).

6. Novelty seeking (16 years). When sample members were aged 16 years they were administered the novelty seeking items of the Tridimensional Personality Questionnaire (Cloninger, 1987). These items were summed to produce an overall novelty seeking measure. The reliability of this scale was assessed using coefficient alpha and found to be moderately good ($\alpha = .76$).

7. School enjoyment (15 years). At the age of 15 years the young people were asked to report the extent to which they enjoyed school: 89.4% of the sample reported that they definitely liked school or liked school somewhat and these young people were classified as enjoying school.

8. Interest in sport (15 years). At the age of 15 years the young people were asked whether or not they had a strong interest in playing any particular sport and, if so, they were asked to describe their sporting interests: 69.8% of the sample responded that they definitely had a strong interest in sport.

9. Other interests (15 years). At the age of 15 years the young people were asked whether or not they had a strong interest in any other (non-sporting) activity and, if so, they were asked to describe this activity: 57.7% of the sample were classified as having a strong interest in a non-sporting activity.

10. Close adult relationship (15 years). At the age of 15 years the young people were asked whether or not they had a close, confiding relationship with an adult who was not a member of their immediate family and to describe the nature of this relationship: 34.6% of the sample responded that they definitely had a close, confiding relationship with an adult outside their immediate family.

11. Parental bonding. To measure parental bonding, the maternal and paternal care and protection scales of the Parental Bonding Instrument (PBI; Parker, Tupling & Brown, 1979) were administered to the young people at the age of 16 years. The young person was asked to rate each of their parents on the PBI items describing the quality of maternal and paternal care and protection throughout their childhood. The care scale measures the extent to which the parents provide support, affection and nurturing with a high score indicating high levels of care. The protection scale measures the extent to which parents exhibit tendencies to over protection or over control with a high score indicating tendencies to over control. The reliabilities of the resulting scale scores were assessed using coefficient alpha and found to be good: maternal care ($\alpha = .89$); paternal care ($\alpha = .91$); maternal protection ($\alpha = .85$); paternal protection ($\alpha = .87$).

12. Parental attachment. Parental attachment was assessed at age 15 years using the parental attachment scale developed by Armsden and Greenberg (1987). The full parental

attachment scale was used in this analysis and this scale was found to have good reliability (α = .87).

13. Nature of home environment. At age 15 the young people were asked to assess the extent to which their home environment was happy or relaxed. Those who reported that their home environment was nearly always or usually happy and relaxed were classified as having a happy and relaxed home environment (78.5% of the sample).

14. Peer affiliations. To measure the extent to which the young person affiliated with delinquent or substance using peers, two general indices of peer affiliations were constructed, one of these indices was based on parental report while the second was based on self report. These indices were based on parental and self reports of the extent to which the young person's best friend and other friends: used tobacco, alcohol and cannabis, truanted or broke the law. These items were summated to produce scale measures of the extent to which the young person was reported as affiliating with delinquent or substance using peers according to parental or self reports. The construction of these delinquent peer scales has been described previously (Fergusson & Horwood, in press). These scales were of moderate reliability, having alpha coefficients of .81 for parental report and .78 for self reports.

15. Peer attachment. The quality of peer attachments was assessed at age 15 years using the peer attachment scale developed by Armsden and Greenberg (1987). The full peer attachment scale was used in this analysis and this scale was found to have good reliability (α = .85).

<u>Sample Size</u>

While the study reported here was based on a birth cohort of 1265 children, the analyses reported here were based on a sample of 940 adolescents. This sample represents 74.3% of the initial cohort of children and 84.6% of the sample alive and resident in New Zealand at the age of 16 years. To examine the effects of sample losses on the representativeness of the sample, comparisons were made of the socio-demographic characteristics of the 940 subjects included in the analysis with the remaining 325 subjects excluded from the analyses. This suggested that losses to follow up during the course of the study were not associated with child ethnicity, gender, maternal age or family size. There were, however, small but statistically detectable tendencies ($p < .01$) for the sample to under represent children from families in which mothers lacked formal educational qualifications, families of low socio-economic status and single parent families.

While these results suggest some small non-random loss of subjects, it is unlikely that these losses will materially influence the results in this study since previous studies in which statistical corrections for non-random sample bias have been applied have suggested that the impact of non-random sample attrition on study estimates were negligible (Fergusson et al, 1991).

Results

<u>The Identification of High Risk Children for Externalising Disorders</u>

The definition of high risk children is, to some extent, arbitrary since studies have typically shown evidence of continuous dose/response relationships between risk factors and outcomes. Under these circumstances, the criteria for identifying a high risk groups rests largely on an informed judgement about the extent of risk exposure that will be classified as

high risk. In the present study this task was approached in the following way. First, as noted previously, sample members were assessed on a 39 item family adversity score. The index was based on a linear composite of items describing exposure to childhood adversities including social and economic disadvantage, family dysfunction, marital conflict and compromised parenting. As we have shown previously (Fergusson, Horwood & Lynskey, 1994a), children exposed to the most adverse conditions had rates of severe problem behaviours that were over 100 times those of children reared in generally advantaged home backgrounds. As we noted in the Method section, this index was a far stronger predictor of childhood outcomes than single demographic measures relating to family living standards, socio-economic status or other demographic features.

A high risk group was identified by setting a cutting point on the distribution of this index with this cutting point being selected to meet two competing criteria:

1. Those in the high risk group were required to show elevated risks of a wide range of externalising behaviours including delinquency, substance use and school problems.

2. The sample selected had to be of sufficient size to make it realistic to compare those who showed resiliency with those who did not.

Consideration of these issues suggested that the most useful cutting point was to classify the 20% of the sample with the highest level of exposure to family adversity as high risk children. This decision gave an adequate sample for analysis (N = 171) but also produced a classification in which the high risk group had clearly elevated rates of externalising behaviours.

Table 2 compares rates of problem behaviours amongst those in the high risk group and the remaining sample members. This Table shows that high risk subjects had

significantly increased risks of cannabis use (OR = 2.8, p<.001), alcohol abuse (OR = 3.6, p<.001), daily tobacco use (OR = 4.2, p<.001), conduct/oppositional disorder (OR = 6.3, p<.001), juvenile offending (OR = 3.4, p<.001), official police contact (OR = 2.4, p<.005), frequent truancy (OR = 4.0, p<.001) and school dropout (OR = 10.2, p<.001).

The extent of difference in the density of externalising problems amongst the high risk and remaining sample members can be seen from the fact that the high risk group met criteria for a mean of 2.05 difficulties compared to a mean of 0.62 for other sample members.

However, while members of the high risk group were at an increased risk of externalising behaviours, it was not the case that all children in this group developed into troubled or troublesome teenagers. Examination of the 171 high risk teenagers revealed that 63 (36.8%) had an absence of externalising behaviours. For the purposes of this analysis, this group was defined as resilient teenagers. (For comparative purposes it is worth noting that while 63.2% of the high risk group had one or more externalising problems, only 30.2% of the remaining sample members had one or more of these problems).

INSERT TABLE 2. HERE

Table 3 compares the group of resilient adolescents (N = 63) with the remaining teenagers from high risk backgrounds (N = 108) on a series of prospectively and concurrently measured variables.

Each comparison is tested for statistical significance. Tests for continuously scored variables (eg IQ) were based on t-tests whereas tests for dichotomously scored variables were based on the chi-square test of independence. The Table leads to the following conclusions.

1. Individual characteristics: resilient adolescents were distinguished from their peers by having higher intelligence, being less prone to early onset attention deficit behaviours ($p<.05$) and conduct disorder behaviours, having high self-esteem and lower levels of novelty seeking. Resilient adolescents did not, however, differ from non-resilient adolescents in terms of anxiety/withdrawal during middle childhood. There was also no significant relationship between gender and adolescent resilience.

2. External interests and relationships: resilient teenagers more often reported enjoying school but there were no significant differences between resilient and non-resilient adolescents in terms of sporting, other interests or reporting a close or confiding relationship with an adult outside the family.

3. Parental relationships and family environment: resilient adolescents reported significantly higher levels of paternal care and lower levels of maternal (over) protection assessed using the PBI and higher levels of parental attachment assessed using the scale developed by Armsden and Greenberg. There were, however, no significant differences between the two groups in terms of maternal care, paternal protection or the number of adolescents who described their home environment as being happy or relaxed.

4. Peer affiliations and peer attachment: resilient teenagers were characterised as adolescents having fewer affiliations with delinquent peers, as assessed by both parental and self report. There were, however, no significant differences between the two groups in terms of their level of peer attachments.

INSERT TABLE 3. HERE

Logistic Regression Analysis

While the results in Table 3 provide evidence to suggest that a number of individual and social factors distinguished between resilient and non-resilient adolescents, many of the factors in Table 3 were intercorrelated. In addition, there is a potential methodological problem with the comparisons given in this Table as the definition of high risk did not select an entirely homogeneous group since, within the high risk group, the extent of adverse family conditions varied from moderate to extreme. It could have been that the resilient adolescents showed this resilience largely because the level of family adversity to which they were exposed was, on average, lower than the adversity faced by the non-resilient group. This was, in fact, the case with resilient teenagers having a significantly $(p<.01)$ lower mean family adversity score (mean = 15.2, s.d. = 2.9) than non-resilient teenagers (mean = 16.9, s.d. = 4.3).

To take into account: a) the intercorrelations between risk factors and b) heterogeneity in the exposure to family adversity, a logistic regression analysis was conducted. In this analysis the log odds of being a resilient teenager were modelled as a function of the family adversity score and the resiliency factors shown in Table 3. In this analysis the family adversity score was retained in the model while the various resiliency factors were entered sequentially into the model using both forward and backward elimination methods to identify a consistent set of factors associated with increased odds of resilience. The findings of this analysis are summarised in Table 4 which shows for all significant factors in the fitted model the estimated logistic regression parameter, the standard error of this parameter and a test of the significance of this parameter based on the log likelihood ratio chi-squared statistic. The Table shows that resilient teenagers were distinguished from their non-resilient peers by:

1. Having less exposure to family adversity.

2. Having higher IQ scores at the age of eight years.

3. Having lower affiliations with delinquent peers on the basis of both parental and self report.

4. Reporting lower rates of novelty seeking at age 16 years (p<.01).

However, a large number of factors that were found to be significant in Table 3 were not significant in the logistic model. The associations between these factors and resiliency was due to the associations and correlations of these factors with the significant risk factors in Table 4. (A full analysis of the relationships between all factors in Table 3 and resiliency is well beyond the scope of this paper. In a future paper we will present an analysis of the statistical relationships between these factors).

INSERT TABLE 4. HERE

While Table 4 identified a series of factors having net effects on resiliency to family adversity, it does not show fully the ways in which these factors combined to influence resiliency. To illustrate this a resiliency score was constructed for each subject by solving the logistic regression equation to estimate for each subject his/her log odds of being resilient. The resulting score was then classified into five equal sized class intervals ranging from those with a low estimated probability of being resilient to those with a high estimated probability. Table 5 shows the relationships between this resiliency score and the proportions of children classified as resilient. To clarify the interpretation of the resiliency score the Table also shows for each group the group profile of mean values on the measures of family adversity, IQ, peer relationships and novelty seeking.

The Table shows that with increasing resiliency scores there were clear tendencies for rates of resilience to rise. Amongst the low resilience group no teenager was resilient

whereas amongst the high resilience group in the region of 85% of adolescents were resilient. Inspection of the mean profile for each group clearly shows that increasing resilience was associated with: a) decreasing exposure to family adversity; b) increased early IQ; c) decreased affiliations with delinquent peers and d) reduced levels of novelty seeking. These results convey the clear impression that what led to increased resiliency to externalising behaviours amongst this group resulted from a combination of factors including levels of exposure to family adversity, IQ, peer affiliations and novelty seeking behaviours that in combination led to a generally quite steep gradient of resiliency amongst this group.

INSERT TABLE 5. HERE

Discussion

In this paper we have used 16 year longitudinal data gathered on a birth cohort of New Zealand children to examine the factors associated with high risk teenagers who showed a resilience to developing externalising problems (substance use, conduct problems, school problems). To achieve this, a high risk group was identified as members of the most disadvantaged quintile of a general family adversity index that previously had been shown (Fergusson et al, 1994a) to be strongly prognostic of externalising behaviours in adolescence. As a group these young people were characterised by increased risks of substance use behaviours, conduct problems, delinquency and school problems. Nonetheless, within this high risk group over a third were apparently resilient teenagers who did not develop adolescent externalising behaviours. These results are generally consistent with studies that have concluded that while childhood and family adversity are associated with elevated risks of externalising problems, not all children exposed to adversity develop these problems

(Bradley et al, 1994; Gribble et al, 1993; Herrenkohl et al, 1988; Masten et al, 1988; Seifer et al, 1992; Wyman et al, 1991).

In the next stage of the analysis we used prospectively and concurrently collected data on potential resiliency factors to identify the factors that distinguished resilient teenagers from their non-resilient peers. This suggested that resilient teenagers were distinguished from their non-resilient peers in a number of ways. First, the definition of risk used in this study classified teenagers as being high risk if they were in the highest quintile of the family adversity index. However, within this high risk group there was some variation in levels of exposure to family adversity with levels of this adversity ranging from moderate to severe. One factor that distinguished between resilient and non-resilient teenagers was that they tended to have lower family adversity scores. Thus, the apparent resiliency of this group was misleading to the extent that they had not, on average, been exposed to the same level of adversity as non-resilient teenagers. This result bears out the contention made in the Introduction to this paper that, in the analysis of resiliency, it is important to take within group variation in levels of exposure to risk into account when analysing results for high risk groups: it is not the case that all children in high risk groups are exposed to exactly the same set of conditions. While resilient teenagers were characterised by lower average levels of exposure to risk than non-resilient teenagers, the two groups were also distinguished by a number of other factors. Resilient teenagers tended to have higher IQ, tended to more frequently avoid affiliations with delinquent peers and showed lower novelty seeking behaviours than non-resilient teenagers.

The finding that IQ apparently plays a role in resilience is consistent with the findings of previous studies (Herrenkohl et al, 1994; Kandel et al, 1988; Masten et al, 1988; Seifer et al, 1992; Werner, 1989) and bears out the contention that at least average IQ is a factor which

may increase the resilience of children from high risk backgrounds. In addition, there was some evidence to suggest that personality or temperamental factors may be associated with resilience since resilient children showed lower levels of novelty seeking and risk taking behaviours than non-resilient children even when due allowance was made for other factors. The finding that IQ and novelty seeking behaviours distinguished between resilient and non-resilient teenagers clearly raises important issues about the extent to which resilience reflects the characteristics of the individual and the extent to which family and social environment may contribute to resilience. Here it is of interest to note that two of the factors (IQ, novelty seeking) that distinguished resilient teenagers from non-resilient teenagers were both measures for which there is evidence of substantial levels of heritability (Heath, Cloninger & Martin, 1994; Plomin, 1986). This may suggest that, in part, resilience to high risk family environments may reflect inherited temperamental traits or cognitive abilities that give some children reared in these environments the strengths to overcome adversity.

The third factor that distinguished teenagers who were resilient to adverse family circumstances was affiliations with non-delinquent peers. On the basis of both self and parental report, teenagers who reported or were described as having low affiliations with delinquent peers emerged as being more resilient than teenagers who had high levels of affiliations with delinquent peers. The finding that peer affiliations contribute to adolescent resilience is consistent with a growing literature that has emphasised the role of positive peer and partner relationships as factors which reduce risks of delinquent and other behaviours. For example, in a study of high risk children followed up into their twenties, Quinton, Pickles, Maughan and Rutter (1993) found that those showing the most favorable outcomes were those who had formed attachments to non-deviant peers and partners.

Whilst IQ, personality and peer factors discriminated between resilient teenagers and others, there were a large number of other factors that did not show any direct association with resilience in adolescence. Specifically, the findings of this study indicated that: a) females were no more resilient than males; b) children who showed an absence of early disruptive behaviours, early anxious/withdrawn behaviours or high self-esteem were no more resilient than other children when due allowance was made for IQ, novelty seeking and peer affiliations; c) external activities and relationships were not related to resilience when due allowance was made for IQ, novelty seeking and peer affiliations; d) measures of parental bonding and attachment were not related to resilience when due allowance was made for IQ, novelty seeking and peer affiliations.

Many of these results apparently contradict previous findings that have suggested that factors such as self-esteem, external activities, parental relationships and gender may confer resilience to children in high risk situations (Bradley et al, 1994; Gribble et al, 1993; Herrenkohl et al, 1994; Hetherington, 1989; Jenkins & Smith, 1989; Seifer et al, 1992; Werner, 1989; Wyman et al, 1991). While the reasons for these results are by no means clear, one possible explanation may be that the relationships between many factors and adolescent resiliency are mediated through relationships with IQ, novelty seeking or peer affiliations. To examine this issue in depth requires the development of a structural model linking all of the factors described in this analysis to each other and to adolescent resilience. For example, it is likely that the absence of direct associations between measures of early childhood adjustment and later resilience or non-resilience may arise because early childhood adjustment is related to both childhood IQ and to adolescent peer affiliations. This would result in a situation in which, while early adjustment was not directly related to later resilience, there may be indirect associations arising from the fact that early adjustment is associated with other factors (IQ,

peer affiliations) that act to encourage resilience. It is also possible that other factors that did not have direct effects on resilience including parental relationships and childhood adversity are linked to resilience by indirect pathways including IQ, peer affiliations and novelty seeking behaviours. Within the scope of the present paper comprehensive modelling of the relationships between all resiliency factors has not been possible but in further studies we intend to examine the structural relationships between the sets of variables examined in this study.

Perhaps the most important results from this study concern the way in which resiliency factors combined to reduce risks in teenagers from high risk backgrounds. In general, the associations between specific resiliency factors and externalising problems were modest. However, in combination, resiliency factors proved to be strong predictors of resilience: of the children in the most resilient quintile of the high risk group 85% proved to be resilient teenagers, whereas of the children in the least resilient quintile none proved to be resilient teenagers. This result parallels findings from risk factor research which have suggested that, in isolation, risk factors may make relatively little contribution to outcome risks whereas such factors in combination may be powerful determinants of adolescent outcomes (Blanz et al, 1991; Fergusson et al, 1994a; Shaw & Emery, 1988; Shaw et al, 1994). The present result suggests that similar findings may apply to resiliency with the determinants of adolescent resiliency reflecting a combination of factors including IQ, novelty seeking and avoidance of affiliations with delinquent peers that act to mitigate the risk of, or protect the individual from externalising behaviours.

The conclusion that resilience is likely to be an outcome of several factors acting in concert rather than a single factor poses a number of difficulties for analyses which seek to distinguish between compensatory and protective factors since, typically, these analyses have

focussed on the effects of single factors in isolation. What the present analysis suggests is the need for studies of resilience to examine the ways in which combinations of factors, some of which may be protective and others compensatory, may act to influence the resilience of teenagers to high risk childhood environments. In general, the findings of this study suggest that teenagers from high risk family backgrounds who show resilience to the development of externalising behaviours were characterised by a combination of at least average intelligence, low tendencies to novelty seeking and an avoidance of affiliations with delinquent peers in adolescence. In contrast, teenagers from high risk backgrounds who are susceptible to developing externalising behaviours were those characterised by a general absence of these features.

Acknowledgments

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Table 1:   Distribution of family adversity score and rate (%) of multiple problem behaviours

Score	N	% of Sample	Number of Mutliple Problem Teenagers	Rate (%) of Multiple Problem Teenagers
0 - 6	513	54.5	1	0.2
7 - 12	281	29.8	7	2.5
13-18	97	10.3	8	8.3
19+	51	5.4	11	21.6
TOTAL	942	100.0	27	2.7

Table 2: Rates (%) of substance use, delinquency and school problems (15-16 years) for

high risk and low risk adolescents

Outcome (15-16 Years)	High Risk Background	Low Risk Background	Odds Ratio (OR) (95%Confidence Interval)	p
Substance Use				
Cannabis Use	35.7	16.8	2.8 (1.9-4.0)	<.001
Alcohol Abuse	18.4	6.0	3.6 (2.2-5.8)	<.001
Daily Tobacco Use	33.9	10.9	4.2 (2.8-6.2)	<.001
Delinquency				
Conduct/Oppositional disorders	32.2	7.0	6.3 (4.1-9.6)	<.001
Self-report Offending (5+ offences)	17.2	5.8	3.4 (2.0-5.5)	<.001
Police Contact	11.5	5.2	2.4 (1.3-4.5)	<.005
School Problems				
Truancy (15+ occasions)	18.0	5.2	4.0 (2.5-6.6)	<.001
School Dropout	19.5	2.3	10.2 (5.6-18.5)	<.001
N	171	769		

Table 3: Comparison of resilient and non-resilient adolescents on measures of individual characteristics, external interests, parent relationships and peer relationships

Measure	Resilient Adolescents	Non-Resilient Adolescents	p
Individual Characteristics			
Gender (% Female)	49.2	50.0	>.90
Mean IQ (WISC-R; 8 years)	97.9	89.9	<.005
Mean Attention Deficit Score (8 years)	21.7	24.1	<.05
Mean Conduct Problems Score (8 years)	53.2	57.2	<.05
Mean Anxious/Withdrawn Score (8 years)	26.6	27.1	>.50
Mean Self Esteem (10 years)	37.1	33.8	<.05
Mean Novelty Seeking (16 years)	17.4	19.8	<.005
External Interests			
% Enjoying School (15 years)	90.5	77.1	<.05
% With Strong Interest in Sport (15 years)	66.7	62.9	>.60
% With Strong Interest in Other Activity (15 years)	47.6	61.9	>.05
% Reporting Close/Confiding Relationship with an Adult Outside the Family (15 years)	46.0	51.4	>.10
Parent Relationships			
Mean PBI Maternal Care Score	28.2	26.5	>.10
Mean PBI Paternal Care Score	26.9	23.1	<.05
Mean PBI Maternal Protection Score	8.2	10.9	<.05
Mean PBI Paternal Protection Score	7.7	9.7	>.10
Mean Parent Attachment Score (15 years)	24.8	20.4	<.005
% Reporting Happy/Relaxed Home Environment (15 years)	69.8	57.1	>.10

Table 3: continued

Measure	Resilient Adolescents	Non-Resilient Adolescents	p
Peer Relationships			
Mean Affiliations with Delinquent Peers (15 years)			
Parental Report	8.6	11.9	<.001
Self Report	4.0	6.8	<.001
Mean Peer Attachment Score (15 years)	35.7	34.1	>.10
N	63	108	

Table 4:   Results of logistic regression analysis predicting resiliency

Predictor	β	S.E.	p
Family Adversity	-0.160	0.053	<.005
IQ (WISC-R; 8 years)	+0.065	0.020	<.001
Novelty Seeking	-0.171	0.061	<.01
Affiliations With Delinquent Peers (15 years)			
Parental Report	-0.604	0.194	<.005
Self Report	-0.342	0.115	<.005

$$N = 132$$

Non-significant Predictors:

Gender (p>.60); Attention deficit (p>.40); Conduct problems (p>.90); Anxiety/ withdrawal (p>.90); Self esteem (p>.70); School enjoyment (p>.70); Interest in sport (p>.40); Interest in other activities (p>.90); Close/confiding relationship with adult outside the family (p>.30); Maternal care (p>.40); Paternal care (p>.70); Maternal protection (p>.40); Paternal protection (p>.80); Parental attachment (p>.90); Happy/ relaxed home environment (p>.60); Peer attachment (p>.05).

Table 5: Classification of high risk group into resiliency groups, mean profiles of each group and rates (%) of resilient individuals in each resiliency group.

| | | | | | GROUP MEAN PROFILE | | |
| | | | | | Affiliations With Delinquent Peers | | |
Resilience Score	N	Family Adversity	IQ	Novelty Seeking	Maternal Report	Self Report	% Resilient
1 (Low)	26	19.2	86.8	21.7	16.7	8.8	0.0
2	27	18.7	86.9	19.1	10.9	6.5	11.1
3	26	15.9	93.4	18.9	9.3	5.8	26.9
4	27	15.2	97.4	19.7	8.4	4.5	70.4
5 (High)	26	14.2	100.8	15.5	8.3	3.2	84.6
Mean		16.2	92.3	18.9	10.7	5.7	
S.D.		3.8	16.0	4.7	3.7	2.9	