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Risk markers associated with challenging behaviours in people with developmental disabilities: A meta-analytic study.

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Please use this reference when citing this work:

McClintock, K., Hall, S. & Oliver, C. (2003). Risk markers associated with challenging behaviours in people with developmental disabilities: A meta-analytic study. *Journal of Intellectual Disability Research*, **47**, 405-416. (DOI:10.1046/j.1365-2788.2003.00517.x.)

Abstract

A meta-analysis of prevalence and cohort studies conducted over the last 30 years was conducted to identify risk markers for challenging behaviour shown by individuals with intellectual disabilities. 86 potential studies were identified from the review, with 22 (25.6%) containing sufficient data to enable a statistical analysis to be conducted. Results indicated that males were significantly more likely to show aggression than females, and that individuals with a severe/profound degree of intellectual disability were significantly more likely to show self-injury and stereotypy than individuals with a mild/moderate degree of intellectual disability. Individuals with a diagnosis of autism were significantly more likely to show self-injury, aggression and disruption to the environment whilst individuals with deficits in receptive and expressive communication were significantly more likely to show self-injury. In most cases, tests for heterogeneity were statistically significant, as expected. The meta-analysis highlighted the paucity of methodologically robust studies of risk markers for challenging behaviours and the lack of data on incidence, prevalence and chronicity of challenging behaviour in this population.

Over the last 30 years, a large body of literature has accumulated concerning the nature, extent and impact of challenging behaviours shown by individuals with intellectual disabilities (Borthwick-Duffy, 1992; Emerson, 2000). Evidence to date suggests that approximately 10-20% of people with intellectual disabilities show challenging behaviour such as self-injury and aggression, with prevalence increasing into the teenage years (Jacobson, 1982; Kiernan & Kiernan, 1994; Oliver et al., 1987). Challenging behaviour, when severe, has been shown to have a negative impact on the individual, and can result in admission to specialist, and costly, residential service provision for many years (Emerson, 2000). As a result, a variety of treatment strategies for challenging behaviour have been implemented over the last 30 years to ameliorate or prevent its occurrence. To date, pharmacological treatments, at best, have been shown to have limited efficacy and behavioural treatments, when conducted, are often complex and have been shown to be prone to attrition, particularly when the behaviours are severe (Murphy et al., 1993; Oliver et al., 1987).

In order to improve upon treatment effectiveness, several investigators have developed methodologies to investigate the determinants of challenging behaviours (Carr & Durand, 1985; Iwata et al., 1982). These studies have shown that challenging behaviours can be maintained by socially-mediated environmental events either through the inadvertent presentation of attention or tangible items from carers (Carr & Durand, 1985) and/or the contingent removal of task demands (Iwata et al., 1990). For some forms of challenging behaviour (e.g., self-injury, stereotypy), non-social 'automatic' reinforcement processes have also been implicated as maintaining factors (Lovaas et al., 1987; Rincover, 1978). In a summary of experimental analyses of SIB conducted over 11 years, Iwata et al. (1994) found that in 64.5% of cases, SIB appeared to be maintained by socially-mediated environmental

events whilst in a further 25% of cases, SIB was hypothesized to be maintained by automatic reinforcement. Similar results were also obtained by Derby et al., (1992) from experimental analyses conducted over a three-year period on 79 individuals showing aggression, self-injury and/or stereotypic behaviour. In both of these studies, evidence suggested that when the factors maintaining challenging behaviours were taken into account during the subsequent treatment process, treatment effectiveness was enhanced (Iwata et al., 1994).

Less attention has been directed towards documenting the incidence, development and chronicity of challenging behaviours shown by individuals with intellectual disabilities. Data arising from these studies are important for two reasons. Firstly, information concerning the extent and persistence of the problem in a particular group of individuals can be useful to identify existing need in services and to inform future service provision. Secondly, data from these studies may allow factors associated with the onset, development and chronicity of challenging behaviour in individuals with intellectual disabilities to be identified. These risk markers could be used to identify individuals most at risk for developing challenging behaviours with a view to implementing interventions for the early amelioration of these behaviours (Chadwick et al., 2000).

To our knowledge, no studies of the incidence of challenging behaviour have been conducted, and studies of the development and chronicity of challenging behaviour are extremely limited in number (see Murphy et al., 1999; Hall et al., 2001; Schroeder et al., 1978; Windahl, 1988; Emerson et al., 2001; Schroeder et al., 1986; Murphy et al., 1993). Given this scenario, data from prevalence and cohort studies may enable 'indicators of risk' to be assessed (Abramson, 1994). Existing data from prevalence and cohort studies of challenging behaviour suggests that several individual characteristics associate to challenging behaviour. These include: gender (Maisto et al., 1978), age (Oliver et al., 1987), degree of intellectual disability (Schroeder et al., 1978), autism (Ando & Yoshimura, 1978a), degree of

communicative impairment, degree of motor impairment, and degree of sensory impairment (Emerson, 2000; Oliver, 1993). To date however, no studies have been conducted to systematically evaluate these associations statistically. A meta-analysis of the existing literature could provide a useful strategy to meet this aim. Although much maligned in recent years, meta-analytic methods combine the results of several studies to produce a quantitative summary, enabling the level of consistency of results across studies to be determined (Abramson, 1994).

Therefore, the aim in the present study was to appraise the consistency and strength of evidence for putative risk markers for challenging behaviours shown by people with intellectual disabilities by conducting a meta-analysis of the existing literature. This was achieved in two ways. Firstly, by statistical combination and graphical representation of the study results. Secondly, by conducting statistical tests designed to assess the heterogeneity of the study results. Differences in prevalence rates between studies are most likely attributable to a variety of methodological factors, most notably the definition and forms of challenging behaviour included in the study, the size of the samples surveyed, individual characteristics of the sample, and data collection methods that were employed (see Rojahn & Esbensen, 2002). A meta-analysis of the existing literature may however allow a more informed appraisal of putative risk markers for challenging behaviour to be conducted and the reasons for any inconsistencies between study results to be identified.

Method

Literature search. A literature search was conducted using the electronic databases PsychLit[®] and Web of Science[®] in order to identify studies reporting the characteristics of people with intellectual disabilities showing challenging behaviour. A number of definitions

were employed as search criteria. The main search terms used and their variations are shown in Table 1.

+++ Insert Table 1 about here +++

A manual search of papers published in key journals between the years 1960 to the present was also conducted. The journals targeted were: American Journal on Mental Retardation (formally the American Journal of Mental Deficiency), Mental Retardation, Research in Developmental Disabilities, Applied Research in Mental Retardation, British Journal of Developmental Disabilities, Journal of Autism and Developmental Disorders (formally the Journal of Autism and Childhood Schizophrenia), Journal of Intellectual Disability Research (formally the Journal of Mental Deficiency Research) and Journal of Applied Research in Intellectual Disability (formally Mental Handicap Research).

The reference lists of all papers obtained through the previous methods were then reviewed. Any relevant studies not yet identified were sought. No attempt was made to search for unpublished studies. Although it has been argued that excluding unpublished data may bias the results of a meta-analysis (see Abramson, 1994; Fleiss & Gross, 1991), in the present study it was felt that this strategy was justified for two reasons. First, the present study was concerned with large-scale surveys and prevalence studies and thus it seemed unlikely that there would be large numbers of unpublished studies in this area. Secondly, the hypotheses to be tested in the present study were not central to the majority of the original studies and as such it was therefore unlikely that there would be a bias towards positive results in support of these hypotheses. Whilst this does not mean that the risk of publication bias was eliminated, it was felt that, given the study objectives, the search for unpublished studies would not be an efficient use of the limited time and resources available for the current analysis.

Selection of studies for the analysis. From those studies identified during the literature search, the studies appropriate for the current analysis were selected. The criterion for the inclusion of studies was that sufficient information was available to enable an odds ratio to be calculated. For case-control studies this would mean that data were available regarding exposure to a particular risk marker for both cases and controls. For prevalence studies it was necessary that data were provided concerning the number of individuals exposed to the given risk marker both in the total sample studied and in the group with challenging behaviour. Exclusion of studies on the basis of quality was also considered. However, given the absence of clear standard guidelines pertaining to study quality in this field, such a strategy was impractical. This coupled with the possible risk of excluding important data if guidelines were inappropriate led to the decision to include all studies for which sufficient data were available.

Risk markers and behaviours. Risk markers and behaviours included in the analysis were limited to those for which appropriate data could be found. Therefore, risk markers investigated were limited to: gender (male vs. female), degree of intellectual disability (profound/severe vs. moderate/mild), diagnosis of autism (presence vs. absence) and expressive and receptive communicative ability (deficit vs. no deficit). The challenging behaviours investigated were: self-injurious behaviour, aggression, stereotyped behaviour, and destruction of property.

Combination of study results and assessment of heterogeneity. The statistical analysis was conducted using Review Manager 4.1 (Cochrane Collaboration, 2000), a software package specifically designed for conducting systematic reviews. The first step in the analysis was to use the software to calculate individual study odds ratios and their confidence intervals. If the test for homogeneity was statistically significant, then the studies were combined using the 'random-effects model'. Otherwise, the 'fixed effects model' was

employed. The fixed-effects model is based on the assumption that there is a common true effect across studies and therefore that all results should be equal. The random effects model is based on the assumption that there are different effects in different studies and that these effects are positioned randomly around a central value. This latter method takes into account the variation between as well as within studies and as a result the confidence intervals calculated are wider. It has been suggested that the random-effects model is appropriate when there is unexplained heterogeneity among the studies.

Investigating sources of heterogeneity. A number of factors were hypothesised to potentially affect the study results. These are outlined here and where possible were used to stratify groups of studies for which significant heterogeneity was demonstrated. Hypothesised sources of heterogeneity were: sample size (i.e., $N < 100$ vs. $N > 100$), study setting (i.e., community, institution, or both), age of sample (i.e., adults only, children only, or both), and geographical location (i.e., Europe, USA, Asia). It could be argued that factors such as method of data collection might reflect study quality and therefore constitute potential sources of heterogeneity. However, such information, whilst recorded, was not included in any formal analysis due to the lack of guidelines and research pertaining to study quality. As such, assessments of study quality are judged to be largely subjective. Whilst assessing the reliability of evaluations of study quality may attenuate this risk of bias, such a strategy is beyond the scope of this study. Any observations regarding methodology and study quality will therefore be presented as exploratory and discussed only in terms of hypotheses to be tested in further research.

Results

Literature Search. The electronic and manual searches yielded 86 studies potentially suitable for the analysis¹. Of these, 22 (25.6%) studies contained the necessary data to calculate an odds ratio and these studies were included in the final analysis. The studies are summarised in Table 2.

+++ Insert Table 2 about here +++

The dates of publication of the studies ranged from 1968 to 1997 (i.e., no studies were published between 1960 and 1967 that included the necessary data for odds ratio analysis). Ten studies were conducted in the USA, five in the UK, three in Japan, one in Sweden, one in Germany and one in Canada. Participants of six studies resided in institutions, four studies used community samples and eleven used combined community and institutional samples. The majority of the studies were prevalence studies. There were, however, a few studies involving group comparisons or examination of the characteristics of a single cohort. The various methodologies employed were questionnaires, observations, interviews, the review of case notes/databases and the administration of published assessments.

Of the 64 studies excluded from further analysis 34 studies were conducted in the US, 20 in the UK, four in Australia, three in Holland and one each in Germany, Holland and Japan. 19 studies were conducted using community samples, 24 used participants living in institutions and 21 used combined community and institutional samples. The range of data collection methodologies were the same as for the included studies. Some of the most frequent risk markers reported on were the same as those included in the analysis below. Other risk markers for which there were frequently cited data are age, mobility, visual and auditory

¹ A full list of these studies can be obtained from the first author.

impairments and residential setting. Risk markers less frequently reported on are epilepsy, psychiatric diagnoses, race and socio-economic status and concomitant challenging behaviours. The dates of publication of the excluded studies ranged from 1962 to 2000.

Meta-analysis. Output from Review Manager 4.1 (Cochrane Collaboration, 2000) can be found in Figures 1 to 4. In each figure, data are presented concerning the numbers of individuals, N , having a particular individual characteristic (i.e., gender, degree of intellectual disability, autism, and communication deficit respectively) and the numbers of individuals, n , showing a particular form of challenging behaviour (i.e., self-injury, aggression, stereotypy, and destruction of property). For each individual study, an odds ratio (and 95% confidence interval) is shown together with the weight contributed by the study to the combined odds ratio. The combined odds ratio and 95% confidence interval is also shown for each association.

+++ Insert Figures 1 to 4 about here +++

Data concerning the association between gender and two forms of challenging behaviour (self-injury and aggression) are shown in Figure 1. Inspection of the upper panel of Figure 1 shows that the overall odds ratio of 0.97 for the association between gender and self-injurious behaviour was not significant ($z = -0.31$, $p = \text{n.s.}$). The test for heterogeneity was significant however, $\chi^2(6) = 21.10$, $p < 0.005$, indicating that there was significant variability in the odds ratios across studies. The lower panel of Figure 1 shows that there was a significant association between gender and aggression ($z = 2.71$, $p < 0.05$). These data indicated that males were significantly more likely to show aggression than females. The test for heterogeneity was not significant $\chi^2(1) = 0.88$, $p = .35$. However, given that only two

studies were included in the review to investigate this relationship, these data should be interpreted cautiously.

Data concerning the association between degree of intellectual disability and three forms of challenging behaviour (self-injury, stereotypy and aggression) are presented in Figure 2. Here, a highly significant association between degree of intellectual disability and self-injury was found ($z = 5.95$, $p < 0.00001$) (upper panel). These data suggest that individuals with a severe or profound degree of intellectual disability are more likely to show self-injury than individuals with a mild or moderate degree of intellectual disability. The middle panel of Figure 2 shows that the association between degree of intellectual disability and stereotypy just reached statistical significance ($z = 1.98$, $p = 0.05$) whilst the lower panel of Figure 2 shows that there was no association between degree of intellectual disability and aggression ($z = 0.84$, $p = \text{n.s.}$). All tests for heterogeneity across studies were highly significant.

Data concerning the association between autism and three forms of challenging behaviour (self-injury, property destruction and aggression) are presented in Figure 3. The upper panel of Figure 3 shows that individuals diagnosed with autism are significantly more likely to show self-injury ($z = 3.14$, $p < 0.0005$) than individuals without a diagnosis of autism. Similar results were obtained for destruction of property ($z = 2.42$, $p < 0.05$) and aggression ($z = 9.74$, $p < 0.00001$). Again, all tests for heterogeneity were significant. Figure 4 shows the data concerning the association between receptive communication and self-injury (upper panel) and expressive communication and self-injury and aggression (bottom panel). The figure shows that there was a significant association between receptive communication and self-injury ($z = 7.37$, $p < 0.00001$) suggesting that individuals with a deficit in receptive communication are significantly more likely to show self-injury than individuals without a deficit in receptive communication. The test for heterogeneity was not significant.

The bottom panel of Figure 4 shows that the association between expressive communication and self-injury was significant ($z = 2.69$, $p < 0.00001$), suggesting that individuals with a deficit in expressive communication are more likely to show self-injury than individuals without a deficit in expressive communication. No association was found between expressive communication and aggression ($z = 0.55$, $p = 0.6$) however. Tests for heterogeneity for both of these associations were significant.

Discussion

The results of the meta-analysis suggested that several risk markers could be identified for particular forms of challenging behaviour. Self-injury appeared to be more common amongst individuals with a severe/profound degree of intellectual disability, a diagnosis of autism, and deficits in receptive and/or expressive communication. Aggression appeared to be more common amongst males, those with a diagnosis of autism, and individuals with a deficit in expressive communication. Stereotypy appeared to be more common amongst individuals with a severe/profound degree of intellectual disability. Finally, destruction of property was more common amongst individuals with a diagnosis of autism.

A number of authors have suggested that an important aspect of meta-analysis is its utility in the appraisal of existing research and its role in guiding future research (Thompson, 1994; Greenland, 1994; Abramson, 1994; Blettner et al., 1999). In this study, only 22 out of 86 studies reviewed contained data that could be subjected to further analysis. This is obviously a potential threat to the extent to which the results of the review can be generalised and this needs to be taken into account in their interpretation. It needs to be reiterated however, that the unsuitability of the studies was due to the absence of control groups or a paucity of information regarding the characteristics of the population from which the groups

of individuals with challenging behaviour were drawn. In some cases such information was unnecessary in answering the questions being posed in that particular study. However, in some studies where conclusions were being made about the characteristics associated with challenging behaviour, such data are important. The lack of adequate comparison data in these studies renders it difficult to ascertain whether or not the reported characteristics are unique to individuals with challenging behaviour or are merely representative of the population of people with intellectual disability.

Examining the results of the heterogeneity analyses, it is clear that the results of the studies included in the review differ significantly. At the outset of the review it was planned that if heterogeneity was found then it would be investigated using stratification techniques. Whilst there are no clear existing guidelines to aid decisions regarding sources of heterogeneity to be investigated, strata could have included factors such as sample size and residential status of the sample. However, the limited number of studies suitable for the review precluded the quantitative analysis of study differences.

It has been pointed out in previous reviews of the literature (Johnson & Day, 1982; Rojahn & Esbensen, 2002) that there is much variation in the methodology employed in prevalence studies of challenging behaviour. This was also noted in the current review. For example there was little consistency amongst the definitions employed, the strategies for identifying participants and the method of assessing behaviour and characteristics. It is possible that these methodological differences could also contribute to heterogeneity amongst study results. Again, the small number of studies is problematic for the investigation of this hypothesis. Another difficulty however, is that in addition to noticeable methodological differences, there were cases where the methodology used was unclear. Therefore, there is a need for greater clarity and rigor in reporting methodology in order for comparisons across studies to be made.

The association between severity of intellectual disability and both stereotyped and self-injurious behaviours has been frequently cited in other reviews (e.g. Emerson, 2000; Johnson & Day, 1982; Oliver, 1993; Rojahn & Esbensen, 2002). This consistency helps to validate the meta-analytic results. In comparison to the results previously cited however, the odds ratios from individual studies provided by the current review offer a clearer appraisal of the level of risk associated with these markers. The same too applies to the added information provided by the estimate of the combined odds ratio. However, as discussed, these combined results need to be interpreted cautiously.

Whilst there does seem to be evidence in support of severity of intellectual disability, poor communication and autism as risk markers, interpretation of the results is difficult in that these variables overlap in a number of ways. For example, many individuals with a severe intellectual disability may be expected to have difficulties in communication. Similarly there is a reported increased prevalence of autistic disorders in this population and autism itself is associated with poor communicative ability (Ando & Yoshimura, 1989b). It is unclear therefore if all of these factors are important or if not, which of them is the most important. Risk markers need to be investigated in a way that allows the extent to which each variable is associated to challenging behaviour in relation to the other possible risk markers to be assessed (as in logistic regression). Surprisingly, there were no data available concerning the association between autism and stereotyped behaviour or between communication deficits and stereotyped behaviour. Presumably, given DSM-IV diagnostic criteria for autism, the association between these characteristics and stereotyped behaviour should be extremely high. It should also be pointed out that other potential risk markers could have been included in the analysis (e.g., age) but insufficient data were available for analysis.

In summary, the trends apparent in both the individual study and combined odds ratios suggest the possibility that severe intellectual disability, autism and poor

communicative ability could be construed as risk markers for challenging behaviour. These results are tentative hypotheses that need further investigation. Such research would need to involve comparison and control groups and to adopt clear and reliable methodological strategies. Furthermore, there is a need to investigate not just the association between each of these variables and challenging behaviour in isolation but also to take into account any overlap between the variables so that the relative contribution of each can be evaluated statistically.

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Figure Captions

Figure 1. Meta-analysis of the relationship between gender and two forms of challenging behaviour (self-injury and aggression).

Figure 2. Meta-analysis of the relationship between degree of intellectual disability and challenging behaviour.

Figure 3. Meta-analysis of the relationship between autism and challenging behaviour.

Figure 4. Meta-analysis of the relationship between receptive and expressive communicative deficits and challenging behaviour.

Table 1

Search Terms Employed in the Meta-analysis

Search Term	Variations
Challenging Behaviour ^a	Maladaptive Behaviour; Behaviour Problems; Problem Behaviour; Aberrant Behaviour
Self-injurious Behaviour	Self-injury; Self-harm
Stereotyped Behaviour	Stereotypy; Repetitive Behaviour;
Aggression	Aggressive Behaviour;
Destructive Behaviour	Disruptive Behaviour, destruction of property
Developmental Disabilities (+ Prevalence)	Learning Disability; Intellectual Disability; Intellectual Impairment; Mental Retardation; Mental Handicap; Learning Disabilities; Developmental Disability; Mental Deficiency

^aThe American spelling of 'behaviour' was also adopted throughout the search.

Table 2
Descriptions of the Studies Included in the Meta-analysis

Author(s)	Behaviour	Risk marker	Type of study	Method of data collection	Study sample
Ando & Yoshimura (1979 a,b)	'Self-injury' 'Attack against others' 'Destruction of property'	Receptive communication, Expressive communication, Autism Gender, Degree of intellectual disability Degree of intellectual disability	Comparison study	Questionnaire and clinical diagnosis	47 autistic children and 128 children with intellectual disabilities. (Aged 6-14 yrs)
Ballinger (1971)	Self-injury		Prevalence / cohort	Review of case notes	626 adults resident in an institution ('subnormality hospital')
Berkson et al. (1985)	'Stereotyped behavior'		Prevalence	Questionnaire	253 0-3 yr olds served by early intervention programmes
Bhaumik et al. (1997)	'Physical aggression' 'Destruction of property' 'Self-injury'	Autism	Prevalence	Questionnaire/interview with key person/carer	2261 adults with intellectual disabilities served by a regional intellectual disability service
Bott et al. (1997)	'Self-injury' 'Hitting'	Expressive communication	Relationship between speech and behaviour problems Cohort	Questionnaire	Individuals in 13 health districts listed Registers for People with Intellectual Disabilities 199 individuals referred to a crisis intervention program
Davidson et al. (1994)	Aggression	Degree of intellectual disability, Autism, Gender	Cohort	Interviews Observations Review of medical records	
Eyman & Call (1977)	'Does physical violence to self' 'Threatens or does physical violence to others' 'Displays stereotyped behavior'	Degree of intellectual disability	Prevalence/ survey	Questionnaire (items from ABS) to direct care staff and social workers	6.870 individuals from institutions and community centres
Griffin et al. (1986)	Self-injury	Gender	Prevalence / State survey	Questionnaire	Residents of all 13 state institutions (Texas)
Hardan & Sahl (1997)	Self-injurious behaviour Aggression	Degree of intellectual disability	Prevalence of psychopathology	Review of medical charts	Children and adolescents taking part in a 12-month program for intellectual disorders

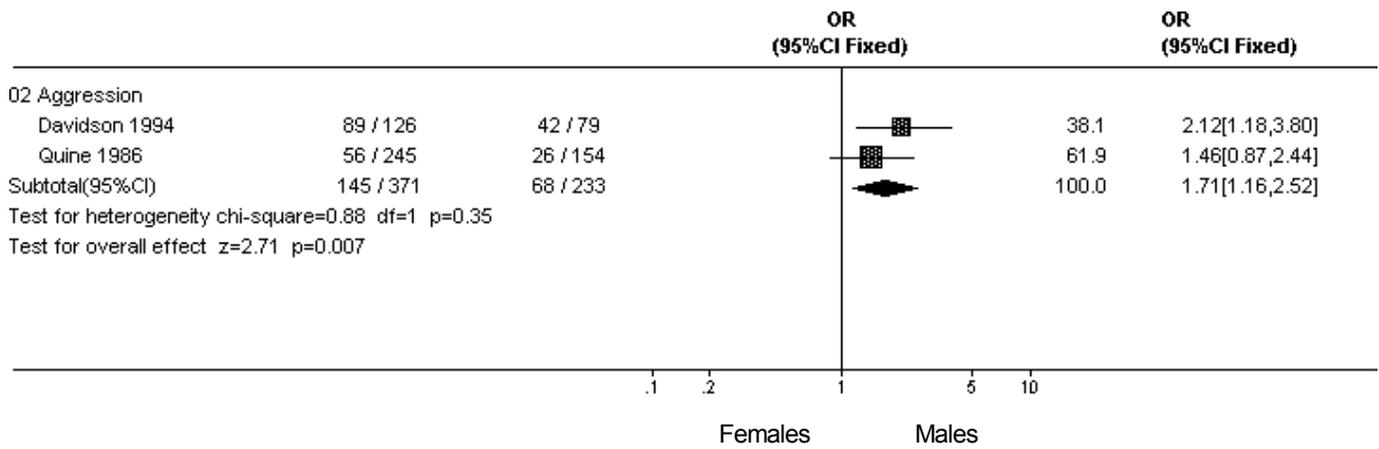
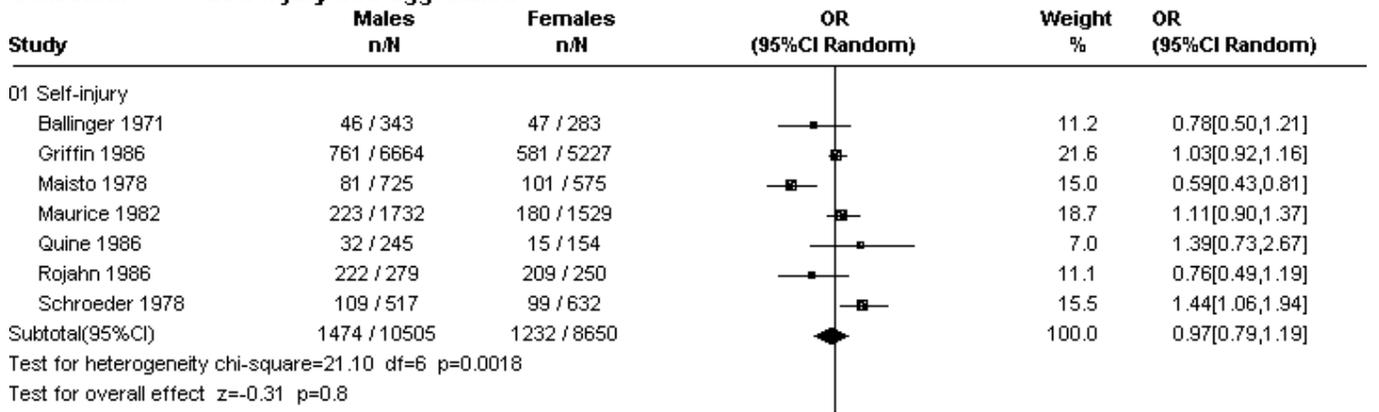
Table 2 (cont.)

		Degree of intellectual disability	Prevalence / survey	Data was extracted from the databases for the New York Developmental Disabilities Information Survey (Questionnaire based; completed by clinical staff) Questionnaires	30,578 developmentally disabled individuals living in the community and institutions in New York
Jacobson (1982)	'Self-injurious action' 'physical assault upon others' 'stereotypic/ repetitive movements'	Degree of intellectual disability	Prevalence / survey	Data was extracted from the databases for the New York Developmental Disabilities Information Survey (Questionnaire based; completed by clinical staff) Questionnaires	30,578 developmentally disabled individuals living in the community and institutions in New York
Kebbon & Windahl (1986)	Self-injury	Degree of intellectual disability	Prevalence / national survey	Interviews with carers	All individuals in Sweden served by services for mental retardation
Kiernan & Alborz (1996)	Self-injury	Receptive communication	Longitudinal study examining persistence of challenging behavior	Interviews with carers	Individuals from seven health districts with challenging behavior
Maisto et al. (1978)	'Self-injurious behavior'	Degree of intellectual disability, Gender	Prevalence/ survey	Questionnaire administered to psychologists	1,300 residents of a large residential training institution in the US
Maurice & Trudel (1982)	'Self-injurious behavior'	Gender	Prevalence	Questionnaire and interview	2,858 individuals with intellectual disabilities living in three institutions
McLean et al. (1996)	'Self-injurious behavior disorder' 'Aggressive behavior disorder'	Expressive communication	Investigation into communication skills	Questionnaire	Total population of individuals with mental retardation in the state of Kansas
Quine (1986)	'Self-injuring' 'Aggressive'	Gender	Prevalence study	Disability Assessment Schedule (Holmes et al. (1982)) completed by health professionals	Individuals from two health districts with intellectual disabilities
Rojahn (1986)	'Self-injurious behavior'	Degree of intellectual disability	Prevalence / survey and comparison of cases and controls	Postal survey completed by staff working with the individuals	Population of mentally retarded individuals using schools/training centres, workshops or group homes in Germany. The facilities that responded served 25,872 individuals.
Ross (1972)	'Self-destructive behavior' 'Attacks others'	Degree of intellectual disability	Prevalence / survey	Data extracted from the computerised results of a 1970 census of California state hospitals (survey forms completed by ward personnel)	11,139 individuals with mental retardation living in state hospitals in California in 1970

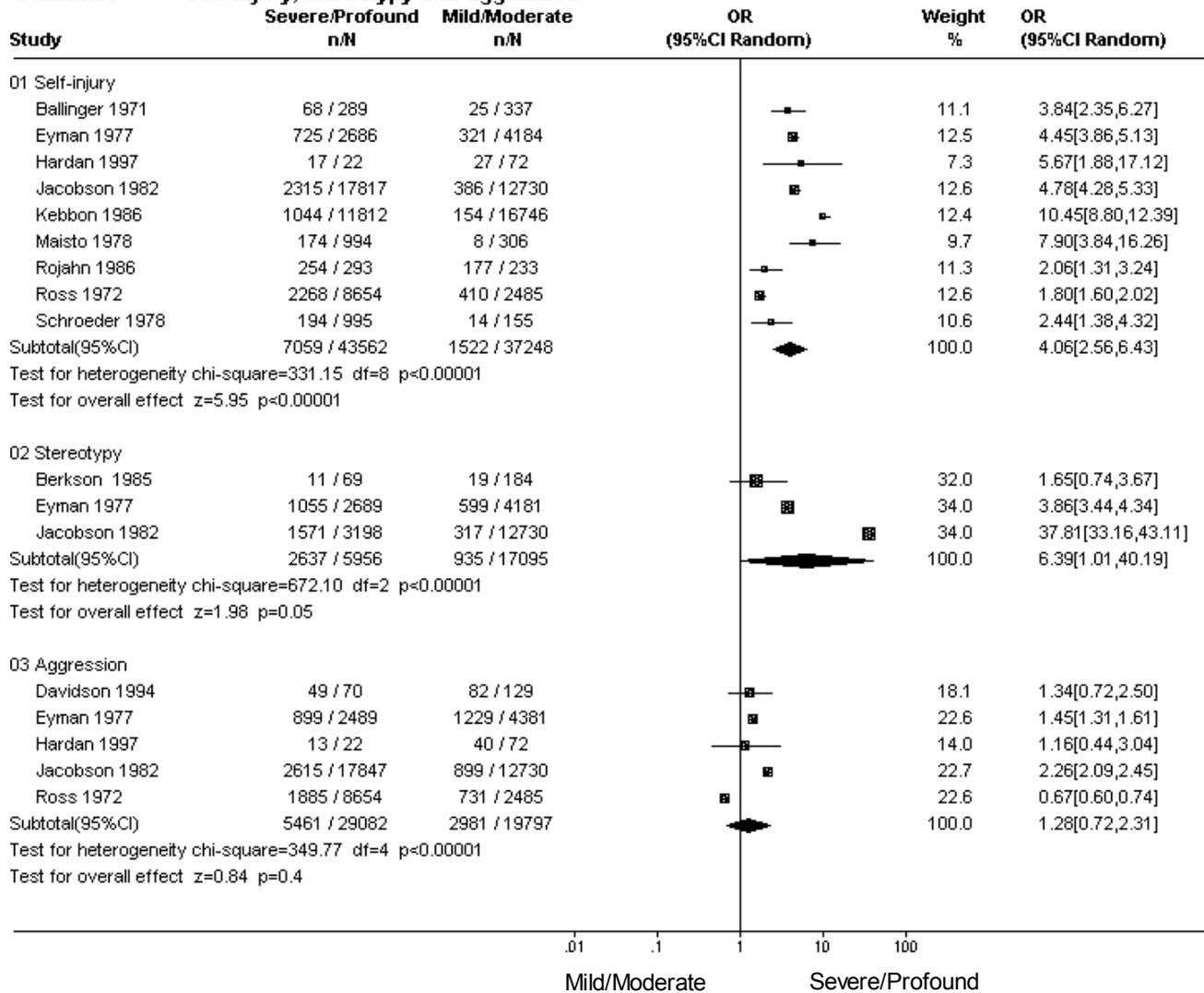
Table 2 (cont.)

Schroeder et al. (1978)	'Self-injurious behavior'	Degree of intellectual disability Communication (receptive and expressive)	Prevalence/ survey/ longitudinal	Questionnaire and interviews with social workers	1,150 residents of a state facility
Shodeil & Reiter (1968)	'Self-mutilative behavior'	Expressive communication	Incidence	Questionnaire and formal language assessment	58 schizophrenic children attending daytime special education programmes

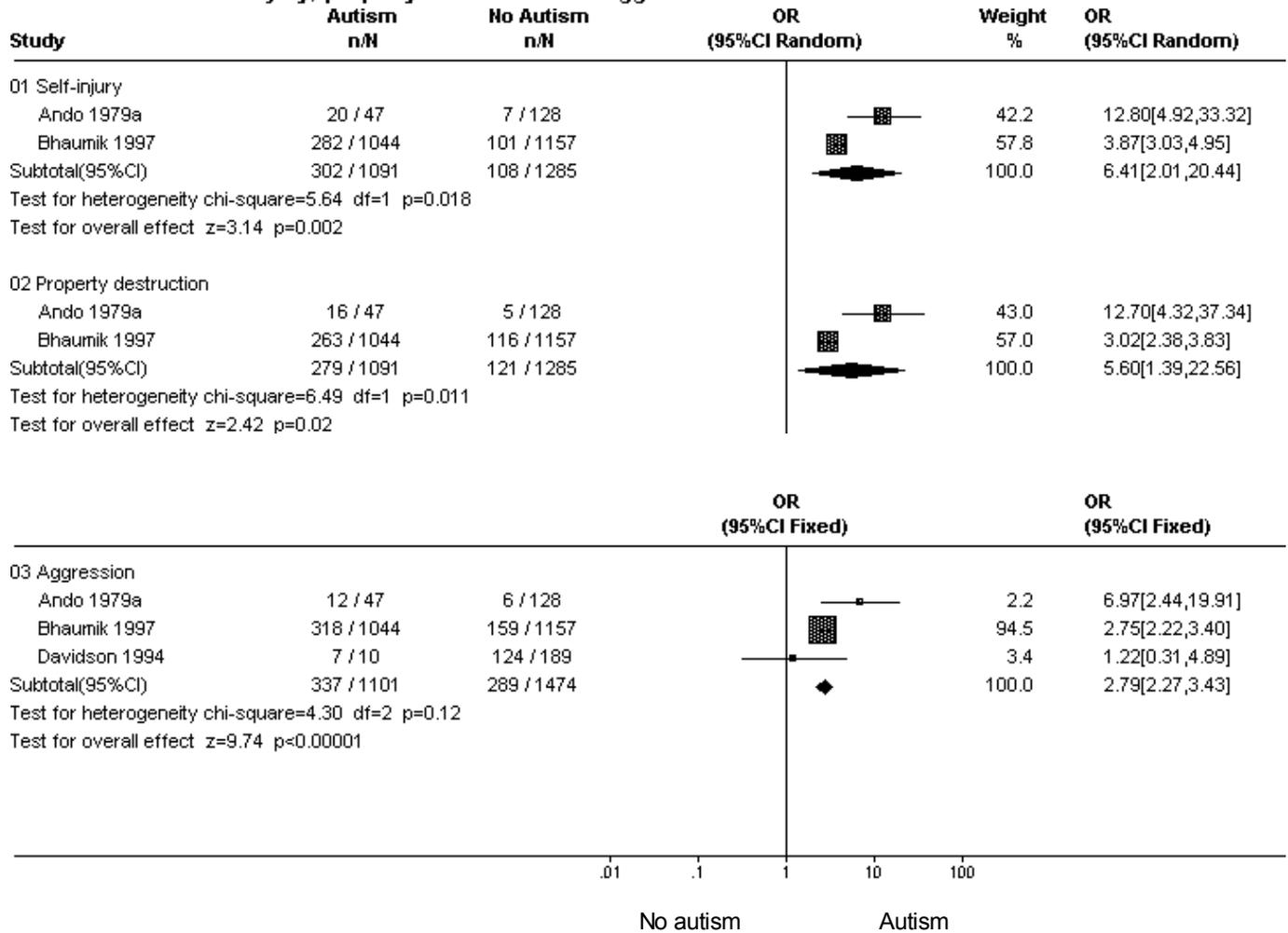
Comparison: Gender
Outcome: Self-injury and aggression



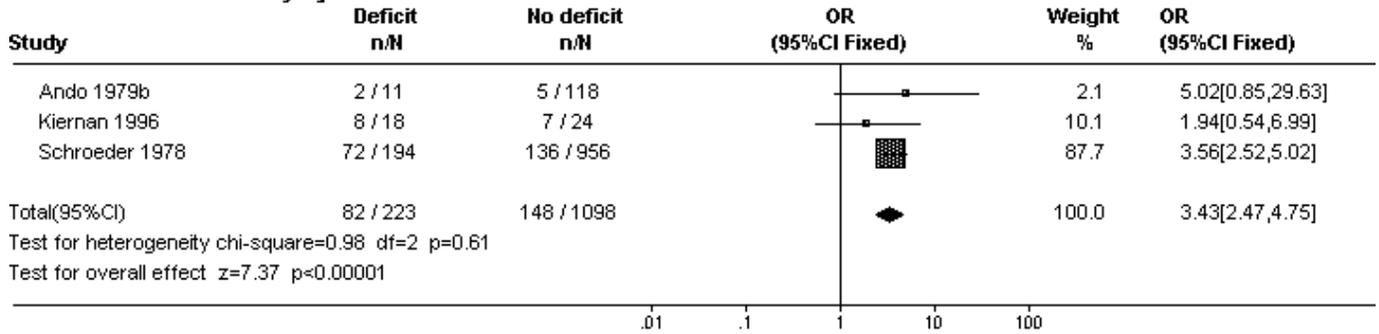
Comparison: Degree of ID
Outcome: Self-injury, stereotypy and aggression



Comparison: Autism
Outcome: Self-injury, property destruction and aggression



Comparison: Receptive Communication
Outcome: Self-injury



Comparison: Expressive communication
Outcome: Self-injury and aggression

