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## Is there a comorbid relationship between hyperactivity and emotional psychopathology?

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**Abstract** Some of the early literature implied that emotional disorders were almost incompatible with hyperactivity in childhood. The paper addresses this issue using a large epidemiological data base – of two cohorts of 7- & 8-year-old and 11- & 12-year-old children from the North of England. There are two themes, first, the paper reports on the prevalence of emotional symptoms and disorder among hyperactive children. Second, it explores co-occurrence of hyperactivity and emotional psychopathology according to whether the hyperactivity is situational or pervasive and accord-

ing to the age of the child. Hyperactivity proved to have an association with emotional symptoms and disorder at both ages but the links with disorder were most prominent among the older children. Among our high risk or maladjusted samples the strongest links were with home-based situational hyperactivity. However, among the general population cohort, emotional disorder proved to be a function of pervasiveness of hyperactivity and older age.

**Key words** Hyperactivity – emotional disorder – epidemiology

### Introduction

The co-occurrence of emotional psychopathology with hyperactivity may reflect a superimposition of internal suffering upon the functional impairment of hyperactivity (9). It may also influence the choice of and response to treatment (13, 38). Hence a clear understanding of the degree to which hyperactivity may be attended by emotional psychopathology (symptoms and disorder) is important for clinical practice.

Comorbidity studies involving hyperactivity have tended to focus on the association with conduct disorder (e.g., 5, 24, 40) not only because of the considerable overlap between the two syndromes but also because of longstanding doubts concerning the status of hyperactivity as a syndrome distinct from conduct disorder (34, 36). Although uncertainties do remain (30, 31), empirical support has emerged not only for a dis-

tinct syndrome (37, 41) but also for a combined hyperkinetic conduct disorder (40, 44).

Clarification of the relationship between hyperactivity and emotional disorders is at a less advanced stage (39). Historically, children with even severe hyperactivity (without specification as to whether it was situational or pervasive) were said to show few signs of emotional disturbance (29). Subsequently, Taylor et al. (40) reported no overlap between hyperactivity, as the ICD-9 hyperkinetic syndrome (43) and clusters of cases with predominantly emotional symptomatology. Similarly, compared to other clinically referred children with other forms of disruptive behaviour, those with the hyperkinetic syndrome evinced fewer emotional symptoms than those with other diagnoses (42). However, in the former work (40) hyperkinetic syndromes were present in only a small number of children; while in the latter (42) data had been gathered over a period of years ending in 1980, long before recent development and focus on comorbidity (18).

In contrast, a number of studies support the notion of a link between emotional psychopathology and hyperactivity. For instance, Schachar et al. (35) reported that among disturbed children pervasive hyperactivity (hyperactivity present in both home and school) and to a somewhat greater extent situational hyperactivity (hyperactivity present in either home or school) did show a moderate level of association with emotional disturbance. However, despite the large sample size in that community based study, the final number of pervasively hyperactive children with additional emotional disturbance proved rather small. Second, in the Puerto Rico epidemiological study of Bird et al. (9) half of the children with the DSM III (2) diagnosis of attention deficit disorder also suffered anxiety and a quarter were depressed. However, in the DSM III classification, the diagnosis of attention deficit disorder was possible in the absence of hyperactivity and the presence or absence of hyperactivity was not specified in this study; further, the population under scrutiny was Hispanic and so cultural differences cannot be dismissed. Third, in their family studies, Beiderman et al. (6, 7) reported an increased risk of anxiety and depression among relatives of children with the DSM III-R diagnosis of attention deficit hyperactivity disorder (3), and suggested that ADHD and major depressive disorders, in particular, might have common familial roots. Nevertheless, no distinction was made between situational and pervasive hyperactivity; further, subjects were drawn from a clinically referred population and so findings may not be reliably generalised.

Finally, in a parallel study, the current authors report that the patterns of co-occurrence of conduct disorder with hyperactivity differ substantially with age and situationality. This study utilised clinicians' diagnoses as well as an epidemiological data base (24). Among 7- and 8-year-olds, hyperactivity reported by teachers and parents (pervasive), and by the teachers alone, but not hyperactivity reported by parents alone, were associated with raised levels of comorbidity and impairment. Also, younger children with severe conduct disorder were virtually always hyperactive, giving rise to the suggestion that hyperactivity may be a necessary condition for severe conduct disorder at that age. Among 11- and 12-year-olds, a significant minority with severe conduct disorder displayed no hyperactivity, so that conduct disorder among older and younger children appears to differ in nature. Also, pervasive hyperactivity among older children was strongly associated with severe conduct disorder.

#### Aims and hypotheses

In this paper a similar methodology to the McArdle (21) paper quoted above has been used to examine the

comorbid relationship between situational and pervasive hyperactivity and emotional symptoms or emotional syndromes among children at two different ages. The main hypotheses are that hyperactive children are at greater risk for emotional symptoms and disorder than those without hyperactivity and the comorbidity will differ according to whether the hyperactivity is situational or pervasive and according to age.

#### Method

##### Populations and screening

Two large representative samples, of 1040 7- and 8-year-olds and 3300 11- and 12-year-olds were screened for emotional and behavioural disturbance using multi-criterion screens. The screens included for all the children the Rutter teacher scales (33) and sociometric indices (22); for the older children the neuroticism subscale of the Junior Eysenck Personality Inventory (15) and for the younger children the Young Group Reading Test (47). Extreme scores on each measure were used as an indicator of deviance.

For the senior children, in order to maximise sensitivity and to avoid excluding children with extreme scores on individual measures because of an insufficiently high summed score, weighting formulae were adopted that allowed children with markedly deviant teacher- or self-ratings to be selected on that basis alone (21). With the younger children the system was less complex: identification by any one or more than one criterion was taken as indicating that the child might be at risk (19). The original screening procedure for the older children had been aimed at identifying children who were actually maladjusted and that in the juniors, those at risk or maladjusted.

The screening yielded 322 screen-positive older (of whom only 309 were used in the original research) and 270 (of whom 265 entered the original research) screen-positive younger children, with full data available for 263 senior (85.1%) and 241 (90.9%) junior children. In order to calculate rates of emotional psychopathology for the entire population (screen-negative and positive), data on samples of screen-negative children (53 and 63 subjects respectively) who were labelled "normal controls" were also analysed. The latter were randomly selected from the residual pool of children who had scored below the specific "cut", with the proviso that they were drawn from all of the schools and that they reflected the sex ratio found in the group of screen-positives.

### Emotional symptoms and disorder

Emotional disorder was indicated by an abnormality of the emotions including states of disproportionate anxiety or feelings of depression, obsessions, compulsions, phobias and hypochondriasis (20). This is broadly equivalent to the concept of emotional disorder used in ICD 9 (44). This diagnosis was made on clinical grounds from a review of first and second stage data. The latter included scores from the Rutter parent scale but primarily data from a semi-structured parent interview concerning behaviour and temperament (19). These records were examined "blind" by research psychiatrists, who, on clinical grounds, made a diagnosis of the presence of conduct or emotional disorder or "other" disorder. In a parallel study (46), a highly satisfactory coefficient of agreement (Kappa<sup>11</sup>) of 0.9 was obtained between two diagnosticians. The children were also rated as to severity of emotional disorder on a four point scale, of nil, slight, moderate and marked. Interrater reliability for this dimension of severity of emotional disturbance proved adequate [ $r=0.58$  (46)] but not high.

'Marked' levels of severity were considered to represent the equivalent of clinical disturbance with definite impairment, warranting specialist referral, and hence the diagnosis of emotional disorder. 'Moderate' levels of severity were viewed as symptoms, giving rise to some degree of distress but not sufficient to give rise to impairment and usually not warranting specialist referral.

Although the diagnostic exercise was not independent of the screen data, the main source of information was parent questionnaires concerning behaviour and temperament. The psychiatrists were, however, blind to the screen status of the children. At the time of the original clinical rating, hyperactivity was not a focus of interest and hyperactivity data had not been extracted from the Rutter questionnaires, so that hyperactivity was not a defining criterion of screen status. As a consequence the original raters had not had their attention drawn to the presence of hyperactivity.

### Symptomatic "diagnosis" of hyperactivity

For the purposes of the current study, the "diagnosis" of hyperactivity did not incorporate clinical judgement. It was based on the method of Goodman and Stevenson (17) and Schachar et al. (35). The latter re-analysed data from the Isle of Wight epidemiological study, utilising information from the Rutter parent and teacher scales. If a child scored a total of 3 or more on certain symptoms (at least a score of one on each of the 3 items or at least 2 on one and 1 on a second) on both the Rutter parent and teacher scales then he or she was designated as pervasively hyperactive. If this was pre-

sent on one scale alone, the child was designated as showing situational hyperactivity. The diagnostic symptoms were "very restless, often running about or jumping up and down", "squirmy, fidgety child", "cannot settle to anything for more than a few minutes". The cut-off score of 3 is identical to that chosen by Schachar et al. (35) and by Goodman and Stevenson (17) and is used here for the sake of comparability. These symptoms consistently emerge as contributing to a hyperactivity factor on multivariate analysis of Rutter scales (17, 25, 35, 41).

### Estimates back to the original population

As information was available about the proportions of the original populations who proved to be screen-negative and screen-positive it was possible to estimate rates of emotional symptoms and disorder and similarly of four categories of hyperactivity, namely no hyperactivity, home-based hyperactivity, school-based and pervasive hyperactivity. This provided data for both the seven- and eight and also the eleven- and twelve-year-old children.

### Statistics

Odds ratios, 95% confidence intervals and chi-squared tests were calculated where appropriate. However, because of the potential for distortions due to applying statistics to estimates, we did not use tests of statistical significance on estimated data.

## Results

### Actual rate of emotional symptoms and disorder in the hyperactive subsamples

#### *Emotional symptoms and disorder among 7- and 8-year-olds with situational and pervasive hyperactivity*

The rates of emotional symptoms among the screen-positives with hyperactivity ranged from 32.3% to 48.3%, compared to 15.1% in the screen-negatives. But these higher rates only reached statistical significance in the case of the total hyperactivity group (Odds Ratio 3.3, 95% C.I.=1.1-10.0), the home-based (Odds Ratio 5.3, 95% C.I.=1.8-16.4) and the school-based (Odds Ratio 3.2, 95% C.I. 1.3-7.8), but not the pervasively hyperactive group. Further, screen-positive children without hyperactivity also displayed significantly raised rates of emotional symptoms (Odds Ratio 3.0, 95% C.I. 1.2 - 7.4). Compared to other hyperactivity categories junior

**Table 1** The rate of neurotic symptoms and disorder in 7- and 8-year-olds with situational and pervasive hyperactivity

	screen -v	screen+v no HA	screen+v home HA	screen+v school HA	screen+v pervasive HA	Total HA Group
no symptoms or disorder	43 (81.1)	44 (61.1)	13 (44.8)	47 (60.3)	38 (61.3)	98 (58.0)
emotional symptoms	8 (15.1)	25 <sup>b</sup> (34.7)	14 <sup>a</sup> (48.3)	28 <sup>a</sup> (35.9)	20 (32.3)	62 <sup>a</sup> (36.7)
emotional disorder	2 (3.8)	3 (4.2)	2 (6.9)	3 (3.8)	4 (6.5)	9 (5.3)
	53	72	29	78	62	169

chi-squared test, compared to screen-ve; <sup>a</sup> p<0.01; <sup>b</sup> p<0.05; legend: figures in brackets are percentages

**Table 2** The relationship of situational and pervasive hyperactivity and neurotic symptoms and disorder among 11- and 12-year-olds

	screen -v	screen+v no HA	screen+v home HA	screen+v school HA	screen+v pervasive HA	Total HA Group
no symptoms or disorder	52 (82.5)	30 (35.7)	4 (13.8)	49 (53.8)	30 (50.8)	83 (46.4)
emotional symptoms	10 (15.9)	39 <sup>a</sup> (46.4)	20 <sup>a,b,c,d</sup> (69.0)	36 <sup>a</sup> (39.6)	24 <sup>a</sup> (40.7)	80 <sup>a</sup> (44.7)
emotional disorder	1 (1.6)	15 <sup>a</sup> (17.9)	5 <sup>a</sup> (17.2)	6 (6.6)	5 (8.5)	16 (8.9)
	63	84	29	91	59	179

chi-squared test, p<0.01; <sup>a</sup> compared to screen-ve; <sup>b</sup> compared to school HA; <sup>c</sup> compared to pervasive HA; <sup>d</sup> chi-squared test, p<0.05, compared to screen+ve no HA

screen-positive children with home-based hyperactivity proved to have the highest rates of emotional *symptoms* (Tables 1 and 2).

The rates of emotional *disorder* were not significantly raised among screen-positive younger children with hyperactivity, compared to screen-negatives. Among the situational hyperactives, the highest rate of emotional *disorder* occurred among children with home-based hyperactivity, but the magnitude of difference compared with the screen-negative group was small.

*Emotional symptoms and disorder among 11- and 12-year-olds with situational and pervasive hyperactivity*

The rates of emotional *symptoms* among screen-positive older hyperactive children ranged from 39.6% to 69.0%. Compared to screen-negatives, these reached statistical significance for the total (Odds Ratio=4.3, C.I.=2.1-8.2), home-based (Odds Ratio=11.8, C.I.=4.5-33.1), school-based (Odds Ratio=3.5, C.I.=1.5-12.2), and pervasive hyperactivity (Odds Ratio=3.6, 95% C.I.=1.5-8.2) groups. The rate was also raised among screen-positive children without hyperactivity. However, again the highest rate of emotional *symptoms* occurred in the home-based hyperactivity

group, significantly greater than for school-based (Odds Ratio=3.4, 95% C.I.=1.3-8.2) and pervasive hyperactivity (Odds Ratio=3.2, 95% C.I.=1.3-7.8), as well as the no hyperactivity group (Odds Ratio=4.6, C.I. 2.0-10.0).

Similarly, rates of emotional *disorder* among children with home-based hyperactivity were greater than among those with school-based or pervasive hyperactivity but these differences did not reach statistical significance. Among the screen-positive hyperactive children, only those with home-based hyperactivity (Odds Ratio=12.9, C.I.=1.5-121.5) displayed significantly higher rates of emotional *disorder* than screen-negative children.

Estimated rates of emotional symptoms and disorder in the population

*Rates of emotional symptoms and disorder*

Emotional *symptoms* proved common and the estimated rates similar in both general population cohorts: 20.6% for the 7- 8-year-old cohort (Table 3) and 18.7% for the 11-12-year-old cohort (Table 4). The prevalence rates for emotional *disorder* were low - 3.9% and 2.5%, respectively.

**Table 3** Estimated numbers and rates of emotional symptoms and disorders in 7- and 8-year-olds in the general population

	no HA group n (%)	home HA group n (%)	school HA group n (%)	pervas HA group n (%)	Total HA group n (%)	Total cohort n (%)
<b>Juniors</b>						
n=	603	206	131	99	436	1040
emotional symptoms	72 (11.9)	59 (28.6)	46 (35.1)	37 (37.4)	142 (32.6)	214 (20.6)
emotional disorder	32 (5.3)	2 (1.0)	3 (2.3)	4 (4.0)	9 (2.1)	41 (3.9)

**Table 4** Estimated numbers and rates of emotional symptoms and disorders in 11- and 12-year-olds in the general population

	no HA group n (%)	home HA group n (%)	school HA group n (%)	pervas HA group n (%)	Total HA group n (%)	Total cohort n (%)
<b>Seniors</b>						
n=	2419	272	442	167	881	3300
emotional symptoms	426 (17.6)	72 (26.5)	91 (20.6)	29 (17.4)	192 (21.8)	618 (18.7)
emotional disorder	18 (0.7)	6 (2.2)	7 (1.6)	53 (31.7)	66 (7.5)	84 (2.5)

#### *Hyperactivity subtypes and comorbidity with emotional symptoms and disorder*

In the juniors, the rate of emotional symptoms proved higher among those with hyperactivity (combining situational and pervasive), compared to those without hyperactivity (Odds Ratio=2.8, C.I.=2.1-3.8). However, among the hyperactive groups, the rate of emotional symptoms did not differ substantially, ranging from 37.4% (pervasive) to 28.6% (home-based).

At this age the rates of emotional disorder among those with hyperactivity (combining situational and pervasive) was low (2.1%) as compared with to those without hyperactivity (5.3%). The rates in the two situational hyperactivity groups were particularly low and it is only in the pervasive group that the rate is similar to the no hyperactivity group, namely 4% as to 5.3%.

In the seniors, emotional symptoms occurred at a similar level in both no-hyperactivity and the combined hyperactivity group. Among the subgroups of those with hyperactivity, the rates of emotional symptoms also proved broadly similar. In contrast, compared to the no-hyperactivity group, emotional disorder was substantially higher among senior hyperactive children (Odds Ratio=9.7, C.I.=5.5-18.2). Among the subgroups of hyperactive children, rates among the pervasively hyperactive proved substantially greater than among the home-based (Odds Ratio=15.5, C.I.=6.1-36.6) or school-based (Odds Ratio=20.6, C.I. 9.3-46.1).

An important issue is whether expansion distortions have occurred due to estimating from a small sub-sample of screen-negatives back to a large original population (and hence a large multiplicative factor). This is only of consequence in relation to emotional disorders

and pervasive hyperactivity among the seniors. In order to check on this the senior screen-positive profile was scrutinized to ascertain if there was an emotional disorder combined with hyperactivity with the likelihood of a borderline screen score which could be the basis of the notion of "false negative". One such subject was identified. If this is assumed to be a missed "screen positive", then emotional disorder in the hyperactivity group reduces to 4.8% (with an Odds Ratio of 6.7). With this formula, while the magnitude of the emotional disorder-pervasive hyperactivity association would be reduced, the overall pattern would remain.

Overall, there was a contrast in the pattern of co-occurrence of emotional disorder and hyperactivity at both ages. Among younger children, emotional disorder is not in excess among those with hyperactivity, as compared to those without. However, among older children, the rate of emotional disorder in hyperactive children was in excess as compared to those without hyperactivity. At both ages, pervasive rather than situational hyperactivity was associated with an excess of emotional disorder - with the excess being more substantial in the older children.

#### *Emotional symptoms and disorder and relationship to hyperactivity*

So far there has been comment upon the distribution of emotional problems in children with hyperactivity. This section explores the distribution of hyperactive behaviour in children with emotional symptoms and disorder, particularly in relation to different types of hyperactivity. First, 2 of 3 of the *junior* children (Table 3) with

emotional symptoms were hyperactive (142 out of 214); of these, 41.5% displayed home HA, 32.3% school HA and 26.1% pervasive HA. In the *seniors* (Table 4), only about 1 of 3 (192 out of 618) with emotional symptoms were hyperactive and with a different distribution: 91 (47.3%) with school HA, the largest subgroup at this age; 72 (37.5%) with home HA and 29 (15.1%) with pervasive HA.

Second, in the *juniors* emotional disorder was not strongly associated with hyperactivity: 22.0% with emotional disorder displayed hyperactivity, while this was true for 78.6% of the *seniors*, and concerned especially pervasive hyperactivity; if the correction formula described in the previous section is applied the percentage reduces to 53.8%. Thus, emotional *symptoms* were more likely to be associated with hyperactivity in the *juniors*. However, among the *seniors*, emotional *disorder* rather than symptoms displayed the strongest links with hyperactivity. The extent of this association may be somewhat exaggerated by the estimation exercise but even when adjustments were made the association remained.

## Discussion

### Hyperactivity syndromes

Diagnostic categories that incorporate hyperactivity include the attention deficit disorder of DSM III (2), attention deficit hyperactivity disorder of DSM III-R (3), its successor in DSM-IV (4), and the hyperkinetic syndrome and disorder of ICD 9 (43) and ICD-10 (44), respectively. Although they are not the equivalent of clinical diagnoses, hyperactivity symptoms derived from Rutter questionnaire scores are associated with male gender, cognitive impairments, psychiatric disorder and genetic predisposition (17, 24, 26, 35). They are also significantly correlated with corresponding items from the Child Behaviour Checklist (1, 16). Hence these hyperactivity symptoms may be regarded as moderately robust and clinically relevant behavioural measures (17). In this paper a Newcastle epidemiological data base is used to explore the relationship of hyperactivity categories derived from the Rutter scales with emotional symptoms and emotional disorder.

Psychiatrically disturbed children (or at risk for disturbance): co-occurrence of hyperactivity and emotional psychopathology

### *Situational and pervasive hyperactivity combined*

The rate of emotional symptoms among screen-positive children who were hyperactive was raised compared to

that of controls at both ages, but to a somewhat greater degree in the older age group. This is in keeping with the recent literature. First, Munir et al. (28) and Beiderman et al. (6) reported significantly higher rates of affective disorder among referred children (m.a. 11.7 years and 10.3/10.9 years, respectively) with ADD and ADHD compared with normal controls. Second, in a study of younger referred children (mean age 8.6 years), Taylor et al. (40) reported no affective comorbidity. Further, though there was some overlap with emotional disorders for ADDH reported for referred children, Taylor et al. (40) found no such overlap for those with the hyperkinetic syndrome. This is consistent with the finding of Beiderman et al. (8) of a relatively late onset of depression among referred children with ADHD, approximately 4 years after the onset of ADHD. These authors argue that developmental reasons, either psychosocial or biological, may be responsible for this lag in the emergence of a full range of emotional disorders. The current findings, using normal controls, are broadly in keeping with the above, while emotional symptoms at both ages are associated with hyperactivity (combining situational and pervasive), among older children there is a particular association with emotional disorder.

### *Situational compared with pervasive hyperactivity*

Among the screen-positive hyperactive samples, parent reported hyperactivity was particularly likely to be associated with emotional symptoms (and disorder among older children) and this was especially the case with older children. Beiderman et al. (7) and Munir et al. (28) also reported a high level of affective disorders among older referred children (m.a. 10.4 and 11.7 years) with attention deficit disorder (2), diagnosed solely on the basis of parent interview. Hence, these findings indicate that the presence of hyperactivity constitutes a risk factor or a marker for emotional symptoms. This is of prognostic significance as hyperactive children with additional emotional symptoms are less likely to respond to stimulant medication (38).

The co-occurrence of emotional symptoms and hyperactivity in a representative population

### *Situational and pervasive hyperactivity combined*

In our general population cohorts, there were broadly similar estimated rates of emotional symptoms at both ages. Among younger children with hyperactivity (combining situational and pervasive), there was a high rate of emotional symptoms. Among the 11 to 12-year-olds, hyperactivity (combining situational and perva-

sive) was associated with a relatively high rate of emotional disorder, with the rate dependent on whether or not a correction factor is applied. These findings are consistent with the data of Taylor et al. (41) who reported links between hyperactivity (combining situational and pervasive) and emotional symptoms among a general population sample of 7-year-olds and those of Bird et al. (9) who reported an association among 9 to 13-year-olds between depression and ADD.

#### *Situational compared with pervasive hyperactivity*

Goodman and Stevenson (17), using Rutter questionnaire-based definitions of hyperactivity, reported that pervasive hyperactivity was associated with high 'deviance' ratings on a questionnaire-based measure that included symptoms of emotional disturbance among 13-year-olds. Our findings are in keeping with the latter conclusions – as in the general population data, and among older children, the highest risk of emotional disorder was linked to pervasive hyperactivity. Similar findings are reported by Bird et al. (9) in their epidemiological study of 9 to 13-year-olds.

#### Developmental factors

The longitudinal data of Esser et al. (23), focusing on disorder, suggested that hyperactivity at age 8 is commonly followed by an emotional disorder at age 13, but not the reverse. This is consistent with the current findings that older hyperactive children (especially the pervasive hyperactives) are at particular risk of emotional disorder. Hence the possibility that the cumulative and multiple adversity that accompanies hyperactivity, consisting of confrontation with parents (12), poor peer relations (27, 40) and school failure (10, 26, 32) could contribute to the emergence of moderate emotional disturbance, reflected by symptoms in middle childhood but a marked degree of emotional disturbance in later childhood.

Follow-up studies have not demonstrated high rates of affective comorbidity on follow-up in young adulthood (23). Also Bird et al. (9) reported a lower rate of emotional comorbidity with ADD in mid-adolescence, compared to late childhood and early adolescence. Therefore, it may be that late childhood or early adolescence represents the period of greatest risk for comorbid emotional disorders in the face of persistent hyperactivity.

#### Methodological issues

It is possible that chance variations in smaller subgroups, considered representative of a very large subpopulation, when extrapolated back to that population could disproportionately inflate the rate of abnormality in that large population. Since the numbers of false negative cases was small, our data is less vulnerable to this possibility. Further, the patterns of overall emotional symptomatology in the different subgroups were broadly similar at both age ranges. Finally, when allowance was made for the small numbers of false negatives, the patterns proved stable. Such evidence provides confidence in our findings.

Finally, it needs to be emphasised that cross sectional studies cannot provide rigorous answers about developmental changes or continuities but we believe our two cohorts of different ages can provide indirect evidence about continuity.

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#### Conclusions

The purpose of this paper was to examine the co-occurrence of hyperactivity with emotional disorder. We report that for both age groups (covering cohorts aged 7–8 and 11–12) hyperactivity is associated with emotional psychopathology. This proved true for both the age cohorts that were selected and for population estimates. Among screen-positive hyperactive children, the strongest link with *emotional symptoms* was among those with home-based hyperactivity. This suggests that within a high risk population, when parents report hyperactivity, but the school does not, their children are at particular risk of emotional problems. However, within a general population the risk for emotional disorder is greatest with pervasive hyperactivity. For both high risk and general population data, links with *emotional disorder* were strongest among older children, and this may be a function of cumulative adversity. On the basis of the above findings, the hypothesis is advanced that in the general population, the risk of comorbid emotional disorder is a function of age and pervasiveness of hyperactivity. The above findings provide further confirmation of a comorbid link between hyperactivity and emotional psychopathology in both junior and senior school children.

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