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## Stability and change in externalising behaviours

**Abstract** This paper provides an overview of a series of issues relating to continuity and discontinuity in externalising disorders including conduct disorder, attention deficit disorder and substance use disorders in childhood and adolescence. These issues include: (a) the assessment of stability and change; (b) the origins of behavioural stability; (c) the origins of behavioural change; and (d) the preventive and clinical implications of research into behavioural stability and change. It is concluded that future research into this area should involve: (a) further research into the genetic factors underlying externalising disorders; (b) continued research into the developmental progressions; (c) refinement and revision of measurement methodologies; and (d) greater use of designed experimentation to examine the extent to which externalising behaviours are amenable to change through both public health and clinical interventions.

**Key words** Externalising disorders · Stability · Change

### Introduction

Externalising disorders, including conduct disorder (CD), oppositional defiant disorder (ODD), attention deficit disorders (ADD/ADHD) and substance use disorders, are amongst the most common disorders of childhood and adolescence. Prevalence studies have suggested that: (a) 1.5–7.3% of children meet criteria for conduct disorder [4, 10, 18, 31, 68, 78, 104]; (b) 1.7–9.7% of children meet criteria for ODD [4, 10, 18, 31, 68, 104]; (c) 2.1–10.1% of children meet criteria for ADD or ADHD [4, 10, 18, 31, 68, 78, 104]; (d) approximately 5% of children meet criteria for a substance abuse or dependence disorder [31]. Frequently these disorders are of early onset, but there is

a dramatic increase in rates of substance abuse or dependence disorders during adolescence [51].

Externalising disorders share two features. Firstly, these disorders are frequently highly comorbid with individuals having one disorder being at increased risk of other disorders [12, 16, 49, 61, 108]. The second feature that links externalising disorders is that these disorders are associated with a range of common or similar risk factors [14, 22, 44, 47, 49, 58, 59, 74, 76, 85]. Risk factors shared by several externalising disorders include:

1. *Sociodemographic disadvantage.* There are general and pervasive tendencies for externalising disorders to be linked to a series of social and demographic disadvantages including low socio-economic status, low income and poverty, poor parental education and minority group ethnic status [28, 96].

2. *Family factors.* A second pervasive feature of externalising disorders is that these disorders are more frequent amongst children and young people from families facing a range of difficulties and problems. These may include: marital conflict or parental divorce [3, 29, 32, 48, 64, 105]; child abuse or neglect [13, 15, 37]; impaired parent/child relationships [80]; impaired parenting or child rearing environment [38, 81, 82, 93]; and parental psychopathology or adjustment problems [19, 66, 92].

3. *Educational factors.* A series of educational factors has been found to be linked with increased risks of externalising disorders. These have included low IQ, delayed educational achievement or educational underachievement and specific learning difficulties [43, 52, 69, 90, 97].

4. *Peer factors.* The rise in rates of externalising behaviours in adolescence has been clearly linked to peer factors with affiliations with delinquent or substance abusing peers proving to be one of the strongest predictors of adolescent externalising disorders and particularly substance use disorders [22, 27, 35, 51, 73].

5. *Individual factors.* Although various aspects of childhood and adolescent social environment are associated with increased risks of externalising disorder, it would be

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misleading to assume that externalising disorders are simply a reflection of dysfunctional social environments. There is growing evidence to suggest that individual variation independently of social environment plays an important role in determining individual vulnerability to externalising disorders. This evidence includes findings on linkages between personality factors and externalising disorders [17, 56, 111] and growing evidence of the contribution of genetic factors from twin and adoption studies [95, 98].

This review presents an overview of a series of issues related to and arising from research into the stability, continuity and change in externalising behaviours. These issues include: (a) the assessment of stability and change in disorder; (b) factors contributing to the stability of disorder; (c) the origins of change in disorder; and (d) the preventive and therapeutic implications of research into stability and change in disorder.

### **Assessment of stability and change in disorders**

There have been two different ways in which variation in externalising symptoms have been analysed. Firstly, in a number of analyses, symptom variation has been represented as a dimensional variable in which the severity of disturbance ranges from none to severe [23, 24, 82, 83, 99]. More recently, there has been an increasing number of analyses that have used categorically scored measures in which subjects are classified as cases or non-cases on the basis of standardised diagnostic criteria [4, 10, 18, 31, 68, 78, 104]. The choice of method for measuring symptom variation has implications for the way in which stability is assessed. In general, the assessment of across-time stability of dimensionally scored variables has been examined using linear models in which scores observed at a given time are regressed on scores observed at earlier times [46, 70, 79, 107]. From such linear models it is possible to derive a series of measures of across-time stability of scores with the correlation coefficient being the most commonly used measure of stability. However, the correlation coefficient is not necessarily the best index of stability as this measure is insensitive to general shifts in symptom levels occurring over time. In the case in which symptom variation is scored as a dichotomous case/non-case measure, linear regression models are not applicable and alternative approaches are used to assess stability. These include: (a) the computation of the relative risk of disorder at some future time conditional on current diagnostic status; (b) statistical modelling using log-linear or logistic-regression methods; and (c) the analysis of state-to-state transition matrices [67, 86]. All of these methods yield parameter estimates that describe the ways in which diagnostic status may vary with the passage of time.

There have been many studies that have examined patterns of stability in a range of measures of externalising behaviours and particularly conduct disorder and substance use behaviours (for reviews of this evidence see [22, 51, 59, 60, 79]). Without exception these studies have pro-

duced evidence of moderate to strong continuities in these behaviours from the point of early to middle childhood through adolescence and into adulthood. Frequently, although not invariably, children and adolescents who exhibit externalising problems continue to show these problems over the life course. For example, in a review of the stability of conduct disorder throughout childhood, Loeber [60] concluded that these behaviours were more enduring than changeable, and that with the passage of time the expression of conduct disorder becomes increasingly variable while at the same time showing an increasing resistance to change. There are, however, reasons for believing that studies that have examined patterns of change and stability in observed diagnostic classifications or scale measures may have led to an underestimation of the true extent of stability in externalising behaviours.

An important issue in assessing measures of stability concerns the issue of errors of measurement in the observed variables. Typically, the assessment of stability in externalising disorders has been conducted on the basis of patterns of stability and change in observed variables. However, analyses in which change and stability are assessed using observed variables may confound two quite different processes that lead to change in observed variables over time. Firstly, artefactual change in variables may arise from errors of measurement in the observed variables that lead to an apparent change of symptom levels or diagnostic classifications over time. Secondly, true or non-artefactual change in scores or diagnoses may occur because of processes that lead to genuine changes in the individual's symptom levels over time. In analyses that examine stability and change using observed symptom levels, artefactual change due to measurement errors is confounded with true change and implicit in such analyses is the assumption that the amount of artefactual change arising from measurement error is sufficiently small to be disregarded in the analysis.

Although the assessment of the extent of measurement error in diagnostic classifications or symptom scales poses complex problems, in recent years there has been a growing body of statistical theory based around latent variable modelling methods that makes the assessment of the magnitude and consequences of measurement errors possible subject to (a) assessments provided by multiple informants or times of measurement, and (b) model-based assumptions about the nature of error processes [2, 39, 40, 62, 63, 103]. The advantage of these approaches is that they make it possible to embed the analysis of stability and change into the context of a theory of measurement error. This provides an at least preliminary basis for assessing the likely impact of measurement errors on estimates of stability and change.

In the last 5 years there have been a growing number of analyses of stability and change that have used latent variable methods to analyse stability and change in externalising behaviours. These analyses have been applied to both dimensionally scored and categorically scored measures [23, 25, 34, 35, 83, 110]. Firstly, a series of studies using structural equation modelling methods has examined the

stability of dimensionally scored measure of conduct problems [23, 24, 83] and substance use behaviours [35] taking into account errors of measurement and method effects in reporting. Invariably these studies have shown that the stability of behaviour across time is far higher when due allowance is made for measurement errors. For example, Fergusson and Horwood [24] studied the stability of dimensionally scored measures of conduct disorder and attention-deficit behaviours in a birth cohort of New Zealand children studied from 8 to 12 years. This analysis suggested that when due allowance was made for measurement errors, measures of conduct disorder or attention deficits at the age of 8 years were correlated in the region of 0.88 to 0.98 with these measures observed at the age of 12 years. Very similar findings of the stability of conduct problems after correction for measurement errors were reported by Patterson [83] in a 4-year study of a sample of American boys.

Findings for dimensionally scored variables have been mirrored in analyses of categorical diagnostic variables using methods of latent Markov analysis [34, 110]. For example, Zoccolillo et al. [110] analysed the stability of antisocial behaviours in a sample of British children studied to the age of 26 years. They found that when due allowance was made for measurement error and the heterotypical expression of conduct difficulties, there was evidence of very strong continuity and stability between childhood adjustment patterns and adjustment in adulthood. Somewhat similar findings have been reported by Fergusson et al. [34] in an analysis of the stability of categorically scored conduct problems in a birth cohort of New Zealand children. This analysis showed that when errors of measurement were taken into account using latent Markov methods, there was strong continuity in conduct disorder during middle childhood and early adolescence.

The findings of latent variable analyses of stability and change in externalising lead to two major conclusions about these processes. First, that measures of externalising behaviours are subject to substantial errors of measurement that make them highly fallible accounts of behavioural variation. Second, when due allowance is made for errors of measurement there is evidence of strong across time continuity in behavioural tendencies.

## Origins of behavioural continuity

Although all research to date is consistent with the view that tendencies to externalising disorders and symptoms are relatively stable over time and show clear continuities from childhood into adulthood with these predispositions being expressed in age-related ways, the reasons for such stability are by no means clear or self-evident. Broadly speaking, three general explanations of behavioural continuity in externalising disorders may be proposed:

*1. The effects of pervasive risk factors on individual adjustment.* It might be proposed that behavioural stability arises from fixed attributes of the individual or his/her social environment that influence the individual's social and

personal adjustment over the life course. There are at least three sets of factors that might play a role in sustaining behavioural continuities. Firstly, it may be suggested that behavioural stability arises from underlying genetic factors or influences that may exert pervasive influences on individual adjustment and behavioural predispositions over the life course. The view that continuity in externalising disorders may be, at least in part, due to common genetic influences is supported by a growing body of literature which has suggested the presence of moderate to strong heritability of antisocial behaviours [41, 95, 98], attention deficit disorders [6, 100] and substance use disorders [41, 72, 87]. It might be expected that the effects of genetic factors would be paralleled by some stability and continuity in behavioural adjustment over the life course. However, it is also possible that genetic factors may lead to behavioural changes as a result of genetic processes that may switch on or off at different developmental stages [20, 55]. A closely related explanation is that stability in externalising disorders reflects more general temperamental or personality factors that have as their correlates or specific manifestations increased tendencies to antisocial, impulsive or risk-taking behaviour. This view is underwritten to some extent by findings of linkages between externalising disorders and a range of measures of temperament and personality [17, 56, 111]. Finally, it could be suggested that stability and continuity in behaviour reflects stability and continuity in the social, family and related milieu to which the individual is exposed. Although many individuals may face changes in their social and family circumstances over the life course, for many the general social and family environment within which they reside may remain relatively fixed and unchanging. In turn, one might expect to find stability and continuity in the individual's social environment and milieu would be reflected to some extent by stability and continuity in individual behaviour.

*2. Exposure to events or circumstances that may have irreversible consequences.* A second explanation of behavioural continuities is that these may arise from events or circumstances that have irreversible or at least difficult-to-reverse consequences for longer-term development. For example, Bowlby's [11] analysis of the role of parental attachment and separation on later adjustment draws heavily on the assumption that unsatisfactory experiences in early childhood may lead to longer-term vulnerability to later adjustment difficulties. On a related note, theories of the long-term sequelae of child abuse make similar assumptions about the role of traumatic life experiences in determining longer-term adjustment [13, 15, 37]. Additionally, Loeber [59] has pointed out that there may be critical periods during childhood during which unsatisfactory experiences may act as factors that determine longer-term vulnerabilities to adjustment problems. Although it is very unlikely that continuities in externalising behaviour can be explained to any great extent by exposures to traumatic life experiences that determine longer-term adjustment, it is possible that these experiences may make some contribution to behavioural continuity and stability [93].

*3. Developmental progressions.* Explanations that suggest that the stability of externalising behaviours arises from common risk factors or traumatic experiences imply a static model of development in which behavioural variation is determined by relatively fixed or immutable characteristics of the individual, his/her social environment and childhood history. It is unlikely that such static accounts will provide an adequate explanation of the complexities of behavioural stability and change. Specifically, there is increasing research to suggest that frequently, although not invariably, the development of externalising behaviours follows a relatively stable and predictable sequence [59]. Examination of the literature suggests that in broad outline this developmental course involves the following life processes and risk factors:

- i. Firstly, it seems likely that the individual's genetic makeup and general social environment may act as broad factors that determine the extent of individual vulnerability to externalising disorders with those most vulnerable to such disorders having both a genetic predisposition to modes of adjustment that may lead to externalising behaviours and being exposed to social and family environments characterised by a range of risk factors known or suspected to encourage externalising behaviour.
- ii. Frequently individuals from high-risk backgrounds show manifestations of tendencies to conduct difficulties early in life with these difficulties often being evident around the point of school entry (e.g. [22, 59, 60, 85]).
- iii. The onset of early conduct difficulties is frequently followed by continued difficulties at home and at school that may be accompanied by school problems or educational underachievement (e.g. [22, 50]).
- iv. Those showing early-onset conduct problems and difficulties then often go on to form affiliations with delinquent or substance-using peers with involvement in such peer groups acting to sustain, reinforce and elaborate tendencies to externalising behaviour (e.g. [22, 27, 35, 51]).
- v. The behaviours established in adolescence are likely to be followed by an increasingly elaborate pattern of antisocial, risk-taking and related behaviours in adolescence and young adulthood (e.g. [22, 59, 60]).

Although the life processes described above frequently characterise those with severe and marked externalising behaviours, several authors have pointed to the fact that life-course processes leading to externalising behaviours are likely to be heterogeneous and to vary with:

1. The age of onset of disorder with the risk factors associated with late-onset disorders differing from those associated with life-course-persistent disorders [73].
2. The nature of the disorder. Although there is considerable overlap and comorbidity between externalising disorders, it is clear that these disorders do not share a completely common aetiology and, for example, there are several important differences in the risk factors and life processes leading to conduct disorders and substance use disorders [22, 58]. Given these likely differences in aeti-

ology, it follows that somewhat different factors and processes will be involved in the stability of different types of externalising disorders.

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### Sources of change in externalising behaviours

Although it is clear that externalising disorders show considerable continuity and stability from childhood into adulthood, behavioural change does occur with some children having early-onset disorders showing remission of these disorders, whereas others who are relatively problem free in childhood may show later onset [36, 73, 84]. Normally occurring changes in externalising behaviours provide natural experiments that may lead to the identification of the processes which may encourage change or discontinuity in behaviour. In contrast to the large numbers of studies that have examined continuities and stability in disorder, there has been less research into the factors and processes that lead to behavioural change. Nonetheless, there have been several themes that have emerged from research into the nature and origins of behavioural change.

#### Heterogeneity amongst those with externalising symptoms or disorders

Whereas many studies have documented common risk factors for externalising behaviours, there has been increasing recognition that individuals with externalising disorders are unlikely to be a single homogeneous group experiencing a common set of risk factors and life processes [73]. It is more likely that those with externalising disorders are heterogeneous, and that there may be different groups for which the aetiology and developmental trajectory of disorders differ. Such heterogeneity would, in turn, give the impression of changes and discontinuities in behaviour. A potentially important distinction that has been drawn by Moffitt [73] concerns the difference between individuals who show life-course-persistent antisocial behaviours and those for whom the expression of these tendencies is limited to adolescence. Moffitt [73] suggests that variations in the course of externalising behaviours reflect the presence of two groups for whom the aetiology of antisocial behaviour differs. Specifically, she attributes life-course-persistent behaviours to a series of processes including neuropsychological vulnerabilities, adverse parent-child interactions and becoming ensnared by the consequences of antisocial behaviour which give rise to a relatively stable and persistent pattern of antisocial behaviour over the life course. On the other hand, those who show adolescent limited behaviours are claimed to lack the pathologies and vulnerabilities of the life-course-persistent group and engage in antisocial behaviours largely as a result of imitation of socially deviant peers. It is relatively easy to see how, by combining these groups, an analysis may give rise to an impression of both change and stability when, in fact, if data were disaggregated by type of behaviour, analysis might show the pres-

ence of a highly stable group of life-course-persistent individuals and a second group showing a changeable pattern of adolescent limited behaviours. Although Moffitt's analysis was applied to the analysis of juvenile crime, it is easy to see the ways in which this theory may be applied to account for patterns of stability and change in other types of externalising behaviours.

#### Role of pre-existing risk in determining potential for change

Moffitt's analysis suggests the need to identify the characteristics of those individuals who are likely to exhibit behavioural change. This theme has been taken up in several studies that have examined the factors that discriminate between those who show behavioural change and those who do not. In an analysis of patterns of stability and change in antisocial behaviours in a cohort of American children, Patterson [84] examined the factors that discriminated between children showing early-onset and persistent behaviours and those showing late onset. He found that the late-onset group was characterised by having exposure to risk factors for antisocial behaviours that were intermediate between those of non-offenders and early-onset offenders. In a similar analysis Fergusson et al. [36] have examined patterns of change in conduct disorders in a New Zealand birth cohort. This analysis examined two types of change: (a) those individuals who showed an early onset and later remission of conduct disorder; and (b) those subjects who showed late-onset disorders and contrasted children showing behavioural change with those who were not conduct disordered or those who were persistently conduct disordered. The analysis showed that those with changing behaviours (early onset/late remission or late onset) tended to come from moderate-risk backgrounds which were intermediate to the backgrounds of those without conduct disorder and those with persistent conduct disorder. What appeared to distinguish the late-onset group from the early-onset later-remission group was that the late-onset group tended to have high rates of affiliations with delinquent peers.

While these findings require replication and extension, they suggest that the potential for behavioural change is likely to be greatest amongst those from moderate-risk backgrounds, and that depending on circumstances these children may show patterns of behavioural discontinuity that include early-onset then later-remission or late-onset behaviours. The finding that children from moderate-risk backgrounds tend to show the greatest behavioural change and malleability clearly suggests the worth of treatment and prevention programs focusing their efforts on this group.

#### Analysis of turning points

As noted previously, one source of stability in externalising behaviours is likely to involve stable or self-perpetuating social and environmental processes that may en-

courage and sustain behavioural stability. The corollary to this conclusion is that behavioural change is likely to occur in response to marked and dramatic shifts in social environment that have the potential to change behavioural directions. Pickles and Rutter [86] point out that these turning-point experiences may be of two types. Firstly, there are those events which may close down or open up life opportunities (e.g. leaving school or entering university). Secondly, there are those events which involve radical and lasting change in the individual's social circumstances (e.g. marriage or divorce). Clearly, both types of experiences are linked by the fact that they will lead to changes and redefinition of the individual's social environment, and with this change there is the potential for a corresponding change, for better or worse, in behavioural adjustment. For example, Pickles and Rutter [86] among others have shown that marriage or the formation of partnership relationships acts as a turning point in criminal careers with marriage to a non-deviant spouse leading to a reduction in offending, whereas marriage to a deviant partner has the opposite effect. Although there has been increasing recognition of the role of turning-point events as determinants of behavioural change, the definition, identification and analysis of turning points poses complex conceptual and methodological problems [86].

#### Recognition of heterogeneity in the nature and aetiology of externalising disorders

Although it has been customary to group externalising disorders together owing to the frequent comorbidity of these disorders, it is likely that there is a swarm of symptom patterns reflecting the presence of different but correlated disorders or behavioural domains [33, 49, 61, 88, 106]. An important issue in understanding behavioural change is clearly that of identifying the relevant behavioural domains and their differing aetiologies. It is already clear that there is considerable heterogeneity and variation in externalising behaviours, and this suggests the need for refined measurement and diagnostic classifications to adequately represent this heterogeneity. In addition, it is likely that the risk factors and life-course processes that lead to stability and change in disorders may vary from condition to condition. For example, there is growing research to suggest that the long-term consequences of early conduct and attention deficit disorders in isolation are different. An increasing number of studies suggest three generalisations about linkages between these disorders and later outcomes:

1. Attention deficit behaviours in the absence of conduct disorders are associated with longer-term academic failure and underachievement [5, 7, 25, 30, 42, 71]. However, attention deficit disorders in the absence of conduct disorders are not associated with longer-term antisocial or substance use behaviours [25, 30, 57, 65].
2. Conduct disorders in the absence of attention deficit behaviours are associated with increased risks of later anti-

social and substance use behaviours [58, 60, 85]. However, conduct disorders in the absence of attention deficit disorders are not associated with increased risks of academic failure or underachievement [25, 30, 57, 65].

3. Children with comorbid conduct and attention deficit disorders are at increased risks of academic failure, anti-social behaviours and substance use [7].

These different developmental trajectories for different disorders and combinations of disorders clearly hint at different aetiological and other processes associated with conduct disorder or attention deficit disorders. More generally, all of the above considerations suggest the need for both measurement and aetiological theories that disaggregate externalising disorder and examine the ways in which different risk factors and life-history processes are associated with different symptom patterns.

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### **Implications of research into stability and change for the prevention, treatment and management of externalising disorders**

The themes and issues that have emerged from the analysis of stability and change in externalising disorders have several implications for the prevention, treatment and management of these disorders. These include:

*1. The need for diagnostic verification and validation.* Studies of stability and change that have incorporated corrections for measurement errors suggest that large amounts of apparent change in behaviour over time may reflect the presence of errors in the classification or measurement of behaviours. These issues of measurement accuracy are likely to emerge in a clinical context and be reflected in diagnostic errors including both false positives and false negatives. Although there is no sure means by which all diagnostic error can be eliminated, research evidence suggests that the accuracy of diagnosis can be markedly increased by using multiple diagnostic assessments. These assessments may be obtained by: (a) collecting reports of behaviours from different sources and informants; (b) the use of multiple clinician assessments; or (c) by repeated assessments of the same subject using the same method to determine the consistency and repeatability of diagnoses. Achenbach [1] has provided an account of the ways in which such multi-axial data may be combined to reach diagnostic decisions and classifications.

*2. The need for early detection and intervention.* Research is unanimous in the finding that children who show early-onset conduct problems and difficulties are at risk of continued difficulties over their life course. In addition, with the passage of time externalising behaviours tend to become increasingly elaborate and increasingly resistant to change. The clear implication of these findings is that detection of children with early-onset conduct difficulties and the early treatment of these problems is likely to offer one of the most effective strategies for reducing the number of young people who show a life-course pattern of antisocial

behaviours and adjustment difficulties [22, 53, 60, 77, 109].

*3. The need for multi-compartment intervention programmes and therapies.* It has also become evident from research into the development of externalising behaviours in childhood that the aetiology of these conditions is likely to be strongly multi-causal and to be shaped by multiple influences that include genetic factors, social conditions, family and childhood circumstances, the school environment and peer influences. The major implication of the strong multi-causality of externalising behaviours is that it will be necessary for prevention, management and therapy to reflect the complexities of the origins of externalising behaviours. This is likely to be best achieved by the development of multi-compartment programmes that combine elements of family support [109], individual treatment and therapy [53, 54, 102], school-based initiatives [43] and peer-based initiatives [8, 9, 101] that may act in concert to minimise opportunities for the development and reinforcement of externalising behaviours.

*4. The need to recognise the heterogeneity of externalising behaviours.* It is clear that whereas externalising behaviours are frequently correlated and comorbid, there is nonetheless considerable heterogeneity in the expression and no doubt the causation of these behaviours. For example, the evidence suggests that the long-term risks faced by children with attention deficit problems in the absence of conduct disorder are very different from the long-term risks faced by children with conduct disorder in the absence of attention deficit disorders. For the first group the major risks involve longer-term educational failure and academic underachievement, whereas for the second group the major risks involve continued antisocial and substance abuse behaviours [25, 30, 57, 65]. Similarly, children who show early-onset conduct problems are likely to have a different pattern of antisocial behaviour and prognosis than those who develop later-onset problems [36, 60, 73, 84]. For these reasons it becomes important for clinical practice to develop refined typologies and accounts of different patterns of externalising behaviours and to develop methods suitable for the treatment of different patterns and mixes of externalising symptoms.

*5. The need to include moderate risk children in prevention, intervention and therapy.* To a large extent, attempts at prevention and therapy have confined their attention to the problems posed by a relatively small minority of children who show externalising behaviours and who meet standardised diagnostic criteria for one or more externalising disorders. However, research into this area has suggested that, in general, externalising behaviours emerge as dimensional variables in which the severity of disturbance varies from none to severe, and that there is no clear-cut demarcation between those who are “cases” and non-cases. Furthermore, this evidence has also suggested the presence of continuous dose/response relationships between the extent of externalising behaviours and outcome

risks. All of this evidence points to the conclusion that it may be important to extend therapeutic and prevention attempts to include children who show moderate but sub-clinical tendencies to externalising problems. There is also evidence to suggest that extending preventive and therapeutic efforts to deal with sub-clinical externalising may be beneficial since the findings suggest that the behaviours of moderate-risk children are more amenable to change for both good or ill [36, 84].

In conclusion, the themes that have emerged from epidemiological research into patterns of stability and change in externalising behaviours suggest, in broad outline, the features of prevention and therapeutic programmes that are likely to be successful in reducing and managing externalising behaviours in children. In general, these themes reinforce and underwrite major issues and themes that have emerged in the clinical literature including: (a) the need for reliable and valid diagnosis; (b) the need for early detection and treatment; (c) the need for a multi-compartmental and multi-disciplinary approach to addressing externalising disorders; (d) the need to recognise heterogeneity in both the expression and causation of externalising disorders; and (e) the need for prevention and therapy to consider the needs of children with significant but sub-clinical levels of externalising behaviours.

## Conclusion

The analysis of patterns of behavioural stability and change in externalising disorders is important for at least two reasons. Firstly, this analysis provides a natural-history account of the processes by which disorders develop, show progression and change over the life course. This account provides a theoretical underpinning to the scientific and clinical understanding of the diagnosis and prognosis of these disorders. Secondly, evidence from studies of change in externalising disorders may suggest policies, interventions and treatment methods to address or reduce risks of externalising disorders. Although there has been considerable research into behavioural stability, the present review highlights the need for further research in this area. Important issues that require attention include:

1. Behavioural genetic studies to examine the extent to which genetic factors may both determine behavioural stability and influence susceptibility to behavioural change. To date, most research into stability and change has drawn implicitly from an environmentalist model that has assumed that the origins of behavioural stability and change lie within the social environment. This view, however, is coming under increasing challenge from behavioural genetic studies which suggest the presence of moderate to large heritability of various externalising disorders. In turn, this evidence demands the use of genetically sensitive designs that are capable of examining the interplay between genes and environment in determining both behavioural stability and individual capacities for behaviour change [45, 55, 75, 94, 95].

2. Further examination of the heterogeneity of externalising disorders. Although over the last decade there has been increasing refinement and analysis of the diagnostic vocabulary used to define externalising disorders, issues and debates remain about the number of behavioural domains needed to represent variability in externalising disorders [33, 49, 61, 88, 106]. In addition, there is a clear need for further analysis of the developmental progressions that lead to different outcomes and the extent of similarity, difference and overlap of these progressions.

3. Measurement issues. As noted previously, errors of measurement in symptom scales and diagnostic classifications may have a profound effect on estimates of behavioural stability, and there is growing evidence from latent variable modelling methods to suggest that much apparent change and instability in externalising disorders may reflect measurement error, rather than genuine behavioural changes. These considerations clearly suggest the need to link research into stability and change with a theory of measurement error and the development of methodologies for adjusting stability estimates for these errors. A related issue concerns the metric most suited for describing behavioural variation. While it is becoming increasingly common for analyses to examine the stability of dichotomously scored diagnostic classifications, there are suggestions that the use of these classifications may lose information and result in reduced analytic precision [26]. As in nearly all areas of developmental psychopathology, clear resolution of the “scales vs categories” debate is central to analytic progress.

4. Experimental research. Most of the knowledge about patterns of behavioural stability and change has been gained in the context of passive longitudinal designs that have examined symptom distributions studied at two or more times. Although the longitudinal design has many advantages over alternative designs [91], there are nonetheless limitations in the extent to which these designs can test causal hypotheses [21]. For this reason it is important that causal hypotheses concerning the origins of behavioural change are tested, wherever possible, by planned experiments that examine the extent to which various interventions may lead to behavioural change.

There has been a long history of research into the stability of externalising disorders that dates back to Robbins [89] pioneering research in this area. This research clearly documented the considerable stability that exists in tendencies to externalising behaviours from early childhood into adulthood, and recent research that has incorporated corrections for measurement error has established that this stability may be even greater than previously believed. In contrast, there has been less research into the factors that encourage behavioural change, but recent research is beginning to suggest some of the factors and processes that account for apparent changes in behaviour. The future is likely to involve a combination of research based on genetically sensitive designs, in-depth longitudinal studies of developmental progressions and planned experiments

designed to clarify the origins of behavioural stability and change, and, perhaps more importantly, to develop and test approaches to treating, managing and reducing risks of externalising disorders.

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