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Change in psychopathology in referred children: the role of life events and perceived stress

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Background: This study examined the relation between stress and change in emotional and behavioural problems in children and adolescents referred for mental health services. **Method:** At three waves across four years, children and their parents ($N = 310$, mean age at the first wave = 11.26 years, $SD = 3.18$) reported emotional and behavioural problems, as well as stressful life events (parent report) and perceived stress (child report). **Results:** Major life events before referral were associated with higher levels of parent-reported internalising and externalising problems at referral. Life events after referral were associated with a slower recovery from internalising problems. The associations between stressful life events and the course of parent- and self-reported problems were mediated by children's subjective feelings of stress. **Conclusion:** Stressful life events appear to interfere with recovery from internalising problems in the years after referral through increasing the experience of stress in daily life. **Keywords:** Life events, stress, externalising disorder, internalising disorder, longitudinal studies.

Stability and change in emotional and behavioural problems are important issues for children and adolescents referred to mental health services. Stressful life events have repeatedly been shown to affect emotional and behavioural problems in children and adolescents (Grant, Compas, Thurm, McMahon, & Gipson, 2004). However, it is unclear to what extent stressful life events are also responsible for the persistence of emotional and behavioural problems, and through which mechanisms this occurs. The current study focuses on the effects of stressful life events on the course of emotional and behavioural problems in referred children and adolescents (henceforward denoted as 'children'). Further, the mediating role of children's subjective experience of stress is addressed as a potential explanation for the association between stressful life events and the course of psychopathology.

Several long-term follow-up studies in children with mental health problems have demonstrated that, on average, levels of emotional and behavioural problems decrease after referral (Heijmens-Visser, Van der Ende, Koot, & Verhulst, 2003; Steinhausen, Drechsler, Foldenyi, Imhof, & Brandeis, 2003). However, many children continue to show high levels of problem behaviour. For example, Heijmens-Visser et al. found that 52% of referred children with high problem levels had problem scores in the deviant range six years later. Thus, problem levels remain high – or bounce back – in a considerable number of individuals. The diathesis-stress model (e.g., Ingram & Luxton, 2005) explains the continuation of

problems as a result of the interaction between the individual and the environment. This model suggests that a genetic vulnerability or predisposition towards psychological disorder is triggered by adversities in the environment. This diathesis might be overrepresented in referred children, which means that when they are confronted with adverse experiences, their emotional and behavioural problems might deteriorate or return.

Adverse experiences have been shown to affect emotional and behavioural problems in children and adolescents. Numerous studies have focused on the effect of stressful life events, defined as 'environmental events or chronic conditions that objectively threaten the physical and/or psychological health or well-being of individuals of a particular age in a particular society' (Grant et al., 2003, p. 449), such as parental divorce, loss of a best friend, and serious physical illness. Studies consistently show that stressful life events are related to heightened levels of internalising and externalising problems in referred and non-referred children (Grant et al., 2003; Hammen & Goodmanbrown, 1990; Jensen, Richters, Ussery, Bloedau, & Davis, 1991; McKnight, Huebner, & Suldo, 2002). Associations with internalising problems were generally stronger than with externalising problems (e.g. Grant et al., 2004).

Although life events have been shown to be associated with the onset of disorders, their role in the course of psychopathology in referred children is less well studied. According to the 'permanence of risk' hypothesis (Koot, 1999), effects of life events might be more enduring in referred children than in children from the normal population, because of

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inadequate appraisal and coping styles and increased sensitivity to stress (Rutter, Kim-Cohen, & Maughan, 2006). Thus, life events preceding referral might continue to influence the course of problems, even after referral. Moreover, Post (1992) suggested that the stress system is sensitised by the initial stressor, so that the experience of later difficulties might also increase the level of problems. Thus, earlier stressful life events may decrease the already weak resilience to stress, so that later events may slow down the expected recovery from emotional and behavioural problems. Indeed, in a referred sample of children aged 9–16 years Mathijssen et al. (1999) found that stressful life events after referral predicted a slower recovery from emotional and behavioural problems across a one-year interval, as reported by parents.

Mechanisms of mediation

To further understand the way life events affect the course of psychopathology, investigation of mechanisms that explain the association may be relevant. In their transactional model of stress, Lazarus and Folkman (1984) argued that the impact of an event depends on the perception of the individual, rather than on the event itself. The focus on subjective appraisal recognises that the impact of life events will vary across individuals.

There are several ways in which stressful life events may have an effect on the individual. First, life events have been shown to affect feelings of control, such as the feeling that things are not going as planned (Martin, Kazarian, & Breiter, 1995). Second, life events may decrease children's access to supportive resources, for example when a parent leaves the home after divorce. Third, life events decrease children's self-confidence and perceived competence (Bruce et al., 2006), for example confidence in their ability to cope with future stressful events.

Life events therefore have consequences that are likely to negatively affect children's ability to meet the demands of daily life, such as problems with doing homework and falling asleep, thus leading to perceived stress. Perceived stress, as the experience that demands are beyond the person's abilities, may contribute over time to emotional and behavioural problems, according to Lazarus and Folkman (1984). Perceived stress may therefore be an important mediator of the relation between stressful life events and the course of emotional and behavioural problems. This may especially be the case in referred children, because of their less adequate appraisal and coping styles. Indeed, cross-sectional findings of Martin et al. (1995) suggested that perceived stress mediated the association between life events and depressive symptomatology in adolescents; however, longitudinal studies and studies with externalising problems as outcomes are lacking.

Current study

The current study is a three-wave longitudinal study with a one- and three-year interval among children referred for outpatient mental health services. Stressful life events (parent report), perceived stress (child report), and emotional and behavioural problems (parent and child report) were measured at all three time points. This study had three aims. First, we examined the change in internalising and externalising problems. Second, we tested if stressful life events predicted the course of these problems in referred children. We examined the effects of life events preceding referral on initial status and recovery and of life events after referral on recovery. Third, we examined if perceived stress mediated the associations between stressful life events and the course of problems. Consistent with prior research, stressful life events were expected to be associated with higher problem levels, especially for internalising problems. Stressful life events preceding referral were expected to increase problem levels at initial status and slow down the recovery of problems across time. In addition, stressful life events occurring after referral were expected to be related to a slower recovery. Given the results of studies addressing psychological mechanisms mediating the effect of stressors, we expected that perceived stress would mediate the effect of stressful life events on the course of internalising and externalising problems.

Method

Participants

The present study is a three-wave four-year follow-up study of a child psychiatric outpatient sample. At the first assessment (T1), the sample consisted of 310 children (response rate 73.1%; mean age 11.3 years; range 6–18), who had been referred between 1 August 2000 and 15 September 2001 to a general or a university child psychiatric outpatient clinic in Rotterdam, the Netherlands. Patients with a broad range of problems, varying from mild to severe, were included. Based on the main clinical diagnosis, obtained with the Dutch version of the DSM-IV Checklist Interview (Bastiaansen, Koot, Ferdinand, & Verhulst, 2004b; Hudziak et al., 1993) at T1, each child was assigned to one of six diagnostic groups: (1) Attention Deficit and Disruptive Behaviour Disorders ($n = 107$, 35%), (2) Anxiety Disorders ($n = 57$, 18%), (3) Mood Disorders ($n = 29$, 9%), (4) Pervasive Developmental Disorders ($n = 28$, 9%), (5) Other Disorders ($n = 22$, 7%; including Somatoform Disorders and Enuresis/Encopresis), and (6) No Diagnosis ($n = 67$, 22%).

At the second assessment (T2; mean follow-up time 1.07 years; $SD = .18$ years), 231 children and their parents participated (response rate 74.5%; mean age 12.2 years; range 7–19 years). At the third assessment (T3; mean follow-up time after T1, 4.22 years; $SD = .32$ years), 257 families participated (response rate 82.9%). Of all families, 194 (63%) participated in all

three waves of the study, 83 (27%) in two waves, and 33 families (10%) in the first wave only. Later non-respondents did not differ from families who did participate in self- and parent-reported problems and perceived stress. However, T2 non-respondents had reported fewer life events at T1 ($F(1, 303) = 4.90$, $p < .05$).

Procedure

At T1, a clinician informed the children and their parents about the study during their first visit to the clinic. At T2 and T3, families were informed by mail. At all three measurements, after informed consent was obtained, questionnaires about stressful life events, perceived stress, and emotional and behavioural problems were sent to their homes for completion and an appointment was made for a home visit. At T2, home visits only took place if children or parents could not answer the questionnaires by themselves, because of reading difficulties or language problems ($n = 34$). The study was conducted after approval by the Dutch Central Committee on Research Involving Human Subjects and the university hospital medical ethical committee.

Instruments

Emotional and behavioural problems. The Child Behaviour Checklist/4–18 (Achenbach, 1991a) and Youth Self-Report (Achenbach, 1991b) were used at each measurement occasion to obtain standardised parent and child reports of children's emotional and behavioural problems over the preceding six months. The questionnaires consist of 120 (CBCL) and 119 (YSR) problem items rated on a 3-point Likert scale (0 = not true, 1 = somewhat true, 2 = very true or often true). In this study, the Internalising (including withdrawn, anxious/depressed behaviours, and somatic complaints) and Externalising (including aggressive and delinquent behaviours) scales were used. When both parents had filled in the CBCL (T1: $n_m = 290$; $n_f = 32$. T2: $n_m = 225$; $n_f = 135$. T3: $n_m = 248$; $n_f = 161$; $m =$ mother, $f =$ father), an average score was computed (cf. Bartels et al., 2003). Table 1 shows the number of completed CBCLs and YSRs at each measurement

wave. The YSR is suitable for children from the age of 11, and was therefore not filled in by younger children (T1: $n = 155$; T2: $n = 88$; T3: $n = 4$). Studies have shown good reliability and validity of the Dutch CBCL and YSR (Verhulst, Van der Ende, & Koot, 1996; Verhulst, Van der Ende, & Koot, 1997).

Stressful life events. At each measurement occasion, parents completed a 12-item Life Events Questionnaire (LEQ: Berden, Althaus, & Verhulst, 1990), which is a yes-or-no format questionnaire tapping potentially stressful events. At T1, life events were rated across the two years preceding referral. To include all life events that adolescents experienced during the studied period, parents reported life events across the years between the succeeding measurement waves (i.e., one year before T2 and three years before T3). The 12 items refer to the following events: parent left the family, new partner moved into the home, children of new partner moved into the home, hospitalisation of the child for 2 weeks or more, death of a friend of the child, hospitalisation of the parent for 2 weeks or more, serious disease or burn-out of parent, jail-sentence for a parent, death of a parent, death of a sib. In addition, the last two items asked if events happened more than once, and if other events had happened besides those on the list. The item scores were summed into a total life events score for each measurement occasion. Validity and reliability of the LEQ have been demonstrated in a general population sample (Berden et al., 1990).

Perceived stress. To measure the child's perceived stress in the form of difficulties with meeting the demands of daily life, the 23-item Pediatric Quality of Life Inventory™ Version 4.0 (Varni, Seid, & Rode, 1999) was filled in by the child on each measurement occasion. Versions for ages 5–7, 8–12 and 13–18 years were used. Children indicated how many problems they perceived with functioning in several life domains (physical, emotional, social and school functioning) during the past month. The items were scored on a 5-point Likert scale (0 = never a problem, 5 = always a problem). A mean score was computed with higher scores indicating more perceived stress. Scores were multiplied by 20 for ease of interpretation. Good reliability and validity have been reported for the Dutch

Table 1 Means and SD at referral (T1) and one (T2) and four (T3) years later

	T1	T2	T3
<i>N</i>	310	231	257
Age, mean (<i>SD</i>)	11.26 (3.18)	12.21 (3.21)	15.27 (3.02)
Range	6.07–18.24	6.88–19.08	10.24–22.20
Gender, male	185 (59.7%)	134 (58.0%)	149 (58.0%)
Life events, mean (<i>SD</i>)	1.43 (1.26)	.71 (.83)	1.47 (1.05)
Range	0–6	0–4	0–5
<i>N</i> with one or more life events	227	118	207
Perceived stress, mean (<i>SD</i>)	27.72 (12.76)	25.12 (14.15)	21.74 (12.20)
CBCL, <i>N</i>	302	226	247
Internalising, mean (<i>SD</i>)	18.35 (10.30)	13.97 (9.63)	10.45 (8.07)
Externalising, mean (<i>SD</i>)	19.32 (11.62)	14.80 (10.58)	11.71 (10.14)
YSR, <i>N</i>	133	116	229
Internalising, mean (<i>SD</i>)	17.48 (10.67)	15.09 (10.46)	11.97 (8.78)
Externalising, mean (<i>SD</i>)	13.20 (6.79)	12.15 (6.56)	10.91 (6.82)

Note: CBCL = Child Behaviour Checklist, YSR = Youth Self Report.

version (Bastiaansen, Koot, Bongers, Varni, & Verhulst, 2004a) of this questionnaire. A significant correlation ($r = .53$, $p < .05$) was found between this measure of perceived stress and the Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983) which was administered at T3 of this study. The PSS is a frequently used questionnaire about the perceived controllability of life, which has been shown to be reliable and valid in clinical adolescents (Martin et al., 1995).

Data analysis

The longitudinal design of this study produced a multilevel or nested data structure. Level 1 consisted of the repeated measures that were collected at each measurement wave (i.e., emotional and behavioural problems, life events, and perceived stress). The level 1 data were nested within level 2 units (i.e., individual participants). This data structure is appropriate for multilevel modelling (Singer & Willet, 2003). Multilevel models take account of possible bias in standard errors resulting from the non-independence of observations within individuals (Kenny, Korchmaros, & Bolger, 2003) and can effectively manage varying sample sizes and unequally spaced measurement occasions (Snijders & Bosker, 1999). Therefore, despite missing data at each measurement occasion, all children were maintained in the analyses.

The multilevel model for change, also known as growth curve modelling, was used to describe change in emotional and behavioural problems across time. Multilevel models provide flexibility by modelling not only mean values across measurements but their variances and covariances as well. The multilevel model has a fixed part and a random part. The fixed part consists of a regression equation which explains average change by one or more predictors and error terms. The random part consists of covariance matrices of the error terms at levels 1 and 2, which represent the variances of the within- and between-persons change parameters, respectively. To test whether predictors contribute to the explanation of change, one predictor at a time is added and change of the fit of the total model is calculated as a deviance statistic ($-2\log\text{likelihood}$). The deviance statistic has a large-sample chi-square distribution with degrees of freedom equal to the difference in the number of parameters estimated. The parameters in the multilevel model were estimated using the IGLS (Iterative Generalised Least Square) algorithm as implemented in MLwiN 2.02 (Rasbash et al., 2000). The multivariate response model was used in which internalising and externalising problems were simultaneously included in the model as outcomes. This model accounts for multivariate dependency and enables examination of the relative contribution of predictors for internalising and externalising problems (Rasbash et al., 2000).

Results

Preliminary analyses

Means and standard deviations of all variables are presented in Table 1. At T1 (referral), 80% of CBCL

Total Problem scores were in the clinical range, i.e., above the cut-off point $T \geq 63$ (≥ 90 th percentile) (Achenbach, 1991a). At T2, 59%, and at T3, 43% had CBCL scores in the clinical range.

The left part of Table 2 presents the unconditional means model, which describes the average level of problem behaviour across the four years after referral. A high proportion of variance was explained on the level of the individual (CBCL: 43% and 59%, YSR: 53% and 56% for internalising and externalising problems respectively), indicating that there was interdependency of problem behaviours across the three waves. Therefore, the multilevel model to analyse the data is appropriate (Snijders & Bosker, 1999). In the linear growth model (right part of Table 2), a time variable was added to the model, representing the number of years since referral. This model describes individual change trajectories across time. Comparisons of the deviance statistic revealed that the growth model was adequate (CBCL: $\Delta\text{deviance } \chi^2(\Delta df = 9) = 230$, $p < .001$; YSR: $\Delta\text{deviance } \chi^2(\Delta df = 9) = 63$, $p < .001$). Problem levels generally decreased during the time to follow-up, but there was large individual variability (right part of Table 2). Including gender, but not age, in the model significantly improved the model fit (CBCL: $\Delta\text{deviance } \chi^2(\Delta df = 2) = 44$, $p < .001$; YSR: $\Delta\text{deviance } \chi^2(\Delta df = 2) = 77$, $p < .001$), and the gender effect was significant, except for self-reported externalising problems ($B = .32$, $SE = .77$, $p = .68$).

Prediction of initial status and change by life events preceding referral

The association between stressful life events preceding referral and the course of problems was investigated in two steps. First, we tested whether early life events were related to initial status of emotional and behavioural problems. Therefore, life events reported at T1 were multiplied by a dummy variable (with 1 representing T1, and 0 representing T2 and T3) to explain the level of problems at referral. Including life events at T1 significantly improved the model fit for parent- ($-2\log\text{likelihood} = 10,698$, $\Delta\text{deviance } \chi^2(\Delta df = 2) = 105$, $p < .001$) and self-reported problems ($-2\log\text{likelihood} = 6,275$, $\Delta\text{deviance } \chi^2(\Delta df = 2) = 98$, $p < .001$). Early life events significantly predicted parent-reported internalising ($B = 1.70$, $SE = .28$, $p = .001$) and externalising problems ($B = 1.28$, $SE = .27$, $p < .001$), and self-reported internalising ($B = .86$, $SE = .40$, $p < .05$) but not externalising problems ($B = .48$, $SE = .28$, $p = .09$).

Second, we examined whether life events preceding referral were associated with the slope of problems across time. Therefore, we expanded the model with the interaction term between life events at T1 and the time variable. This improved the model fit for parent-reported internalising and externalising problems ($-2\log\text{likelihood} = 10,691$, $\Delta\text{deviance}$

Table 2 Summary of the multilevel model for internalising and externalising problems reported by parent and child

Predictor	Unconditional means model				Unconditional growth model			
	CBCL INT	CBCL EXT	YSR INT	YSR EXT	CBCL INT	CBCL EXT	YSR INT	YSR EXT
	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>
<i>Fixed effects (B)</i>								
Initial status								
Intercept	14.75	16.04	13.84	12.09	17.42	18.52	16.83	13.47
Slope								
Time					-1.67*	-1.57*	-1.21*	-.56*
<i>Random effects</i>								
Variance level 2								
In initial status	43.28	75.71	51.46	26.87	67.06	99.14	63.32	32.58
In slope					.81	1.81	-1.01	.59
Covariance status and slope					-6.45	-7.07	-1.38	-1.55
Variance level 1	56.81	52.33	46.73	20.55	39.43	31.99	45.00	15.87
Deviance statistic ^{a)}	11,077	11,077	6,513	6,513	10,847	10,847	6,450	6,450

Note: CBCL = Child Behaviour Checklist, YSR = Youth Self Report, INT = Internalising, EXT = Externalising, *B* = parameter estimate in multilevel model.

^{a)}The deviance statistics for internalising and externalising problems were the same because both were included as outcomes in the multivariate response model.

* $P < .05$.

$\chi^2_{\text{cbcl}}(\Delta df = 2) = 7, p < .05$). Early life events significantly predicted the slope for internalising ($B = .23, SE = .09, p < .05$), but not for externalising problems ($B = .10, SE = .11, p = .37$). For self-reported problems, including the interaction term did not improve model fit further ($p > .10$).

Prediction of rate of change by life events after referral

To examine whether the slope with which problems changed was predicted by life events after referral, life events at T2 and T3 were summed, multiplied by the time variable, and added to the model. The effects of life events preceding referral on level and slope were again included in the model. Adding life events after referral strongly improved the model fit for parent-reported internalising and externalising problems ($-2\log\text{likelihood} = 7,672, \Delta\text{deviance } \chi^2_{\text{cbcl}}(\Delta df = 2) = 3,019, p < .001$). Life events after referral significantly predicted the slope of internalising ($B = .19, SE = .08, p < .05$), but not externalising problems ($B = .14, SE = .09, p = .19$). For self-reported problems, adding the effect of life events after referral also strongly improved the model fit ($-2\log\text{likelihood} = 4,376, \Delta\text{deviance } \chi^2_{\text{cbcl}}(\Delta df = 2) = 1,906, p < .001$), significantly predicting the slope of internalising ($B = .21, SE = .08, p < .01$), but not externalising problems ($B = .10, SE = .07, p = .15$). After addition of these later life events predicting the slope, the slope of parent-reported internalising problems was no longer predicted by life events preceding referral. The parameters of this best-fitting model are presented in the left part of Table 3. Compared to the unconditional growth model, the best-fitting model explained 7% and 18% of the variance in parent- and self-reported problems, respectively.

Perceived stress mediating the effects of life events on parent- and self-reported outcomes

To investigate the mediation effect, perceived stress was added to the equation similar to the way life events were included: 1) perceived stress at T1 was multiplied by a dummy variable representing T1 to explain the initial level of problem behaviour at referral, 2) perceived stress after T1 was multiplied by the time variable to explain the slope of problem behaviour. As shown in the right part of Table 3, including perceived stress strongly improved the model fit for parent- ($\Delta\text{deviance } \chi^2_{\text{cbcl}}(\Delta df = 4) = 1,114, p < .001$), and self-reported problems ($\Delta\text{deviance } \chi^2_{\text{ysr}}(\Delta df = 4) = 539, p < .001$).

The significant associations between life events and psychopathology in the best-fitting model were tested for mediation (as shown in Table 3). The procedures recommended for the multilevel framework were followed (Kenny et al., 2003). First, stressful life events were established as significantly and positively related to the mediator (perceived stress) (life events preceding referral $B = 1.75, SE = .49, p < .05$; life events after referral $B = .25, SE = .09, p < .05$). Second, perceived stress was related to parent- and self-reported internalising and externalising problems (Table 3, right part). Mediation can be established if the association between the predictor and the outcome is significantly attenuated after adding the mediator to the regression equation. Indeed, as shown in Table 3, the parameter estimates for the effects of life events on initial level and slope in the mediated model (right part) were lower in comparison to the non-mediated model.

The chance probability of the effect of life events on initial level of parent-reported externalising problems and on the slope of parent- and self-reported

Table 3 Summary of the non-mediated and mediated multilevel model for parent- and self-reported internalising and externalising problems

Predictor	Non-mediated model				Mediated model			
	CBCL INT	CBCL EXT	YSR INT	YSR EXT	CBCL INT	CBCL EXT	YSR INT	YSR EXT
	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>	<i>B</i>
<i>Fixed effects</i>								
Initial status								
Gender	2.73*	-1.34**	6.72**		2.60*	-3.25*	6.12**	
Life events T1	1.61**	1.37**	.45	.02	.94*	.48	-.58	-.53
Perceived stress T1					.09*	.08*	.19*	.07*
Slope								
Later life events	.19*	.14	.21*	.10	.15	.11	.06	.02
Later perceived stress					.03*	.02*	.05**	.03**
Deviance statistic	7,674	7,674	4,370	4,370	6,560	6,560	3,831	3,831

Note: CBCL = Child Behaviour Checklist, YSR = Youth Self Report, INT = Internalising, EXT = Externalising, *B* = parameter estimate in multilevel model, *SE* = Standard error. Gender was coded as 1 = male, 2 = female. Significant ($p < .05$) effects are in bold face. * $P < .05$, ** $P < .01$.

internalising problems rose above the statistical cut-off of $p < .05$, indicating complete mediation. However, the effect of life events on initial level of parent-reported internalising problems remained significant, indicating partial mediation. To test the strength of mediation, Sobel's test (Sobel, 1982) was performed as described for a multilevel framework by Krull and MacKinnon (1999). In addition, the percentage of the total effect that was explained by perceived stress was computed. Mediation was confirmed by significant Sobel *Z*-statistics for all mediating effects: the effect of life events T1 on initial level of parent-reported internalising ($Z_{cbint} = 2.94$, $p < .01$, 38%) and externalising problems ($Z_{cbext} = 2.00$, $p < .05$, 24%), and the effect of later life events on the slope of parent- and self-reported internalising problems ($Z_{cbint} = 3.04$, $p < .01$, 53%, $Z_{ysrint} = 5.00$, $p < .01$, 66%).

Discussion

This study showed that problem levels generally declined in children after referral for mental health services. Stressful life events preceding referral predicted higher levels of parent-reported internalising and externalising problems at referral. Life events after referral were associated with a slower recovery of parent- and self-reported internalising, but not of externalising problems across time. The subjective experience of stress explained the effects of life events on both initial level and course of psychopathology. These findings indicate that higher problem levels may be due to an effect of negative life events on the subjective experience of stress in daily life.

Life events preceding referral were associated with higher levels of parent- and self-reported internalising and of parent-reported externalising problems at referral. This is understandable from findings that stressful life events predict the onset of emotional and behavioural problems (Hammen & Goodman-brown, 1990; Jensen et al., 1991). Associations

between life events and self-reported externalising problems were nonsignificant. In a study of McKnight et al. (2002), stressful life events did affect self-reported externalising problems. However, in their study life events as well as problem behaviour were reported by the child, which may have resulted in reporter bias and overestimation of the effect. In the current study, results cannot be fully explained by (parental) reporter bias, because parent-reported life events also predicted child-reported outcomes.

Life events preceding referral were related to the course of parent-reported internalising problems. However, this effect disappeared in the best-fitting model, when life events after referral were included. This is in contrast to our expectations and to studies suggesting that stressful life events may have long-term effects on the developmental course of psychopathology (Grant et al., 2004). It is possible that attrition at follow-up affected these results. Wave two non-responders reported less life events preceding referral, which may have weakened the strength of the association between life events preceding referral and the course of psychopathology. Children exposed to life events after referral, however, had a slower recovery of parent- and self-reported internalising problems. Later events explained the effect of life events preceding referral on the course of psychopathology, suggesting that children who were exposed to life events preceding referral were more likely to undergo new life events after referral, which in turn decreased their recovery from internalising problems. The permanence of risk hypothesis in referred children can therefore be partially accepted. Referred children once exposed to stressful life events remained vulnerable to the experience of new events, which in turn decreased their recovery from internalising problems.

Later stressful life events were not associated with the course of externalising problems. Mathijssen et al. (1999) did find less recovery of externalising problems in children confronted with stressful

events during the follow-up interval. It may be that the effect on the recovery from externalising problems is a shorter-term effect, because Mathijssen et al. followed the children for one year. This study extended the findings of Mathijssen et al. by showing that the effect of parent-reported life events on recovery also applied for self-reported internalising problems, which makes a potential effect of reporter-bias less likely.

The mediating role of perceived stress as an explanation for the effect of life events on adjustment in referred children has been relatively understudied. As expected, perceived stress, defined as experiencing difficulty in meeting demands within important life domains, mediated the association between life events and initial level of, and recovery from, emotional and behavioural problems. Perceived stress fully explained the effects of life events on initial level of parent-reported externalising problems, and on the slope of parent- and self-reported internalising problems. In other words, for referred children experiencing life events, life is more difficult, and demands are more difficult to meet. The effect of life events on parent-reported internalising problems at referral, however, was partially mediated by perceived stress. Apparently, parents see their children as more internalising after the exposure to life events, which cannot be fully explained by the child's perceived stressfulness of daily life. Nevertheless, perceived stress explained moderate to high levels of variance in psychological problems, especially in the course of internalising problems over time. This extends the cross-sectional findings of Martin et al. (1995) that perceptions of the controllability of daily life predict internalising problems in children exposed to major life events. More research is needed into the effects of life events and perceived stress, as this may be an important intermediate outcome.

Limitations

Some limitations of this study should be acknowledged. First, stressful life events were lumped together. Thus, each event got the same weight, while some events (e.g., death of a parent) might have stronger effects on perceived stress and psychopathology than other events (e.g., hospitalisation of child). However, studies have shown that the sheer number of adverse circumstances may affect levels of psychopathology (Fergusson & Lynskey, 1996). Second, this study has focused on major events, which occur at low frequency, and not on minor daily hassles, which are also important for the understanding of individual differences in the course of psychopathology (Seiffge-Krenke, 2000). Effects of minor stressors on the course of psychopathology might be an interesting topic to be addressed in future studies. In addition, different time intervals for the report of life events might have increased the

error variance, resulting in weaker effects. Third, we did not control for effects of treatment or family counselling that the children received after referral. It might be the case that some of the treatments might have explicitly focused on dealing with the aftermath of life events, such as trauma therapy. As such, the findings constitute a conservative estimate of the effects of stress on psychopathology. A fourth limitation is that the effects on the course of self-reported problems only refer to the children who were 11 years or older, because the self-report instrument was deemed inappropriate for this group. Finally, life events were reported retrospectively over the preceding period, at the same time as children's problem levels (which were reported over the past 6 or 2 months for parent- and self-reports, respectively). Nevertheless, parent-reported life events were related to both parent- and self-reported problems, and this was mediated by self-reported perceived stress, indicating that the findings cannot be solely explained by single informant effects, such as the current level of stress experienced by the informant. The current report focused on broad-band dimensions of symptomatic behaviour. An important avenue for research would be to investigate differences among specific diagnostic groups, given the differences among disorders in the role of the environment in the onset of disorder (e.g., schizophrenia, ADHD, depression).

Implications

The results of this study underline the importance of interventions that focus on the experience of subjective stress to engender feelings of control and self-confidence. Children appear to relate stressful events that happen outside of their own control to their perception of their own abilities and their environment, and this appears to have a deleterious effect on their mental health. Foster resiliency by engendering feelings of control and self-confidence may be as important for treatment as alleviating the symptoms present at referral.

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References

- Achenbach, T.M. (1991a). *Manual for the Child Behavior Checklist/4-18 and 1991 profile*. Burlington, VT: University of Vermont Department of Psychiatry.

- Achenbach, T.M. (1991b). *Manual for the Youth Self Report and 1991 profile*. Burlington, VT: University of Vermont Department of Psychiatry.
- Bartels, M., Hudziak, J.J., Boomsma, D.I., Rietveld, M.J.H., Van Beijsterveldt, T.C.E.M., & Van den Oord, E.J.C.G. (2003). A study of parent ratings of internalizing and externalizing problem behavior in 12-year-old twins. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 1351–1359.
- Bastiaansen, D., Koot, H.M., Bongers, I.L., Varni, J.W., & Verhulst, F.C. (2004a). Measuring quality of life in children referred for psychiatric problems: Psychometric properties of the PedsQL (TM) 4.0 generic core scales. *Quality of Life Research, 13*, 489–495.
- Bastiaansen, D., Koot, H.M., Ferdinand, R.F., & Verhulst, F.C. (2004b). Quality of life in children with psychiatric disorders: Self-, parent, and clinician report. *Journal of the American Academy of Child and Adolescent Psychiatry, 43*, 221–230.
- Berden, G.F.M., Althaus, M., & Verhulst, F.C. (1990). Major life events and changes in the behavioral functioning of children. *Journal of Child Psychology and Psychiatry, 31*, 949–959.
- Bruce, A.E., Cole, D.A., Dallaire, D.H., Jacquez, F.M., Pineda, A.Q., & LaGrange, B. (2006). Relations of parenting and negative life events to cognitive diatheses for depression in children. *Journal of Abnormal Child Psychology, 34*, 321–333.
- Cohen, S., Kamarck, T.W., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*, 385–396.
- Fergusson, D.M., & Lynskey, M.T. (1996). Adolescent resiliency to family adversity. *Journal of Child Psychology and Psychiatry, 37*, 281–292.
- Grant, K.E., Compas, B.E., Stuhlmacher, A.F., Thurm, A.E., McMahon, S.D., & Halpert, J.A. (2003). Stressors and child and adolescent psychopathology: Moving from markers to mechanisms of risk. *Psychological Bulletin, 129*, 447–466.
- Grant, K.E., Compas, B.E., Thurm, A.E., McMahon, S.D., & Gipson, P.Y. (2004). Stressors and child and adolescent psychopathology: Measurement issues and prospective effects. *Journal of Clinical Child and Adolescent Psychology, 33*, 412–425.
- Hammen, C., & Goodmanbrown, T. (1990). Self-schemas and vulnerability to specific life stress in children at risk for depression. *Cognitive Therapy and Research, 14*, 215–227.
- Heijmans-Visser, J., Van der Ende, J., Koot, H.M., & Verhulst, F.C. (2003). Predicting change in psychopathology in youth referred to mental health services in childhood or adolescence. *Journal of Child Psychology and Psychiatry, 44*, 509–519.
- Hudziak, J.J., Helzer, J.E., Wetzell, M.W., Kessel, K.B., McGee, B., Janca, A., et al. (1993). The use of the DSM-III-R checklist for initial diagnostic assessments. *Comprehensive Psychiatry, 34*, 375–383.
- Ingram, R.E., & Luxton, D.D. (2005). Vulnerability-stress models. In B.L. Hankin, & J.R.Z. Abela (Eds.), *Development of psychopathology* (pp. 32–47). Thousand Oaks, CA: Sage.
- Jensen, P.S., Richters, J., Ussery, T., Bloedau, L., & Davis, H. (1991). Child psychopathology and environmental-influences: Discrete life events versus ongoing adversity. *Journal of the American Academy of Child and Adolescent Psychiatry, 30*, 303–309.
- Kenny, D.A., Korchmaros, J.D., & Bolger, N. (2003). Lower level mediation in multilevel models. *Psychological Methods, 8*, 115–128.
- Koot, H.M. (1999). Studying risk and protective factors in the development of psychopathology. In H.M. Koot, A.A.M. Crijnen, & R.F. Ferdinand (Eds.), *Child psychiatric epidemiology: Accomplishments and future directions* (pp. 100–115). Assen, The Netherlands: Van Gorcum.
- Krull, J.L., & MacKinnon, D.P. (1999). Multilevel mediation modeling in group-based intervention studies. *Evaluation Review, 23*, 418–444.
- Lazarus, R.S., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.
- Martin, R.A., Kazarian, S.S., & Breiter, H.J. (1995). Perceived stress, life events, dysfunctional attitudes, and depression in adolescent psychiatric-inpatients. *Journal of Psychopathology and Behavioral Assessment, 17*, 81–95.
- Mathijssen, J.J.J.P., Koot, H.M., & Verhulst, F.C. (1999). Predicting change in problem behavior from child and family characteristics and stress in referred children and adolescents. *Development and Psychopathology, 11*, 305–320.
- McKnight, C.G., Huebner, E.S., & Suldo, S. (2002). Relationships among stressful life events, temperament, problem behavior, and global life satisfaction in adolescents. *Psychology in the Schools, 39*, 677–687.
- Post, R.M. (1992). Transduction of psychosocial stress into the neurobiology of recurrent affective-disorder. *American Journal of Psychiatry, 149*, 999–1010.
- Rasbash, J., Browne, W., Goldstein, H., Yang, M., Plewis, I., Healy, M., et al. (2000). *A user's guide to MLwinN: Second edition*. London: Institute of Education.
- Rutter, M., Kim-Cohen, J., & Maughan, B. (2006). Continuities and discontinuities in psychopathology between childhood and adult life. *Journal of Child Psychology and Psychiatry, 47*, 276–295.
- Seiffge-Krenke, I. (2000). Causal links between stressful events, coping style, and adolescent symptomatology. *Journal of Adolescence, 23*, 675–691.
- Singer, J.D., & Willet, J.B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. New York: Oxford University Press.
- Snijders, T.A.B., & Bosker, R.J. (1999). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London: Sage.
- Sobel, M.E. (1982). Asymptotic confidence intervals for indirect effects in structural models. In S. Leinhardt (Ed.), *Sociological methodology* (pp. 290–312). San Francisco, CA: Jossey-Bass.
- Steinhausen, H.C., Drechsler, R., Foldenyi, M., Imhof, K., & Brandeis, D. (2003). Clinical course of attention-deficit/hyperactivity disorder from childhood toward early adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry, 42*, 1085–1092.

- Varni, J.W., Seid, M., & Rode, C.A. (1999). The PedsQL (TM): Measurement model for the pediatric quality of life inventory. *Medical Care*, 37, 126–139.
- Verhulst, F.C., Van der Ende, J., & Koot, H.M. (1996). *Manual for the CBCL/4-18*. Rotterdam: Erasmus University/Department of Child and Adolescent Psychiatry, Sophia Children's Hospital.
- Verhulst, F.C., Van der Ende, J., & Koot, H.M. (1997). *Manual for the Youth Self Report (YSR)*. Rotterdam: Erasmus University/Department of Child and Adolescent Psychiatry, Sophia Children's Hospital.

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