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Coping and emotion regulation effects on the association between change in life stress and change in emotional and behavioral problems in adolescence

Eirini Flouri, PhD

(Department of Psychology and Human Development, Institute of Education, University of London, 25 Woburn Square, London WC1H 0AA, UK. E-mail: e.flouri@ioe.ac.uk)

&

Stella Mavroveli, PhD

(Department of Surgery and Cancer, Division of Surgery, St. Mary's Hospital, Imperial College London, 2nd floor, Paterson Centre, South Wharf Road, London W2 1PD, UK. E-mail: s.mavroveli@imperial.ac.uk)

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Abstract

We tested whether emotion regulation (cognitive reappraisal and expressive suppression) and coping (distraction, avoidance, support seeking and active coping) mediate or moderate the association between change in life stress (change in number of adverse life events) and change in problem behavior. We used prospective and retrospective longitudinal data from a community adolescent sample. We measured change in problem behavior as emotional and behavioral problems at Time 2 controlling for emotional and behavioral problems at Time 1, a year earlier. We measured change in life stress as interim life stress (between Time 1 and Time 2) controlling for total previous life stress (before Time 1). We found that avoidance and expressive suppression worsened problem behavior. Neither coping nor emotion regulation mediated the association between change in life stress and change in problem behavior. Cognitive reappraisal and support seeking buffered the effect of increase in life stress on worsening of problem behavior.

Keywords: adolescence, adverse life events, coping, emotion regulation, emotional and behavioural problems

Introduction

The link between children's adverse experiences and their psychosocial health is well-documented (1-5). At the same time, however, there is evidence for considerable variability in children's responses to all kinds of life stressors (6-8). This evidence for resilience, or good outcomes in spite of serious threats to adaptation or development, has attracted both academic and popular interest, as it opened up new perspectives for identifying and understanding those individual and environmental characteristics that promote adaptation in the midst of adversity (7).

Emotion regulation strategies and coping mechanisms may be two such individual characteristics. A 2006 review (9) showed that since the early 1990s at least eight studies examined coping or emotion regulation variables as moderators of the relationship between life stress and adolescent emotional and behavioral problems, and about half reported a buffering effect. However, no study has simultaneously modeled both coping and emotion regulation as moderators of the effect of life stress on child and adolescent behavior. Because coping and emotion regulation are closely inter-related, this has confounded the picture about their individual importance as protective factors. A further complication is that studies have not yet established if coping and emotion regulation should be viewed as mediators or moderators of the association between life stress and emotional and behavioral problems (9, 10, 20, 21). This longitudinal study of a community sample of adolescents was designed to address both these issues.

Coping, emotion regulation and the life stress/emotional and behavioral problems association

Coping refers to "conscious and volitional efforts to regulate emotion, cognition, behavior, physiology, and the environment in response to stressful events or circumstances" (11, p. 89) or to "regulatory processes in a subset of contexts - those involving stress" (12, p. 42). Coping as a distinct field of psychological inquiry emerged during the 1970s, and a large proportion of contemporary research on coping can be traced back to the publication of Richard Lazarus's 1966

(13) book, "Psychological stress and the coping process." Coping is a complex, multidimensional process that is sensitive both to the environment and to personality dispositions that influence the appraisal of stress and resources for coping (14). There are many ways of coping - including problem solving, support seeking, escape, rumination, positive restructuring, distraction, negotiation, direct action, social withdrawal and helplessness. While certain kinds of escapist coping strategies are consistently associated with poor mental health outcomes, some coping strategies - such as support seeking - are sometimes associated with negative outcomes, sometimes with positive ones, and sometimes with neither, usually depending on characteristics of the appraised stressful encounter (14).

Emotion regulation as a distinct field of psychological inquiry emerged more recently. There was little work on what is now referred to as emotion regulation prior to the mid-1980s, and the vast majority of the work on emotion regulation has been done since the mid-1990s. Emotion regulation refers to processes through which individuals modulate their emotions consciously and nonconsciously to appropriately respond to environmental demands (15, 16). The connection between coping and emotion regulation is, therefore, close. Coping is strongly associated with the regulation of emotion - especially distress - throughout the stress process, and emotion is integral to all phases of the coping process (36). Recent studies, acknowledging this strong connection, create latent constructs of emotion dysregulation from measures of poor understanding of emotional reactions to stress, poor coping with emotions, and maladaptive coping with stress (37).

Although a relatively new field, emotion regulation attracted the attention of mental health professionals almost as soon as the first theoretical papers were published. There is already strong evidence for consistent associations of emotion regulation strategies with, particularly, internalizing disorders (18, 19). In general, reappraisal, problem solving and acceptance are negatively associated with emotional and behavioral problems, whereas suppression, avoidance and rumination elevate

the risk of emotional and behavioral problems. A recent meta-analysis (17) found a large effect size for rumination, medium to large for avoidance, problem solving and suppression, and small to medium for reappraisal and acceptance.

The present study

Despite all this recent progress, there are several important issues not yet resolved. First, coping and emotion regulation measures differ widely across studies. For example, none of the studies reviewed by Grant et al. (9) operationalized coping in the same way. Incremental research, using comparable measures, is needed to determine the role of specific coping and emotion regulation strategies in the relationship between life stressors and psychiatric symptoms. Second, it is not yet clear how coping and emotion regulation are interrelated (30). One possibility is that maladaptive coping mediates the association between deficits in emotion regulation and psychiatric symptomatology (35), but more studies integrating work on coping and processes of emotion regulation studies are needed. Third, it is unclear if coping and emotion regulation mediate or moderate the association between life stress and psychiatric symptoms. Studies usually model coping and emotion regulation as life stress mediators. However, testing moderator effects in the tradition of the risk and resilience research may shed light on some unexpected findings of studies testing linear effects. For example, the effect of reappraisal on psychopathology may be small (17) because it likely varies by level of life stress.

We carried out this longitudinal study in a community sample of UK adolescents to address all these issues. We focused on change in life stress (and in outcomes) over time rather than on levels of life stress on outcomes at a particular point in time, because this is the most appropriate method of separating genuine causal effects from processes of self-selection and choice with general population longitudinal data. Our primary research objective was to test if coping and emotion regulation mediate or moderate the effect of increase in life stress on worsening of emotional and

behavioral problems in adolescence. Our secondary research objective was to test whether coping mediates the association between emotion regulation and change in emotional and behavioral problems.

Method

Participants

Overall, 680 secondary school age (11-16 years) UK children participated in the study at Time 1. At Time 2 (a year later) 660 children took part in the study. Of these, 611 had valid data on emotional and behavioral problems at Time 2, and these 611 children comprised the original study sample. The final study sample comprised 159 children, of whom 58.5% were girls and 88% white British. The mean age of the children in the final study sample was 14.33 ($SD = 1.24$) years. All children attended the same state secondary school in London.

Measures

Interim life stress was measured at Time 2. This was assessed with the developmentally appropriate Adverse Life Events Scale (22), which is a modified version of the Life Events Checklist (2), a widely used and psychometrically sound (23) measure of potentially traumatic events. Participants were asked to indicate whether each of a list of 25 events had happened to them in the last 12 months (i.e., in the period that intervened between Time 1 and Time 2). These events mostly concerned parents, family or friends (e.g., “Family had drug/alcohol problem;” “Parents got divorced”), or individual exposure to possibly risky situations (e.g., “Saw a crime or an accident”).

Total previous life stress was measured at Time 1. This was assessed with the Adverse Life Events Scale, as described above. Participants were asked to report which events occurred in two time periods, “During the past year” and “Before the past year.” Participants’ total previous life stress scores were calculated as the sum of their scores for these two time periods.

Emotional and behavioral problems were assessed at both Time 1 and Time 2 with the self-report version of the Strengths and Difficulties Questionnaire (SDQ; 25), a 25-item 3-point (ranging from 0-2) scale measuring four difficulties (hyperactivity, emotional symptoms, conduct problems, and peer problems), as well as prosocial behavior. The SDQ has both good test-retest reliability and excellent concurrent and discriminant validity (26). Each SDQ subscale has five items. A total difficulties score, assessing overall problem behavior, is calculated by summing the scores for hyperactivity, emotional symptoms, conduct problems and peer problems. Therefore, participants may score from 0-10 for each scale, giving a total difficulties score from 0-40. Cronbach's alphas in our original study sample were .74, .66, .59, .72, and .53 for emotional symptoms, prosocial behavior, conduct problems, hyperactivity and peer problems, respectively.

Emotion regulation was measured at Time 2 with the Emotion Regulation Questionnaire (ERQ; 27). This measure comprises 10 items responded to on a 7-point Likert scale, and assesses individual differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression. Sample items include "I control my emotions by changing the way I think about the situation I'm in," and "I control my emotions by not expressing them", respectively. Although the measure is relatively new, it has been widely used and has demonstrated satisfactory reliability and validity (27, 28). The reliability coefficients for the two ERQ subscales in our original study sample were .79 and .57 for cognitive reappraisal and expressive suppression, respectively.

Coping was measured at Time 2 with the Children's Coping Strategies Checklist-Revision 1 (CCSC-R1; 29). This self-report inventory of coping assesses four coping strategies used by adolescents (30): active coping, distraction, avoidance and support seeking. Items are scored on a 4-point Likert scale ranging from "Never" to "Most of the time." The CCSC-R1 has 54 items, and all

statements start with “If you had a problem” followed by a statement such as, “You thought about which things are best to do to handle the problem.” The reliability coefficients in our original study sample were .90, .63, .70, and .89 for active coping, distraction, avoidance and support seeking, respectively.

Control variables were age and gender, as well as Time 1 socio-economic disadvantage and special educational needs (SEN). These correlates of emotional and behavioral problems were added as controls to reduce the effects of self-selection. Socio-economic disadvantage was assessed by asking participants if they were or had ever been eligible for free school meals. Table 1 shows the descriptives.

(Table 1)

Procedure

Several state secondary schools in London were considered for participation in the study and were approached through mail. The school that agreed to participate was assessed as ‘Good’ by the Office for Standards in Education, and was below average in the proportion of its pupils who received free school meals, spoke a first language other than English, had special educational needs, or were from a minority ethnic background. In all, 939 pupils were on roll at Time 1. Overall, 680 children aged 11-16 years participated in the study at Time 1. At Time 2 (12 months later), 937 pupils were on roll, and 660 children completed the questionnaire. Not all of these 660 children had taken part in the study at Time 1. This was because at Time 2 there were both additions (e.g., all 11-year-olds at Time 2 were new additions as they first joined the school at Time 2) and exits (e.g., those aged 16 years at Time 1 had left the school at Time 2). Parental consent was obtained for all participants, and ethical approval was given by our Department’s Ethics Committee. The children completed the questionnaires during planned school classes with the presence of a teacher and/or a teacher assistant. All school staff followed a detailed protocol outlining the administration procedure. All

children were informed of the confidentiality of their responses and that they could withdraw from the study at any point.

Results

Preliminary analysis

We first tested for differences between the final (N = 159) and the original (N = 611) study samples, and considered the zero-order correlations among the study variables. There were no differences between the two samples in current emotional and behavioral problems, previous emotional and behavioral problems, emotion regulation, coping, interim life stress, total life stress, or socio-economic disadvantage. However, those in the final sample tended to score higher on prosocial behavior. The proportion of boys and children with SEN was also lower in the final study sample (results available from the authors). As regards zero-order correlations (shown in Table 2), coping and emotion regulation were not very strongly inter-related. At the bivariate level, the only coping variable that was significantly associated with cognitive reappraisal was active coping, and the only coping variable significantly associated with expressive suppression was support seeking. Both coping and emotion regulation were significantly associated at the bivariate level with emotional and behavioral problems at Time 2, and there was also evidence for Time 2 outcome specificity. In particular, avoidance was positively related to total difficulties, emotional symptoms, and hyperactivity, cognitive reappraisal was negatively related to total difficulties, conduct problems, and hyperactivity, active coping was negatively related to hyperactivity and conduct problems, and expressive suppression and support seeking predicted (positively and negatively, respectively) peer problems (results available from the authors). As expected, the strongest correlate of Time 2 total difficulties was Time 1 total difficulties.

(Table 2)

Ordinary Least Squares (OLS) Regressions

To answer our research questions we fitted eight regression models on total difficulties. As can be seen in Table 3 which shows the model results, total previous life stress was strongly associated with total difficulties (Model 1), but became nonsignificant in Model 2 which added previous total difficulties. As expected, previous problem behavior remained significantly associated with current problem behavior and, as shown below, was its most powerful predictor even after including the control variables and the coping and emotion regulation variables. Model 3 added interim life stress, and was, therefore, the baseline model predicting change in emotional and behavioral problems from change in life stress. As can be seen, life stress change was significant in Model 3, and remained significant in Model 4 which added age, gender, SEN, and socio-economic disadvantage. Model 5 added cognitive reappraisal and expressive suppression. Both emotion regulation strategies were significant, but only expressive suppression remained significant after adjustment for coping (Model 6). Model 6 was the full baseline model. As can be seen in the Table, the effect of change in life stress remained significant, and of the coping variables only avoidance predicted increase in total difficulties. The findings from Models 5 and 6 suggest that avoidance mediated the negative effect of cognitive reappraisal on worsening in emotional and behavioral problems, and that neither coping nor emotion regulation mediated the effect of change in life stress on change in emotional and behavioral problems.

Next, we tested if emotion regulation and coping moderate the effect of change in life stress on change in total difficulties. We first tested the moderator effect of emotion regulation by adding to the full baseline model an interaction term between interim life stress and cognitive reappraisal and an interaction term between interim life stress and expressive suppression (Model 7). The interaction term between expressive suppression and interim life stress was nonsignificant. However, cognitive reappraisal moderated the effect of change in life stress on change in emotional and behavioral problems. The moderator effect of coping was tested in Model 8 which added to Model 7 interaction terms between interim life stress and coping. Support seeking, but no other

coping style, moderated the effect of change in life stress on change in total difficulties.

(Table 3)

Supplementary analysis

As expected - and shown in the models in Table 3 - the most important predictor of adjustment at follow up (Time 2) was adjustment at baseline (Time 1). In order to eliminate the influence of regression to the mean, we fitted regression models, preserving the modeling sequence shown in Table 3, to standardized residual scores of total difficulties. We generated standardized residual scores of total difficulties by fitting a linear regression model of Time 2 total difficulties score on Time 1 total difficulties score. These standardized residual scores measure emotional and behavioral problems at Time 2 that were not explained by emotional and behavioral problems at Time 1, and were used to measure change of adjustment over time. A standardized residual score below zero reflects better than expected adjustment at Time 2, whereas a standardized residual score above zero reflects worse than expected adjustment at Time 2. The results from this set of analyses replicated the pattern of findings presented in Table 3 (results available from the authors).

Discussion

This study was designed to test the effects of coping (measured as distraction, avoidance, support seeking and active coping) and emotion regulation (measured as cognitive reappraisal and expressive suppression) on the association between change in life stress and change in emotional and behavioral problems in adolescence. The study showed that no coping style and no emotion regulation mechanism mediated the association between change in life stress and change in emotional and behavioral problems. By contrast, there was evidence for moderation; cognitive reappraisal and support seeking buffered the effect of increase in life stress on increase in emotional and behavioral difficulties. These findings, therefore, suggest that both cognitive reappraisal and support seeking are positively associated with resilience in adolescence. Of note, previous research,

also using prospective longitudinal data from adolescents in the community, has shown that emotion dysregulation mediates the association of life stress to changes in adolescent internalizing problems (37). This inconsistency could be because of differences in the outcome measures, in the measures of emotion regulation and coping, or simply in the study design. Our study modeled the effect of change in life stress rather than the effect of life stress on change in emotional and behavioral difficulties. To the best of our knowledge, ours is the first general population longitudinal study to test the effect of emotion regulation and coping on the association of change in life stress to change in emotional and behavioral problems. Clearly, more studies examining coping and emotion regulation as mediators of life stress effects in change-to-change models are needed.

The present study also extended previous findings about the role of coping and emotion regulation in mental health (17) in two important ways. First, it showed that both suppression and avoidance strongly predicted increase in adolescents' emotional and behavioral difficulties. Previous studies have established associations between adolescent emotional problems and response styles (38); this study adds the finding that these two strategies worsen adolescents' behavioral as well as emotional problems. Second, it showed that avoidance mediated the association between one emotion regulation strategy, cognitive reappraisal, and change in emotional and behavioral difficulties. This finding suggests that the reason why cognitive reappraisal does not appear in previous research to have a strong direct effect on mental health may be simply because cognitive reappraisal is negatively related to those regulatory *behaviors* (i.e., avoidance coping) that, in turn, predict worsening in mental health. Cognitive reappraisal may, therefore, predict positive mental health outcomes indirectly, by steering away from those coping mechanisms (such as avoidance) that are least effective in appropriately responding to stressful events (31).

The conclusions of this study should be evaluated in the light of its limitations in several areas. Firstly, our measures of coping and emotion regulation did not include information on rumination, a

mechanism of life stress (and distress) regulation that has been consistently associated with, particularly, emotional problems (18). Because our aim was to carry out incremental research on broad adjustment rather than examine the role of specific emotion regulation strategies as outcome-specific (39) or, conversely, transdiagnostic (40) risk factors, we decided on the two probably most widely used measures of emotion regulation and coping in adolescence, neither of which, however, indexes rumination. Secondly, our measure of change in life stress was, in line with previous studies (41), the difference in the number of adverse life events in the last 12 months. This approach to modeling life stress change was guided by previous research showing that, although adverse or stressful life events likely differ in severity, cumulative life stress specifications are superior for reasons of both model parsimony (41) and theory (3). Thirdly and related to this, the total previous life stress measure may have weighted chronic factors more heavily than one-off adversities. This is because adolescents could have recorded a total previous life stress score of 2 for a single chronic event (e.g., familial mental health problem) that persisted both before Time 1 and between Time 1 and Time 2. By contrast, an event such as parental divorce might have been less likely to be recorded both before Time 1 and between Time 1 and Time 2, making 1 the effective maximum score. However, recording life events in a binary ‘ever/never experienced’ form would have ignored information about chronicity. Finally, this study, like the well-known Adverse Childhood Experiences Study, measured total previous life stress and interim life stress retrospectively. Reporting of adverse life events, however, may be highly related to current state of behavioral or emotional difficulties due only to coloring of recall by current emotional state. Furthermore, the accuracy of long-term recall also varies significantly (33, 34).

Despite these limitations, it is important not to lose sight of the study’s strengths. Using prospective and retrospective longitudinal data, this study added to the knowledge about the effect of change in life stress on change in adolescents’ emotional and behavioral difficulties, and highlighted the role of cognitive reappraisal and support seeking in resilience. At the same time, it also suggested that

avoidance and expressive suppression worsen adolescents' emotional and behavioral problems over time. From a public health perspective, these response styles may be even more important because they predict worse than expected internalizing and externalizing problems irrespective of amount of change in life stress levels.

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Table 1. *Descriptive Statistics for Study Variables in the Original Study Sample*

	N	Minimum	Maximum	<i>M</i>	<i>SD</i>
Age	519	11.00	17.00	13.60	1.43
Girl (=2)	576	1.00	2.00	1.47	.49
No SEN (=2)	266	1	2	1.95	.21
No free school meals (=2)	268	1	2	1.90	.30
Cognitive reappraisal*	325	1.00	7.00	4.54	1.13
Expressive suppression*	327	1.00	7.00	3.82	1.16
Active coping*	305	1.13	4.00	2.55	.60
Distraction*	325	1.00	4.00	2.20	.62
Avoidance*	340	1.00	4.00	2.49	.58
Support seeking*	432	1.00	4.00	2.29	.71
Interim life stress	547	.00	14.00	3.79	2.88
Total difficulties	611	1	32	12.56	5.56
Previous total difficulties	275	2	29	12.17	5.37
Total previous life stress	268	.00	24.00	8.35	5.37

*scale score as the sum of item scores divided by number of items

Table 2. Intercorrelations between All Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Total difficulties	-													
2. Previous total difficulties	.584**	-												
3. Total previous life stress	.235**	.300**	-											
4. Interim life stress	.337**	.249**	.458**	-										
5. Active coping	-.126*	-.122	.031	-.004	-									
6. Distraction	-.029	-.081	.006	-.072	.547**	-								
7. Avoidance	.122*	.025	.052	.042	.536**	.418**	-							
8. Support seeking	-.036	-.104	-.023	-.004	.596**	.419**	.384**	-						
9. Cognitive reappraisal	-.209**	-.134	.118	-.020	.301**	.083	-.001	.045	-					
10. Expressive suppression	.043	-.041	-.043	-.091	-.115	-.095	.078	-.340**	.272**	-				
11. No free school meals	.052	-.111**	-.259**	-.029	.002	.050	-.049	.064	-.028	-.030	-			
12. No SEN	-.048	-.131**	-.118**	.057	.149*	.110	.008	.167*	.029	-.173*	.103*	-		
13. Girl	.114**	.135**	.185**	.093*	.067	-.142*	.200**	.101*	-.090	-.177**	-.071	.057	-	
14. Age	.055	.104**	-.053	.099*	.012	-.079	-.092	-.088	-.011	-.017	.005	.042	-.031	-

* $p < .05$, ** $p < .01$.

Table 3. *Total Difficulties (Coefficients and Standard Errors)*

Predictors	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.	b	s.e.
Constant	10.106	.562	4.708	.705	4.433	.690	2.593	3.059	3.050	4.325	.017	5.084	-5.441	5.163	-7.707	5.817
Total previous life stress	.224	.057	.076	.050	-.052	.054	-.057	.057	-.075	.074	-.064	.076	-.047	.075	-.062	.075
Previous total difficulties			.548	.053	.495	.052	.492	.052	.436	.062	.408	.065	.402	.064	.407	.064
Interim life stress					.522	.094	.511	.097	.671	.122	.616	.127	2.119	.577	2.474	.853
Girl							.904	.532	1.159	.642	1.072	.699	1.140	.688	1.126	.684
Age							.171	.191	.078	.236	.062	.257	.176	.256	.242	.254
No free school meals							.692	.835	.583	.921	.652	.948	.694	.932	.887	.926
No SEN							-1.562	1.193	-988	1.711	.251	2.081	-.540	2.110	-.697	2.084
Cognitive reappraisal									-.827	.284	-.574	.321	.225	.479	.216	.523
Expressive suppression									1.089	.275	.933	.306	1.214	.470	1.559	.489
Active coping											-1.149	.741	-1.044	.730	-1.922	1.311
Distraction											.901	.627	.677	.622	-.197	1.048
Avoidance											1.606	.681	1.722	.673	1.507	1.141
Support seeking											-.437	.531	-.619	.527	1.381	.897
Cognitive reappraisal * Interim life stress													-.250	.116	-.252	.122
Expressive suppression * Interim life stress													-.102	.095	-.197	.104
Active coping * Interim life stress															.162	.224
Distraction * Interim life stress															.263	.196

Avoidance * Interim life stress	.110	.233
Support seeking * Interim life stress	-.505	.179

Note: statistically significant ($p < .05$) effects are in bold