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THE EFFECTS OF STRESSFUL LIFE EVENTS ON DEPRESSION

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ABSTRACT

This chapter reviews recent research on the relationship between stressful life experiences and depression. A distinction is made between aggregate studies of overall stress effects and focused studies of particular events and difficulties. A distinction is also made between effects of life stress on first onset of depression and on the subsequent course of depression. Although the available evidence suggests that acute stressful life events can lead to the recurrence of episodes of major depression, a series of methodological problems compromise our ability to make clear causal inferences about the effects of life events on first onset of major depression or about the effects of chronic stress on either onset or recurrence of depression. The main problems of this sort are discussed, and recommendations made for ways of addressing these problems in future studies.

CONTENT

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INTRODUCTION

Despite ample theories of psychopathology and many associated empirical studies, it is uncertain whether stressful life events promote psychiatric disorders. This chapter reviews contemporary theorizing and research about mental health in the context of stress. Although I focus on major depression, the most commonly investigated outcome, effects of stress on other psychiatric disorders are also considered (e.g. Blazer et al 1987, Dohrenwend et al 1995, Falsetti et al 1995, Kessler et al 1995).

The fundamental question—Does stress cause depression?—can only be evaluated rigorously in an experiment. Two different experimental literatures have developed to address this question. One addresses the effects of stress on what appear to be episodes of depression in animals (Soumi 1991a,b), and one addresses the effects of experimentally manipulated presumed mediating or modifying variables in field experiments of people facing serious stressors (Mrazek & Haggerty 1994). Both paradigms are limited in the evidence they provide about the effects of stress on major depression. It is unclear whether the results of animal studies generalize to human beings. Intervention experiments, which provide more direct evidence about major stress effects on human beings, are limited in that they manipulate stress mediators or modifiers rather than stress itself. In such work, the range within which stress effects can be changed is evaluated rather than the magnitude of these effects.

Because of these limitations, most evidence for a depressogenic effect of stressful life events comes from nonexperimental research. Inferences about the effects of stress in nonexperimental research are based on attempts to approximate the conditions of experimental random exposure by some combination of matching and use of control variables. Several methodological problems exist in most of these studies that make it difficult to estimate the effects of life events on depression and make it even more difficult to address complex questions about the importance of refining life event measures, distinguishing the effects of life events on onset and course of depression, and investigating stress-modifying effects. The review discusses these questions in sections. Each section begins with a review of the literature and then discusses theoretical and methodological problems. Sections end with suggestions to resolve these problems and advance the substantive research agenda.

ESTIMATING THE SHORT-TERM EFFECTS OF STRESS ON DEPRESSION

Aggregate Life Event Studies

The most common study estimating the effects of life events on depression focuses on short-term effects, typically a recall period of no more than one year. These studies compare scores on aggregated stressful life event scales between persons who did and did not report the recent onset of an episode of major depression. Community surveys (e.g. Brown & Harris 1978) and case-control studies of depressed patients and matched nondepressed controls (Dohrenwend et al 1995) have been used to make these comparisons. The comparisons have generally been, of necessity, retrospective in the sense that information about stress exposure was gathered after onset of depression. Retrospective life event assessment is the norm even in prospective studies, where information about intercurrent events and depressive episodes between waves of data collection is collected in the later wave (e.g. Lewinsohn et al 1988).

Many such studies have been conducted in the past two decades (Bidzinska 1984, Billings et al 1983, Brown et al 1987, Hammen et al 1985, Holahan & Moos 1991, Kendler et al 1995a, Lloyd 1980, Patrick et al 1978, Paykel 1979, Shrout et al 1989, Williamson et al 1995) and mainly show the following: 1. There is a consistently documented association between exposure to stressful life events and subsequent onset of episodes of major depression. 2. However, the magnitude of this association varies across studies depending on how life events are measured, with associations generally stronger when "contextual" measures are used rather than simple life event checklists. 3. There is consistent evidence for a dose-response relationship between stressful events and depression, with severe events more strongly associated with depression than nonsevere events. 4. Stressful life events are highly prevalent in these studies. Although the majority of depressed people report the occurrence of a stressful event shortly before the onset of their depression, only a minority of those people exposed to such events become depressed.

Two main methodological problems compromise our ability to make causal inferences about stress effects from these studies. First, most of the studies failed to consider that accuracy in reporting life events is associated with depression. These studies failed to adjust for the bias introduced by this possibility. For example, many studies failed to confirm whether events occurred before depression. Because depression can cause some events (Hammen 1991) and because people with a history of depression have more events than others even when not in episodes of depression (Kessler & Magee 1993), there may be a bias toward finding specious associations between life events and depression. A number of researchers have found, consistent with this concern, that the relationship between "dependent" events and depression is stronger than

the relationship between "independent" events and depression (Williamson et al 1995), where a dependent event was defined as one that could plausibly be a consequence of the respondent's own actions (e.g. being fired from a job) while an independent event could not be defined so (e.g. losing a job due to a plant closing).

The fact that independent events were generally significant predictors of depression in those studies that distinguished independent and dependent events has been considered evidence that life events do cause depression (e.g. Brown & Harris 1978). However, another type of confounding could have led to the association between independent events and depression. Retrospective reports about event exposure might have been biased in these studies by differential recall accuracy or differential willingness to disclose and discuss stressful experiences among currently (at the time of interview) depressed versus nondepressed respondents in such a way that created the appearance that life events cause depression. Consistent with this possibility, experimental research has shown that induction of depressed mood can lead to a significant increase in reports of past stressful events (Cohen et al 1988). Furthermore, recent research with twins has documented a significant heritable component in reports about the occurrence of both independent and dependent life events, which could be due to a stable difference in reporting styles that is associated with liability to depression (Kendler et al 1993).

The problems of accuracy of life event reporting and dating can be partially overcome by obtaining independent reports about life events from informants or archival records. However, this is seldom practiced, and even when it is, these procedures can only provide a partial solution because it is impossible to find informants for all study respondents, many important events will not be known to informants even when they exist, informants will not be perfectly accurate even when they are aware of all relevant events, and archival records exist for only a small fraction of all relevant events.

A second methodological problem compromising our ability to make causal inferences about stress effects involves the logic of causal analysis used in nonexperimental studies of aggregate stress effects. As noted above, these studies interpret the associations between life events and depression as indicating a causal effect of the former on the latter. The assumption implicit in this interpretation is that exposure to life events occurs randomly with respect to other causes of depression. However, this assumption is generally incorrect. Some researchers have attempted to adjust for this problem statistically by introducing controls for confounding variables in multivariate causal models. The recent statistical literature shows quite clearly, though, that efforts of this sort are doomed to failure in the absence of highly unrealistic assumptions

about completeness of controls and linearity-additivity of multivariate influences (Holland 1986, Sobel 1990).

It is important to emphasize in this regard that misspecification can invalidate the control variable approach even when confounding variables are correctly measured. The most obvious example involves the case where the researcher assumes that confounding variables have additive effects. Given what we know about stress-modifying effects, it is almost certain that this is not the case in most applications. Common causes of event exposure and depression, such as a genetic liability or various aspects of personality or access to supportive social relationships, are likely to modify the impact of stressful life events on depression and lead to a biased estimate of the magnitude of this impact in the absence of a correct specification of interactions between the events and the controls.

Focused Studies of Individual Events

Because of the methodological problems enumerated above, the studies cited above cannot be interpreted as providing unequivocal support for the view that aggregated stressful life events cause depression. However, other studies do provide support. Such studies exploit the fact that the relationship between a stressful life event and a health outcome can be interpreted as if it were based on an experiment when exposure to the event occurred for reasons that are random with respect to the outcome. There are cases where this situation occurs, but these are almost entirely limited to single events such as job loss due to economic conditions, exposure to an unanticipated natural disaster, or involvement in a fatal automobile accident where the other driver was at fault. These "natural experiments," each focusing on a single fairly common event such as job loss (e.g. Dew et al 1987), widowhood (e.g. Umberson et al 1992), and divorce (e.g. Aseltine & Kessler 1993), provide the strongest evidence about the effects of stressful life events on depression. This evidence is especially strong when the sample of people exposed to these events is obtained from archival data so that there is no risk of selective recall bias. All these studies show that serious stressful events are associated with a substantial increase in depressive episodes.

A New Emphasis on Chronic Stress

Although early research on life stress and depression was almost exclusively concerned with life events, the past decade has seen a new interest in chronic stress. This interest draws on a long-standing epidemiological research tradition that has studied the health-damaging effects of chronic work stress (e.g. House & Cottington 1986, Karasak & Theorell 1990, Kasl 1978) and a growing body of literature on the relationship between chronic marital difficulties and depression (e.g. Beach et al 1990, Gotlib & McCabe 1990). We know

from these studies that chronic role-related stresses are significantly associated with chronically depressed mood (Mirowsky & Ross 1989, Pearlin 1989). We also know from the handful of life event studies that have included assessments of them that chronic stresses are often associated with an exacerbation of the effects of life events on episodes of major depression, especially when the life domains affected by the events are the same as the domains affected by the chronic stresses (Brown et al 1987, McGonagle & Kessler 1990).

Recent research has also begun to focus on chronic stresses as mediators of the effects of life events on depression. These studies suggest that enduring stressful sequelae of stressful events account for most of the effects of life events on major depression. For example, the adverse effects of unemployment on depression are partly mediated by resultant financial stresses (Kessler et al 1987), while the relationship between loss of spouse and depression is partly mediated by social isolation (Umberson et al 1992). As discussed below, an exciting opportunity for increasing our understanding of the processes linking life events to depression involves the disaggregation of life event effects through these mediating chronic stresses.

Future Directions

AGGREGATE LIFE EVENT STUDIES It is important for researchers to grapple more seriously with the complex methodological problems involved in conducting naturalistic studies of aggregate stress effects in community samples. Focused studies of individual randomly occurring events are limited because few life events occur for reasons that are entirely random with respect to the outcome of interest. This means that reliance on those few opportunities where natural experiments present themselves or the somewhat larger set of opportunities where design enhancements can be used to develop the functional equivalents of natural experiments (Kessler et al 1996b), while providing clear documentation that life events lead to depression, provide no insights into the dynamics of the much more common situations in which potentially dependent events occur before the onset of depression. Yet we need to study these complex situations because they are most commonly associated with depression. It is a challenge for future research to develop procedures to do this. These procedures will presumably require innovations in research design and analysis (Kessler et al 1996b).

FOCUSED STUDIES OF INDIVIDUAL EVENTS In addition, life events researchers need to begin working more seriously with studies of individual events to better understand causal relationships. Many focused studies already exist on the stress and coping processes associated with such important stressors as unemployment (Feather 1990), bypass surgery (Kulik & Mahler 1993), and rape (Von et al 1991). However, the vast majority of these studies are by clinicians interested

in treatment effects rather than life event effects. As a result, the studies generally lack control groups and usually focus on people in treatment rather than on representative community samples of those who have been exposed to the event under investigation. Consequently, it is impossible to draw any inferences about stress effects (Burgess & Holstrom 1979). Despite such limitations, the results from these studies provide a rich source of information about the meanings of stressful events in the lives of the people who experience them, the coping challenges these events elicit, and the resources and vulnerabilities associated with successful and unsuccessful coping efforts. These results could be invaluable to future researchers who attempt to apply the logic of nonexperimental causal analysis to new investigations of the effects of these events on depression. Such studies should include prospective designs and use carefully constructed control groups in an effort to estimate the magnitude of life event effects, the pathways through which these effects operate, and the modifying factors that lead these events to vary in their effects across respondents.

CHRONIC STRESS STUDIES The methodological issues are a good deal more complex in research on the relationship between chronic stress and chronic depression. The possibility that chronic role-related stress is an important determinant of chronic depression is certainly consistent with the observation that people who have chronic major depression or dysthymia often report ongoing problems in one or more of their central life roles. However, a major problem in interpreting this fact is that both the chronic role-related stresses and the chronic depression by definition have occurred for so long that deciding unambiguously which came first is difficult. No serious efforts address this problem of causal order. The researcher, however, may focus on stresses that can be assumed to have occurred randomly with respect to other risk factors of depression and to be inescapable, in which case matched comparison can be used to make causal inferences about long-term stress effects. A good example is the matched comparison of the parents of children having cancer, diabetes, or some other serious childhood physical disorder with the parents of healthy children. Disorders of this sort are quite common and occur, in most cases, for reasons that are unrelated to other risk factors for parental psychiatric disorder (Pless 1994). The small amount of research shows that these childhood physical disorders have significant psychiatric effects on the family (Jessop et al 1988, Krosnick 1970).

The more usual case, however, is one in which nonrandom exposure to the chronic stress cannot be ruled out, as in studies of the relationship between chronic marital difficulties and chronic depression. Frequently an added complication is systematic selection out of exposure (e.g. differential likelihood of seeking a less stressful job based on individual differences in the depressogenic effects of job stress). Standard longitudinal data collection methods have

limited potential for studying chronic stress situations because these situations, by their very nature, are quite stable. These problems make it much more difficult to assess the long-term effects of chronic stress on chronic depression than the short-term effects of life events on episodic depression. Nevertheless, there are some opportunities for making provisional assessments of this sort when exposure is nonrandom. For example, prospective research can be carried out to investigate role entry (e.g. the first few years of marriage or of employment) in an effort to study selection processes into and out of stressful situations in light of the prior existence of both depression and risk factors for depression (Orbuch et al 1993, Veroff et al 1993). Another opportunity for making provisional assessment of causal effects is to focus on microprocesses of chronic stress effects using daily diaries or other fine-grained time-series methods (Csikszentmihalyi & Larson 1987, Eckenrode & Bolger 1995).

REFINING LIFE EVENT MEASURES

Checklists versus Contextual Measures

As noted above, there is considerable variation in the estimated effects of life events, depending on whether scores are based on checklists or contextual measures. The intellectual origin of the checklist approach is usually traced to Adolf Meyer's use of a "life chart" to summarize information provided by patients at intake (Lief 1948), the subsequent use of the life chart method by Wolff and his colleagues (1950) to study the relationship between life change and illness onset, and the eventual refinement of this method by Holmes & Rahe (1967) in the Social Readjustment Rating Scale (SRRS). The SRRS was a checklist of 43 stressful experiences generated on the basis of clinical research to characterize the events that most often occurred to patients before seeking treatment. Separate life change unit (LCU) weights were generated by a panel of raters for each event in the SRRS and used to construct a summary LCU score from this checklist.

The publication of the SRRS led to an enormous amount of research on the relationship between life events and various types of illness onset, with over 1000 papers using the SRRS published in the first decade after its development (Holmes 1979). Subsequent research with mental health outcomes (typically screening scales of nonspecific psychological distress) led to refinements and proliferation of life event checklists (Turner & Wheaton 1995). Refinements included the following: 1. At least three of the events in the SRRS were thought by many critics to be better conceptualized as early symptoms of illness (change in sleeping habits, change in eating habits, sexual difficulties) than life events. Subsequent checklists eliminated these events. 2. Many of the events in the SRRS were actually vaguely defined categories of events (e.g. business readjustment, change in financial state). Subsequent checklists re-

placed these with a longer set of more concretely defined events within each of these categories. 3. The SRRS was a fairly short checklist that omitted a great many stressful events (e.g. rape, criminal victimization, witnessing a traumatic event). Subsequent checklists added these events and sometimes customized event lists to special populations (e.g. Kessler et al 1992).

In addition, methodological studies of the SRRS and the various checklists based on it were carried out. The main results of these studies were as follows: 1. Negative events are much more powerful predictors of mental health outcomes than positive events (Zautra & Reich 1983), which led to the conclusion that life change is not the central dimension linking stressful life events to psychological disorder and that the LCU weighting approach in the SRRS leads to an underestimation of life event effects. 2. Within the set of fairly serious events typically included in life event checklists like the SRRS, the use of differential weights does not markedly increase the association between negative life event scales and measures of psychological distress (Zimmerman 1983). 3. However, distinctions along a number of other dimensions (e.g. amount of loss, amount of threat, degree of controllability of consequences of the event) do lead to substantial increases in the association between negative life event scales and measures of distress (Thoits 1983).

A key feature of the checklist approach is that all life events of a given type are treated as equivalent. Death of a spouse, for example, was assigned a 100 point LCU score on the SRRS irrespective of the suddenness of the death, the quality of the marriage, or any circumstances surrounding the death that might have made it more stressful (e.g. the death occurred in an automobile accident in which the respondent was driving) or less stressful (e.g. the death occurred peacefully after the spouse had spent many years suffering from a degenerative illness). There is clear evidence from focused studies of individual events that the strength of the relationship between life events and depression increases substantially when these sorts of distinctions are made. Based on this observation, a number of researchers have attempted to modify the checklist approach in such a way as to consider these distinctions.

Two strategies have been used to make these adjustments. One is to allow each respondent to assign a subjective weight to his or her own events (Sarason et al 1978). The other is to use objective information about the person and his life situation to construct an independent judgment of how stressful the event would be for a typical person in that same situation. The first of these strategies has been rejected as confounding measurement of the event with emotional reaction to the event (Turner & Wheaton 1995, Zimmerman 1983) and has consequently been abandoned. The second strategy has evolved into what has been termed the “contextual” approach to rating life events.

The intellectual origins of the contextual approach can be traced to the work of Brown & Harris (1978), who developed a method of using a rating panel to assign scores on a variety of dimensions to stressful life events. According to this rating scheme, the death of a neighbor would be rated as more severe than otherwise if the respondent who reported it was a rural elderly person who lived alone and was a housebound invalid whose main source of social contact was the weekly visit of the neighbor for lunch. To obtain adequate contextual information for rating events, the Brown & Harris method requires intensive personal interviews and qualitative probes to specify precisely the characteristics of the events believed to be relevant to contextual ratings. Detailed probing is also used to establish the timing of the event in relation to the onset of the depression. Precise dating is also used to identify the aspects of the event that are thought to affect depression onset.

Methodological studies suggest that such intensive interviewing is much more effective than the comparatively mechanical procedures used in the administration of checklists in avoiding misdating of events (McQuaid et al 1992), communicating to the respondent the importance of accurate recall (Cannell et al 1981), and facilitating the use of memory aids to improve recall of events and accurate dating of event occurrence (e.g. calendars, visual representations, reminders of personally salient events reported previously in the interview). Such aids have been shown to significantly improve accuracy of life event reports (Sobell et al 1990). Furthermore, the use of contextual ratings has been shown to substantially reduce the response errors in checklist measures due to individual differences, such as checking off the occurrence of a "serious physical illness" that, in fact, was only a cold, or otherwise giving reports that are inconsistent with the implied severity thresholds in the checklist events (Kessler & Wethington 1991, Raphael et al 1991).

There are two practical problems with the contextual rating approach to life events measurement. The first is that great care is needed to make sure information about the occurrence of depression after the event does not contaminate the ratings of context, possibly by highlighting to the interviewer an aspect of the respondent's life situation that would not have been known were it not for the fact that the respondent became depressed. Concerns have been raised that some users of the Brown & Harris method are not sufficiently attentive to this possibility, which can result in confounding of stress ratings with outcomes (Bebbington 1986). The second practical problem is that the intensive interviews used to make contextual life event ratings are very labor intensive. Interviewers must be highly trained. Interviews can take as much as five hours to complete. A complicated rating scheme typically requiring several additional hours to complete is needed to review interview audiotapes. Weekly panel meetings sometimes last an entire day to review these ratings (Brown

1989). Several attempts have been made to evaluate whether a short-cut can be devised to approximate the Brown & Harris method (Cooke 1985, Dohrenwend et al 1993, Kessler & Wethington 1991, Miller & Salter 1984). The most promising of these is a structured version of the method, still being pilot tested, that appears to generate information similar to the original in a shorter interview period and with fewer demands for complex postprocessing (Wethington et al 1995).

There is also a conceptual problem with the contextual rating method. As described below, life events researchers are greatly interested in stress-modifying factors: aspects of the personal and situational environments of people exposed to stressful events that are associated with variation in the impact of these events on their probability of becoming depressed. The contextual rating method subverts this investigation by absorbing information about stress modifiers into the ratings of life event severity. Indeed, the information used by the Brown & Harris ratings panel can be seen as hypotheses concerning stress modifiers that never have a chance to be investigated because they are assumed in rating event severity. A clearly preferable approach would be to subject these hypotheses to empirical test. The difficulty of doing so until now, though, has been that studies of the sort using the Brown & Harris method have all had quite small sample sizes due to the labor-intensive nature of the method. This has meant that the number of subjects has been too small to test specific hypotheses about the modifying effects of particular aspects of context.

Unpacking Events in Focused Studies of Individual Events

The confounding of measures of life event severity with stress modifiers can work in the opposite way as well, by suggesting that there are individual differences in emotional reactivity to an event when, in fact, the event is not the same for all people who experience it. A good illustration is found in research on the relationship between widowhood and depression, which consistently shows that death of a spouse is more strongly associated with depression among men than women (Stroebe & Stroebe 1983). Does this mean that men are less capable of coping with emotional losses than women? Or, alternatively, is widowhood a different stress for men than women? One way to distinguish these two possibilities is to carry out focused studies in which the researcher attempts to disaggregate widowhood in such a way as to unpack its stress components and study how these components explain the effect of the event on depression.

Several recent studies of this sort have been carried out, each focused on a single major event such as divorce (Aseltine & Kessler 1993), unemployment (Turner et al 1991), and widowhood (Umberson et al 1992). The basic approach in each study has been to start with a conceptual model of the dimen-

sions that lead to the effects of the event on depression and then measure these dimensions longitudinally in a sample of people who were exposed to the event and in an appropriate comparison sample of people not exposed to it. Standard multivariate procedures have then been used to study the mediating effects of the stress dimensions on the overall relationship between the event and depression. Umberson et al (1992), for example, examined how much the observed gender difference in the impact of widowhood on depression in a national sample was due to male-female differences in the impact of widowhood on stress dimensions versus differences in the impact of these dimensions on depression. The analysis documented that the greater depressogenic effect of widowhood on men than women is, at least in part, because the death of a spouse leads to a number of secondary stresses for men that do not exist for women. For example, death of a spouse leads to a significant decrease in contact and emotional closeness between the surviving parent and adult children among widowed men but not widowed women.

A consistent result in these studies has been that most of the association between some stressful events and depression is due to a mediating effect on role-related stresses. Caution is needed in interpreting this result, however, in light of the fact that only one of the three studies (Aseltine & Kessler 1993) was truly prospective (i.e. assessed both depression and the mediators before the onset of the stressful event) and none of them controlled for other possible confounding effects. Future work on unpacking life event effects needs to be based on prospective designs that use carefully matched control groups and use intensive interview methods and contextual ratings to define the intervening chronic stress dimensions.

DISTINGUISHING THE EFFECTS OF STRESS ON ONSET AND COURSE ON DEPRESSION

The Effects of Traumatic Stress on Lifetime Depression

The results discussed so far have focused on the short-term effects of recent stressful life events on episodes of depression. Another area of stress research is concerned with the long-term effects of previous stresses (usually either childhood or lifetime traumatic stresses) on lifetime depression. The only programmatic research of this sort we know of is that of Kessler & Magee (1993, 1994a), who analyzed lifetime retrospective data on the relationship between childhood adversities and lifetime depression in a nationally representative general population sample of adults. They concluded that most severe childhood adversities have significant effects on early-onset depression (defined as an onset before age 20) but not on later-onset depression, which indicates that there is some risk period for the impact of childhood adversities beyond which they lose their depressogenic effects. Subsequent work by the

same investigators in two other large-scale community surveys yielded similar results (Kessler et al 1996a).

This investigation has the potential to yield important information about life course variations in the effects of traumatic events. By studying differential effects as a function of time since occurrence of the event, it might be possible to document variation in both initial impact and in the length of the risk period associated with the event. We would expect these effects to vary depending on the event and the age of exposure. An investigation of the association between childhood parental loss and clinical depression, for example, would probably look for fairly rapid onset of the disorder after the traumatic event, while an investigation of the association between childhood sexual abuse and lifetime depression might be interested in the possibility of more long-term delayed reactions. By investigating the possibility of variation in the long-term effects of traumas as a function of the respondent's age at occurrence, in comparison, the researcher can investigate the hypothesis that some traumas have their most powerful health-damaging effects during certain critical developmental phases of the life course.

The Long-Term Effects of Traumatic Stress on Current Depression

Related research considers the long-term effects of traumatic stress on current adult depression. A number of studies have been carried out in both psychiatric patient samples and general population samples. These studies have all been based on retrospective data and comparative analyses of persons who are depressed with those who are not. The studies consistently find that depressed adults report the occurrence of more childhood adversities such as separation from a parent, family turmoil, parental psychopathology, and physical/sexual abuse than those who are not depressed (e.g. Birtchnell et al 1988, Brown & Anderson 1991, Bryer et al 1987, Earls et al 1988, Faravelli et al 1986, Fendrich et al 1990, Holmes & Robins 1988, McLeod 1991, Rutter 1989, Tennant 1988, West & Prinz 1987, Stein et al 1988, Yama et al 1993).

The use of long-term retrospective recall to assess these relationships raises concerns about confounding based on selective recall as a function of current depression even though there is evidence that fairly objective adversities such as parental death or divorce are recalled with good reliability (Brewin et al 1993). It is important, in light of these concerns, that researchers who work with retrospective data maximize accuracy of assessment, perhaps by using follow-back designs based on archival records or relying on evaluation of the effects of self-reports about fairly objective and major childhood stressors. In addition, it is important that methodological research be conducted to refine methods of collecting retrospective data to improve the accuracy of respondent reports (Kessler et al 1997).

Disaggregating Long-Term Stress Effects on Onset and Course

History of depression might explain, either in whole or in part, the relationship between childhood adversities and current depression. The plausibility of this hypothesis is supported by research showing that many forms of childhood adversity are associated with increased risk of depression in adolescence and early adulthood (Fleming & Offord 1990, Goodyear 1990) and that early-onset depression is associated with high recurrence risk (Lewinsohn et al 1988). Recent research, in fact, suggests that there is specificity in the continuation of depression between childhood and adulthood (Harrington et al 1990). Because of this observation, it is important for research on the long-term effects of childhood adversities on current depression to control for history and distinguish effects on first onset, recurrence, and speed of episode recovery.

Analyses of this type could shed light on the pathways involved in the long-term effects of early adversities. What little is known about these pathways suggests that childhood adversities are associated with difficulties in making successful role transitions into early adulthood, which in turn are associated with depression during the adult years (McLeod 1991, Quinton et al 1984). Childhood adversities have also been linked to intrapsychic factors that predict adult depression, such as helplessness, low self-esteem, and interpersonal dependency (Brown et al 1987). However, an important limitation in this research is that prior history of depression has not been considered a potential confounding variable. This makes it much more difficult to interpret the true effects of other mediating variables than it would be otherwise.

A good illustration of this problem is provided by Parker & Hadzi-Pavlovic's (1984) investigation of women whose mothers died during the women's childhoods. Retrospective reports about lack of care from fathers and stepmothers after the death of the mothers were significantly associated with high adult scores on screening scales of both state depression and trait depression. These associations were attenuated among respondents with supportive spouses, which led the authors to conclude that success in forming intimate relationships "largely corrected any diathesis to greater depression created by uncaring parenting." However, this conclusion ignores the alternative hypothesis that lack of success in forming a supportive marriage and current depression were both due to a history of depression that began after the death of the mother but before marriage. If this is true, there might be no causal effect of success in forming a supportive marriage on subsequent depression even though there is a significant association between these two variables.

As noted above, Kessler and his associates (Kessler & Magee 1993, 1994b; Kessler et al 1996a) examined these issues and found that a wide variety of retrospectively reported childhood adversities are associated with lifetime onset of depression before age 20 and that few of these adversities continue to be

associated with later risk of either first onset or episode recurrence. Their studies have not examined the relationships between childhood adversities and speed of episode recovery. Replications and extensions of these studies are needed in more focused samples.

Controlling History in Studying the Determinants of Episode Onset

An understanding of history of depression could be important in evaluating the short-term effects of stressful life events on episode onset. The literature on sex differences in depression provides an interesting illustration of this situation. Point prevalence of depression is much higher among women than men (Blazer et al 1994, Weissman et al 1988). However, there is no sex difference in recurrence of depression (Coryell et al 1991), nor in speed of episode recovery of depression (Kessler et al 1993), which means that the higher rate of current depression typically found among women is presumably due to a relationship between sex and lifetime depression (Eaton et al 1989, Weissman et al 1988). We know that the average age of onset of depression for both men and women is in the early twenties (Sorenson et al 1991). However, the sex difference in prevalence of depression is more pronounced in mid-life because the density of recurrent episodes of depression is greatest in this period of the life cycle. This mid-life bulge in the sex difference in depression has been considered by many commentators as evidence that chronic life stresses associated with sex roles explain the sex difference in depression (e.g. Ensel 1982). However, a consideration of sex differences in first onset and in recurrence shows that the mid-life increase in the sex difference is largely because of a sex difference in lifetime onset of depression that occurs by the early twenties. The implications of this observation for current ideas about the relationship between the chronic stresses associated with adult sex roles and depression are profound.

An informative illustration of the importance of controlling for depression history in studying the short-term effects of stressful life events comes from reanalysis of date collected in the Epidemiologic Catchment Area (ECA) study, a major five-site collaborative study of the epidemiology of adult psychiatric disorders (Robins & Regier 1991). Data from the ECA public-use file shows that 91% of the respondents who reported an episode of depression in the 12 months before the baseline ECA interview had a previous history of depression. An obvious question is whether prior depression should be considered a predictor in studies of the short-term effects of stressful life events on episodes of depression. It is clear that such a variable would be a powerful predictor of subsequent episode onset. In the ECA data, history of depression had an odds-ratio close to 40.0 in predicting an episode onset in the 12 months before the baseline ECA interview, an association that dwarfs the effects of any other risk factor in the literature on depression.

Much evidence is consistent with the possibility that history might be an important predictor of current stress, in which case failure to control history could lead to serious bias in estimation of short-term stress effects. History of depression, for example, is thought to influence interpersonal style in ways that provoke other people to act toward depressed people in ways that are nonsupportive and that could lead to increased exposure to interpersonal loss events (Coyne 1976, Monroe & Steiner 1986). This possibility implies that a risk-factor analysis that includes history of depression as a control variable might find that social support and interpersonal loss are less powerful predictors of episode onset than an analysis that failed to control for history.

There is only one published report that investigated this possibility empirically. Kessler & Magee (1994b) introduced a control for history of depression into a risk-factor model for episode onset of recent depression and found that a number of previously significant predictors became insignificant. As discussed below, they also found that history significantly modified the relationships between most other risk factors, which suggests that future work on risk factors for depressive episodes needs to look separately at the predictors of onset and recurrence. As a practical matter, given that the vast majority of episode onsets in adulthood are recurrences, this injunction implies that studies of the relationship between stressful life events and depression in adult samples should explicitly recognize that they are, in effect, studying recurrence of depression. Therefore, the appropriate comparison group is the subsample of respondents with a lifetime history of depression who have not had a recent recurrence and where controls or matching should be used to adjust for variation in age of onset and course of depression before the onset of events as well as for the possibility of selection into dependent events on the basis of prior course of the disorder.

Stress Effects on Speed of Episode Recovery

A number of studies have examined the relationship between stressful life experiences that occurred before the onset of depressive episodes and speed of recovery of these episodes. Most were carried out in patient samples (Brugha et al 1990, Huxley et al 1979, Karp et al 1993, Keller et al 1986, Krantz & Moos 1988, Mann et al 1981, Monroe et al 1992, Parker et al 1988, Weissman et al 1978), although a few were carried out in community samples (Beiser 1976, McLeod et al 1992, Sargeant et al 1990). In these studies, stressful life events and chronic difficulties were generally found to predict slow speed of recovery. A smaller number of studies examined the relationship between intercurrent life events and speed of episode recovery (Brown & Moran 1994, Brown et al 1995, Tennant 1988). These studies found that events arising in the midst of a depressive episode impede recovery if they exacerbate the stressful situations that triggered the episode (e.g. foreclosure in the wake of a job loss). However, events

that reverse or resolve an earlier stress are associated with more rapid recovery (e.g. reemployment after a job loss). An especially interesting result is that otherwise negative events can sometimes lead to episode recovery either because they resolve an ongoing difficulty (e.g. separation from an abusive spouse) or because they put the event that triggered the episode into perspective (e.g. a near-death experience in an automobile accident leading to the realization that a recent job loss was not really life-shattering).

STRESS-MODIFYING EFFECTS

Substantive Modifiers

I have focused until now on investigations that document the existence of aggregate effects of stress on depression. However, contemporary research on stress and depression typically accepts this association as a given and focuses more on the consistent finding that the majority of people exposed to all but the most extreme stressful life experiences do not become depressed. An attempt is made to explain this finding and, more generally, individual differences in stress reactivity by searching for characteristics of the individual or the environment in which the individual is embedded that modify stress effects. These modifying factors are sometimes referred to as stress-buffering factors, vulnerability factors, or stress-diathesis factors.

It is beyond the scope of this review to provide an overview of the enormous literature that has accumulated over the past decade to study this diverse array of modifying factors. Instead, see reviews by Gotlib & Hammen (1992), Mrazek & Haggerty (1994), and Taylor & Aspinwall (1996). Several factors have been repeatedly shown to predict an attenuation of the relationship between subsequent events and episode onset of depression, including access to social support, various aspects of personality, appraisal processes, intellectual capabilities such as cognitive flexibility and effective problem-solving skills, interpersonal skills such as social competence and communication ability, and various coping strategies.

History of Depression as a Modifier

There is a problem with interpreting these substantive results in causal terms because virtually none of the studies distinguished modifiers of the stress-depression relationship for first onset of depression from the modifiers of the stress-depression relationship for recurrence of depression, nor did they control for the possible confounding effect of history of depression. As noted above, Kessler & Magee (1994b) found that a number of previously significant stress-modifying factors became statistically insignificant, and the effects of others were substantially attenuated, when they controlled for history of depression and considered that history operates as a stress modifier. Failure to

introduce similar controls seriously compromises our ability to draw any inferences from the larger literature on stress-modifying factors in depression.

It is important to reemphasize two earlier points in making this criticism of the literature on stress-modifying effects. First, recurrent major depression can profoundly affect most of the individual-level and environmental factors that have been studied in the modifier literature. Consistent with this observation, Kessler & Magee (1994b) found strong relationships between retrospective reports of a lifetime history of depression and current scores on most of the variables that are normally considered to be stress modifiers in their nationally representative survey. Second, history of depression is itself a stress modifier. That is, the relationship between stressful life events and first onset of depression in the subsample of adult respondents who report no prior history of depression is much weaker than the relationship between stressful life events and recurrence of depression in the subsample of adult respondents who report having a prior history (Kessler & Magee 1994b). The conjunction of these two observations implies that many of the variables currently thought to be stress modifiers will appear to have modifying effects even if they do not. This will occur because they are related to history of depression.

Number of Prior Episodes of Depression as a Modifier

In addition to the distinction between people who have and have not previously been depressed, recent research has shown that number of episodes in the subsample of people with a history is also significantly related to stress reactivity. Post et al (1986) were the first to report this phenomenon and noted that even though stressful life events often precipitate early episodes of depression, as the number of episodes increases "the illness appears to evolve with its own rhythmicity and spontaneity, independent of life events." A subsequent review of epidemiologic studies supported this clinical observation (Post 1992), which led Post to postulate that "sensitization to stressors and episode sensitization occur and become encoded at the level of gene expression" in such a way that responsivity to stress is permanently altered.

Genetic Predisposition as a Modifier

A related line of research has examined the possibility that genetic factors influence stress reactivity. The plausibility of this possibility is suggested by a variety of twin and adoption studies that document genetic influences on major depression (Kendler et al 1992, Tsaung & Farone 1990). However, these genetic effects could occur either independent of environmental stress effects or in interaction with stress by affecting emotional vulnerability to the effects of stress. A recent study by Kendler et al (1995a) in a general population sample of adult female twins investigated this issue by using information on zygosity and co-twin history of depression to define a gradient of genetic

vulnerability to depression. The results showed that genetic liability is associated with a threefold increase in the stress-depression relationship.

It is also important to recognize that genetic influences can account for what appears to be an effect of a substantive stress-modifying variable. Kessler et al (1992) found in a study of the stress-buffering effect of social support on the relationship between life events and depression that it was not support itself but the genetically determined component of social support that became more strongly associated with depression in the presence of stressful life events. Future research on stress modifiers should use genetically informative designs, such as twin or adoption studies, to investigate related possibilities in more detail.

OVERVIEW

The evidence reviewed above clearly shows that inventories of stressful events predict subsequent depression. A smaller number of controlled comparative studies of people exposed to single major life events provide strong evidence that at least part of this association is due to events causing depression. It is also clear from other studies that this relationship can be reciprocal and that depression can elicit or exacerbate certain stressful events and difficulties.

In addition, much evidence from prospective studies shows that the association between stressful life events and depression varies considerably depending on prior characteristics of the people exposed to the events and the environments in which these people are embedded. However, this evidence cannot be interpreted unequivocally as demonstrating that these factors are stress modifiers. The reason for this is that unmeasured variables such as prior history of depression or genetic vulnerability could be confounding factors that explain the associations between the presumed stress modifiers and depression.

The results of experimental interventions aimed at preventing depression among people exposed to particular life events offer great promise for reducing this uncertainty about stress modifiers. A number of such interventions have been shown to reduce the depressogenic effects of certain otherwise stressful events by manipulating either stress modifiers and/or the secondary stresses created by the events (Bloom et al 1985, Heaney 1992, Price et al 1992), which shows that some aspects of the stress process can be modified. However, it has not been possible to use this information to make informed judgments about the significance of individual stress modifiers.

There are two reasons for this. First, all the interventions had multiple components. Further nonexperimental process evaluation of their outcome results would consequently be needed to make informed judgments about the effects of separate intervention components. Second, none of these interventions included carefully matched control groups of people who were not ex-

posed to the events, which made it impossible to distinguish stress-modifying effects from the effects of presumed modifiers operating in exactly the same way among people who were not exposed to the events used to define the intervention subjects.

It is unclear why there has not been more collaboration between interventionists and nonexperimental stress researchers. It is conceivable that disciplinary differences in orientation are involved. Preventive interventions are typically carried out by clinical or community psychologists, while naturalistic stress studies are typically conducted by personality/social psychologists, epidemiologists, and sociologists. Future advances in our understanding of the relationship between life events and depression, in my view, will require a collaboration between both perspectives.

The above review has repeatedly implied why such a collaboration would be useful to naturalistic researchers but has also emphasized that these researchers must work harder at approximating the conditions of experiments to clarify the meanings of their results. One unique way of doing this is to work with interventionists to construct control groups of people who were not exposed to the events under investigation and to use the manipulation of intervention exposure with parallel measurement in the control group to facilitate analysis of stress-modifying effects. It is also important to recognize, though, that there is another side of the exchange: Nonexperimental studies are equally important for intervention specialists. Such studies are needed to select intervention targets and to interpret the pathways involved in the effects of successful interventions. Once reliable data on pathways are obtained, nonexperimental studies should search for factors that might effectively block these pathways. This kind of iterative cross-fertilization is our best hope for advancing research on stressful events and depression in the future.

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