Economic, Life, and Disorder Changes: Time-Series Analyses[1]

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Implicit in recent social science research and political discussions is a model linking the economy to mental disorder through the intervening constructs of life change and trauma. Using time-series analysis of a 16-month survey in Kansas City, Missouri (n = 1,140), economic and noneconomic life events and the Midtown scale were predicted using a variety of economic measures for the standard metropoliton statistical area. Both life event variables and the symptom measure were related positively to unemployment, and absolute economic change measures lagged 1 and 2 months. However, the life event variables were not strongly associated with the Midtown scale. Most striking of the subgroup findings was that, on the Midtown scale, the low-income group was more responsive than the middle-income group to economic fluctuations.

Psychologists have recently become interested in the effect of economic fluctuations on the incidence of behavioral problems (Dooley & Catalano, 1977). This interest has been stimulated by Brenner's (1973) finding that change in manufacturing employment rates is highly associated with subsequent mental hospitalization rates as well as with a variety of other health and criminal deviance indicators

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(Brenner 1976). Unfortunately, the aggregate nature of Brenner's data risks the ecological fallacy (Robinson, 1950) since no individual was shown to be hospitalized after experiencing economic stress. The use of treated mental disorder, moreover, leaves the plausible rival hypothesis that total mental disorder may be unresponsive to economic change while case openings (uncovered disorder) fluctuate with variations in the budgets of households (interpersonal tolerance of deviance hypothesis) or of the public sector (supply of treatment hypothesis). Finally, Brenner (1973) used the year as his unit of analysis, a period probably too long to capture the psychological processes occurring in emotional crisis.

The life events approach avoids some of the above problems by associating recent life changes, including economic events, with subsequent stress symptoms in individuals (Dohrenwend & Dohrenwend, 1974). Little work has been done to link the occurrence of life change to prior changes in the environment, although such research might permit greater prediction and control of stressful life events through community interventions. Particularly salient is the economic environment because of its relatively high predictability and manageability. An analysis bridging archivally measured economic change and survey measures of life events and symptoms would require a longitudinal survey based on representative samples drawn from an economically meaningful geographic unit. Such a survey is costly and has been accomplished only twice. One of these surveys was conducted in Kansas City, Missouri.

In their secondary analysis of the Kansas City survey data, Catalano and Dooley (1977) found evidence for the view that environmental economic change is followed in 1 to 3 months by significant increases in self-reported life change and depressed mood. Although improving on previous work in several important ways, Catalano and Dooley's study was based on aggregated data which raise several issues: (a) Since life events were reported for the 12 months prior to the interview, some life changes may have preceded the economic predictors. (b) Since the life event scale included economic as well as non-economic events, it could not be determined if one type of life change was more associated with environmental economic change. (c) Since age, sex, and social status variations were lost in the aggregated data, previously found differences in subgroup reactions to environmental economic change (Brenner, 1973) could not be checked. (d) Since only a depressed mood variable was included, the power of the economic and survey variables to predict community symptom levels was not optimally tested. Disaggregation of the Kansas City survey data allows the present analysis to address the issues left unresolved by the Catalano and Dooley (1977) study.

Hypotheses: 1. Monthly surveyed life events, both economic and non-economic, will be significantly positively related to monthly means of surveyed psychiatric symptoms, and this relationship will be stronger when symptoms follow 1 or 2 months after life events than when the variables are synchronous.

2. Based on previous work (Catalano & Dooley, 1977) monthly mean life events, both economic and noneconomic, and symptoms are expected to be positively associated with prior economic change.

3. The life events and symptoms experienced by sex, age, and income subgroups will be differentially related to measures of absolute and of directional economic change (unemployment and inflation rates): (a) Following Brenner's (1973, p. 145) findings for total functional psychoses, males, with traditionally greater involvement in their roles of worker and provider, are expected to exhibit larger positive correlations of life events and symptoms with unemployment than females. (b) Based on Brenner's (1973) argument that the middle-aged group had the most to lose in an economic downturn (p. 160), it is predicted that the 31–50 group in this study will have larger positive correlations of unemployment with life change and symptoms than the young or old age groups. The over-50 age group with a greater proportion of fixed-income retirees is expected to be most responsive to inflation. (c) Based on Brenner's findings, it is expected that the middle- and high-income groups in this study will reveal larger positive correlations of unemployment with surveyed life change and symptoms than the lowest income group.

METHOD

Kansas City Survey

The data for the present secondary analysis were generously provided by the Center for Epidemiologic Studies of the National Institute of Mental Health which sponsored the original data collection by contract to the Greater Kansas City Mental Health Foundation. Fresh groups of 28 households were drawn weekly by stratified random sampling from October 1971 through January 1973. A single interview was completed with each of 1,173 adults randomly selected from household members (18 years of age or over) representing a 73% completion rate. The approximately 1-hour long, personal interviews were conducted by paid, trained interviewers and covered a variety of health, mental health, life event, and demographic variables. The goal of the original project was to provide data representing the community during each week of the survey in order to study changes in the community over time. Since the economic data employed in the present study are monthly, the life event and symptom survey data were aggregated by month rather than by week. Unlike the previously cited study by Catalano and Dooley (1977) which was based on already aggregated data, the present analysis began with a data archive which included responses to each interview item for each interviewee. Markush and Favero (1974) and Roth and Locke (Note 1) report further details about the design and conduct of the survey.

Respondents

The case file was reduced to the 1,140 respondents who had give answers to all 41 of the life event items. Of these respondents, 449 were male and 691 were female. With respect to age, 345 were between 18 and 30; 392 were between 31 and 50; 398 were 51 or over, with 5 declining to give their ages. In terms of ethnicity, 848 were White; 279 were Black; 13 fell into all other ethnic groups combined. Socioeconomic status was estimated from self-reported annual income: 466 reported less than $8,000; 438 reported $8,000 to $15,999; 159 reported $16,000 or more, with 77 declining to state their incomes.

Life Events Measures

The life event section of the interview followed the section on psychological symptoms. Respondents answered "yes" or "no" to each of 40 specific life events plus one miscellaneous event item which may have occurred in the year prior to the interview. No check on the veridicality of report was made. For each reported event, the respondent was asked to indicate the month of occurrence. In order to avoid the possibility of some life events occurring prior to the independent variable of archival economic change, only life events occurring in the preceding month were included in the present analysis.

The life events were divided into economic and noneconomic groups, a division consistent with Ruch's (1977) smallest space analysis of Holmes and Rahe's (1967) Schedule of Recent Experiences. The life event items in the Kansas City survey were drawn from several different sources but at least 20 were considered equivalent to their counterparts on the Holmes and Rahe schedule. To check the possibility that different classes of events were differentially associated with economic change, a further threefold division was performed. Each of 17 economic life events was judged by the authors to be primarily job related, financial, or other.[3]

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[3] Economic events included: Started school or training program (O), Graduated from school or training program (O), Quit or failed school or training program (O-), Entered armed services (O), Left armed services (O), Started to work for first time (J), Job improved (J), Job downgraded (J-), Retired (J), Laid off or fired (J-), Started at new type of work (J), Major gain in income not due to change in work (F), Major loss in income not due to change in work (F-), Serious property loss (F-), Acquisition of property (F), Changed residence for better (F), and Changed residence for worse (F-). The 24 Noneconomic events included: Engaged, Married, Other new love relationship, Widowed (-), Divorced (-), Separated (-), Other broken love relationship (-), Pregnancy, Birth of first child, Birth of child other than first, Miscarriage (-), New person in house other than birth of child, Family member left home, Illness or injury (-), Improvement in health, Death of a loved one (-), Arrested, indicted, or convicted of other than minor traffic offenses (-), Released from prison or acquitted, Started new hobby, Dropped hobby, Acquired a pet, Lost a pet (-), Took a vacation, Other major event.

Despite the difficulties reported in categorizing the desirability of life events (e.g., Coates, Moyer, Kendal, & Howat, 1976), recent findings suggest that undesirable life change is more closely related to subsequent symptoms than change per se (Vinokur & Selzer, 1975). To check the possibility that undesirable life change would be more closely related to prior undesirable archival economic change and to later symptoms, undesirable economic and noneconomic life event variables were defined on an a priori basis for the present study. Although the recent life event literature also points to the importance of such contextual variables as social support and coping (Cobb, 1976; Myers, Lindenthal, & Peper, 1975), such variables were not included in the Kansas City survey.

Midtown Scale (Langner 22-Symptom List)

Perhaps the most widely used measure of mental disorder in community surveys, the Midtown scale of psychophysiological symptoms (Langner, 1962; Srole, Langner, Michael, Opler, & Rennie, 1962) was also employed in the Kansas City survey. Despite its imperfections (Dohrenwend & Crandell, 1970; Seiler, 1973), the Midtown scale has shown utility as a measure of psychological distress and as a predictor of formal help-seeking (Mechanic & Greenley, 1976).

To serve in the test of the present hypotheses, it was important that the Midtown scale be sensitive to short-term changes in community symptomatology. It was of concern, therefore, that the Midtown scale asked whether any of 22 symptoms had been experienced over the *past year*. Nevertheless, the scale appears sensitive to current emotional status. For example, in the Kansas City survey, the Center for Epidemiologic Studies Depression (CESD) measure which taps mood over the past week was positively correlated with the Midtown scale. The association of these two symptom measures held both within individuals ($r = .56$, $p < .001$, $n = 1,140$) and over consecutive monthly sample means ($r = .77$, $p < .001$, $n = 16$) controlling for linear trends and seasonal variability. The Midtown scale was selected over the CESD because the latter includes a narrower range of symptoms (depressed mood), allows less comparability with the epidemiological literature, and had already been employed in a parallel analysis (Catalano & Dooley, 1977).

Economic Indicators

Detailed descriptions of each of the following economic variables and formulae for their computation can be found in Catalano and Dooley (1977). Two measures of directional economic change were included in the analyses: Monthly unemployment rates for the Kansas City Standard Metropolitan Statistical Area (SMSA, Wyandotte and Johnson Counties in Kansas, and Platte, Clay,

Bay, Jackson, and Cass Counties in Missouri); regional monthly unemployment rates calculated by combining Kansas and Missouri work forces and subtracting the Kansas City SMSA. To determine if economic change, regardless of direction, was predictive of the survey variables, two measures of change per se were included: Absolute change in the size and mix of the metropolitan economy which is derived by summing the absolute monthly differences in the number of employees engaged in each sector of a 26-industry breakdown of the metropolitan economy; monthly sums of job accessions and separations in the manufacturing industries of the metropolitan economy. Monthly change in inflation based on the Consumer Price Index for food for the metropolitan area was also included.

Analyses

Time-series data are subject to both seasonal cycles and linear trends. Because the present data extended over less than 2 full years, standard deseasonalization was not feasible. However, the National Weather Service was contacted for monthly weather reports for Kansas City for October 1971 through January 1973. Of the numerous weather variables provided, monthly average temperature was judged to be the best proxy for seasonality based on correlations with the study variables. Using multiple regression, the variability in each economic and survey variable accounted for by the best linear combination of order (dummy variable 1-16) and average temperature was removed. The resulting standardized residuals were used in the following analyses.

Single and multiple linear regressions were used to predict the detrended and deseasonalized Economic Events, Noneconomic Events, and the Midtown Scale. The predictor variables were the various detrended and deseasonalized economic indicators lagged from 0 to 3 months before the survey variables. Regressions were computed for the total sample and for each of the demographic subgroups as specified by the hypotheses. Unless otherwise specified, time-series correlations were based on 16 monthly cases and 14 degrees of freedom. The Durbin-Watson test (1950; 1951) for serial correlation was routinely applied to all significant correlations (see Koutsoyiannis, 1973). Unless otherwise indicated, presentation of the Durbin-Watson d value implies no autocorrelation at the .05 level.

RESULTS

Economic Variables

The mean unemployment rates in the Kansas City SMSA over the 16 months of the survey (4.58%) and in the surrounding two-state region (4.73%)

were positively correlated ($r = .48, p < .05$, 1-tail test). Similarly the two measures of absolute or unsigned economic change, Absolute Change, and Accessions and Separations were positively correlated ($r = .55, p < .05$). Neither unemployment variable was correlated with either absolute economic change variable. Average month to month inflation change was uncorrelated with any of the other economic variables.

Survey Variables

Over the 16 months of the survey, the number of respondents per month ranged from 55 to 89. In the average month, the average respondent reported .24 Economic events ($SD = .07$) and .64 Noneconomic events ($SD = .22$) and acknowledged 1.40 symptoms on the Midtown scale ($SD = .27$).

Both monthly sample size and average reponse to the survey varied across demographic groups. The range of monthly sample sizes by sex were 21 to 35 for males and 30 to 56 for females. Males reported more Economic events than did females, $t = 3.38, df = 1138, p < .001$. However, females admitted to more symptoms on the Midtown scale than did males, $t = 3.73, df = 1138, p < .001$. The ranges of monthly sample sizes were similar for the three age groups: 18–28 for youngest group, 19–32 for the middle-aged group, and 14–34 for the oldest group. The age groups did not differ on the Midtown scale, but both life event scales were inversely related to age.

Ranges of monthly sample sizes varied most among the income groups: 20–36 for the low income, 22–41 for the middle income, and 5–17 for the high income. Because of the high-income group's low minimum monthly sample size, results for that group will not be reported. Although not different on life events, the low-income group reported more symptoms on the Midtown scale ($M = 1.79, SD = 2.71$) than the middle-income group ($M = 1.15, SD = 1.90, p < .001$). Of the 11 respondents reporting more than 10 Midtown Scale symptoms, 8 were from the low-income group. Unfortunately, the ranges of monthly sample sizes did not permit futher disaggregation of respondent groups by income-by-sex or by income-by-age.[4]

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[4] Income level was closely related both to educational attainment divided into less than grammar school, grammar school, high school, and more than high school ($x^2 = 152.54$, $df = 6, p < .001$) and to ethnicity, divided into White, Black, and other ($x^2 = 54.98, df = 4, p < .001$). For example, of the 263 Black respondents, 163 (62%) were from the low-income group. Of the 69 respondents reporting less than grammar school education, 59 (85.5%) were from the low-income group. Although unrelated to each other, both age ($x^2 = 106.96, df = 4, p < .001$) and sex ($x^2 = 19.33, df = 2, p < .001$) were associated with income level. For example, of the 360 respondents over 50 years old, 232 (63.4%) were in the low-income group, and of the 640 female respondents, 315 (49%) were in the low-income group.

The above description of the variables was based on unresidualized data. Subsequent time-series analyses are all based on *standardized* residuals. Thus, any subgroup differences in time-series correlations cannot be attributed to differences in variability.

Intercorrelations of Survey Variables

Over the entire sample of individuals, Economic events and Noneconomic events were slightly positively correlated ($r = .17$, $df = 1138$, $p < .001$). When monthly means for the whole sample were correlated over 16 months, Economic and Noneconomic events were positively but nonsignificantly correlated ($r = .39$). However, this low association is the result of opposite associations for men ($r = .60$, $p < .02$) and women ($r = -.49$, $p < .06$).

Noneconomic events were unrelated to Job, Financial, and Other Economic events in the total sample and each of the subgroups. Job and Other Economic events were correlated with each other ($r = .67$, $p < .005$) but not with Financial events. Undesirable Noneconomic events accounted for much of the variability of Noneconomic events (total sample, $r = .71$, $p < .005$), but undesirable Economic events and Economic events are significantly positively associated only for males, the young, and the low- and middle-income groups.

Noneconomic events were slightly positively correlated with the Midtown scale over individuals in most demographic groups (total sample, $r = .17$, $p < .001$, $df = 1138$). However, Economic events rarely achieved a significant association with the Midtown scale (total sample, $r = .05$, ns), and neither life event variable accounted for much more than 4% of the variance in the Midtown scale when analyzed over individuals.

Contrary to the first hypothesis, neither Economic nor Noneconomic events was reliably predictive of the Midtown scale using monthly means as the unit of analysis. Whether synchronous or with 1- or 2-month lags, only 3 of 48 correlations reached significance. Undesirable Economic and Noneconomic events proved to be no more predictive of the Midtown scale.

Economic Predictions of Survey Variables for the Total Sample

As displayed in Table I, the economic indicators were virtually unrelated to the survey variables of the same time period. Consistent with past findings (Catalano & Dooley, 1977) none of the lagged inflation series was significantly associated with any of the survey variables.

The lagged unemployment variables yielded several significant positive predictions of the life event variables. As expected, Noneconomic as well as Economic events varied with unemployment. The best combination of two unemployment variables (Regional, Lag 3, and Kansas City SMSA, Lag 0)

Table I. Correlations of Lagged Economic Indicators and Survey Variables for the Total Sample[a]

Economic indicators	Lag	Survey variables		
		Economic events	Noneconomic events	Midtown scale
Kansas City SMSA	0	−.45	.22	−.17
unemployment rate	1	−.19	.22	.58[b]
	2	.58[b]	.28	.04
	3	.23	−.05	−.09
Regional unemployment rate	0	−.53[b]	−.45	−.11
(Kansas and Missouri excluding	1	−.35	−.14	.39
Kansas City SMSA)	2	.18	.06	.39
	3	.56[b]	.59[b]	−.05
Accessions and separations	0	−.38	−.17	.22
(in manufacturing industries)	1	.02	.47	.57[b]
in SMSA)	2	.18	.42	.04
	3	.14	.22	−.09
Absolute changes (in employment	0	−.04	−.08	.04
in 26 standard categories in	1	−.17	.17	.06
the SMSA)	2	−.25	.10	.56[b]
	3	.38	.40	.00
Inflation (monthly change in	0	−.45	.11	.01
Consumer Price Index for food)	1	−.18	−.13	.16
	2	.18	.10	.46
	3	.31	.23	.04

[a] For all correlations, sample size is 16. All time series are residuals after removal of variation due to time trend and monthly average temperature. All significance tests of correlations are 2-tailed, and autocorrelation tests are by the Durbin-Watson method.
[b] $p < .05$; no autocorrelation at .05.

predicted Noneconomic events with a multiple correlation of .79 ($F = 10.92$, $df = 2,13$, $p < .005$). Regional Unemployment, Lag 3, was the best single predictor of both life event variables ($r = .68$) for the sum of the residuals of Economic and Noneconomic events, $p < .01$. This finding is consistent with Catalano and Dooley's (1977) finding that Regional Unemployment lagged 3 months correlated with total Life events for the past year ($r = .78$).

The possibility that job-related environmental economic change measures are associated only or primarily with job-related life events, particularly synchronous job events, did not receive support. Two economic variables were selected to minimize the risk of spurious findings due to overproduction of correlations, Absolute Change and Kansas City SMSA Unemployment. The unemployment measure, a directional variable, was unrelated in the total sample to Job, Financial, or Other Economic events either synchronously or lagged. In the total sample, Absolute Change was related positively to Job events (Lag 3, $r = .57$, $p < .05$, $d = 2.35$) but was also related negatively to Financial events (Lag 2, $r = −.55$, $p < .05$, $d = 2.06$).

Of the 12 lagged correlations of unemployment and absolute variables with the Midtown scale, three were significant, all positive. The lagged relationships with the Midtown scale were surprisingly consistent across predictors: Rising from a low or slightly negative correlation on-time through a positive peak at 1- or 2-month lag, back to a negligible association with 3-month lag. This lag pattern for the Midtown scale is very similar to the pattern previously reported for the economic predictions of the CESD from the Kansas City survey (Catalano & Dooley, 1977).

Findings for Demographic Subgroups

The hypothesis for sex differences received partial support. Men appeared to be more responsive than women to unemployment. For females, no lagged or unlagged unemployment variable correlated significantly with any survey variable. But for males, Economic events were positively correlated with Kansas City SMSA Unemployment, Lag 2 ($r = .56, p < .05, d = 2.44$) and Noneconomic events were positively correlated with Regional Unemployment, Lag 3 ($r = .64$, $p < .01$, $d = 1.70$). Unlagged Regional Unemployment correlated negatively with male Noneconomic events ($r = -.51, p < .05, d = 1.73$) and the Midtown scale was not significantly associated for men with any unemployment variable. Women appeared more responsive than men to absolute economic change. For males, only Other Economic events was significantly correlated with Absolute Change (Lag 3, $r = .55$, $p < .05$, $d = 2.34$). For females, Noneconomic events was positively correlated with Accessions and Separations, Lag 1 ($r = .62, p < .05$, $d = 2.60$). For women, the Midtown scale was positively correlated with both Absolute Change, Lag 2 ($r = .61, p < .05, d = 1.84$) and Accessions and Separations, Lag 1 ($r = .59, p < .05, d = 1.88$).

The hypotheses for age groups received little or no support. The over-50 age group was not more responsive to inflation than the other two age groups. Inflation, in fact, was uncorrelated with any survey variable for any age group with one exception, Inflation, Lag 3 with Economic events in the 18-30 group ($r = .57$, $p < .05$, $d = 2.29$). Contrary to the hypothesis and Brenner's (1973) findings, the middle-aged group was not especially sensitive to unemployment. Only one unemployment-survey correlation was significant for the 31–50 group: Kansas City SMSA Unemployment, Lag 1 and Midtown scale, $r = .60$, $p < .05$, d inconclusive at .05. Kansas City Unemployment, Lag 1 was also predictive of the Midtown scale for the oldest group ($r = .53, p < .05, d = 1.95$). The young group was not more sensitive to unemployment than either of the other two groups with no lagged unemployment variable associated significantly with any survey variable. Absolute economic change variables were also relatively unpredictive of life events and the Midtown scale for any age group.

Table II. Correlations of Lagged Economic Indicators and the Midtown
Scale for Low- and Middle-Income Samples[a]

Economic indicators	Lag	Low income	Middle income
Kansas City SMSA	0	.25	−.36
unemployment rate	1	.80[d,e]	.16
	2	.32	−.24
	3	−.26	−.25
Regional unemployment rate	0	.00	−.10
	1	.54[b,e]	.21
	2	.64[c,e]	.11
	3	−.09	−.23
Accessions and separations	0	.32	.35
	1	.58[b,e]	.31
	2	−.03	−.03
	3	−.24	.05
Absolute change	0	.17	.22
	1	.09	.06
	2	.58[b,f]	.25
	3	−.10	.01
Inflation	0	.14	−.19
	1	.41	.14
	2	.60[b,e]	.16
	3	−.14	−.17

[a]For all correlations, sample size is 16. All time series are residuals after
removal of variation due to time trend and monthly average tempera-
ture. All significance tests of correlations are 2-tailed, and autocorrela-
tion tests are by the Durbin-Watson method.
[b]$p < .05$.
[c]$p < .01$.
[d]$p < .001$.
[e]No autocorrelation at .05.
[f]No autocorrelation at .01 but inconclusive at .05.

In contrast to the hypothesis and to Brenner's (1973) findings, the low-
income group appeared much more responsive to economic change than did the
middle-income group. Even disregarding the rare significant inflation predic-
tion (Inflation, Lag 2, with low-Income Midtown scale, $r = .60$) of the 12 lagged
predictions of the low-income Midtown scale, five were significant ranging from
.54 to .80 (see Table II). The best combination of unemployment predictors
of low-income Midtown scale yields a multiple correlation of .85 (Kansas City
SMSA, Lag 1, and Regional, Lag 2, $F = 17.12$, $df = 2,13$, $p < .001$, d incon-
clusive at .01). Both the low- and middle-income groups had a small number
of significant associations between economic change and life events. The low-
income group appeared more responsive than the middle-income group to
Absolute Change on two subcategories of economic life change (Financial

events, Lag 2, $r = -.59$, $p < .05$, $d = 2.51$; Other Economic events, Lag 3, $r = .57$, $p < .05$, $d = 1.95$).

DISCUSSION

Economic Change and Life Events

This study was intended to contribute to two broad objectives: (a) to encourage life event researchers to look back in time to the aggregate economic precursors of community variation in life change, (b) to deepen our understanding of the association between the economy and treated mental disorder by introduction of life change and untreated symptom variables. That lagged environmental economic change is linked to surveyed community life events was supported with two methodological improvements over past research. The possibility that reported events preceded or coincided with archival economic change was ruled out by employing only past month events. The possibility that the economy—life change association was due only to job changes measured twice, archivally and by life event survey, was also ruled out. These findings indicate that changes in a community's economy are associated with later changes in noneconomic events and both direct (job) and indirect (financial and other) economic events. The importance of this latter finding is underscored by the finding by Pearlin and Lieberman (1977) that the impact of noneconomic life change is significantly moderated by the economic context in which it occurs.

Life Events and Disorder

Contrary to the hypothesis, life change was weakly associated with the Midtown scale. The latter finding is consistent with recent theoretical arguments (e.g., Brown, 1974) and empirical findings (e.g., Goldberg & Comstock, 1976; Rabkin & Struening, 1976).

Nevertheless, at least three arguments can be raised against treating the present data as grounds for rejecting life change as the intervening variable between economic change and psychophysiological disorder: (a) The reduction of past year life events to past month life events and the subsequent division into Economic and Noneconomic events is unique in the life event literature. While necessary to rule out temporal overlap of lagged economic indicators with surveyed life events and to check the possibility of an identity between economic indicators and Economic events, such life event definitions may have severely restricted the predictive power of the variable. (b) New evidence has appeared suggesting that psychological symptom counts may be curvilinearly related to life events (Wildman & Johnson, 1977). The linear regressions employed here

would not be able to capture an association of very low and very high life change with disorder. (c) The present analysis addressed only the psychological consequences of life event variation. Maladaptive responses to heightened life stress may evidence themselves as physical symptoms, aggressive or criminal behavior, or abuse of licit or illict drugs as well as depression or other psychological symptoms (e.g., Pearlin & Radabaugh, 1976).

Economic Change and Disorder

Whatever the role of life change, the present data add to previous work the finding that increases in unemployment and absolute economic indicators precedes, by 4 to 8 weeks, increases in psychophysiological symptoms reported by samples of a metropolitan population. The present findings conflict, however, with past research on the relative sensitivity of demographic subgroups to economic change. In contrast to Brenner's (1973) findings, economic change has direct and significant impacts on both females and lower income groups. As women have increasingly participated in the work force and have aspired to equality in income and work opportunities, it should come as no surprise that they were responsive to the hirings and firings in Kansas City during the early 1970s (Brenner's time series ended in 1967). Interestingly, while men revealed responsiveness in their life event variables to unemployment changes, it was the female sample which evidenced more responsiveness on the Midtown scale. This latter finding of a sex difference in responsiveness to economic change, if replicable, may contribute to an understanding of previously found sex differences in untreated (Warheit, Holzer, Bell, & Arey, 1976) and treated mental disorder (Tudor, Tudor, & Gove, 1977).

The assumption by Brenner (1973) that low-income persons are less affected by economic downturns than the middle and upper classes has been contradicted by recent findings. Gramlich (1974) found that families at the poverty line lost a larger proportion of their income (including public subsidies) during times of increased unemployment than did either middle-class or higher income families. Moreover, low-income people, by definition, have the smallest economic resources with which to cushion any short-term economic setbacks (e.g., houses to refinance, good credit ratings to borrow against, cash savings). When the economy improves, it may be the low-income group which disproportionately has to pay the psychological price for adapting to new jobs in new locations with new colleagues.

Reservations in Applying These Findings to Policy

It has been argued that research such as that described above has implications for economic policy-making (Brenner, 1977) as well as for planning mental health services (Dooley & Catalano, 1977). In light of the present findings,

however, it appears that both the policy and service impact of this type of research may be moderated by political and managerial realities.

Political consensus on definitive economic policies for the employment vs. inflation or growth vs. steady-state issues has traditionally been difficult to achieve. The current finding, that the psychological well-being of various socio-economic and demographic subgroups is differentially affected by unemployment and change per se, is not likely to add decisive strength to the arguments of any of the interest groups involved in the economic policy debate. These and similar findings should, however, sharpen the issues and underscore the need for more sophisticated human cost accounting in policy making.

The managerial issue alluded to above arises from the questionable cost-effectiveness of basing either economic policy or service routines on research such as this. It should be noted that time-series analysis requires that a data set be "stationary," i.e., without linear or seasonal trends (Kendall, 1973). Detrending, however, may remove substantial variation from the dependent variable. It should also be noted that the original monthly or yearly variance may not have been large relative to total prevalence. The cost-effectiveness issue arises in those cases in which economic change accounts for a moderate but significant amount of detrended variance which itself is a small proportion of original (trended) variance, which, in turn is small relative to the average case load. Is it rational to incur the economic and/or political cost of shifting the economic or bureaucratic *status quo* for a small though statistically significant reduction in the outcome measure?

Research Directions

A number of research directions are suggested by the present findings. First, this research must be replicated in other metropolitan and nonmetropolitan areas to test for generalization. Because of the complicated harmonics in the economic measures and because of the quantity of time-series correlations generated in this type of research, some inexplicable "significant" associations can be expected by chance or by artifact. Thus, replications are crucial for discriminating spurious results from those meriting interpretation. Help in this effort to apply time-series techniques to hypothesis testing may come from recent work on cross-correlograms (Campbell, Note 2; Lee, Note 3).

Second, additional measures of disorder should be obtained to compare with the survey measures of untreated disorder such as the Midtown scale. Measures of mental case openings would be especially appropriate for making budgetary or primary prevention plans. Such work is necessary to specify the practical meaning, if any, of the temporal variation of one or two symptoms for the average member of a community sample. Such variation in normal respondents may represent only marginal, if widespread and unpleasant, changes in morale. Or, such variations may be concentrated in those borderline respon-

dents for whom any noticeable increase in symptoms has serious implications for admission to treatment.

Third, follow-up interviews in a panel design would provide an opportunity to assess the impact of life events on subsequent symptom counts in the same individuals (e.g., Kasl, Gore, & Cobb, 1975). Cross-lag correlations associating pre- and postmeasures of life change and symptoms could be conducted over lags varying from 1 to 3 or more months (e.g., Coates et al., 1976). Such designs would permit analysis of the variance contributed by individual differences, by economic climate, and by the interaction of the two.

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