

The effect of social networks and social support on common mental disorders following specific life events

Maulik PK, Eaton WW, Bradshaw CP. The effect of social networks and social support on common mental disorders following specific life events.

Objective: This study examined the association between life events and common mental disorders while accounting for social networks and social supports.

Method: Participants included 1920 adults in the Baltimore Epidemiologic Catchment Area Cohort who were interviewed in 1993–1996, of whom 1071 were re-interviewed in 2004–2005. Generalized estimating equations were used to analyze the data.

Results: Social support from friends, spouse or relatives was associated with significantly reduced odds of panic disorder and psychological distress, after experiencing specific life events. Social networks or social support had no significant stress-buffering effect. Social networks and social support had almost no direct or buffering effect on major depressive disorder, and no effect on generalized anxiety disorder and alcohol abuse or dependence disorder.

Conclusion: The significant association between social support and psychological distress, rather than diagnosable mental disorders, highlights the importance of social support, especially when the severity of a mental health related problem is low.

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Key words: life change events; mental disorders; social support; longitudinal studies; psychological stress

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Significant outcomes

- Social networks and social support had a more important role in reducing stressful event related psychological distress, rather than more severe clinically diagnosed mental disorders.
- Even in such situations, social support from friends, relatives and spouse appeared to play a more important role, compared to social networks.

Limitations

- Although attrition weights were used, there was some loss to follow-up, which may have influenced the findings.
- Reports of social networks and social support were based on self-reports.
- Life events were not weighted according to severity.

Introduction

The occurrence of mental disorders has often been linked with a stressful event (1–7). Stressors have been understood as two types: life events which have a specific time period at which they occur and

cause significant stress (e.g. death of spouse, retirement, life threatening illness, birth of a child), and chronic stressors which are recurrent over time (e.g. poverty, chronic illness). In other words, life events occur over a shorter period of time, are more intense, and can cause life changing

experiences. In contrast, chronic stressors are more prolonged, are less intense, and the effects while serious may not be life changing experiences. Lazarus and Folkman (8) defined stress as ‘...a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources, and endangering his or her well-being’ (pg 19). The stress-diathesis model (9) suggests that each individual has a threshold determined by the combined effects of stressful events and level of vulnerability (diathesis), in the form of genetic or environmental factors. Once that threshold is exceeded the individual manifests mental health problems. These can start as subclinical disorders, but with increasing levels of stress or vulnerability factors more serious mental health problems can be manifested. Social networks and social support may be beneficial in reducing the impact of stress on precipitation of mental disorders (10–12).

A social network has been conceptualized as an objective assessment of the size and frequency of contact with one’s friends, relatives or spouse, whereas ‘social support’ is a subjective perceived quality of the support as appraised by an individual (13). It is not clear, however, whether social networks and social support have a direct effect (i.e. the effect of social networks and support on mental disorders irrespective of presence or absence of a life event), or stress-buffering effect (i.e. interaction between stressful life event and social networks/social support, or in other words how social networks and social support varies among those with or without a life event and how that affects mental disorders) or both.

The research on this topic has been inconsistent, as some studies have used inadequate measures of social networks and social supports. Other studies have employed cross-sectional study designs, which limited the ability to investigate causality, and failed to investigate the confounding effect of a previous life event on social networks and social supports (14). Aneshensel and Stone (15) found that a direct effect of social support rather than stress-buffering effect was more important in determining depression. An earlier literature review found that measures of social support had a stress-buffering effect while measures of social networks had a direct effect (11). In contrast, a more recent review concluded that social support had both direct and stress-buffering effects on depression, such that low support increases the risk for depression, but high support buffers the effect of stress (16). Furthermore, low social support was linked with increased risk for depression in a multi-country study (17).

Studies have often used summary measures of social networks or social support in their analyses, but most have not differentiated between supports received from different sources. Current evidence suggests that social support may have both direct and buffering effects on the overall effect of stressful events on psychological problems, especially depression. Whereas, most researchers have focussed either on the effect of social networks or social support on depression or depressive symptoms, some other common mental disorders, like generalized anxiety disorder, panic disorder, and alcohol abuse or dependence have not been studied. Having an enhanced understanding of the potential effects of social networks and social support on the risk for different mental health problems may elucidate potential supports for individuals exposed to life events, which in turn, may facilitate intervention. We hypothesized that increased social networks and social support would be associated with reduced odds of mental disorders and psychological distress.

This study included the 1993–1996 and 2004–2005 cohorts of the Baltimore Epidemiologic Catchment Area (ECA) study. Some of the key elements that differentiated this study from prior research were: use of disaggregated measures of social networks and social support; use of specific life events rather than a summary life event score; analyzing the association between life events, social networks and social support, and specific common mental health conditions individually, rather than using an outcome measure like ‘any mental health condition’; and using a population-based longitudinal dataset, and accounting for correlation between the repeated measures in the analyses.

Aims of the study

The aim of this study was to examine the direct and stress-buffering effect of social networks and social support received from friends, relatives and spouse on the association between specific life events and some common mental disorders (e.g. major depressive disorder, generalized anxiety disorder, panic disorder, alcohol abuse or dependence disorder) and psychological distress.

Material and methods

The Baltimore ECA study was started in 1981, as part of the larger ECA study that was conducted across five metropolitan cities in the United States. In 1981, the Baltimore cohort comprised of 3481 participants, a probabilistic sample of the target population. They were followed-up in 1982, 1993–

1996, and 2004–2005. Mental health related information was sought from the participants at each time. In 2004–2005, 1071 individuals from the original cohort were re-interviewed. At each time-point about 73% of the survivors could be interviewed. Further details are provided in earlier publications (18). The participants for this study were part of the cohort followed-up in 1993–1996 and 2004–2005.

Life events

Questions were asked about the occurrence of specific life events in the year preceding each interview. These were the primary measure of exposure and the responses were coded as yes/no. Given that this was a population-based cohort study, there were no *a priori* assumption about the exposures and their effect on the outcomes. Consistent with prior research (19, 20), the following life events assessed were selected: *death of a loved one other than spouse (which was defined as bereavement), divorced and/or separated, had children or adopted children, life threatening injury or illness, loss of job, child moved in or out of the house, retirement and widowhood*. The total number of life events experienced within the past year of the interview was also computed. This was a continuous measure.

Mental disorder and psychological distress

Subjects were interviewed using the Diagnostic Interview Schedule (21) version III-R. At each interview, respondents were probed about symptoms experienced by them within the prior year. Based on the interview, a diagnosis of major depressive disorder, generalized anxiety disorder, panic disorder and alcohol abuse/dependence disorder was made according to *DSM-III-R* criteria (22). The General Health Questionnaire 20 (GHQ20) (23, 24) was also used to assess distress within the past few weeks, and a score of ≥ 4 was used to indicate the presence of psychological distress.

Social networks and social support

Two sets of questions assessed the social networks, and one set assessed social support. These questions inquired about their presence within the last 6 months of each interview. The questions on social networks asked about number and frequency (through meetings, email communications, post or phone) of contact with friends and relatives. An example of questions on social

networks was: ‘How often do you talk on the phone or get together with relatives who do not live with you’ (25, 26). For the purpose of analysis, the network size of both friends and relatives were grouped into three categories: 0–1 contacts; 2–6 contacts and > 6 contacts. This was based on earlier research on network sizes which found that the average size of ‘support cliques’ in United States of America was about 3 (SE 1.8) (27), which effectively means between two and six contacts. However, for most models the network size was divided into two categories (four or less contacts/more than four contacts), in order for the models to compute properly. The frequency of contact with friends or relatives was grouped into two: frequent (meeting everyday to few times/month) and infrequent (meeting once/month to never). For computation purposes, in some analyses, contact with relatives was grouped as frequent (meeting everyday) and less frequent (meeting few times/week to never); and contact with friends as frequent (meeting everyday to few times/week) and less frequent (meeting few times/month to never).

The questions on social support were derived from the National Comorbidity Survey (28). Examples of the questions that enquired about social support were: ‘How much does your (husband/wife/partner) really care about you?’, ‘How much can you rely on your (husband/wife/partner) for help if you have a serious problem?’. Similar questions were asked regarding spouse, friends and relatives. Based on their responses, a score ranging between 6 and 24 was generated for each category, with higher scores indicating better support.

Analysis

The outcome was defined by the presence of any of the four mental disorders and psychological distress. The models were adjusted for age (30–44, 45–64, ≥ 65 years); sex; ethnicity (white/black/other ethnicities); marital status (married/previously married/never married); grade (education $< \geq 13$ years); presence of any form of health insurance; presence of physical illnesses like diabetes mellitus, heart trouble, hypertension and arthritis in 1993–1996 and prior to it; presence of any of the above four mental disorders prior to 1993–1996; and use of any mental health services (general medical services/mental health within general medical services/specialty psychiatric services/other human services) prior to 1993–1996. Prior history of mental disorders, physical disorders, and services use were included as covariates in these models, as individuals having past exposure to

these factors could have greater awareness about symptoms related to mental and physical health.

The overall analysis plan was to model the association between life events and presence of mental disorders or psychological distress, while accounting for social networks and social support. The analysis accounted for the longitudinal structure of the dataset and used attrition weights to adjust for loss to follow-up and missing data. Parsimonious models were identified and corrections were made for multiple comparison. Further details about the analysis are provided in the paragraphs given below.

To account for the correlation between repeated measures, longitudinal data analysis using generalized estimating equations (GEE) (29) with exchangeable correlation matrix was used, and the data from 1993 to 1996 and 2004 to 2005 were pooled to maximize sample size. Initially unweighted analyses were performed. The effect of each specific life event on each mental health condition was modeled separately in three sets of hierarchical models. For each life event, social networks and social support measures were introduced individually in a hierarchical manner to first analyze their direct effects, and then the buffering effect (i.e. interaction) in the presence of the life event. The primary predictor in Model 1 was the experience of a specific life event or total number of life events. Model 2 included an additional social networks or social support measure to test for their direct effects. Model 3 included an interaction term for the life event by the social networks, or the life event by social support measure introduced in Model 2 (i.e. stress-buffering effect). The full models adjusted for all the covariates. The final parsimonious models were based, either on lowest QIC score (Quasi-likelihood under the independence model criteria) (30, 31), or on the most appropriate combination of covariates that facilitated comparison across models. The variable sex was included as a covariate in all models.

To explore whether non-response to items and attrition had an influence on the pattern of findings, we then reran all the longitudinal analyses using weights to account for item non-response and attrition across the two time-points. Data were imputed for missing data for the base year (1981) and two follow-up periods, 1993–1996 and 2004–2005. Multiple imputations were performed using 43, 45 and 39 variables from the three time-points respectively. These set of variables were found to affect non-response and attrition across the three time-points, and included socio-demographic characteristics, physical functioning, psychopathology, mental health services use and physical illness. Five

imputed datasets were generated. Based on them five different attrition weights were created for each observation. The weights were the inverse probability of participation in a given year, after accounting for the base year sampling weights. More details are provided in previous publications (18). For the purpose of the current analyses, we used the weights corresponding to the first dataset. This selection was not based on any prior assumption. Consistent with the National Longitudinal Survey on Youth (32, 33), data was analyzed in two different ways while using attrition weights. The first approach involved using all respondents from interviews across different time-points in a selected sample population, irrespective of attrition, and using the weight corresponding to the initial year of that sample (i.e. 1993–1996 weights in the current study). Using the second approach, respondents who completed both the interviews were included, and attrition weights corresponding to the last year (i.e. 2004–2005 weights in the current study) were used. Finally, analyses were done using the weights corresponding to 1993–1996 and 2004–2005 for each observation from the two time-points. However, in such cases the correlation structure between repeated measures had to be ignored as time-varying weights could not be computed in our models while using GEE.

Results were compared across all analyses, both with and without the attrition weights. The point estimates were similar for both unweighted and weighted analyses. As using only completers has been criticized because it can lead to selection bias (34), and using the final method of time-varying weights ignores the correlation between repeated measures, the tables report the bivariate and multivariate analyses using data weighted by the attrition weights of 1993–1996. However, 112 observations from 1993 to 1996 had to be dropped as they were non-responders based on the variables used for creating the weights, and so had not been given a weight. Thus, the weighted sample had 1808 individuals in 1993–1996.

The primary objective was to study the association between each life event and mental health condition across seven different social networks and social support measure. Thus, a number of models were tested, and the Bonferroni adjusted two-tailed test of significance was set at $P \leq 0.007$. We also determined whether there were substantively meaningful patterns of results across different types of life events, social networks and social support, and the outcome. For each mental health condition, the effect of different social networks and social support after experiencing a specific life event was assessed to discern consistent patterns of

findings. In keeping with previous studies which have performed multiple comparisons without using statistical corrections (35, 36), a conservative statistical significance level was fixed at $P \leq 0.01$. Other researchers (37–39) have also suggested using rational methods to justify the results where multiple comparisons are being made. Thus, we report both the Bonferroni adjusted results ($P \leq 0.007$), as well as those meaningful results which were significant at $P \leq 0.01$ level. All analyses were performed in STATA 9.0 (40).

Results

There were 1920 participants in 1993–1996, and 1071 of them were re-interviewed in 2004–2005. Population characteristics are outlined in Table 1. In the year 1993–1996, about two-thirds of the population were female, and a similar proportion was White. About a third each were 30–44, 45–64 and ≥ 65 years old. The majority had greater than 9 years of education. *Bereavement* was the most common life event reported across both time-points, followed by *life threatening illness*, and a *child moved in or out of the house*. Across both time-points, about three-fourth had more than four relatives, and half had more than four friends. The median social support score for friends, relatives or spouse was 20 across both time-points.

Initially bivariate analyses were performed to estimate the association between each life event and mental health condition (Table 2). *Life threatening illness* increased the odds of suffering from alcohol abuse/dependence disorder or psychological distress by 2–3 times. The odds of psychological distress were increased more than three times when one experienced either a *divorce/separation* or *widowhood* within the last year of the interview. Increasing number of life events or *life threatening illness* within the last year was associated with 36–70% increased odds of psychological distress. As life events were measured within the year prior to the interview, and social networks and social support was measured over the past 6 months, any effect of life events on social networks and social support was initially analyzed. The analyses indicated that the number of life events in 2004–2005 was not associated with any of the social networks or social support measures at that time after controlling for similar measures in 1993–1996.

Major depressive disorder, generalized anxiety disorder and alcohol abuse/dependence disorder

Having regular contact with greater than four relatives was associated with a reduction in the

Table 1. Characteristics of the study population

	1993–1996 (Total = 1920)%*	2004–05 (Total = 1071)%*
Female	63.2	62.9
Age (years)		
30–44	37.2	7.6
45–64	30.4	65.6
≥ 65	32.4	26.8
Marital status		
Married	45.1	54.3
Divorced/separated/widowed	34.1	41.6
Never married	13.1	10.7
Ethnicity		
White	63.2	61.8
Black	33.4	34.9
Other ethnicities	3.3	3.3
Education (years)		
<9	19.0	9.4
9–12	52.7	49.2
13–16	23.4	32.1
> 16	4.9	9.2
Insurance present	64.5	89.6
Prevalence of mental health problems in the last year		
Major depressive disorder	2.1	2.4
Generalized anxiety disorder	0.9	1.0
Panic disorder	1.2	1.8
Alcohol abuse/dependence disorder	3.1	1.4
Psychological distress	19.6	15.4
Life events in the last year		
Bereavement	28.3	24.7
Divorce/separation	1.9	1.4
Had children or adopted children	2.0	0.7
Life threatening illness	7.1	4.0
Loss of job	4.0	2.8
Child moved in or out of the house	5.9	6.3
Retirement	1.0	3.4
Widowhood	1.3	0.8
Social networks		
Number of relatives		
0	1.5	1.7
1	2.3	2.5
2–4	13.3	15.0
4–6	19.1	16.8
> 6	53.7	62.5
Number of friends		
0	5.8	7.0
1	7.1	7.0
2–4	27.1	26.4
4–6	20.5	22.1
> 6	29.4	36.0
Frequency of meeting relatives		
Everyday	23.5	26.6
Few times/week	31.2	36.0
Few times/month	23.2	19.6
Once/month	5.0	10.0
Less than once/month	4.5	4.4
Never	0.2	0.0
Frequency of meeting friends		
Everyday	22.4	23.3
Few times/week	33.2	33.8
Few times/month	20.2	21.5
Once/month	4.4	8.9
Less than once/month	5.2	2.7
Never	4.5	0.0

Table 1. Continued

	1993–1996 (Total = 1920)%*	2004–05 (Total = 1071)%*
	Scores	
Social support		
Social support from friends		
25th percentile	18	18
50th percentile	20	20
75th percentile	22	21
Range	7–24	9–24
Social support from spouse		
25th percentile	19	19
50th percentile	20	20
75th percentile	22	22
Range	6–24	6–24
Social support from relatives		
25th percentile	18	18
50th percentile	20	20
75th percentile	22	21
Range	6–24	8–24

*Some percentages do not add up to 100% due to missing values.

odds of experiencing major depressive disorder when faced with a *loss of job* (OR 0.38, 95% CI 0.19, 0.74, $P \leq 0.007$). None of the other social networks or social support variables were significantly associated with major depressive disorder ($P \leq 0.01$) (data not shown). No significant direct effects of social networks or social support were observed for generalized anxiety disorder and alcohol abuse/dependence disorder (data not shown). Social networks and social support did not have a significant ($P \leq 0.01$) stress-buffering effect on experiencing any of these mental health conditions when affected by any of the life events.

Panic disorder

The association between number of life events, *bereavement*, *life threatening illness*, *loss of job* and *child moved in or out of the house* on panic disorder

was analyzed for the different social networks and social support measures. *Loss of job* (OR 1.73, 95% CI 0.42, 7.05) and a *child moved in or out of the house* (OR 1.81, 95% CI 0.62, 5.28) were the only two life events that were associated with an increased odds of panic disorder (Table 3). Meeting a relative only a few times/week, compared to daily, was associated with a 70% reduction in the odds of experiencing panic disorder when a *child moved in or out of the house*. On the other hand, increased social support from a relative was associated with an 80% reduction in the odds of panic disorder across all the different life events analyzed, including a *child moved in or out of the house*. None of the social networks or support measures had a significant ($P \leq 0.01$) stress-buffering effect.

Psychological distress

Having more than four friends was associated with a reduction in the odds of experiencing psychological distress when *bereaved* (OR 0.74, 95% CI 0.59, 0.92, $P \leq 0.01$). Across all the life events, having higher than median level of social support from a friend was significantly ($P \leq 0.007$) associated with almost a 30% reduction in the odds of experiencing psychological distress (Table 4). Similarly, having higher than median level of support from spouse and a relative was significantly ($P \leq 0.007$) associated with a 47–57% reduction in the odds of suffering from distress. None of the social networks or social support measure had a significant stress-buffering effect.

Discussion

This study examined the association between different types of life events and common mental

Table 2. Bivariate analyses for mental health outcomes following a life event in the last year

	Major depressive disorder		Generalized anxiety disorder		Panic disorder		Alcohol abuse/dependence disorder		Psychological distress	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Total number of life events	1.33	0.92–1.91	1.43	0.93–2.21	1.10	0.71–1.71	1.20	0.87–1.67	1.36	1.19–1.56**
Bereavement	1.24	0.72–2.13	1.28	0.59–2.77	0.87	0.41–1.86	0.84	0.48–1.49	1.20	0.97–1.49
Divorce/separation	3.01	0.98–9.21	2.84	0.39–20.91	2.42	0.52–11.25	1.29	0.30–5.60	3.60	1.83–7.07**
Had children or adopted children	0.79	0.09–6.66	†		0.001	0.001–0.002**	1.66	0.38–7.19	0.92	0.41–2.05
Life threatening illness	2.39	1.10–5.19*	0.92	0.31–3.93	1.17	0.33–4.12	2.68	1.40–5.11**	1.70	1.21–2.38**
Loss of job	2.36	0.97–5.74	2.53	0.74–8.66	1.27	0.31–5.29	2.09	0.86–5.11	1.31	0.83–2.07
Child moved in or out of the house	0.93	0.27–3.23	1.96	0.58–6.64	2.16	0.83–5.66	1.47	0.58–3.73	1.38	0.95–2.00
Retirement	†		2.15	0.28–16.36	†		0.88	0.19–4.05	1.26	0.61–2.60
Widowhood	†		3.97	0.51–30.79	2.30	0.32–16.73	†		3.18	1.59–6.33**

* $P < 0.05$, ** $P < 0.01$.

†Few observations – model failed to compute.

Table 3. Effect of life events and social networks or social support on panic disorder

	Frequency of meeting relative is few times/ week or less		Higher than median social support score for relative	
	OR	95% CI	OR	95% CI
Total number of life events†				
Model 1 – LE	0.85	0.53–1.36	0.93	0.59–1.48
Model 2 – LE	0.85	0.53–1.37	0.86	0.54–1.37
SS	0.29	0.14–0.61*	0.18	0.06–0.54*
Bereavement‡				
Model 1 – LE	0.64	0.27–1.52	0.63	0.27–1.52
Model 2 – LE	0.68	0.28–1.63	0.65	0.27–1.55
SS	0.29	0.14–0.62*	0.18	0.06–0.54*
Life threatening illness‡				
Model 1 – LE	0.73	0.15–3.51	0.73	0.15–3.51
Model 2 – LE	0.73	0.16–3.37	0.76	0.16–3.60
SS	0.29	0.14–0.60*	0.18	0.06–0.54*
Loss of job‡				
Model 1 – LE	NC		1.73	0.42–7.05
Model 2 – LE			1.75	0.39–7.92
SS			0.18	0.05–0.61*
Child moved in or out of the house‡				
Model 1 – LE	1.81	0.62–5.28	1.81	0.62–5.28
Model 2 – LE	1.81	0.64–5.15	1.72	0.57–5.19
SS	0.29	0.14–0.64*	0.19	0.06–0.56*

LE, life events; SS, social networks and social support measures; NC, indicates that the analysis could not be computed due to few observations.

Model 3 which included the interaction term LE × SS has not been shown as there were no significant results.

* $P \leq 0.007$ (Bonferroni adjusted).

†All regressions adjusted for sex, mental disorder prior to 1993–1996, physical illness in 1993–1996 or prior, mental health service use prior to 1993–1996, health insurance.

‡All regressions adjusted for sex, ethnicity (white/non-white), mental disorder prior to 1993–1996, physical illness in 1993–1996 or prior, mental health service use prior to 1993–1996, health insurance.

disorders, while accounting for the influence of different social networks and social support measures. The results supported our *a priori* hypothesis that increased social networks and social support would be associated with reduced odds of mental disorder and psychological distress. Some of the limitations of previous studies in this area (14) were accounted for in this study. First, the effects of each social network and social support measure were assessed separately, and their definitions were clarified. Second, the data came from a large longitudinal population-based cohort study. Because the study was longitudinal, we were able to account for the correlations between the repeated measures in the analyses, and adjust for prior mental disorders, prior use of mental health services, and presence of a physical illness, at any time before the first time-point of 1993–1996. It is important to note that we did not attempt to predict the effect of life events at the first time-point on occurrence of mental disorder at the second time-point, due to almost a 10-year difference in the time-points. We thought the 10-year

time span between measures was too long to justify such predictions. We did, however, test for the effect of life events on social networks or social support.

Most studies to date have assessed the effects of social networks or social support on different life events that lead to depression or distress (11, 16, 35, 41–43). However, the stress-buffering effect of any social support has been inconclusive. While a number of studies have reported only direct effects (15, 17, 36, 44, 45), others have found both direct and stress-buffering effects (11, 46). Although our study failed to find evidence of a significant stress-buffering effect of social networks or social support, significant direct effects were observed. More importantly, when faced with specific life events, a higher level of social support from a friend, spouse, or relative was associated with a significant reduction in the odds of psychological distress. Increased social support from spouse was also associated with reduced odds of panic disorder after experiencing job loss or a child moving in or out of the house. The association between job loss and major depressive disorder was also reduced when the participant had contact with more than four relatives.

Previous researchers (47–49) have also found that increased support from spouse, relative and friends were associated with reduced odds of suffering from a mental health condition. The effect of social support measures on the experience of major depressive disorder was less evident than on distress. This could be a reflection of the greater effect of social networks and social support on subclinical depression or distress rather than diagnosable mental disorder. Increased social support from a spouse was generally associated with a larger reduction in the odds of psychological distress compared to increased social support from friends or relatives, across each life event. This highlights the qualitative differences in the effect of social support based on the source of such support. Future research should study this in more detail, and identify specific aspects of relationships that predict variation in the level of social support.

The effect of life events accounting for social networks and social support on either generalized anxiety disorder, panic disorder or alcohol abuse/dependence disorder has not been studied in great detail in the past. Research findings have been mixed. While some have shown that the association between social support and alcohol use following a life event is weakly correlated or absent (50, 51), other research found that support from one's spouse, relatives, friends and church reduced excessive drinking after suffering stressful events

Table 4. Effect of life events and social networks or social support on psychological distress

	Higher than median social support score for friend		Higher than median social support score for spouse		Higher than median social support score for relative	
	OR	95% CI	OR	95% CI	OR	95% CI
Total number of life events†						
Model 1 – LE	1.29	1.11–1.50**	1.29	1.11–1.50	1.29	1.11–1.50
Model 2 – LE	1.28	1.10–1.49**	1.29	1.04–1.60**	1.28	1.10–1.49**
SS	0.68	0.54–0.85**	0.47	0.34–0.66**	0.53	0.42–0.67**
Bereavement‡						
Model 1 – LE	1.13	0.89–1.43	1.13	0.89–1.43	1.13	0.89–1.43
Model 2 – LE	1.15	0.90–1.46	1.15	0.82–1.62	1.13	0.89–1.44
SS	0.68	0.54–0.86**	0.46	0.33–0.64**	0.52	0.42–0.66**
Divorce/separation‡						
Model 1 – LE	3.22	1.56–6.67**	¶		3.22	1.56–6.67**
Model 2 – LE	3.28	1.60–6.73**			3.42	1.69–6.96**
SS	0.66	0.51–0.84**			0.51	0.40–0.65**
Had children or adopted children‡						
Model 1 – LE	1.14	0.51–2.59	1.14	0.51–2.59	1.14	0.51–2.59
Model 2 – LE	1.18	0.52–2.66	1.13	0.42–3.10	1.14	0.51–2.55
SS	0.67	0.53–0.86**	0.43	0.31–0.61**	0.49	0.39–0.63**
Life threatening illness‡						
Model 1 – LE	1.53	1.05–2.24	1.53	1.05–2.24	1.53	1.05–2.24
Model 2 – LE	1.47	1.00–2.17	1.41	0.81–2.46	1.47	1.00–2.16
SS	0.68	0.54–0.86**	0.44	0.32–0.62**	0.52	0.41–0.65**
Loss of job‡						
Model 1 – LE	1.26	0.77–2.08	1.26	0.77–2.08	1.26	0.77–2.08
Model 2 – LE	1.29	0.78–2.12	1.42	0.70–2.85	1.28	0.78–2.11
SS	0.67	0.51–0.87**	0.43	0.29–0.63**	0.54	0.41–0.70**
Child moved in or out of the house‡						
Model 1–LE	1.25	0.82–1.92	1.25	0.82–1.92	1.25	0.82–1.92
Model 2–LE	1.18	0.76–1.83	1.42	0.78–2.58	1.22	0.78–1.89
SS	0.66	0.52–0.85**	0.44	0.31–0.62**	0.48	0.37–0.61**
Retirement‡						
Model 1–LE	1.07	0.46–2.51	1.07	0.46–2.51	1.07	0.46–2.51
Model 2– LE	1.09	0.45–2.65	0.96	0.33–2.77	1.10	0.46–2.67
SS	0.66	0.52–0.84**	0.48	0.34–0.68**	0.53	0.42–0.68**
Widowhood§						
Model 1 – LE	2.30	0.99–5.33	¶		2.30	0.99–5.33
Model 2 – LE	2.09	0.88–4.97			2.46	1.04–5.83
SS	0.67	0.52–0.85**			0.52	0.41–0.66**

LE, life events; SS, social networks and social support measures.

Model 3 which included the interaction term LE × SS has not been shown as there were no significant results.

** $P \leq 0.007$ (Bonferroni adjusted).

†All regressions adjusted for sex, ethnicity (white/non-white), age (30–44/45–64/≥65 years), mental disorder prior to 1993–1996, physical illness in 1993–1996 or prior, mental health service use prior to 1993–1996, health insurance.

‡All regressions adjusted for sex, ethnicity (white/non-white), age (30–44/45–64/≥65 years), marital status (married/previously married/never married), mental disorder prior to 1993–1996, physical illness in 1993–1996 or prior, mental health service use prior to 1993–1996, health insurance.

§All regressions adjusted for sex, mental disorder prior to 1993–1996, physical illness in 1993–1996 or prior, mental health service use prior to 1993–1996, health insurance.

¶Spousal support was not analyzed for divorce/separation and widowhood.

(52). Researchers (53) also found that only tangible support (or received support) reduced the effect of acute or chronic financial stress on alcohol use, and not appraisal or belonging support. Less research has been done on anxiety disorders. A recent case–control study found that patients with panic disorder (with/without agoraphobia) had experienced more life events and had poorer social support from friends and relatives (54).

The current study did not find any significant association between social networks or social support, and presence of generalized anxiety disorder or alcohol abuse/dependence disorder

following a life event. But increased social support from relatives was associated with reduced odds of experiencing panic disorder when facing some specific life events. However, the results also indicated that meeting relatives less frequently was associated with reduced panic disorder when facing the same life events. This can seem counterintuitive, as it would be expected that more frequent contact with relatives should be beneficial, if higher social support from relatives was helpful. However, the questions regarding social support from friends or relatives were not specifically linked to a particular friend or relative included

within a network within that study. Although perceived social support should refer to the support received from those within one's social network, not every friend or relative within one's network provides similar level of social support. It is also possible that while higher perceived social support from a particular relative is beneficial, meeting relatives too frequently can exacerbate those same symptoms, as they may be questioned about it repeatedly, which in turn could lead to increased level of worry. In summary, the findings underlined the importance of the role of social support rather than social networks in mental disorders. However, it should be clarified that perceived social support is dependent on individuals within one's social network, so both of those concepts are interlinked.

The failure to find significant associations between social networks and social support in the diagnosable mental disorders examined in this study may be due to the limited number of life events included in the analyses. The effect of life events on mental disorders can vary. For example, bereavement and divorce is associated with depressive disorder, but unemployment has been found to be associated with depressive symptoms and distress. Research has shown that specific life events, similar to the ones in this study, are associated most commonly with depressive disorder and psychological distress (55). The causal effect of such life events on alcohol use disorders or anxiety disorders is unclear. In this study, psychological distress rather than any diagnosable mental disorder was found to be significantly associated with more life events. Another reason could be the time frame used to inquire about mental disorders and social networks and social support. While the questions on mental disorders asked about their presence until a year prior to the interview, those related to social networks and social support went back only until 6 months prior to the interview. Questions on psychological distress, however, asked about their presence in the past few weeks. Thus, it is possible that for some individuals mental disorders could have affected social networks and social support.

The results highlight the importance of the quality of support rather than number or frequency of contacts when one is faced with a life event. This appears to be particularly relevant for milder forms of mental health problems, like psychological distress. Given that the role of social networks and social support were more important when the level of illness had not reached that of a clinically diagnosable mental disorder, it becomes more important to involve one's social

networks and social support at an earlier stage of the illness. These findings are also significant for clinical interventions for individuals suffering from psychological distress and common mental health problems. For example, a recent study reported that people with subclinical depression do not use general health services or formal mental health services as frequently as people with major depression (56). This suggests that individuals with subclinical depression might benefit from increased social support, and thus may not need to seek formal mental health services. The importance of social support in clinical research was also highlighted in a recent randomized controlled trial in which patients with psychosis who participated in peer support groups experienced a greater increase in self-efficacy, quality of life and social support, compared to the control group (57). Although psychosis was not examined in the current study, future treatment studies should explore the outcomes of peer support groups among individuals experiencing a range of common mental disorders including preclinically diagnosable mental health problems as suggested by our study.

From a case management perspective, these findings suggest that early detection of symptoms, and identification of individual(s) within one's network who can provide adequate social support may be critical to preventing subsequent mental health disorders. Assessment of a patient affected by a significant life event should encompass detailed review of social networks and social support, and case managers should encourage significant contacts to be involved in the treatment process. From a public health perspective, these findings underscore the potential significance of strengthening existing social networks and social support within a community and identifying key community members who could provide support in times of stress. The importance of quality of support from friends, relatives and spouse points to the need for building strong support structures within the community, and maintaining such structures.

Although this study did not find a significant effect of the total number of life events on change of social networks or social support, other similar communities with ageing population could have different effects. For example, Carstensen (58) found that with age, people tend to have more interactions with their spouse or siblings, but fewer interactions with acquaintances. Also, with age, death of a spouse or close contact could lead to loss of social support, the role of extended families, friends, faith, and community services would need to be strengthened in such cases. Some exploratory

analyses were performed on the significant models identified above to examine any interaction between social networks and social support and three other covariates: gender, prior use of mental health services and prior mental health condition. Although no significant interaction was found, additional research is needed to further explore these associations, including other factors such as age.

This study has some limitations which need to be considered. There was some loss to follow-up between the two time-points. Of those lost to follow-up between 1993–1996 and 2004–2005, more than half died, about 8% could not be traced, and about 10% refused to be interviewed. We accounted for bias due to attrition by using attrition weights, but residual bias is possible. Another limitation is that the measures of social networks and social support were based on self-reports, and thus could not be corroborated. The number life events, social networks and social supports assessed in the study were also limited. A different pattern of findings may have emerged if a different set of life events had been assessed. The life events were also not weighted according to severity or any other criteria, thus it is not possible to determine if the severity of a life event had variable effect on the results. The question on mental disorders inquired about its occurrence within the past year of each interview. On the other hand, the questions on social networks and social support inquired about such within the past 6 months of the interviews. Thus, it is possible that in some cases, the presence of mental disorder may have affected social networks and social support; however, we are precluded from exploring these associations given the available data.

In conclusion, this study has improved upon previous research by using disaggregated data about life events and social networks and social support, and studying their association with a number of specific common mental health conditions, in a population-based longitudinal study. To the best of our knowledge, this is also the first study to examine the effect of life events on generalized anxiety disorders, panic disorder, and alcohol abuse/dependence disorder, while accounting for social networks and support in a population-based longitudinal study. Future research should not only focus on assessing the effect of specific life events on specific mental disorders in the presence of specific social support measures, but also examine these associations within the context of clinical treatment by incorporating social structure into the treatment plan. Future studies should look for a potential causal relation-

ship. Further, research is also needed to explore differences in the outcomes associated with support received from friends, relatives, and spouse.

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Declaration of interest

No conflict of interest.

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