

Neighborhood characteristics and mental health: the relevance for mothers of infants in deprived English neighborhoods

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Abstract

Purpose Neighborhood features have been linked with adult mental-health problems, particularly depression. A recent comprehensive review indicated structural neighborhood features derived from data sources such as the census may be less important predictors of mental health problems than social processes but that most studies lack multiple neighborhood measures. The aim of the study is to investigate relations between multiple neighborhood factors (observations, interviewer ratings, UK Census data) and maternal mental-health problems.

Methods 14,700 mothers with 9-month-old infants living in 195 deprived neighborhoods in England were interviewed, neighborhoods were observed and census data on employment, ethnic background and housing tenancy utilized.

Results Lower (interviewer-rated) neighborhood quality and lower neighborhood prosperity predicted more mother-reported mental-health problems net of family-level predictors. Contrary to expectations detailed observations did not contribute additionally.

Conclusions Neighborhood conditions, though not as important as family factors and maternal characteristics,

are sufficiently important to consider when planning mental health services; they can be assessed at relatively low cost by census data or professionals' ratings.

Keywords Neighborhood · Mental health · Parenting · Deprivation · Prevention

Introduction

Associations have been documented between neighborhood characteristics and adult mental health problems, in particular depression [1–3], although some studies find no such link once individual and family factors such as low income, low educational qualifications or lone parenthood are taken into account [4–6]. Neighborhood deprivation is also considered detrimental to the mental health of children and adolescents [7–10]. A likely explanation of such findings is that parental perceptions of neighborhood features are related to their concerns about their own and their children's safety and about the potential influence of other (antisocial) children in the community. These anxieties are likely to affect parental mental health and family functioning, fostering poor discipline and inconsistent parenting, but other processes involving peer group influences may also play a part. These adverse family processes then undermine child well-being, placing children at risk of developing problems [11, 12].

A recent comprehensive review [13] concluded that at least one neighborhood characteristic was associated with depression or depressive symptoms in adults in the majority of studies examined (i.e., 37 out of 45). What is less clear is which particular aspects of the neighborhood are most likely to place adults (and thereby children) at risk. The review [13] noted that, although the average

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socioeconomic status (SES) of residents was the most commonly studied neighborhood characteristic, the evidence for the association of depression with structural aspects of the neighborhood—such as SES composition or housing stock—was less consistent than for social processes, including presence of violence and disorder. In considering whether such results were a function of research methods and designs, the authors called attention to the absence of studies using observational measures of the neighborhood or of ones assessing neighborhood resources, as well as the various ways in which neighborhood has been defined and operationalized.

Much available work has considered only one dimension of the neighborhood, while relying on a single source of information—for example, administrative data describing economic inactivity [14] and neighborhood poverty [15]; questionnaire data on residents' perceptions of danger and disorder [16, 17] or measures of the quality of the built environment [18]. Rarely have studies focussed upon multiple dimensions of the neighborhood, used multiple methods or called upon multiple informants. While the reviewers of the evidence [13] consider more and better quality observational work essential to advancing understanding of the neighborhood determinants of mental health problems, some take a different view; indeed an earlier US study concluded that relatively inexpensive information, such as that from the census about neighborhood poverty, should be sufficient for such purposes [19].

To address issues just raised, this study used a range of measures of the socioeconomic, structural, social and resource aspects of the neighborhood to predict the mental health problems of mothers with infants living in deprived neighborhoods throughout England. Data come from existing data sources, from the resident mothers themselves and from observers carrying out systematic field observations. As maternal mental illness is known to place infants at risk for developmental and behavioral problems [20], it is important from an intervention perspective and when planning or targeting health service provision to know whether neighborhood factors do play an important role once family and individual factors have been taken into account and, if so, which aspects of the neighborhood are most relevant to parental and consequently child mental health.

Method

Participants

An NHS Multi-Regional Ethics Committee and Birkbeck's ethics committee approved the research. Data were gathered during the first phase of the National Evaluation of

Sure Start [21, 22] evaluating a community-based early intervention programme targeting all families with young children living in defined deprived areas in England. 150 of 260 active Sure Start Local Programme (SSLP) areas were randomly selected following stratification across nine government regions within England and an additional 50 deprived areas waiting to have SSLPs. Families in the areas with 9-month-old children were randomly selected from Child Benefit records (a Government payment for each child living in the UK, which is not means tested; the database contains 98% of all births) during calendar years 2003 and 2004 and data were gathered on 15,811 families. The response rate was 84.4%; no information was gathered on non-respondents. Mother/guardians provided written informed consent. Neighborhood observations were conducted by the research team in 195 of the 200 areas; missing information was related to staffing problems, not the nature of the areas. The number of observations per area depended on its geographical size and the density of streets, determined by visual examination of maps of each area, with 12 observations in the 31 smallest/least dense areas, 16 in the 87 medium areas and 20 in the 77 largest/most dense areas. Characteristics of the participants and their neighborhoods can be seen in Table 1.

Outcome: maternal mental health

Information on current maternal mental health problems was gathered using a 9-item version of the Malaise Inventory [23] developed for the nationally representative UK Millennium Cohort Study on the basis of factor analysis of questions from previous national cohorts [24]. Questions answered 'yes' (1) or 'no' (0) cover feeling miserable or depressed, often worried, often in a violent rage, suddenly scared for no reason, easily upset or irritated, keyed up and jittery, little things get on your nerves, and heart often races.

Independent variables

Neighborhood characteristics

Neighborhood definition SSLP areas were defined locally and did not conform to existing administrative boundaries. Although all were deprived there remained substantial variability between them on many indicators [25]. Maps of the areas were digitized using geographic information systems [26] and estimations made of the proportion of each 2001 Census Lower Level Super Output Area (LSOA) covering each SSLP area so that data could be extracted to describe their characteristics. This was achieved by identifying each unit postcode in any LSOA that intersected with a SSLP area and, from the count of households within

Table 1 Characteristics of the participants and their neighborhoods

Characteristic	Categories	N (%)
A. Categorical characteristics		
Maternal highest educational qualification	None	3,996 (27.2)
	Other	1,066 (7.3)
	GCSE/'O' level	3,623 (24.6)
	'A' level	3,391 (23.1)
	Degree	2,530 (17.2)
	Missing	94 (0.6)
Parental status	Has partner/husband	9,723 (66.1)
	Lone	4,977 (33.9)
Maternal ethnic group	White	11,833 (80.5)
	Other ethnic groups	2,773 (18.9)
	Missing	94 (0.6)
Family managing financially	Doing all right or better	6,692 (45.5)
	Getting by	4,864 (33.1)
	Finding it hard	2,357 (16.0)
	Missing	787 (5.4)
Characteristic	N	Mean (SD)
B. Continuous indicators		
Maternal age	14,523	27.3 (6.1)
Number of people in the household	14,700	3.9 (1.4)
Maternal rating of the area	14,689	32.2 (6.4)
Interviewer rating of the area	14,564	22.2 (3.5)
Observed area deterioration	14,700	0.78 (0.07)
Observed public social disorder	14,700	0.98 (0.03)
Observed facilities for families	14,700	0.23 (0.09)
Observed 'hangout' locations	14,700	0.33 (0.17)
Percentage of population employed	14,700	56.4 (8.9)
Percentage of population ethnic minority	14,700	14.7 (19.7)
Percentage of households owner occupied	14,700	47.7 (14.3)
Percentage of households renting from council	14,700	30.6 (15.9)
Malaise total score	14,700	1.78 (1.9)

the postcodes, estimating the proportion of households within that LSOA that fell within the SSLP. This proportion was then applied to relevant census counts of residents (released by the Office of National Statistics) and summed for each SSLP.

Administrative data Information from the most recent national Census (2001) that was relevant to poverty, housing tenancy and the neighborhood ethnic composition was extracted, along with the population (by age group) of each area. The proportion of the adult population of working age (16–64) in employment was selected as the most reliable indicator of neighborhood economic prosperity, more reliable than worklessness as data are more complete. Further neighborhood-poverty or affluence indicators were created based on household tenancy: the proportions of households described as owner occupied and

the proportion in rented social housing. Two categories of ethnic diversity, white and non-white, were created by combining census indicators 'white British', 'white Irish' and 'white other' together and the indicators 'mixed' (all subcategories), 'Asian' (all subcategories), 'Black' (all subcategories) and 'Chinese or other ethnic group' (all subcategories) together.

Maternal rating Mothers answered 10 questions from the Neighborhood Characteristics Questionnaire [27] about friendliness of neighbors, satisfaction with their home, satisfaction with the area, frequency of neighborhood problems (i.e., noisy neighbors, rubbish in the street, vandalism, racial insults or attacks, pollution, and drug related crime), and whether the neighborhood was a good place to bring up children. The internal consistency reliability (Cronbach alpha) of the composite score was 0.83.

Interviewer rating After each home visit the interviewer completed a seven-item questionnaire about the area immediately surrounding the home (e.g. general conditions of buildings, level of traffic, rubbish visible, people behaving in a hostile manner); a higher composite score reflected a more positive perception of the neighborhood (Cronbach alpha = 0.78).

Neighborhood observations In each area researchers—sometimes, but not always, the same individual conducting interviews—completed a pre-specified number of detailed observations using an adaptation of the Block Environment Inventory [28, 29] modified for use in the UK. Items pertained to the nature and behavior of people observed, the nature of houses and commercial buildings, the street itself and any disrepair, traffic movement, and commercial or institutional facilities present. (Full schedule available on request.) All items were re-scored so that the positive responses led to the highest scores and re-scaled to have a minimum of 0 and a maximum of 1. The total for each item was divided by the total number of observations per area to create a mean score for the area. Based on the instrument's previous scale development [27] and confirmatory factor analysis of data gathered in this study, four composite scales were created: area deterioration (8 items, e.g. burned-out buildings, poor road surface, litter, graffiti, bad odors), public social disorder (4 items, e.g. public drinking, fights), establishments associated with disorder by attracting 'hanging out' behavior or social disorder (11 items, e.g. arcade, betting shop, off-license, pub) and the presence of establishments providing resources for families with young children (22 items, e.g. chemist, GP surgery, health centre, library, bank, park). Internal consistency reliability for these subscales ranged from 0.69 to 0.78. All composite subscale scores used in the analysis represent mean item scores so that they are directly comparable to one another. (Full details of all scales available on request.)

Demographic factors

Mothers reported on their highest educational qualification (5-point coding: none, vocational, General Certificate of Secondary Education/ordinary level qualification—gained usually at the school leaving age of 16; advanced level qualification—gained usually after two additional years of school at 18, bachelor's or higher degree), ethnic background (coded like the census data into 'white' or 'other' groups); partner status (i.e., lone parent or living with a partner/husband), number of people in the household (range 2–10) and on stated problems managing financially (3 = doing all right, 2 = getting by, 1 = finding it difficult), as well as infant gender.

Analysis

Pearson correlation coefficients were calculated between continuous demographic and neighborhood characteristics and the maternal Malaise score to determine which were significantly associated with maternal mental health. Categorical factors were entered into one-way ANOVAs with the Malaise score as dependent variable. Those demographic, family and neighborhood factors found to be significantly associated with malaise were entered into a multilevel hierarchical Linear Mixed Model using SPSS version 12.0 so that both levels of influence (neighborhood, family) could be examined separately, taking into account the clustering of individuals within areas.

Results

Zero order correlations indicated that malaise was related to the respondent's rating of the neighborhood ($r = -0.19$, $p < 0.001$), the interviewer's rating of the immediate neighborhood ($r = -0.09$, $p < 0.01$) and the composite observed area "deterioration" scale score ($r = -0.05$, $p < 0.01$). Thus, the more mothers and interviewers rated the neighborhood badly and the more objective evidence of deterioration from multiple observations of the area, the more mothers reported feeling badly. Mothers also reported more mental health problems when, according to the UK Census 2001, there were fewer local residents employed ($r = -0.07$, $p < 0.01$), when there were more ethnic minority residents ($r = 0.04$, $p < 0.01$) and when there was less home ownership ($r = -0.03$, $p < 0.01$). No significant association emerged between maternal Malaise and proportion of households renting social housing. Neither was maternal mental health associated with observed social disorder in the neighborhood, the observed presence of facilities likely to benefit families (e.g., library, swimming pool), or of establishments linked to disorder by attracting 'hanging out' behavior (e.g., pub, pool hall).

Mothers with fewer educational qualifications reported more mental health problems ($F = 36.05_{(4, 14,983)}$, $p < 0.001$), as did younger mothers ($r = -0.04$, $p < 0.01$), lone mothers [$F = 68.90_{(1, 15,083)}$, $p < 0.001$], those of ethnic minority status ($F = 22.96_{(1, 14,983)}$, $p < 0.001$), those who reported difficulty managing financially ($F = 438.51_{(2, 14277)}$, $p < 0.001$) and those living in households with more people ($r = 0.03$, $p < 0.01$). Malaise was not significantly associated with infant gender.

The proportion of households that were owner-occupied was strongly associated with the proportion of the local population employed ($r = 0.58$, $p < 0.001$). The former, less strongly associated with malaise, was not used in the final analysis to avoid collinearity problems.

When all variables significantly associated with malaise were entered into a mixed model analysis, the strongest predictors were at the family or maternal level, namely lone parenthood, a larger family size, the mother's report that the family was not managing financially or were just 'getting by', younger maternal age and the mother having no educational qualifications. Ethnic minority status was no longer a significant predictor (see Table 2). Two neighborhood factors predicted maternal mental health problems even after taking into account a variety of other factors. Interviewer ratings of a poor-quality neighborhood and census data showing a smaller proportion of local residents employed predicted more maternal malaise (see Table 2).

Discussion

A recent review [13] concluded that detailed observations of local neighborhoods could provide more information about aspects of a community likely to be associated with risk for maternal mental health problems beyond structural characteristics, often the only ones included in studies linking neighborhood factors with maternal mental health. In particular it was suggested that social processes may be relevant. This study included a range of observed neighborhood indicators, some based on the physical structure of

the neighborhood and others on the behavior of local residents. Univariate analyses suggested that the major neighborhood factor associated with malaise in this study of mostly poor mothers with infants living in disadvantaged neighborhoods was one that could be described as the 'broken windows' aspect [30], an uncared for community with more burned-out buildings, much litter and rubbish on the streets, graffiti, bad odors and a deteriorated road surface, the latter an indicator of the extent to which the local government has failed to invest resources into the area. Local provision of facilities such as transport, General Practitioner offices, child health clinics, playgrounds, libraries, schools and other such establishments proved unrelated to maternal well-being in this study of disadvantaged communities and neither did the presence of establishments such as amusement arcades, pubs and bars or betting shops. Finally, the observed measure of social disorder (such as people arguing loudly in public or public drinking of alcohol) was not related to maternal mental health, even in univariate analyses.

One difficulty is that social disorder is event-based and observations such as those conducted in this research may be less likely to detect it simply because the observer needs to be on the street when an incident occurs in order to record it. In contrast, structural deterioration was evident whenever an observer visited the area. A more

Table 2 Results of mixed methods linear model to predict Malaise score

Fixed effects	Estimate	SE	<i>df</i>	<i>t</i>	Significance	95% confidence intervals	
Intercept	2.218	0.267	240.9	8.30	0.000	1.691	2.744
Lone parent	0.086	0.036	13,342.5	2.35	0.019	0.014	0.158
Household size	0.049	0.013	13,403.1	3.84	0.000	0.024	0.074
Maternal age	-0.013	0.003	13,191.4	-4.55	0.000	-0.019	-0.008
Maternal qualifications							
None	0.231	0.053	13,469.2	4.39	0.000	0.128	0.335
Other	0.077	0.071	13,567.3	1.08	0.280	-0.062	0.216
GCSE/'O' level	0.054	0.052	13,506.89	1.04	0.300	-0.048	0.155
'A' level	0.001	0.052	13,558.93	0.02	0.988	-0.101	0.103
Finances							
Not managing	1.222	0.045	13,556.7	26.88	0.000	1.133	1.312
Getting by	0.521	0.035	13,576.8	14.71	0.000	0.452	0.591
Mother ethnic minority (non-white)	0.026	0.054	13,516.3	0.49	0.627	0.080	-0.133
Interviewer's rating of local neighborhood	-0.016	0.005	8,148.7	-3.27	0.001	-0.026	-0.007
Observed area deterioration	0.105	0.352	167.1	0.30	0.767	-0.591	0.800
% of local residents employed (census)	-0.853	0.302	182.5	-2.82	0.005	-1.449	-0.257
% of local residents ethnic minority (census)	-0.040	0.132	382.2	-0.31	0.76	-0.300	0.219
Parameter	Estimate	SE	Wald Z	Significance	95% confidence intervals		
Covariance parameters							
Residual	3.349	0.041	81.85	0.000	3.270–3.430		
Sure Start area variance	0.022	0.007	3.00	0.003	0.011–0.042		

labor-intensive study of a smaller number of neighborhoods might detect the hypothesized, but not discerned effect of social disorder on maternal mental health.

The extent of economic deprivation in the area, as indicated by the proportion of local residents who were employed, was relevant to maternal mental health, even after taking into account family levels of economic hardship and even in this sample of neighborhoods that have reduced variance in the extent of deprivation since all (by definition as Sure Start areas) were to varying extents deprived. Thus, for a mother struggling financially, living in an area where fewer local residents are employed may exacerbate mental health difficulties, though the association, while significant, is small in comparison with associations between observers judgements about the area and maternal mental health. The mechanism is not clear from this study but the results suggest that the unemployed residents are not creating disorder in the local area by hanging out. Rather it is likely that a sense of hopelessness surrounds many of the local households. The lack of employment may also indicate a lack of investment in the local area, which will contribute to the structural deterioration.

Detailed (and costly) observation of neighborhood deterioration was significantly associated with more maternal mental health problems in the univariate analyses, though the correlation coefficient was small and not a significant factor t once others were taken into account. The observations did not have any additional predictive effect in analyses beyond the information from global interviewer ratings or the demographic data from the census. However, observational data may be useful in exploratory research studies designed to tease out which aspects of the local area are associated with residents' negative perceptions.

Not included in the regression analysis since it may have been influenced by maternal mental well-being, but significantly associated with reported mental health problems, was the respondent's view of the local area. It is noteworthy, however, that the interviewer, a trained professional familiar with the neighborhood, could provide similar information which was significantly related to maternal well-being in the multilevel analysis. Maternal and interviewer ratings of the local area were significantly related ($r = 0.39$, $p < 0.001$) and interviewers' ratings are not as subject to the risk of respondent bias as maternal reports are. Thus, a short observational schedule used by local community health professionals who make home visits (e.g., in the UK health visitors and midwives) could be a cost-effective way to collect information about which parts of local authority areas might be targeted by outreach or the provision of additional services for mothers with infants in hopes of preventing or ameliorating mental

health problems. This would seem important with regard to promoting the well-being of children given well-documented links between poor maternal mental health and child behavior problems [20].

Prevention strategies focussed on adult mental health can, on the basis of this study, be informed in the first instance by readily accessible neighborhood indicators available from the census—the proportion employed, the proportion of households that are owner-occupied—supplemented by observational ratings by local professionals.

The study has limitations: if fewer neighborhoods had been studied then more observations could have been conducted per area which may have increased the likelihood that social disorder could be observed though it is more likely that this could be enhanced by observing in the evenings; if a wider range of areas including some affluent ones had been included, then the observed impact of neighborhood factors on maternal well-being might have been more evident. At the time that the study was conducted small area-level crime statistics were not available nationally and specially collected crime data for the Sure Start areas were not available for all areas [31]. Local crime is likely to be related to maternal well-being, particularly their own perception of the extent of local crime and disorder. Finally, a more detailed mental health measure with a specific focus on depression symptoms might have revealed further associations with neighborhood characteristics.

In conclusion, neighborhood conditions are not as relevant as family factors and maternal characteristics when predicting maternal well-being. They do, however, have sufficient relevance to be incorporated into a community public health strategy and can be assessed relatively accurately by ratings made by local professionals.

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