Prevalence and Predictors of Parenting Outcomes in a Cohort of Mothers With Schizophrenia Admitted for Joint Mother and Baby Psychiatric Care in England

Kathryn M. Abel, Ph.D.; Roger T. Webb, M.Sc.; Margaret P. Salmon, B.Sc.; Ming W. Wan, Ph.D.; and Louis Appleby, M.D.

Objectives: Most women with schizophrenia have children. Schizophrenia has been identified as an independent predictor of poor parenting outcome following joint mother and baby psychiatric admission. We aimed to describe the characteristics of these women postnatally and to estimate the prevalence of, and identify independent predictors of, parenting outcomes.

Method: Clinical and psychosocial data from consecutive joint psychiatric admissions of mothers and infants between September 1996 and September 2002 were collected. Diagnoses were based on ICD-10 criteria (N = 239 schizophrenia; N = 693 affective disorders). The prevalence of each parenting outcome at discharge, assessed according to social services intervention and staff-rated measures of parenting ability, was estimated. Factors associated with poor parenting outcomes and independent predictors were identified using "modified" Poisson regression, and prevalence of these parenting outcomes was estimated in subgroups of mothers stratified by combinations of protective/risk factors.

Results: Mothers with schizophrenia were characterized as having more complex clinical and psychosocial problems and were considerably more likely to experience all types of poor parenting outcomes, compared to mothers with affective disorders. Mothers with schizophrenia reporting supportive marital and other relationships, those whose partners were well, and those of higher social class showed the best parenting outcomes.

Conclusions: Mothers with schizophrenia who experience better parenting outcomes may be protected by certain factors. Successful parenting is related, partly, to stability within the family and access to financial and social resources. The nature of the relationship between identified predictors and parenting outcomes in this group is unclear but may suggest that parenting outcome varies with clinical outcome in schizophrenia. Future research and service development should focus on potential protective factors that may encourage successful parenting outcomes in this vulnerable group.

(J Clin Psychiatry 2005;66:781–789)

Received Oct. 29, 2004; accepted March 10, 2005. From the Centre for Women's Mental Health Research, Manchester University, Manchester, United Kingdom.

This project received funding from the Marcé Society and South Manchester University Hospitals Trust (United Kingdom).

In the spirit of full disclosure and in compliance with all ACCME Essential Areas and Policies, the faculty for this CME activity were asked to complete a full disclosure statement. The information received is as follows: Drs. Abel, Wan, and Appleby, Mr. Webb, and Ms. Salmon have no significant commercial relationships to disclose relative to the presentation.

Corresponding author and reprints: Kathryn M. Abel, Ph.D., Centre for Women's Mental Health Research, Manchester University, 7th Floor, Williamson Building, Manchester M13 9LR (UK) (e-mail: kathryn.m.abel@manchester.ac.uk).

Joint mother and baby psychiatric admissions have generally been reported to have a positive effect on ill mothers.[1–3] We have previously reported that most mothers admitted to a mother and baby unit (MBU) in England have good clinical (78%) and parenting (80%) outcome[4] as assessed by clinical staff. However, maternal schizophrenia has consistently been reported to be associated with poor parenting outcomes.[5] One community study,[6] based on a sample of 19 mothers, reported that a quarter of infants of women with schizophrenia were placed in institutional care. It has been suggested that institutionalization is likely to occur even if mothers received greater levels of nursing care and services compared to those admitted with other disorders.[6,7]

In spite of these poorer outcomes, most women with schizophrenia become mothers.[8–11] Based on a prevalence of 0.3%,[11,12] over 37,000 women of childbearing age in the United Kingdom have schizophrenia. Around a thousand of these women give birth per year.[11] Greater prescribing of atypical antipsychotic medication (which does not suppress the hypothalamic gonadal axis) is likely to increase childbearing in this group.[11] The deinstitutionalization of severely mentally ill women may also make them more likely to become pregnant, in part through increased social contact. Indeed, in England, the percentage of MBU admissions for schizophrenia has been increasing.[13] Recent changes in U.K. health policy and greater social awareness of potentially vulnerable children may in part account for this. The offspring of women with schizophrenia represent a particularly vulnerable group. Severe instabil-

ity in early rearing environment,[14] poor relationship with both parents,[15] and poor verbal communication of parents[16] have all been reported to predict poor outcomes in the children of parents with schizophrenia. These include a high risk of emotional, behavioral, and cognitive difficulties as well as psychiatric symptoms later in life (see reference 17).

However, little is known about the factors that determine whether or not a mother with schizophrenia can successfully parent her child. In one small sample (schizophrenia, N = 20; affective psychosis, N = 36; nonpsychotic disorders, N = 24),[3] mothers admitted with schizophrenia were more likely to be single, to be perceived as having problems interacting with their infants at discharge, and to be recommended for formal supervision or separation from their infants. The long-term consequences of placing infants of mothers with schizophrenia into care are unknown and may be particularly pernicious.

The Marcé database was established in 1996 as a prospective audit of MBU admissions in England. Information concerning more than a thousand (N = 1153) subjects was available for this investigation, thereby providing a large and unique sampling frame of mothers with severe mental illness in the postpartum period. Using this database, we aimed to describe the characteristics of mothers with schizophrenia admitted postnatally in England and to estimate the prevalence of, and identify independent predictors of, parenting outcomes in these mothers. As well as identifying risk factors for poor parenting, we also set out to identify potential protective factors in mothers who experience better outcomes. We hypothesized that mothers with schizophrenia who have lower levels of social adversity (as reflected by socioeconomic factors), those with supportive marital or other social relationships, and those with less severe illness (as indicated by timing and duration of admission and informal legal status at admission) would be more likely to have better parenting outcomes.

METHOD

Setting

Eight MBUs and 3 hospitals providing designated mother and baby beds participated. These constitute the majority of National Health Service–funded units that provide joint psychiatric care for mothers and their infants in England.

Marcé Clinical Checklist

Each unit/facility submits data to the Centre for Women's Mental Health Research on a quarterly basis as part of the prospective audit. The Marcé checklist (available from the authors by request) consists of 10 sections to be completed in 2 parts, at admission and during the final week of admission. Data are collected and stored anonymously with no patient-identifiable information, a format that is compliant with the United Kingdom Data Protection Act.

Subjects

Data from 1153 women were entered into the audit database between September 1996 and September 2002. Diagnosis was determined at discharge by the mother's clinical team and consultant psychiatrist according to ICD-10 criteria. The main results are based on mothers diagnosed with schizophrenia (N = 239), approximately a fifth of all the mothers admitted. For some analyses, mothers diagnosed with affective disorders (i.e., three quarters of the remaining mothers, N = 693) were also used as a comparison group.

Outcomes

The prevalence of each parenting outcome at discharge was estimated as the primary parenting outcome, categorized according to social services intervention and staff-rated measures of parenting ability: (1) Infant home with mother without supervision, (2) Infant home with mother but placed on an "at risk" register, (3) Infant home with mother under care or a protection order, (4) Infant voluntarily placed in foster care, (5) Infant placed in statutory care or adopted. Poor parenting outcome was defined as any level of social services intervention (i.e., categories 2, 3, 4, or 5), with separation of infant from mother (i.e., categories 4 or 5) used as a more stringent definition of poor outcome.

Clinical teams (which include the responsible medical officer and nursing, occupational therapy, psychology, and social work staff), under whose care mothers are admitted, routinely assess clinical state and parenting skills prior to discharge. Decisions about subsequent care of the infant are based in part on these clinical assessments, so we investigated these as secondary parenting outcome measures. They consisted of 3 binary variables: "significant problems in caring for infant," "significant problems of emotional response to child," and "significant risk of harm to child." These variables were found to be strongly intercorrelated (70%–80%). This could have occurred because staff raters may have developed a response set, whereby they filled in the same response for all parenting outcomes without considering them each independently. For this reason, and to avoid producing a large number of repetitious tables, an overall binary staff-rated "poor parenting" outcome variable was generated (i.e., "at least 1 poor parenting outcome" versus "no poor outcomes").

Interrater Agreement

The degree of agreement between raters was established for the 3 staff-rated poor parenting outcomes measures listed above. In relation to 4 mothers admitted to different MBUs, a clinician from the same unit rated the outcomes (i.e., evidence of a significant problem, "yes"

or "no"). Video recordings were made of these mother/interviewer and staff/interviewer scenarios, and then a researcher (K.M.A. or M.P.S.) gave a rating blinded to that given by the clinician. For the purposes of the exercise, the ratings given by the researchers were treated as the "gold standard" (although clearly no such standard can truly exist for these ratings). The videos were sent to other MBUs where a member of staff was also asked to assess and rate the outcomes. The ratings made by the clinicians were then compared to our own. A high level of agreement between the clinical raters and ourselves was found. Thus, 82% agreed with our rating for practical problems caring for infant, 93% agreed for mothers experiencing problems with emotional responsiveness toward their infant, and 86% agreed for mothers perceived as posing a significant risk of harming their infant. Overall, the level of agreement between the clinicians' ratings and our ratings was high (87%).

Statistical Analysis

Statistical analyses were performed using Stata software.[18] Descriptive statistics were used to illustrate the clinical and psychosocial characteristics of the mothers with schizophrenia and compared to the characteristics of the mothers with all types of affective disorders. Prevalence of parenting outcome according to various definitions was calculated. Risk ratios (RRs) and their 95% confidence intervals (CIs), comparing outcome in the mothers with schizophrenia versus those with bipolar disorder and those with unipolar depression as separate reference categories, were calculated using the method described in the next paragraph.

For the mothers with schizophrenia only, factors associated with poor parenting outcomes were examined using a modified version of Poisson regression,[19] which entails fitting the model with a robust (i.e., Huber/White/sandwich) variance estimator.[20] Logistic regression, a common approach to modeling binary outcomes, was rejected due to extreme violation of the rare disease assumption[21] (i.e., half of the women with schizophrenia had poor outcome according to either measure). This was confirmed by preliminary analyses, which indicated that the odds ratios overestimated the relative risks by up to 250% in this data set. By contrast, the "modified" Poisson regression models provide valid estimates of the risk ratio (a true measure of relative risk). This approach was favored over log-binomial regression due to the latter's known propensity for failing to converge.[21] Two sets of models were generated, one using social services intervention as the outcome and the other using the staff-rated outcome measure. Variance inflation factors were estimated to test for the presence of collinearity in the multivariate models.[22] Using the parameters estimated by these multivariate models, the (population) attributable fraction (PAF) was calculated with covariate adjustment.[23]

Finally, for 3 different definitions of poor parenting outcome (overall staff-rated binary measure, social services intervention at discharge, mother/infant separation at discharge), prevalence was estimated for subgroups of mothers with schizophrenia stratified according to the independent predictors of outcome. These subgroups were stratified by individual risk/protective factors and by combinations of these factors.

All statistical tests were 2-sided, and significance was set at $p < .05$.

RESULTS

Sociodemographic and Psychosocial Characteristics

The clinical and psychosocial characteristics of the admitted mothers are presented in Table 1. The mothers with schizophrenia were more likely than those with affective disorders to have adverse clinical features (for example, in terms of past psychiatric history, timing of illness onset, timing of referral, and legal status at admission) and psychosocial problems (for example, lower social class, poor quality of relationships and other social support, and psychiatric illness in partner). However, the 2 groups of mothers were comparable in terms of age distribution and parity, and there was no evidence of between-group differences in duration of admission and sex of baby.

Prevalence of Poor Parenting Outcomes

In Table 2, prevalence rates of poor parenting outcomes and clinical evidence of harm to infant are presented for mothers with schizophrenia versus those with bipolar disorder and unipolar depression. Only half of the mothers with schizophrenia were discharged home caring for their infants without any level of formal supervision by the social services, in contrast to the great majority of mothers with affective disorders (91% for unipolar depression; 80% for bipolar disorder). A relative risk of 5 for intervention, comparing maternal schizophrenia with unipolar depression, was observed; the relative risk for intervention, comparing schizophrenia with bipolar disorder, was lower (RR = 2.5).

Just over half of mothers with schizophrenia had at least 1 staff-rated poor parenting outcome compared to around one fifth of those in each of the 2 groups of affective disorders. The most common staff-rated poor outcome was "significant problems of emotional response to infant" (43% for maternal schizophrenia), followed by "significant problems caring for infant" (36%), and then "significant risk of harm to child" (20%). For each of these 3 outcomes there was approximately a 3-fold relative risk of poor outcome in the mothers with schizophrenia compared to those with either bipolar disorder or unipolar depression (Table 2).

A quarter of all mothers admitted with schizophrenia were separated from their infants, compared to only 6

Table 1. Psychosocial and Clinical Characteristics at Discharge of Mothers Admitted for Joint Mother and Baby Psychiatric Care in England[a]

Characteristic	Schizophrenia (N = 239) N	%	Affective Disorder (N = 693) N	%	Statistic[b]
Age, y					$\chi^2 = 0.13$, df = 3, p = .99
< 25	47	20	137	20	
25–29	69	29	196	29	
30–34	71	30	198	29	
35+	52	22	156	23	
Social class					$\chi^2 = 39.64$, df = 2, p < .001
Professional/managerial/ skilled manual	64	28	339	51	
Semiskilled/unskilled	124	54	270	40	
Never employed/ unclassifiable	41	18	59	9	
Ethnicity					$\chi^2 = 56.34$, df = 3, p < .001
White	133	56	534	78	
Black African or Caribbean	64	27	62	9	
South Asian (Indian subcontinent)	26	11	49	7	
Other	15	6	44	6	
Marital status					$\chi^2 = 46.67$, df = 1, p < .001
Married/cohabiting	125	53	524	76	
Single/divorced/ separated/widowed	112	47	163	24	
Quality of relationship					$\chi^2 = 35.35$, df = 2, p < .001
Predominantly good	110	47	434	63	
Predominantly poor	62	26	174	25	
No partner	63	27	78	11	
Psychiatric illness in partner					$\chi^2 = 20.08$, df = 2, p < .001
None	164	78	590	90	
Treated by public mental health services	20	10	36	5	
Treated as inpatient	25	12	30	5	
Quality of other support					$\chi^2 = 25.62$, df = 2, p < .001
Predominantly good	106	48	447	67	
Predominantly poor	64	29	137	20	
None	50	23	85	13	
Sex of baby					$\chi^2 = 1.21$, df = 1, p = .27
Female	118	50	310	46	
Male	118	50	366	54	
Parity					$\chi^2 = 0.05$, df = 1, p = .83
Primiparous	132	57	382	56	
Multiparous	101	43	302	44	
Past psychiatric history					$\chi^2 = 15.26$, df = 1, p < .001
Absent	18	9	118	21	
Present	190	91	453	79	
Timing of illness onset					$\chi^2 = 39.56$, df = 2, p < .001
Antenatal	92	45	148	23	
< 3 weeks postpartum	48	24	252	39	
3+ weeks postpartum	62	31	240	38	
Timing of referral					$\chi^2 = 28.48$, df = 1, p < .001
Antenatal	60	25	77	11	
Postnatal	176	75	614	89	
Baby's age at admission					$\chi^2 = 31.80$, df = 1, p < .001
< 3 weeks	97	41	150	22	
3+ weeks	140	59	530	78	
Legal status at admission					$\chi^2 = 64.05$, df = 1, p < .001
Informal	133	57	564	83	
Section (any)	101	43	118	17	
Duration of admission					$\chi^2 = 3.17$, df = 2, p = .21
< 4 weeks	61	27	201	30	
4–7 weeks	69	31	233	35	
8+ weeks	95	42	240	36	
Living situation at discharge					$\chi^2 = 37.59$, df = 1, p < .001
With partner	110	47	469	69	
Other	124	53	207	31	

[a]Data at least 95% complete except for "psychiatric illness in partner" (schizophrenia: 87%), "quality of other support" (schizophrenia: 92%), "past psychiatric history" (schizophrenia: 87%; affective disorders: 82%), "timing of illness onset" (schizophrenia: 85%; affective disorders: 92%), and "duration of admission" (schizophrenia: 94%).
[b]p Values for test across all strata of the variable.

percent of mothers with affective disorders (Table 3). Only a quarter of the mothers with schizophrenia with staff-rated poor parenting outcome at discharge went home unsupervised with their infants, compared to most (60%) of the equivalent mothers with affective disorders. Nearly 70% of the mothers with schizophrenia who were rated as posing a significant risk of harm were separated from their infants at discharge, compared to less than half the equivalent mothers in the affective disorder group, a difference that was almost significant ($\chi^2 = 3.67$, df = 1, p = .055).

However, rates of clinical evidence of harm indicated that mothers with schizophrenia were no more likely to harm their children before or during admission than mothers with bipolar disorder or unipolar depression (in all 3 groups the reported prevalence of harm was between 2% and 4%; Table 2). However, mothers with unipolar depression were around twice as likely to report having thoughts of harm during the admission than those with schizophrenia or bipolar disorder. Mothers with affective disorders who were subject to social services intervention at discharge were around 3 times more likely to have a reported history of harming or neglecting their infant compared to the equivalent group of mothers with schizophrenia (12.5% vs. 4.3%; $\chi^2 = 4.57$, df = 1, p = .03).

Factors Associated With Parenting Outcomes: Univariate Models

As the results in Table 4 show, most of the checklist variables were significantly (p < .05) associated with social services intervention at discharge. The strongest associations, with risk ratios greater than 2, were observed for earlier disease onset, lower social class, being unmarried (or not cohabiting with partner), having a poor relationship with partner, having no partner at home at discharge, and having a partner with psychiatric illness.

The univariate results for the staff-rated outcome measure were generally congruent with those for social services intervention, although the associations were generally weaker, and so the results are not presented in detail. The strongest associations, with risk ratios of almost 2, were for

Table 2. Prevalence and Relative Risks of Poor Parenting Outcomes and Clinical Evidence of Harm to Infant at Discharge of Mothers Admitted for Joint Mother and Baby Psychiatric Care in England

	Schizophrenia (N = 239)		Bipolar Disorder (N = 180)		Unipolar Depression (N = 513)			
Measure	N	%	N	%	N	%	RR[a] (95% CI)	RR[b] (95% CI)
1. Social services intervention								
Under social services supervision	118	50	34	20	46	9	2.5 (1.8 to 3.5)	5.4 (4.0 to 7.4)
2. Staff-rated								
Significant problems caring for infant	87	36	26	15	54	11	2.4 (1.6 to 3.6)	3.4 (2.5 to 4.6)
Significant problems of emotional response	103	43	23	13	73	14	3.2 (2.1 to 4.8)	3.0 (2.3 to 3.9)
Significant risk of harm to child	48	20	10	6	30	6	3.5 (1.8 to 6.7)	3.4 (2.2 to 5.3)
At least 1 staff-rated poor outcome	123	51	38/174[c]	22	101	20	2.4 (1.7 to 3.2)	2.6 (2.1 to 3.2)
3. Clinical evidence of harm to infant								
Actual harm to child (preadmission/during admission)[d]	7	3	3	2	18	4	1.7 (0.5 to 6.6)	0.8 (0.4 to 2.0)
Any clinical evidence (thoughts or acts)	26	11	19	11	124	24	1.0 (0.6 to 1.8)	0.5 (0.3 to 0.7)

[a]Risk ratios comparing outcome prevalence in mothers with schizophrenia vs. bipolar disorder.
[b]Risk ratios comparing outcome prevalence in mothers with schizophrenia vs. unipolar depression.
[c]Missing data on 6 patients.
[d]All 28 cases of actual harm were of a nonfatal nature.

Table 3. Prevalence of Specific Types of Social Service Intervention at Discharge Among All Mothers Admitted for Joint Mother and Baby Psychiatric Care in England and Among Clinical Subgroups Defined According to Staff-Rated Outcome[a]

	All Mothers Admitted, %		Mothers With at Least 1 Staff-Rated Poor Outcome, %		Mothers Rated as Significant Risk of Harming Infant, %	
Intervention	Schizophrenia (N = 237)	Affective Disorders (N = 693)	Schizophrenia (N = 121)	Affective Disorders (N = 135)	Schizophrenia (N = 47)	Affective Disorders (N = 36)
Infant with mother						
No formal supervision	50	88	25	60	15	25
On "at risk" register	13	3	15	7	11	17
On care/protection order	12	3	12	6	6	11
Infant placed in voluntary foster care	11	4	21	19	26	25
Infant placed in statutory care or adopted	14	2	27	8	43	22
Statistic (df = 4)	$\chi^2 = 158.85$, $p < .001$		$\chi^2 = 38.93$, $p < .001$		$\chi^2 = 4.68$, $p = .32$	

[a]Ns represent those patients for whom social services intervention status was known.

lower social class, unmarried status (or not cohabiting with partner), poor relationship with partner, no partner at home at discharge, and partner with psychiatric illness.

Prescription of Depot Neuroleptic Medication at Discharge

More than a quarter (27%) of the mothers with schizophrenia were prescribed depot neuroleptic medication at discharge. These mothers were more likely to be of low social class than those not prescribed depot medication at discharge (80% vs. 68%; $\chi^2 = 3.58$, df = 1, p = .059). The proportion of women who were nonwhite was similar for those prescribed depot medication compared to the other women with schizophrenia (41% vs. 44%; $\chi^2 = 0.13$, df = 1, p = .72). Almost three quarters (70%) of the mothers prescribed depot medication at discharge were subject to social services intervention compared to a minority (42%) of the other mothers with schizophrenia (Table 4). The mothers with schizophrenia who were prescribed depot medication were also more likely to be rated by clinical staff as having poor parenting outcome. The variable "depot medication at discharge" was dropped from the multivariate model reported in the next section due to nonsignificance.

Independent Predictors of Parenting Outcome: Multivariate Models

Table 5 presents the multivariate model for the independent predictors of social services intervention at discharge. In order to fit stable multivariate models, some of the explanatory variable categories were collapsed. Being of lower social class, having a psychiatrically ill partner, having a poor quality relationship (or no partner), and having poor quality of other social support independently predicted social services intervention at discharge. The adjusted PAF estimates were large (especially for social class, which was over half), reflecting the high prevalence of the predictors in this high-risk group of mothers. The population impact estimate for the combined effect of all covariates in the model was high (PAF = 73.7%). A second multivariate model, using the staff-rated measure, resulted in the same set of independent predictors of poor outcome (except for quality of other support, which was dropped due to nonsignificance). The strongest indepen-

Table 4. Univariate "Modified" Poisson Regression Models for Predictors of Social Services Intervention at Discharge in Mothers With Schizophrenia Admitted for Joint Mother and Baby Psychiatric Care in England

Explanatory Variable	Social Services Intervention N	Social Services Intervention %[a]	Risk Ratio	95% CI	p Value[b]
Age					.93
< 25 years	24	51	1.00		
25–29 years	31/67	46	0.91	0.62 to 1.33	
30–34 years	36	51	0.99	0.69 to 1.43	
35+ years	27	52	1.02	0.69 to 1.49	
Social class[c]					< .001
Higher	13	20	1.00		
Lower	101/164	62	3.03	1.84 to 5.00	
Ethnicity					.16
White	71/131	54	1.00		
Nonwhite	47	45	0.83	0.63 to 1.08	
Marital Status					< .001
Married/cohabiting	39/123	32	1.00		
Single/separated/ divorced/widowed	79	71	2.22	1.67 to 2.96	
Quality of relationship					< .001
Predominantly good	35	32	1.00		
Predominantly poor	40	65	2.01	1.44 to 2.80	
No partner	41	65	2.03	1.46 to 2.81	
Psychiatric illness in partner					< .001
None	59	36	1.00		
Treated by public mental health services	37	82	2.26	1.77 to 2.89	
Quality of other support					< .001
Predominantly good	40	38	1.00		
Predominantly poor	46	72	1.89	1.41 to 2.52	
None	25	50	1.31	0.91 to 1.90	
Sex of baby					.04
Female	67	57	1.00		
Male	51/117	44	0.76	0.59 to 0.99	
Parity					.85
Primiparous	66/130	51	1.00		
Multiparous	50	50	0.98	0.75 to 1.26	
Timing of illness onset					< .001
3+ weeks postpartum	12	19	1.00		
Antenatal or < 3 weeks postpartum	82	59	3.07	1.81 to 5.20	
Timing of referral					.07
Postnatal	81/174	47	1.00		
Antenatal	36	60	1.29	0.99 to 1.67	
Baby's age at admission					< .001
3+ weeks	57	41	1.00		
< 3 weeks	61/96	64	1.55	1.21 to 1.99	
Legal status at admission					.89
Informal	67	50	1.00		
Section (any)	49	49	0.98	0.76 to 1.28	
Duration of admission					.30
< 4 weeks	24/60	40	1.00		
4–7 weeks	36	52	1.30	0.89 to 1.92	
8+ weeks	50	53	1.32	0.91 to 1.89	
Living situation at discharge					< .001
With partner	32	29	1.00		
Other	85	69	2.38	1.73 to 3.26	
Depot antipsychotics at discharge					< .001
No	69	42	1.00		
Yes	43	70	1.69	1.32 to 2.15	

[a]Denominators used to calculate percentages are Ns shown in Table 1, unless otherwise noted to accomodate missing data.
[b]For test across all strata of the variable.
[c]Higher = professional, managerial, or skilled manual; Lower = semiskilled, unskilled, never employed, or unclassifiable.

dent predictor again was lower social class (RR = 1.72, 95% CI = 1.13 to 2.60); the largest attributable fraction estimate was for this variable (PAF = 30%), and the combined estimate for all covariates was again large (PAF = 48%). There was no evidence that either model was subject to collinearity according to the variance inflation factors.

Prevalence of Parenting Outcome Stratified by Protective/Risk Factors

The 3 variables that independently predicted poor outcome, according to either social services intervention or the staff-rated measure (i.e., lower social class, poor quality of relationship, psychiatric illness in partner), were used to stratify the parenting outcomes. The results are presented in Table 6. Mothers with schizophrenia who had a psychiatrically ill partner (22% of 209 mothers for whom psychiatric treatment status of partner was known) were likely to have poor parenting outcomes; over 80% of them had their infants placed under social services intervention at discharge, almost half were separated from their infants, and three quarters had at least 1 staff-rated parenting problem. The relatively small group of mothers with schizophrenia who were of lower social class, reported poor-quality relationships, and had psychiatrically ill partners (10% of 200 mothers for whom data for all 4 variables were available) had exceptionally poor outcomes. All of these mothers were subject to social services intervention at discharge and almost two thirds were separated from their infants.

By contrast, mothers with schizophrenia who were of higher social class (more than a quarter of the total) generally had good staff-rated parenting outcomes. Only a fifth of these mothers were subject to social services intervention at discharge, with less than 10% being separated from their infant. The prevalence of poor parenting outcome in mothers with schizophrenia who were of higher social class and who had a supportive, mentally well partner was even lower and was comparable to the prevalence in the mothers with affective disorders as a whole. This group accounted for almost a fifth of all the mothers admitted with schizophrenia.

Table 5. Multivariate "Modified" Poisson Regression Model for Independent Predictors of Social Services Intervention at Discharge in Mothers With Schizophrenia Admitted for Joint Mother and Baby Psychiatric Care in England

Explanatory Variable[a]	Risk Ratio (adjusted)	95% CI	p Value	Prevalence of Risk Factor, %	PAF, %[b] (adjusted)	95% CI
Social class						
Higher	1.00					
Lower	2.38	1.35 to 4.21	< .001	72	51.2	30.7 to 65.7
Quality of relationship						
Predominantly good	1.00					
Predominantly poor or no partner	1.53	1.11 to 2.11	.001	53	23.3	14.9 to 30.9
Quality of other support						
Predominantly good	1.00					
Predominantly poor or none	1.39	1.01 to 1.92	.04	52	18.9	11.0 to 26.1
Psychiatric illness in partner						
None	1.00					
Treated by public mental health services	1.85	1.45 to 2.36	< .001	22	17.3	14.0 to 20.4

[a]Multivariate model created using 77% (183/239) of the whole sample of women with schizophrenia.
[b]Population Attributable Fraction = estimate for the combined effect of all covariates: PAF = 73.7% (95% CI = 59.9 to 82.7).

Table 6. Prevalence of Poor Outcome for Subgroups of Mothers With Schizophrenia Admitted for Joint Mother and Baby Psychiatric Care in England Stratified According to Independent Predictors of Parenting Outcome

Stratification	Staff-Rated Poor Outcome, %	Social Services Intervention, %	Mother/Infant Separated, %
All mothers with schizophrenia (N = 239)	51	50	25
All mothers with affective disorders (N = 693)	20	12	6
Mothers with schizophrenia with risk factors			
1. Lower social class (N = 165)	59	62	33
2. Predominantly poor quality of relationship with partner/no relationship (N = 125)	65	65	35
3. Psychiatric illness in partner (N = 45)	76	82	47
Risk factors 1 and 2 (N = 99)	70	73	39
Risk factors 1 and 3 (N = 36)	72	89	53
Risk factors 1, 2, and 3 (N = 19)	84	100	63
Mothers with schizophrenia with protective factors			
1. Higher social class (N = 64)	31	20	9
2. Predominantly good quality relationship with partner (N = 110)	35	32	13
3. No psychiatrically ill partner (N = 164)	41	36	15
Protective factors 1 and 2 (N = 40)	22	12	3
Protective factors 1 and 3 (N = 50)	20	14	4
Protective factors 1, 2, and 3 (N = 37)	19	8	8

DISCUSSION

Main Findings

We report that only half of mothers with schizophrenia admitted for joint psychiatric care with their infants in England leave hospital with their infants without social services intervention, and only half have good parenting outcomes as judged by clinical staff. Large variation in rates of social service intervention by maternal diagnosis was observed; 20% of mothers with bipolar disorder and only 9% of those with unipolar depression were subject to intervention at discharge. Our results suggest that mothers with schizophrenia who experience better parenting outcomes may be protected by certain factors. According to the outcome measures available in this data set, those who experience less social adversity, as reflected by being of higher social class, are more likely to have a good parenting outcome. Other factors that emerged as being independently protective were having a mentally well partner and having high-quality supportive relationships. Among mothers with schizophrenia who were judged by staff to have at least 1 significant parenting problem, only a quarter were discharged home unsupervised with their infant compared to nearly two thirds of equivalent mothers with affective disorder. These data extend and support previous findings.[24]

Among all mothers admitted for joint psychiatric care, we have reported that the perceived risk of harm to infants at discharge is small.[4] However, clinicians were more likely to perceive a risk in mothers with schizophrenia than in those with affective disorder. Although measured over a different time point (prior to or during admission) than the parenting outcome measures, the recorded prevalence of physical harm to infants was low and comparable between the diagnostic groups. The clinical state of the patient, as well as staff perceptions of mother-infant interaction, are likely to be key determinants in the clinical assessment of risk of harm to child and may explain the discrepancy between levels of perceived and actual risk in women with schizophrenia. Clinicians may be rating

perception of risk of both physical harm and harm from possible emotional neglect, although we could not distinguish these. Alternatively, staff may have been more vigilant about mothers with schizophrenia due to higher perceived risks. Previous research has reported that mothers with schizophrenia show poor mother-infant interaction[25,26] and that negative symptoms are an important predictor of poor staff-rated scores on mother-infant interaction assessments at discharge.[26] The Marcé checklist does not currently record cross-sectional assessments of negative symptoms. However, only a quarter of mothers with schizophrenia had poor clinical outcome recorded by staff at discharge, and legal status at admission and duration of admission were not found to be independent predictors of poor parenting outcome. The use of standardized measures of parenting may avoid clinician bias,[7,27] and future studies using instruments developed specifically for the assessment of women with schizophrenia may be more informative.

Methodological Limitations

These findings are limited for a number of reasons. First, the sample reported here only represents mothers in England admitted to MBUs and designated facilities. These are not distributed evenly throughout the country and are only available to a minority of women.[28] Selection bias may result from referral patterns so that only the mothers with schizophrenia who are relatively well are admitted. Alternatively, although admitted mothers in general may represent more severely ill postpartum women due to the nature of the illness, mothers admitted with schizophrenia may be more representative of schizophrenic mothers as a whole than those admitted with less severe illness (e.g., unipolar depression). This view is supported in part by Howard et al.[10] who report that mothers with psychotic illness in the community are as disabled as women with psychotic illness without children.

Second, the Marcé checklist assessments are cross-sectional, as longitudinal data have, to date, not been collected to enable assessment of outcomes following discharge.

Third, the staff-rated parenting outcomes are based on clinical judgments, and although a high degree of interrater agreement was demonstrated and the assessments are made through consensus within the clinical team during an average 7-week stay, the assessments are not operationalized or standardized. These assessments of parenting outcomes may be more prone to bias in the context of poor levels of psychosocial support or ill partners. The items in the checklist do, however, have reasonable face validity.

Fourth, nonblinded assessment of maternal diagnosis may have generated response-set phenomena for women with schizophrenia, a diagnosis that may carry more stigma and misperception than a nonpsychotic disorder. Alternatively, it may be expected that poor outcomes on different variables occur in the same individuals. In this regard, the severity of maternal schizophrenia may also determine the likelihood of having a supportive partner and thereby explain the association with parenting outcomes.

Fifth, although the overall sample size is large, some of the subgroup analyses were lacking in statistical power. Nevertheless, this article describes the characteristics of the largest reported sample of mothers with schizophrenia admitted for joint psychiatric care and, as such, is able to support detailed analyses.

Finally, the study demonstrates a number of independent associations with poor outcomes, but these cannot be assumed to be causal in nature. Therefore, the large estimates of population impact, especially the large PAF observed for the effect of social class, must be interpreted in this context and should be considered as a marker for numerous additional unmeasured predictors.

Implications

It seems that mothers with schizophrenia who have the capacity to make good marital and social relationships are also more likely to be successful at parenting, which implies that there is an important overlap between the ability to attain social skills and the ability to attain parenting skills. Our results also imply that variations in parenting are a reflection of variation in the outcome of the illness. Mothers with schizophrenia may have a better prognosis than women with schizophrenia who do not become mothers, but they continue to have complex mental health needs.[10] Increasing evidence suggests that interventions can be successfully targeted at aspects of social interaction in some people with schizophrenia.[29] Mothers with schizophrenia may require more intensive efforts to improve their parenting skills. It is likely that a new mother with schizophrenia has particular needs in coping with the emotional and physical demands of an infant.[30] Interventions focused on the family and other supportive social relationships may also be appropriate.

Despite strong evidence of poorer parenting outcomes in mothers with schizophrenia compared to mothers with affective illness, the risk of physical harm that they pose to their infants is less than anticipated by clinical staff, at least in the short-term. These findings highlight the need for more sophisticated approaches to the assessment of mothers with schizophrenia. The task for future studies should be to elucidate the mechanisms that underlie the apparent protective factors that encourage successful parenting outcomes. Service development can then respond accordingly to meet the needs of these vulnerable families.

Disclosure of off-label usage: The authors have determined that, to the best of their knowledge, no investigational information about pharmaceutical agents that is outside U.S. Food and Drug Administration–approved labeling has been presented in this article.

REFERENCES

1. Baker AA, Morison M, Game JA, et al. Admitting schizophrenic mothers with their babies. Lancet 1961;2:237–239
2. Fowler DB, Brandon RE. A psychiatric mother and baby unit. Lancet 1965;1:160–161
3. Kumar R, Marks M, Platz C, et al. Clinical survey of a psychiatric mother and baby unit: characteristics of 100 consecutive admissions. J Affect Disord 1995;33:11–22
4. Salmon M, Abel K, Cordingley L, et al. Clinical and parenting skills outcomes following joint mother-baby psychiatric admission. Aust N Z J Psychiatry 2003;37:556–562
5. Howard L, Shah N, Salmon M, et al. Predictors of social services supervision of babies of mothers with mental illness after admission to a psychiatric mother and baby unit. Soc Psychiatry Psychiatr Epidemiol 2003;38:450–455
6. Hipwell AE, Kumar R. Maternal psychopathology and prediction of outcome based on mother-infant interaction ratings. Br J Psychiatry 1996;169:655–661
7. Wang AR, Goldschmidt V. Interviews of psychiatric inpatients about professional intervention with regard to their children. Acta Psychiatr Scand 1996;93:57–61
8. McNeil TF, Kaij L, Malmquist LA. Women with non-organic psychosis: pregnancy's effect on mental health during pregnancy: obstetric complications in schizophrenic patients. Acta Psychiatr Scand 1984;70:140–148
9. McGrath JJ, Hearle J, Jenner L, et al. The fertility and fecundity of patients with psychoses. Acta Psychiatr Scand 1999;99:441–444
10. Howard LM, Kumar R, Thornicroft G. Psychosocial characteristics and needs of mothers with psychotic disorders. Br J Psychiatry 2001;178: 427–432
11. Howard LM, Kumar C, Leese M, et al. The general fertility rate in women with psychotic disorder. Am J Psychiatry 2002;159:991–997
12. McCormick A, Fleming D, Charlton J. Morbidity Statistics From General Practice: 4th National Study 1991–1992. Series MB5, no 3. London: HMSO; 1995
13. Appleby L, Dickens C. Mothering skills of women with mental illness. BMJ 1993;306:348–349
14. Parnas J, Taesdale TW, Schulsinger H. Institutional rearing and diagnostic outcome in children of schizophrenic mothers. Arch Gen Psychiatry 1995;42:762–769
15. Schiffman J, LaBrie J, Carter J, et al. Perception of parent-child relationships in high-risk families, and adult schizophrenia outcome of offspring. J Psychiatr Res 2002;36:41–47
16. Wahlberg K-E, Wynne LC, Hakko H, et al. Interaction of genetic risk and adoptive parent communication deviance: longitudinal prediction of adoptee psychiatric disorders. Psychol Med 2004;34:1531–1541
17. Niemi LT, Suvisaari JM, Tuulio-Henriksson A, et al. Childhood developmental abnormalities in schizophrenia: evidence from high-risk studies. Schizophr Res 2003;60:239–258
18. StataCorp. Stata Statistical Software: Release 8.0. College Station, Tex: Stata Corporation; 2003
19. Zou G. A modified Poisson regression approach to prospective studies with binary data. Am J Epidemiol 2004;159:702–706
20. StataCorp. Stata User's Guide: Release 8. College Station, Tex: Stata Corporation; 2003:270–275
21. McNutt LA, Wu C, Xue X, et al. Estimating the relative risk in cohort studies and clinical trials of common outcomes. Am J Epidemiol 2003; 157:940–943
22. StataCorp. Stata Base Reference Manual, vol 3, N-R: Release 8. College Station, Tex: Stata Corporation; 2003:378–380
23. Benichou J. A review of adjusted estimators of attributable risk. Stat Methods Med Res 2001;10:195–216
24. Kumar R, Robson KM. A prospective study of emotional disorders in childbearing women. Br J Psychiatry 1984;144:35–47
25. Riordan D, Appleby L, Faragher B. Mother-infant interaction in postpartum women with schizophrenia and affective disorders. Psychol Med 1999;29:991–995
26. Snellen M, Mack K, Trauer T. Schizophrenia, mental state, and mother-infant interaction: examining the relationship. Aust N Z J Psychiatry 1999;33:902–911
27. Henry LA, Kumar RC. Risk assessments of infants born to parents with a mental health problem or a learning disability. In: Weir A, Douglas A, eds. Child Protection and Adult Mental Health. London: Butterworth Heinemann; 1999
28. Prettyman RJ, Friedman T. Care of women with puerperal psychiatric disorders in England and Wales. BMJ 1991;302:1245–1246
29. Wykes T, Reeder C, Corner J, et al. The effects of neurocognitive remediation on executive processing in patients with schizophrenia. Schizophr Bull 1999;25:291–307
30. Plant K, Byrne L, Barkla J, et al. Parents with psychosis: a pilot study examining self-report measures related to family functioning. Australian e-Journal for the Advancement of Mental Health 2000;1:1–11

We encourage authors to submit papers for consideration as a part of our Focus on Women's Mental Health section. Please contact Marlene Freeman, M.D., at marlenef@email.arizona.edu.

For the CME Posttest for this article, see pages 808–809.