Mental Health Shocks and Housing Insecurity

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It is widely assumed that the relationship between health and housing is bi-directional; that is, that poor housing compromises health and that poor health can adversely affect housing affordability and other aspects of individuals' housing circumstances (Lee et al., 2010; Evans et al., 2003; Hwang, 2002). Establishing causality has been a challenge in the literature on health and housing because individuals living in poor housing conditions are more likely to be poor, socially disadvantaged, and unhealthy and because randomized controlled trials are rarely feasible and relevant natural experiments are rare. Numerous studies with varying degrees of rigor suggest that environmental hazards, such as asbestos, lead paint, rodents, dust mites, lack of heat, and mold (see WHO, 2006) lead to adverse health outcomes. Other aspects of housing, such as affordability, appear to matter as well; for example, Katz, Kling and Liebman (2001) found, in the Moving to Opportunity (MTO) randomized experiment in the U.S. that provided vouchers for subsidized housing to families to move from high-poverty to low-poverty neighborhoods, that both household heads and their children in the experimental group had significantly better health than those in the control group.

Much less research has focused on links between housing and health in the reverse direction—that is, how health affects housing. In particular, a paucity of research exists on the effects of mental health on housing outcomes, despite evidence of linkages between various

aspects of housing and psychological distress symptoms among both adults and children (e.g., Burgard et al, 2012; Evans et al, 2003; Fertig and Reingold 2008; Gilman et al., 2003; Evans et al., 2002; Phinney et al. 2007; Suglia et al. 2011). Most work that examines the relationships between mental health and housing challenges focuses on the homeless population, and, more precisely, maintaining housing for persons with severe mental illness (Newman & Goldman, 2009; Montgomery et al., 2013). From this literature, we know that the homeless are in poorer health than their domiciled counterparts (Culhane et al., 2001) and have reported rates of mental disorders that are markedly higher than in the general population (Boa et al. 2000; Fitzpatrick et al. 2007).

Four recent studies, all based on longitudinal population-based data, have produced varying degrees of evidence vis-à-vis effects of mental or physical health shocks on housing outcomes. Fertig and Reingold (2008), examined correlates of homelessness among mothers with young children with family incomes < 50% of poverty and found that both poor health status and depression of mothers were positively associated with later homelessness controlling for many individual and contextual variables. Phinney et al. (2007) found that both mental and physical health problems were positively associated with later homelessness among mothers on welfare. Neither of these studies attempted to isolate the effects of health shocks. In contrast, Curtis et al. (2010) and Curtis et al. (2011) focused specifically on the effects of infant health shocks that are arguably exogenous and, together, found that among mothers with young children, poor child health increases the likelihood of both overcrowding and homelessness and may also increase the likelihood of having inadequate utilities and poor housing quality. Exploiting shocks is important for establishing the temporal order of events and because observed changes in health status or income may reflect unobserved tastes and risk preferences.

As far as we know, no studies have investigated the effects of physical or mental health shocks to other family members on families' housing-related outcomes.

In this study, we exploit an exogenous shock in mental health—postpartum depression—to explore the effects of a relatively common mental illness on various dimensions of families' housing situations. Postpartum depression, defined as moderate to severe depression in a woman after she has given birth, is experienced by 10 to 20 percent of all childbearing women within 6 months of delivery (Miller 2002). Given that Curtis et al. (2010) found that having a child with a serious health condition affects multiple dimensions of housing, we explore the effects of the mental health shock on housing situations in three different domains—quality, crowding, and stability. We exploit a shock that appears to have a large random component and also use econometric techniques to estimate causal effects. This research is important not only to more fully understand the "reverse pathway" (how health effects housing), but also to study potentially important effects of a highly salient mental illness on families. As far as we know, this is the first study of an exogenous mental health shock on housing.

Despite being a relatively common mental disorder with a clear timing of onset, few studies have investigated the effects of postpartum depression on individual and family well-being. A notable exception is a study by Marcotte, Wilcox-Gok and Patrick Redmon (2000) that used nationally representative data from 1990 to 1992 to estimate the effects of female depression (not postpartum depression) on employment. The authors addressed the potential endogeneity of depression by using family members' history of mental health problems as identifiers for depression in 2-stage models and found negative effects of female depression on employment.

It is expected that maternal postpartum depression would directly affect the family's income through reduced productivity limiting mother's ability to maintain employment. In addition, studies have found that poor child health makes it less likely that the father will live with the child (Reichman, Corman and Noonan 2004), perhaps through parental stress and strain in the relationship, and more likely that he becomes incarcerated (Corman et al. 2011). As such, the mother's own postpartum depression may affect the quality and stability of housing through these channels.

Data

The Fragile Families and Child Wellbeing study follows a cohort of parents and their newborn children in 20 large U.S. cities (in 15 states). The study was designed to provide information about the conditions and capabilities of new (mostly unwed) parents, the determinants and trajectories of their relationships, and the consequences of welfare reform and other policies. Births were randomly sampled births in 75 hospitals between 1998 and 2000. By design, approximately 75% of the mothers were unmarried. Face-to-face interviews were conducted with 4,898 mothers while they were still in the hospital after giving birth (see Reichman et al., 2001 for a description of the research design). The postpartum (baseline) response rate was 86% among eligible mothers.

Follow-up interviews were conducted over the telephone approximately 1, 3, and 5 years after the birth of the focal child. Eighty nine percent of the mothers who completed postpartum interviews were re-interviewed when their children were 1 year old, 86% of mothers who completed baseline interviews were re-interviewed when their children were 3, and 85% of mothers who completed baseline interviews were re-interviewed when their children were 5 years old. The FFCWB data are well suited for analyzing the effects of postpartum depression on

family housing insecurity because they were collected as part of a longitudinal birth cohort study, and include: (1) survey questions asked at the 1-year follow-up interview that allow us to characterize postpartum depression using a standard and widely-applied instrument; (2) survey questions at the 3- and 5-year follow-up interviews that allow us to characterize a range of housing conditions in the domains of quality, crowding and stability, including homelessness; (3) data from hospital medical records, allowing us to construct measures of maternal prenatal mental and physical health; (4) rich data to use for control variables (see Methodology section below for specifics); (5) city and state of residence at each wave, which allow us to control for these factors or attach relevant contextual variables (such as city level unemployment rates, housing costs); and (6) geocodes, which allow us to attach local contextual measures (such as availability of mental healthcare providers at the zip code level. In addition, the oversampling of nonmarital births resulted in a relatively socioeconomically disadvantaged sample that may be particularly susceptible to the effects of health shocks.

We characterize a family's housing situation according to the three different domains (quality, crowding, and stability), with multiple measures in certain of the domains. We follow, as closely as possible, definitions used by Department of Housing and Urban Development (HUD) to characterize housing conditions (e.g., U.S. Department of Housing and Urban Development, 2005). We will measure housing outcomes at three years in our main models, and at 5 years in auxiliary analyses.

Our measures of *poor housing quality* are designed to capture housing characteristics that are associated with disease and/or accidents, such as presence of vermin, leaks, exposed wiring, peeling paint or plaster, significant disrepair in common areas, holes in floors, walls, ceilings, no hot water, no flush toilets, no heating or electricity (U.S. Department of Housing and Urban

Development, 2005). We characterize poor housing quality using two variables that we refer to as inadequate utilities and poor home quality. The first, inadequate utilities, is measured from the 3 year survey and operationalized as whether the family's electricity or gas had been turned off or heating oil had not been delivered in the past 12 months, or the family had no running water for a period of 48 hours or more. The second, poor home quality, is taken from the 3 year interviewer observations and captures the reporting of any of the following conditions within the respondent's housing unit: broken windows or cracked windowpanes, unconcealed or frayed wiring, mice or rats, open cracks or holes in walls/ceiling/floor, broken plaster, peeling paint, or broken stairs.

Crowding is characterized as more occupants than number of rooms in the housing unit. This variable was created using questions from the 3 year in-home survey about the number of rooms (not including bathrooms) and people living in the housing unit. If number of rooms divided by number of occupants was less than one, the housing unit was coded as being overcrowded. It is important to note that the most widespread definition of overcrowding in the literature is constructed as number of rooms (including bathrooms) divided by number of people living in the unit (U.S. Department of Housing and Urban Development, 2007). However, the number of bathrooms was not available in our data. As such, our measure will tend to over-classify overcrowding. For example, a unit with a living room, 4 bedrooms, 2 bathrooms, and 7 people would be classified by us, but not HUD, as overcrowded (5 rooms for 7 people by us vs. 7 rooms for 7 people by HUD). Because we classify some families as overcrowded that are not, associations with health may be underestimated.

Housing stability is characterized by whether the mother reported at 3 years that the family had moved in with others for financial reasons in the past 12 months; whether the family

had moved 3 or more times since the birth of the focal child (based on findings by Wood et al. (1990) and Weinreb et al. (1998) that moving more than once per year is a risk factor for homelessness and findings by Gilman et al. (2003) that moving more than 3 times from birth until the age 7 is associated with an increased risk of depression among children); whether the family had been evicted, homeless, or in a shelter for at least one night in the past 12 months; and whether family had been homeless at any time in the past 12 months.

Because the outcomes are derived from study modules with different response rates, the potential sample sizes could vary considerably. To maximize statistical power, we use all available cases to analyze each outcome, resulting in different sample sizes across outcomes. However, in supplementary analyses, we will explore the representativeness of the various samples and also restrict the sample to make it more consistent across outcomes and assess the sensitivity of our findings.

Methods

Postpartum depression has large random components based on what we know from medical science and previous research and also affects family resources. A fairly recent meta-analysis found that postpartum depression is not significantly related to maternal age, marital status, length of relationship with partner, education, number of children, parity, or pregnancy employment status, and that the associations between postpartum depression and both income and occupation, though statistically significant, are small (O'Hara & Swain 1996). Despite the seeming randomness of postpartum depression based on sociodemographic characteristics, however, the largest risk factor for postpartum depression is past history of psychopathology (O'Hara & Swain 1996)—an issue we will explicitly address in our modeling strategy. We will exploit this mental health shock with large random components, use rich control variables,

explore exogeneity assumptions, and estimate two-stage models designed to address potential endogeneity that may remain.

Our basic specification, generalized as Equation 1 below, will be a multivariate equation model that estimates the impact of postpartum depression at time *t* on housing insecurity one or two time periods in the future.

(1) Housing Insecurityt+1 or t+2 = f (postpartum depressiont, maternal characteristics, family characteristics, neighborhood characteristics, city characteristics).

We will use functional forms consistent with the categorical nature of the dependent variables (i.e., probit and/or logit models for dichotomous dependent variables).

Characterizing postpartum depression

Following Mitchell et al. (2011), who used the FFCWB data to study gene-environment interactive effects on postpartum depression, we will measure postpartum depression using a dichotomous indicator for whether the mother met the diagnostic criteria for major depression in the past 12 months according to the Composite International Diagnostic Interview Short Form (CIDI-SF) Version 1.0 November 1998, which was embedded in the mother's 1-year follow-up interview. We will use two different validated measures (FFCWB 2012), one which is ―conservative and one which is ―liberal. Each measure is a count of number of depressive symptoms ranging from 0 to 7, with a major depression episode defined as the experience of three or more symptoms of dysphoria or anhedonia. The conservative measure characterizes respondents who reported experiencing symptoms (sad, blue, depressed or complete loss of interest) for most of the day for a period of at least 2 weeks. The liberal measure characterizes respondents who reported experiencing symptoms for at least half the day for a period of at least 2 weeks. Models using these two measures of postpartum depression to predict the effects of

postpartum depression on food insecurity will control for diagnosed mental illness before the focal child was born (from the mother's prenatal medical record) as well as the grandmother's history of depression. We will also consider measures of *becoming depressed* (not having had any diagnosed mental illness before the focal child was born but screening positive for depression at the 1-year follow-up).

Covariates

The FFCWB data will allow us to control for a rich set of maternal and family characteristics, measured at baseline whenever possible, that may be associated with both health (non-random components) and housing insecurity. These include maternal age, race/ethnicity, immigrant status, education, prenatal employment status, whether the birth was financed through Medicaid (a proxy for poverty), father's relationship with the mother (married, cohabiting, romantic but not cohabiting, friends, or no relationship), maternal prenatal physical and mental health, and father's education and employment status, as well as father's incarceration which has been linked to poor health (Schnittker & John 2007; Massoglia 2008; Curtis 2011) and material hardship (Schwartz-Soicher, Geller & Garfinkel 2011) in the family. As indicated above, in models estimating the effects of maternal postpartum depression, we will control for not only the mother's prenatal mental illness, but also the grandmother's (the mother's mother) history of depression. We will also include family background characteristics of the parents that may be related to both health and hardship later in the lifecourse; these include whether the mother lived with both of her biological parents when she was 15 years old, whether the father lived with both of his biological parents when he was 15, and the education levels and immigrant status of the focal child's grandparents.

We will include variables related to the focal child, including gender and multiple birth, both of which are associated with postpartum depression (Choi, Bishai & Minkovitz 2009) and may also be associated with material hardship (e.g., Dahl & Moretti 2008 found that child gender affects resources devoted to the child). In addition, we will include the number of mother's biological children in the household, number of other children in the household, and whether the father has other children residing in another household, as family structure is associated with both health and hardship (Bzostek & Beck 2011; Bass & Warehime 2011; Osborne et al. 2011). Importantly, we will control for child health, given findings by Curtis et al. (2010; 2011) that child health are associated with adverse housing outcomes and the possibility that child health and maternal mental health may be related.

We will incorporate a number of contextual variables measured at the individual level. These include the poverty rate in the family's census tract, the availability of mental health providers in the zip code, and city indicators (which represent an amalgam of the city characteristics that could potentially be associated with both health and housing insecurity) or city-level characteristics such as housing costs, cost of living index and MSA-level unemployment rates.

We will estimate both parsimonious models and those with large sets of covariates, and assess robustness of our estimates (to the extent that we have characterized true health shocks, the estimates should be stable).

Addressing the potential endogeneity of postpartum depression

We will include a rich set of covariates as described earlier, explore exogeneity assumptions though ―falsification tests, and conduct supplemental analyses using 2-stage modeling techniques. For falsification tests, we will estimate the impact of the having

postpartum depression on housing insecurity before the child was born (the postnatal health shock should have no impact on prenatal hardship, controlling for other factors). For 2-stage models, we will use bivariate probit models and/or 2-stage linear probability models given the dichotomous nature of our housing insecurity dependent variables. We will select identifiers for postpartum depression that are both theoretically valid and correlated with postpartum depression but uncorrelated with the error term in the housing insecurity equation when controlling for postpartum depression. We will perform appropriate tests to assess the validity of our identifiers (e.g., overidentification tests), run models with alternate sets of identifiers to assess the robustness of our 2-stage estimates, and test our single-stage estimates for consistency.

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