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The Great Recession and the Health of Young Children: A Fixed Effects Analysis in Ireland

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ABSTRACT

Economic recessions have been linked to adult health, but few studies have examined how recessions influence the health of young children. This study examines the impact of life transitions linked to the financial crisis in Ireland on the health of young children. Data came from the Growing Up in Ireland Infant Cohort Study (n = 11,134), which assessed children before (2008), during (2011), and after (2013) the recession and incorporated questions on the impacts of the financial crisis on families. Using fixed effects models to control for confounding, we found that a reduction in welfare benefits during the recession was associated with a significant increase in the risk of asthma (β : 0.0136, 95% confidence interval (95% CI): 0.0062, 0.0328) and atopy (β : 0.0161, 95% CI: 0.0026, 0.0297). While parental job loss was not associated with child health, a reduction in working hours was associated with increased reports of fair or poor child health (β : 0.0235, 95% CI: 0.0041, 0.0429), as were difficulties affording basics (β : 0.0193, 95% CI: 0.0005, 0.0381). Results suggest that failing to protect vulnerable families and children during economic recessions may have long-lasting implications for child health.

Key Words: Child Development, Child Health, Economic Recession, Ireland, Social Welfare

Abbreviations: CI, confidence interval; GUI, The Growing Up in Ireland National Longitudinal Study of Children

Growing evidence suggests that a child's environment during the early years is a critical determinant of future health and developmental outcomes (1, 2). The first five years of life represent a particularly sensitive period, where dramatic changes in the family situation may have long-lasting consequences for health (3-5). Poor health during early childhood is strongly associated with lifelong health, education, and socioeconomic trajectories (6), and it has been linked to the origin of health inequalities in later life (7).

While much research has examined the impact of economic downturns on adults (8, 9), few studies have assessed how recessions influence the health of young children. The 2008 financial crisis had a dramatic impact on Irish families (10); the unemployment rate nearly doubled from 2008 to 2009, peaking at 15% in 2011 (11, 12). The recession led to large reductions in wages and employment, and in 2010 and 2011, it resulted in substantial cuts in welfare payments for families (13). Economic downturns have previously been linked to negative changes in the home environment, such as increases in family stress (14), which may have implications for child health. For example, exposure to stress during sensitive periods of development may program the immune cells responsible for inflammation responses through multiple mechanisms, including epigenetic markings, posttranslational modifications, and tissue remodeling (5, 15). This biological embedding of stress may induce a chronic pro-inflammatory state, which along with physical exposures, such as allergens, can lead to negative child health outcomes, such as asthma and atopy, generally viewed as inflammatory conditions (5, 16, 17).

Most studies on the impact of the recent recession on child health have been based on repeated cross-sections or aggregate statistics (18). In this study, we use longitudinal data from a cohort study that collected detailed data on how the recession impacted families. We examine whether different household-level transitions in employment, income, welfare benefits, and

material circumstances due to the recession have potentially different impacts on asthma, atopy symptoms, and parents' reports of children's general health status, as well as on mothers' health behaviors that are potentially associated with child health. We hypothesize that the recession may impact general health status, asthma, and atopy in children due to the sensitivity of these conditions to stress and poor living environments (16, 19-21).

METHODS

Study Sample

We used data from three waves of the infant cohort of The Growing Up in Ireland National Longitudinal Study of Children (GUI). The infant cohort is comprised of 11,134 children born between December 2007 and June 2008 who were randomly selected from Ireland's Child Benefit Register (22). The infant cohort represented 14.8% of all births in Ireland in 2008, and was close to a pure Equal Probability of Selection Method Sample (22). Baseline assessments and interviews with mothers were conducted in 2008-2009 when infants were 9 months old. The second wave of data was collected in 2011, and the third wave was collected in 2013, which provided us with one assessment prior and two assessments after the onset of the recession in Ireland (Figure 1).

Insert Figure 1

The flowchart in Figure 2 details the study sample selection and exclusions. The analytical sample included households that participated in all three waves of GUI and always had the mother as the main respondent. We excluded households where the main respondent changed in order to avoid bias in reporting of children's and mothers' outcomes. This yielded a sample of 8,468 children and their mothers followed from waves 1 to 3.

Insert Figure 2

Measures of Recession Impact

The second and third wave of GUI asked mothers to rate the extent to which the recession had an impact on their household in a four-point scale (“no effect,” “small effect,” “significant effect,” and “very significant effect”). Families that reported at least a small effect were asked more detailed questions about how the recession affected their household. Possible responses were (1) mother’s job loss, (2) spouse/partner’s job loss, (3) working hour reduction for either partner, (4) wage reduction for either partner, (5) social welfare benefit reduction; (6) household is behind with rent or mortgage payments, (7) household is behind on utility bills, and (8) household cannot afford/had to cut back on basics, such as food and clothing. Responses were coded as binary variables taking the value of 1 if the household reported experiencing the effect and 0 otherwise. We expected that experiencing any of these changes might be associated with both immediate and longer-term changes in child health. To account for this, if families reported an exposure to a recession impact in the second wave (e.g. father’s job loss), the value of this exposure was carried forward to the third wave. Thus, the measures of recession impacts retain their value at the time they were first experienced for the remainder of the observation period. This is consistent with the approach used in previous studies of recession impacts on adults (23, 24). Models that update recession exposure at every wave yield similar results to the main specification (Web Table 1 for children, Web Table 2 for mothers).

Child Health Outcomes

Child health outcomes were based on mothers’ reports of whether the child has asthma, atopy symptoms (asthma and/or eczema), or any health problems. These outcomes were chosen based on data availability and their susceptibility to rapid changes in a child’s environment (25, 26). For asthma and eczema, mothers were asked, “Has a medical professional ever told you that

[baby] has any of the following conditions” at baseline. In follow-up waves, mothers were first asked, “What longstanding illness, condition or disability does [child] have,” followed by “Has this illness, condition or disability been diagnosed by a medical professional.” We relied on the mother’s reports of child illness rather than the mother’s reports of diagnoses for constructing the asthma and atopy indicators for Wave 2 and 3 because information about diagnoses were not included in the publicly available Wave 3 dataset. However, most mothers who reported a child had an illness at Wave 2 also reported that the illness had been diagnosed by a medical professional (asthma: 92.23%, eczema: 93.24%). Additionally, due to differences in the wording of the questionnaire between baseline and subsequent waves, we did not include allergic rhinitis in the atopy indicator. Based on the mother’s response to the question “In general, how would you describe [the child’s] current health,” we constructed an indicator of having any health problems that took the value of 1 if the child was categorized as being “healthy but a few minor problems” or “sometimes or almost always unwell” and took the value of 0 if children were categorized as “very healthy, no problems.” Comparisons of health problems among the three original categories indicate that while children rated “sometimes/almost always unwell” are clearly in the poorest health, children who were categorized as “healthy but a few minor problems” also have much higher rates of health conditions, hospitalizations, and bouts of illness than those categorized as “very healthy, no problems” (Web Figure 1, Web Table 3). All outcomes were constructed as binary variables that took a value of 1 if the child or mother had the outcome and 0 otherwise.

Mother’s Health Outcomes

We assessed mothers’ health outcomes that may reflect changes in the family environment and impact the health of their children. Health behaviors included mother’s reports

of current smoking (daily or occasional smoker) and alcohol consumption (5 or more units of alcohol per week). Our drinking indicator was restricted to consumption of five or more units as the publicly available dataset did not provide raw data for alcohol units. The third outcome indicated whether the mother was overweight or obese based on World Health Organization (27) cut-off points for body mass index, which was derived from GUI interviewer measurements of mother's height and weight (22).

Control Variables

We controlled for the following time varying characteristics: wave, urban/rural residence, maternal age (16 – 17, 18 – 29, 30 – 39, 40+), mother's marital status (married and cohabiting, married but separated, divorced or widowed, never married), and each parent's highest education level (lower secondary or less, secondary, post-secondary non-tertiary and tertiary education). For mother's health models, we controlled for the number of children under 18 living in the household (1, 2+). In separate analyses, we also control for income (equivalized house income quintiles) and each parent's employment status (employed, unemployed, out of labor force). For both father's highest education level and employment status, there were two additional categories to denote households without a secondary caregiver and households where the secondary caregiver did not complete a survey. In random effect models, we also controlled for mother's ethnicity (Irish, Other white, African or black, Chinese or Asian, Other or mixed), household occupational class classified according to the highest class of the co-resident parents (professional and managerial, non-manual and skilled-manual, semi-skilled and unskilled manual, other and unknown, no social class and never employed), child's sex, whether the child was ever breastfed, the number of pregnancy complications the mother experienced (0, 1, 2, 3, 4+), and whether the child had low birth weight (less than 2,499 grams) .

Insert Table 1

Statistical Analysis

Hausman specification tests (28) rejected the null hypothesis that random effect models were consistent, relative to fixed effects models (Web Tables 4 and 5 for children, Web Tables 6 and 7 for mothers). Therefore, we used linear probability fixed effect regression models to examine whether changes in socioeconomic circumstances due to the recession were associated with changes in individual health outcomes (29, 30). Fixed effects models control for time-invariant variables that may be correlated with both exposure and outcome. They effectively compare the same individual's health before and after exposure to the recession, thus using each individual as his or her own control. We use fixed effect, rather than first difference models, as fixed effect models are more efficient when there are more than two waves of data (31); however, first difference models yielded very similar results (Web Table 8). We used linear probability models instead of fixed effects logistic models because the latter only examine changes among individuals who reported the outcome (29). However, models using logistic regressions yielded similar results and are presented in the appendix (Web Table 9 for children, Web Table 10 for mothers). Our main model specification was as follows:

$$\text{Health}_{it} = \mu_t + \beta_1 \text{recession}_{it} + \beta_2 x_{it} + \alpha_i + \varepsilon_{it},$$

where Health_{it} is the health outcome for individual i at time t , recession_{it} represents a vector of changes in the economic circumstances of families linked to the recession (i.e. mother's job loss), x_{it} captures a vector of control variables, and ε_{it} is the error term. μ_t controls for effects of time that are constant across individuals, and α_i controls for individual time-invariant characteristics. We first present results that do not control for equalized household income

quintiles or parents' employment statuses, as these variables may partly capture recession impacts on the household or they may be mediators of the relationship between the changes in household circumstances due to the recession and children's health. In a separate model, (Table 3, Model 3) we show estimates that control for both equalized household income quintiles and parents' employment statuses. In sensitivity analyses, we also adjusted models for child health outcomes for mother's self-rated health (Web Table 11). All analyses were conducted in Stata, version 14 (32).

RESULTS

The recession in Ireland had sizeable impacts on families: 61.2% of mothers reported experiencing a significant or very significant effect of the recession in 2011, and this increased to 65.1% in 2013 (Table 2). Table 1 shows that the recession had the largest impact on disadvantaged families, disproportionately affecting parents who had lower income, education, and occupational grade prior to the recession. The most common forms of economic hardship families suffered by 2011 as a result of the recession were a reduction in wages (62.2%), a reduction in social welfare benefits (48.1%), and difficulties affording basics (28.5%) (Table 2). By 2013, these percentages increased for all forms of economic hardship, with larger increases for social welfare benefit reduction (59.9%) and difficulties affording basics (38.2%). Children and mothers from households that reported a very significant effect of the recession were also more likely to be in poor health prior to the recession.

Insert Table 2

Figure 3 shows changes in health outcomes before, during and after the onset of different measures of economic hardship as a result of the recession derived from fixed effect models.

Figure 3 suggests that, except for wage reduction, the onset of all measures of economic hardship

were associated with an increase in the probability that mothers reported any child health problems, an effect that persisted until the next wave for most measures. Mother's job loss, welfare reduction, being behind on housing or utility bill payments, and difficulties affording basics were also associated with a sustained increase in the probability of asthma and atopy symptoms.

Insert Figure 3

Results from child fixed effect models are shown in Table 3. In models that controlled separately for each change in family economic circumstances, a reduction in working hours, a reduction in welfare benefits, being behind on rent or mortgage payments, being behind on utility bills, and difficulties affording basics predicted an increase in reports of fair or poor child health, asthma, and atopy symptoms. In models that simultaneously controlled for all changes in family economic circumstances, a reduction in working hours (β : 0.0235; 95% confidence interval (CI): 0.0041, 0.0429) and difficulties affording basics (β : 0.0193; 95% CI: 0.0005, 0.0381) were both associated with an increased risk of reporting fair/poor child health, while a reduction in welfare benefits was associated with an increased risk of reporting asthma (β : 0.0136; 95% CI: 0.0043, 0.0230) and atopy symptoms (β : 0.0161; 95% CI: 0.0026, 0.0297). Model 3 in Table 3 additionally controls for equivalized household income quintile and parents' employment statuses. Adjusting for these variables leads to relatively small changes in coefficients; overall, these models confirm that reductions in welfare, being behind on utility bills, and inability to afford basics are the most prominent factors in explaining the impact of the recession on health.

Insert Table 3

Sensitivity analyses revealed similar results from logistic regression models (Web Table 9) and models that controlled for mother's self-rated health (Web Table 11). In particular, associations between welfare reduction and asthma and atopy were maintained in all models.

Table 4 shows results of fixed effect models for three indicators of mother's health behaviors hypothesized to contribute to child health. There was a reduction in the prevalence of smoking among mothers whose partner experienced job loss, and among mothers who reported being unable to afford basics; however, these associations did not meet the significance threshold of $P < 0.05$ in fully adjusted models. A reduction in wages predicted an increase in the probability of mothers consuming 5 or more drinks per week (β : 0.0195; 95% CI: 0.0062, 0.0328) and an increase in mothers being overweight or obese (β : 0.0191; 95% CI: 0.0041, 0.0342). By contrast, spouse's job loss and being behind with utility bills were associated with a decrease in the probability of consuming 5 or more drinks per week, but the association was only maintained for spouse's job loss in fully adjusted models (β : -0.0210; 95% CI: -0.0361, -0.0059). A reduction in work hours was also associated with an increased risk of being overweight or obese, but this association did not meet the significance threshold of $P < 0.05$ in fully adjusted models.

Insert Table 4

DISCUSSION

To our knowledge, this is the first longitudinal study examining the impact of the recent financial crisis on the health of young children in Ireland, a country that was strongly hit by the recession. Our findings suggest that the recession negatively impacted children's health, particularly those who were socio-economically vulnerable, during this sensitive period of development. Reductions in welfare benefits linked to the recession were consistent predictors of increased risk of asthma and atopy symptoms.

Our findings are in line with previous studies suggesting that socioeconomic circumstances in early childhood are associated with child health outcomes (33), including asthma and atopy (34, 35). Our results support previous findings that cuts to social welfare have negative implications for health (36). Results also suggest that existing inequalities in child health in Ireland (37), may have been exacerbated by the recession, particularly as the number of children living in consistent poverty increased and Child Benefit welfare payments decreased between 2008 and 2013 (38, 39).

There are several mechanisms through which recession-induced economic hardships and welfare benefit reductions may have led to poorer health outcomes for children. First, household financial stress may lead to a home environment that is less conducive to healthy childhood development. For instance, working hour reductions may lead to parents working non-standard or inflexible hours, as well as increased perceptions of job insecurity, all of which have been linked to worse child developmental outcomes (40). Welfare reductions may also contribute to income instability, which has been linked to negative child developmental outcomes (41). Difficulties affording housing payments, utility bills, and basics such as food and clothing are indicators of material deprivation or vulnerability to poverty, which have long been linked to poor child development and later life outcomes (1, 42).

Previous research has documented how household financial hardship in the context of economic downturns is associated with increases in parents' psychological stress, parental relationship strain, child maltreatment, and harsh parenting, as well as with decreases in warm, nurturing, and supportive parent-child interactions (14, 43, 44). These experiences of family stress may directly and indirectly increase children's psychological stress, which has been linked to the development and exacerbation of asthma and atopy (45-47). Changes in the physical home

environment induced by the recession may also be important. For example, using available data in GUI, we found that families who reported being behind on utility bills were more likely to report going without heating in the past year (Web Table 12). Going without heating was independently associated with increases in asthma and atopy (Web Table 13). Lack of heating may have led to worsening housing conditions, such as chronic dampness, cold temperatures, and mold, all of which are connected to poor child health outcomes, especially asthma and atopy (20).

Currie et al (48) found that increases in aggregate unemployment rates in the context of the Great Recession in the U.S. were associated with increased reports of poor health, smoking, and drug use among mothers. We found inconsistent evidence of this pattern in Ireland. For example, smoking prevalence declined among mothers whose partners lost their jobs and those who could not afford basics. While a reduction in wages predicted higher alcohol consumption, there were no consistent associations between other measures of economic hardship and alcohol consumption. The most consistent association was found for overweight and obesity, which increased among mothers who experienced a reduction in wages. These findings suggest that changes in the quality of diet and food security may offer a potential explanation for the negative impacts on mother's weight and child health. Future studies with more detailed data on diet and food security should examine this potential explanation. In addition, further research is needed on how fathers' transitions during the recession impact child health.

There are several limitations to this study. First, families more negatively impacted by the Great Recession may have been more likely to be lost to follow-up. Indeed, the 2,422 families lost to follow up between waves 1 and 3 were more likely to be from lower income, social class, and educational attainment groups at baseline (49). If anything, this would lead to

underestimation of the negative impact of the recession on child health. Another concern is that individuals who reported being more affected by the recession were different from those who were less affected. However, this is a lesser concern in our study, which used fixed effects models to isolate the impact of the recession from compositional differences. We were also limited by the health measures available in the GUI study, as mothers' reports for their own and their children's outcomes may have been affected by changing economic circumstances. However, it is reassuring that we also observed associations with asthma and atopy, which may be less susceptible to reporting bias than overall self-rated health measures. Finally, our study covered a relatively short time period after the recession. Future studies should therefore assess whether the impact of recessions during early childhood are sustained into adolescence and adulthood.

In conclusion, findings from this study suggest that the Great Recession had a negative impact on the health of children. Our study provides important evidence that social policy responses are critical: reductions in welfare benefits due to budget cuts in the aftermath of the recession were associated with increases in asthma and atopy symptoms. These impacts on child health and development may have long-lasting consequences for future socioeconomic and health outcomes, which may offset any government savings from reduced welfare payments for poor families. Our findings highlight the need to protect vulnerable families and children and illustrate the potential benefits of social protection programs for families during economic recessions.

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References

1. Case A, Fertig A, Paxson C. The lasting impact of childhood health and circumstance. *J Health Econ* 2005;24(2):365-389.
2. Cunha F, Heckman J. The technology of skill formation. *Am Econ Review* 2007;97(2):31-47.
3. Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *Int J Epidemiol* 2002;31(2):285-293.
4. Hertzman C, Boyce T. How experience gets under the skin to create gradients in developmental health. *Annu Rev Public Health* 2010;31:329-347.
5. Miller GE, Chen E, Parker KJ. Psychological stress in childhood and susceptibility to the chronic diseases of aging: moving toward a model of behavioral and biological mechanisms. *Psychol Bull* 2011;137(6):959-997.
6. Currie J, Almond D. Human capital development before age five. *Handbook of Labor Economics* 2011;4:1315-1486.
7. Kuh D, Power C, Blane D, et al. Socioeconomic pathways between childhood and adult health. *A Life Course Approach to Chronic Disease Epidemiology* 2004;2:371-398.
8. Stuckler D, Basu S, Suhrcke M, et al. The public health effect of economic crises and alternative policy responses in Europe: an empirical analysis. *Lancet* 2009;374(9686):315-323.
9. Karanikolos M, Heino P, McKee M, et al. Effects of the global financial crisis on health in high-income OECD countries: a narrative review. *Int J Health Serv* 2016;46(2):208-240.

10. Whelan CT, Watson D, Maitre B, et al. Family economic vulnerability & the Great Recession: an analysis of the first two waves of the Growing Up In Ireland Study. *Longitudinal and Life Course Studies* 2015;6(3):230-244.
11. Central Statistics Office (Ireland). Quarterly national accounts (Q4 2011 and year 2011 preliminary). 2012. Available at:
http://www.cso.ie/en/media/csoie/releasespublications/documents/economy/2011/qna_q4_2011.pdf [Accessed March 30, 2017].
12. Central Statistics Office (Ireland). Quarterly national household survey (Q1 2013). 2013. Available at:
http://www.cso.ie/en/media/csoie/releasespublications/documents/economy/2013/qna_q1_2013.pdf [Accessed March 30, 2017].
13. Callan T, Nolan B, Keane C, et al. Crisis, response and distributional impact: The case of Ireland. *IZA Journal of European Labor Studies* 2014;3(1):9.
14. Conger RD, Ge X, Elder GH, et al. Economic stress, coercive family process, and developmental problems of adolescents. *Child Dev* 1994;65(2):541-561.
15. Miller G, Chen E, Cole SW. Health psychology: developing biologically plausible models linking the social world and physical health. *Annu Rev Psychol* 2009;60:501-524.
16. Chen E, Hanson MD, Paterson LQ, et al. Socioeconomic status and inflammatory processes in childhood asthma: the role of psychological stress. *J Allergy Clin Immunol* 2006;117(5):1014-1020.
17. Wright R. Exploring biopsychosocial influences on asthma expression in both the family and community context. *Am J Respir Crit Care Med* 2008;177(2):129-131.

18. Rajmil L, de Sanmamed M-JF, Choonara I, et al. Impact of the 2008 economic and financial crisis on child health: a systematic review. *Int J Environ Res and Pub Health* 2014;11(6):6528-6546.
19. Kilpelainen M, Koskenvuo M, Helenius H, et al. Stressful life events promote the manifestation of asthma and atopic diseases. *Clin Exp Allergy* 2002;32(2):256-263.
20. Sandel M, Wright RJ. When home is where the stress is: expanding the dimensions of housing that influence asthma morbidity. *Arch Dis Child* 2006;91(11):942-948.
21. Repetti RL, Taylor SE, Seeman TE. Risky families: family social environments and the mental and physical health of offspring. *Psychol Bull* 2002;128(2):330-366.
22. Thornton M, Williams J, McCrory C, et al. Growing Up in Ireland National Longitudinal Study of Children: Design, Instrumentation and Procedures for the Infant Cohort at Wave One (9 Months). Dublin, Ireland: Department of Children and Youth Affairs, 2013.
23. Noelke C, Avendano M. Who suffers during recessions? Economic downturns, job loss, and cardiovascular disease in older Americans. *Am J Epidemiol* 2015;182(10):873-882.
24. Noelke C, Beckfield J. Recessions, job loss, and mortality among older US adults. *Am J Public Health* 2014;104(11):e126-e134.
25. Sandberg S, Paton JY, Ahola S, et al. The role of acute and chronic stress in asthma attacks in children. *Lancet* 2000;356(9234):982-987.
26. Flaherty EG, Thompson R, Litrownik AJ, et al. Effect of early childhood adversity on child health. *Arch Pediatr Adolesc Med* 2006;160(12):1232-1238.
27. World Health Organization. Physical status: The use of and interpretation of anthropometry, Report of a WHO Expert Committee. 1995. Available at: <http://apps.who.int/iris/handle/10665/37003> [Accessed February 2, 2016].

28. Hausman JA. Specification tests in econometrics. *Econometrica: Journal of the Econometric Society* 1978;1251-1271.
29. Gunasekara FI, Richardson K, Carter K, et al. Fixed effects analysis of repeated measures data. *Int J Epidemiol* 2014;43(1):264-269.
30. Leyland AH. No quick fix: understanding the difference between fixed and random effect models. *J Epidemiol Community Health* 2010;64(12):1027-1028.
31. Allison P. *Fixed Effects Regression Models*. Thousand Oaks, California: SAGE, 2009.
32. StataCorp. Stata Statistical Software: Release 14. College Station, Texas: StataCorp LP, 2015.
33. Case A, Lubotsky D, Paxson C. Economic status and health in childhood: The origins of the gradient. *Am Econ Review* 2002;92(5):1308-1334.
34. Panico L, Stuart B, Bartley M, et al. Asthma trajectories in early childhood: identifying modifiable factors. *PLoS One* 2014;9(11):e111922.
35. Williams DR, Sternthal M, Wright RJ. Social determinants: taking the social context of asthma seriously. *Pediatrics* 2009;123(Supplement 3):S174-S184.
36. Stuckler D, Basu S. *The Body Economic: Why Austerity Kills*. New York, New York: Basic Books, 2013.
37. Nolan A, Layte R. Socio-economic Inequalities in Child Health in Ireland. *The Economic and Social Review* 2014;45(1, Spring):25-64.
38. Central Statistics Office (Ireland). Survey on Income and Living Conditions (SILC) Thematic Report on Children 2004 – 2010. 2012. Available at: <http://www.cso.ie/en/media/csoie/releasespublications/documents/silc/2010/children0410.pdf> [Accessed 30 March 2017].

39. Central Statistics Office (Ireland). Survey on Income and Living Conditions 2013. 2015.
Available at:
<http://www.cso.ie/en/releasesandpublications/er/silc/surveyonincomeandlivingconditions2013/> [Accessed 30 March 2017].
40. Hsueh J, Yoshikawa H. Working nonstandard schedules and variable shifts in low-income families: Associations with parental psychological well-being, family functioning, and child well-being. *Dev Psychol* 2007;43(3):620-632.
41. Hill HD, Morris P, Gennetian LA, et al. The consequences of income instability for children's well-being. *Child Dev Perspectives* 2013;7(2):85-90.
42. Duncan GJ, Ziol-Guest KM, Kalil A. Early-childhood poverty and adult attainment, behavior, and health. *Child Dev* 2010;81(1):306-325.
43. Brooks-Gunn J, Schneider W, Waldfogel J. The Great Recession and the risk for child maltreatment. *Child Abuse Negl* 2013;37(10):721-729.
44. Lee D, Brooks-Gunn J, McLanahan SS, et al. The Great Recession, genetic sensitivity, and maternal harsh parenting. *Proc Natl Acad Sci* 2013;110(34):13780-13784.
45. Rosenberg SL, Miller GE, Brehm JM, et al. Stress and asthma: novel insights on genetic, epigenetic, and immunologic mechanisms. *J Allergy Clin Immunol* 2014;134(5):1009-1015.
46. Wright RJ, Cohen RT, Cohen S. The impact of stress on the development and expression of atopy. *Curr Opin Allergy Clin Immunol* 2005;5(1):23-29.
47. Wright RJ. Perinatal stress and early life programming of lung structure and function. *Biol Psychol* 2010;84(1):46-56.

48. Currie J, Duque V, Garfinkel I. The Great Recession and Mothers' Health. *The Economic Journal* 2015;125(588):F311-F346.
49. McCrory C, Williams J, Murray A, et al. Growing Up in Ireland National Longitudinal Study of Children: Design, Instrumentation and Procedures for the Infant Cohort At Wave Two (3 Years). 2013.

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TABLES

Table 1: Baseline Characteristics in 2008 by Extent of Recession Effect on Family in 2011, Growing Up in Ireland infant cohort (n = 8,468)

Baseline Characteristics	n	Extent of Household Recession Effect in 2011 ^a			
		No effect (%) ^b	Small effect (%) ^b	Significant effect (%) ^b	Very significant effect (%) ^b
Household's Number of Children					
1 child	3,175	7.6	34.9	37.3	20.2
2+ children	5,293	5.6	31.0	38.6	24.7
Household's Equivalized Income Quintile					
Lowest	1,501	5.4	27.3	35.2	31.8
2nd	1,413	6.2	26.6	39.0	28.2
3rd	1,543	5.5	30.8	39.5	24.1
4th	1,795	5.0	35.8	40.3	18.9
Highest	1,615	9.8	40.7	36.7	12.8
Missing	601	6.2	31.0	36.8	26.1
Household's Occupational Class					
Professional/Managerial	4,385	7.0	36.6	39.5	16.9
Non-manual/Skilled-manual	2,514	5.3	27.9	37.8	29.0
Semi-skilled/Unskilled manual	729	6.7	30.0	33.3	29.6
Other and Unknown	38	10.5	36.8	26.3	26.3
No Class/Never Employed	802	5.6	26.2	36.4	31.8
Household's Region					
Urban	3,615	6.7	33.1	37.9	22.3
Rural	4,821	6.1	31.9	38.3	23.6
Missing	32	6.3	37.5	34.4	21.9
Mother's Ethnicity					
Irish	6,985	5.7	33.1	38.6	22.6
Other white	992	9.7	32.4	35.1	22.5
African or black	242	6.6	19.0	36.0	38.4
Chinese or Asian	189	6.9	29.1	41.8	22.2
Other or Mixed	36	27.8	27.8	22.2	22.2
Missing	24	20.8	29.2	25.0	25.0
Mother's Age Range					
16 – 29	2,475	6.5	31.4	35.6	26.4
30 – 39	5,405	6.1	33.2	39.4	21.3
40+	588	8.2	30.1	36.7	25.0
Mother's Education Level					
Lower Secondary or Less	876	5.4	26.6	33.1	34.8
Secondary	1,546	5.7	31.4	36.9	26.1
Post-Secondary Non-Tertiary	2,868	5.8	30.2	39.7	24.3
Tertiary	3,174	7.5	36.7	38.6	17.2

Missing	4	0.0	0.0	50.0	50.0
Mother's Employment Status					
Employed	5,051	6.4	34.2	39.0	20.3
Unemployed	255	4.7	30.2	32.9	32.2
Out of Labor Force	3,158	6.3	29.9	37.1	26.6
Missing	4	50.0	25.0	0.0	25.0
Mother's Marital Status					
Married and Together	5,915	6.5	33.7	38.8	20.9
Married and Separated	135	4.4	24.4	37.8	33.3
Divorced or Widowed	102	7.8	34.3	29.4	28.4
Never Married	2,240	5.7	29.7	37.1	27.5
Missing	76	11.8	29.0	29.0	30.3
Father's Education Level					
Lower Secondary or Less	1,082	4.7	26.8	36.7	31.8
Leaving Certificate	1,194	5.3	31.3	37.4	26
Sub-degree	2,232	6.9	31.7	39.9	21.4
Degree or Third Level	2,259	7.5	39.0	37.8	15.7
No Father Survey Completed	815	6.8	28.7	38.9	25.5
Single Mother Household	878	5.4	29.4	36.6	28.7
Missing	8	0.0	50.0	0.0	50.0
Father's Employment Status					
Employed	6,070	6.5	34.8	38.5	20.1
Unemployed	508	5.3	19.5	35.2	40.0
Out of Labor Force	190	6.3	22.1	37.4	34.2
No Father Survey Completed	815	6.8	28.7	38.9	25.5
Single Mother Household	878	5.4	29.4	36.6	28.7
Missing	7	0.0	0.0	42.9	57.1
Child's Health Status					
Good	7,009	6.4	33.0	37.6	23.0
Fair/Poor	1,431	5.9	29.9	40.7	23.4
Missing	28	14.3	28.6	32.1	25.0
Child's Asthma					
No Asthma	8,133	6.4	32.6	38.0	22.9
Yes Asthma	335	4.5	27.8	41.8	26.0
Child's Atopy Symptoms					
No Atopy Symptoms	7,143	6.4	32.6	38.2	22.8
Any Atopy Symptoms	1325	6.1	31.2	37.7	25.1
Mother's Smoking					
Non-Smoker	6,549	6.8	33.8	38.6	20.8
Current Smoker	1,918	4.8	27.8	36.6	30.7
Mother's Alcohol Consumption					
Less than 5 Units/ Week	7,340	6.5	32.5	38.1	22.9
5 or More Units/Week	1,128	5.3	32.1	38.5	24.1

Mother's Overweight or Obesity

Not Overweight/Obese	4,345	7.0	34.7	37.6	20.7
Yes Overweight/Obese	3,739	5.9	30.4	38.5	25.2
Missing	384	4.2	27.1	40.6	28.1

^a At Wave 2 in 2011, mothers were asked to rate the extent to which the recession had an impact on their family using a four-point scale: “no effect on the family,” “small effect on the family,” “significant effect on the family,” or “very significant effect on the family”

^b Row percentages are shown

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Table 2: Percentage of Sample Reporting Household Recession Impacts in 2011 and 2013, Growing Up in Ireland infant cohort (n = 8,468)

Recession Effects on the Household	% of Sample	
	2011	2013
Overall Recession Effect on Household		
No effect	6.4	6.5
Small effect	32.5	28.4
Significant effect	38.1	40.0
Very significant effect	23.0	25.1
Specific Effects of the Recession		
Mother's Job Loss	10.6	11.3
Father's Job Loss	18.8	20.1
Work Hours Reduced	21.7	26.6
Wages Reduced	62.2	65.7
Social Welfare Reduced	48.1	59.9
Behind on Rent/Mortgage	7.2	11.7
Behind on Utility Bills	11.6	14.6
Cannot Afford Basics	28.5	38.2
Total Recession Effects Reported ^a		
0	9.8	10.0
1	28.3	19.4
2	28.8	26.1
3	17.8	19.9
4	9.4	13.1
5	4.1	6.4
6	1.4	3.2
7	0.3	1.4
8	0.1	0.3

^a 2 respondents had missing values in 2013

Table 3: Associations Between Changes in Family Economic Circumstances Due to the Recession and Child Health: Fixed Effect Models, Growing Up in Ireland, 2008 – 2013

Outcome and Recession Effect	Model 1 ^{a, b}			Model 2 ^{b, c}			Model 3 ^{b, c}		
	β	95% CI	P Value ^d	β	95% CI	P Value ^d	β	95% CI	P Value ^d
Any Health Problems									
Mother's Job Loss ^e	0.0071	-0.0180, 0.0322		-0.0016	-0.0270, 0.0237		0.0054	-0.0223, 0.0331	
Father's Job Loss ^f	0.0186	-0.0019, 0.0391		0.0062	-0.0149, 0.0273		0.0045	-0.0183, 0.0273	
Work Hour Reduction ^g	0.0271	0.0084, 0.0458	<0.01	0.0235	0.0041, 0.0429	<0.05	0.0200	-0.0004, 0.0403	
Wage Reduction ^h	-0.0051	-0.0235, 0.0133		-0.0084	-0.0273, 0.0106		-0.0080	-0.0278, 0.0118	
Welfare Reduction ⁱ	0.0169	0.0001, 0.0338	<0.05	0.0082	-0.0090, 0.0254		0.0087	-0.0092, 0.0266	
Behind on Housing Bills ^j	0.0456	0.0180, 0.0731	<0.01	0.0234	-0.0064, 0.0533		0.0225	-0.0087, 0.0537	
Behind on Utility Bills ^k	0.0444	0.0198, 0.0691	<0.001	0.0253	-0.0018, 0.0524		0.0289	0.0006, 0.0571	<0.05
Cannot Afford Basics ^l	0.0320	0.0145, 0.0494	<0.001	0.0193	0.0005, 0.0381	<0.05	0.0242	0.0046, 0.0437	<0.05
Asthma									
Mother's Job Loss ^e	0.0139	-0.0006, 0.0284		0.0127	-0.0019, 0.0274		0.0193	0.0033, 0.0353	<0.05
Father's Job Loss ^f	0.0032	-0.0090, 0.0153		0.0002	-0.0121, 0.0125		0.0032	-0.0102, 0.0165	
Work Hour Reduction ^g	-0.0051	-0.0155, 0.0052		-0.0070	-0.0178, 0.0038		-0.0092	-0.0205, 0.0021	
Wage Reduction ^h	-0.0044	-0.0149, 0.0060		-0.0025	-0.0133, 0.0082		-0.0015	-0.0127, 0.0098	
Welfare Reduction ⁱ	0.0155	0.0065, 0.0246	<0.001	0.0136	0.0043, 0.0230	<0.01	0.0130	0.0032, 0.0228	<0.01
Behind on Housing Bills ^j	-0.0006	-0.0174, 0.0162		-0.0110	-0.0290, 0.0071		-0.0071	-0.0259, 0.0116	
Behind on Utility Bills ^k	0.0155	0.0004, 0.0306	<0.01	0.0139	-0.0025, 0.0304		0.0096	-0.0076, 0.0269	
Cannot Afford Basics ^l	0.0109	0.0007, 0.0211	<0.01	0.0070	-0.0040, 0.0180		0.0086	-0.0029, 0.0201	
Any Atopy Symptoms^m									
Mother's Job Loss ^e	0.0075	-0.0124, 0.0275		0.0057	-0.0144, 0.0258		0.0106	-0.0111, 0.0323	
Father's Job Loss ^f	0.0015	-0.0157, 0.0186		-0.0027	-0.0201, 0.0147		-0.0034	-0.0223, 0.0154	
Work Hour Reduction ^g	-0.0074	-0.0218, 0.0069		-0.0068	-0.0218, 0.0081		-0.0066	-0.0223, 0.0090	
Wage Reduction ^h	-0.0156	-0.0300, -0.0013	<0.05	-0.0131	-0.0278, 0.0017		-0.0120	-0.0273, 0.0034	
Welfare Reduction ⁱ	0.0159	0.0033, 0.0286	<0.05	0.0137	0.0008, 0.0266	<0.05	0.0151	0.0017, 0.0285	<0.05

Behind on Housing Bills ^j	0.0075	-0.0140, 0.0291		-0.0061	-0.0293, 0.0171		-0.0003	-0.0244, 0.0238
Behind on Utility Bills ^k	0.0264	0.0066, 0.0462	<0.01	0.0225	0.0012, 0.0437	<0.05	0.0170	-0.0052, 0.0392
Cannot Afford Basics ^l	0.0131	-0.0006, 0.0269		0.0074	-0.0071, 0.0219		0.0086	-0.0065, 0.0237

Abbreviations: β , β coefficient; CI, confidence interval

^a Model 1: Each recession effect in a separate model

^b All models control for wave, parents' education levels, mother's age, mother's marital status, and household region. Model 3 additionally controls for equivalized household income quintile and parents' employment statuses

^c Model 2 & Model 3: All recession effects included in a single model

^d 2 sided P-values

^e Reference category is no mother's job loss

^f Reference category is no father's job loss

^g Reference category is no work hour reduction

^h Reference category is no wage reduction

ⁱ Reference category is no welfare reduction

^j Reference category is not behind on housing bills (rent/mortgage)

^k Reference category is not behind on utility bills

^l Reference category is able to afford basics (food, clothing, etc.)

^m Atopy symptoms include asthma and eczema

Table 4: Associations Between Changes in Family Economic Circumstances Due to the Recession and Mothers' Health Behaviors: Fixed Effect Models, Growing Up in Ireland, 2008 – 2013

Outcome and Recession Effect	Model 1 ^{a, b}			Model 2 ^{b, c}			Model 3 ^{b, c}		
	β	95% CI	P Value ^d	β	95% CI	P Value ^d	β	95% CI	P Value ^d
Current Smoker									
Mother's Job Loss ^e	-0.0061	-0.0233, 0.0112		-0.0024	-0.0197, 0.0149		0.0031	-0.0156, 0.0219	
Father's Job Loss ^f	-0.0168	-0.0315, -0.0021	<0.05	-0.0132	-0.0282, 0.0018		-0.0149	-0.0310, 0.0011	
Work Hour Reduction ^g	-0.0122	-0.0251, 0.0007		-0.0117	-0.0252, 0.0017		-0.0122	-0.0263, 0.0020	
Wage Reduction ^h	0.0071	-0.0053, 0.0194		0.0096	-0.0032, 0.0225		0.0096	-0.0039, 0.0232	
Welfare Reduction ⁱ	0.0040	-0.0073, 0.0153		0.0083	-0.0031, 0.0198		0.0090	-0.0030, 0.0210	
Behind on Housing Bills ^j	-0.0158	-0.0363, 0.0046		-0.0115	-0.0334, 0.0103		-0.0136	-0.0367, 0.0094	
Behind on Utility Bills ^k	-0.0042	-0.0211, 0.0128		0.0059	-0.0126, 0.0244		0.0073	-0.0122, 0.0269	
Cannot Afford Basics ^l	-0.0135	-0.0254, -0.0017	<0.05	-0.0122	-0.0247, 0.0004		-0.0106	-0.0237, 0.0025	
Alcohol Consumption^m									
Mother's Job Loss ^e	0.0061	-0.0117, 0.0240		0.0109	-0.0070, 0.0288		0.0104	-0.0084, 0.0291	
Father's Job Loss ^f	-0.0241	-0.0388, -0.0094	<0.01	-0.0210	-0.0361, -0.0059	<0.01	-0.0248	-0.0411, -0.0086	<0.01
Work Hour Reduction ^g	-0.0106	-0.0236, 0.0025		-0.0127	-0.0266, 0.0012		-0.0153	-0.0297, -0.0009	<0.05
Wage Reduction ^h	0.0179	0.0052, 0.0307	<0.01	0.0195	0.0062, 0.0328	<0.01	0.0165	0.0027, 0.0302	<0.05
Welfare Reduction ⁱ	0.0004	-0.0114, 0.0121		0.0038	-0.0081, 0.0157		0.0040	-0.0084, 0.0163	
Behind on Housing Bills ^j	-0.0178	-0.0366, 0.0010		-0.0082	-0.0286, 0.0121		-0.0146	-0.0353, 0.0062	
Behind on Utility Bills ^k	-0.0184	-0.0353, -0.0015	<0.05	-0.0116	-0.0299, 0.0066		-0.0122	-0.0311, 0.0067	
Cannot Afford Basics ^l	-0.0064	-0.0185, 0.0056		-0.0011	-0.0137, 0.0116		0.0002	-0.0131, 0.0134	
Overweight/Obese									
Mother's Job Loss ^e	-0.0020	-0.0223, 0.0183		-0.0028	-0.0233, 0.0176		0.0042	-0.0175, 0.0260	
Father's Job Loss ^f	0.0066	-0.0101, 0.0233		0.0069	-0.0104, 0.0241		0.0084	-0.0100, 0.0267	
Work Hour Reduction ^g	0.0159	0.0004, 0.0315		0.0110	-0.0052, 0.0273		0.0126	-0.0045, 0.0296	
Wage Reduction ^h	0.0219	0.0075, 0.0364	<0.01	0.0191	0.0041, 0.0342	<0.05	0.0202	0.0043, 0.0361	<0.05
Welfare Reduction ⁱ	0.0038	-0.0099, 0.0176		0.0043	-0.0098, 0.0184		0.0037	-0.0110, 0.0185	

Behind on Housing Bills ^j	-0.0017	-0.0223, 0.0189	0.0014	-0.0211, 0.0239	0.0019	-0.0216, 0.0254
Behind on Utility Bills ^k	-0.0066	-0.0247, 0.0114	-0.0039	-0.0239, 0.0161	-0.0043	-0.0251, 0.0166
Cannot Afford Basics ^l	-0.0067	-0.0209, 0.0075	-0.0092	-0.0244, 0.0060	-0.0103	-0.0263, 0.0057

Abbreviations: β , β coefficient; CI, confidence interval

^a Model 1: Each recession effect in a separate model

^b All models control for wave, parents' education levels, mother's age, mother's marital status, and household region. Model 3 additionally controls for equivalized household income quintile and parents' employment statuses

^c Model 2 & Model 3: All recession effects included in a single model

^d 2 sided P-values

^e Reference category is no mother's job loss

^f Reference category is no father's job loss

^g Reference category is no work hour reduction

^h Reference category is no wage reduction

ⁱ Reference category is no welfare reduction

^j Reference category is not behind on housing bills (rent/mortgage)

^k Reference category is not behind on utility bills

^l Reference category is able to afford basics (food, clothing, etc.)

^m Whether the mother drinks 5 or more units of alcohol per week

Figure 1 Legend:

The annual unemployment rate among the active population in Ireland, data from Eurostat, 2016. The large increase in the annual unemployment rate after 2008 serves as an indicator of the Great Recession in Ireland. The markers are at waves 1, 2, and 3 of data collection in the Growing Up in Ireland study, which fall prior to, during, and after the Great Recession in Ireland.

Figure 2 Legend:

Abbreviation: GUI, The Growing Up in Ireland National Longitudinal Study of Children

Flowchart illustrating follow-up in GUI from Wave 1 in 2008 through Wave 3 in 2011 and exclusion criteria for the analytic sample.

Figure 3 Legend:

Predictive prevalence of any health problems (black dashed lined), atopy (gray short dashed line), and asthma (gray solid line) at wave before recession exposure (-1), wave during recession exposure (0), and wave after recession exposure (1) for A) Mother's Job Loss B) Father's Job Loss C) Work Hour Reduction D) Wage Reduction E) Welfare Reduction F) Behind on Rent or Mortgage Payments G) Behind on Utility Bills H) Cannot Afford Basics. Predictive prevalence derived from fixed effects models that used treatment variables coded to designate the time of onset and one wave after the onset, with each change in family economic circumstance in a separate model. All models control for wave, mother's education level, father's education level, mother's age, mother's marital status, and household region.

Figure 1: Timing of the Great Recession in Ireland and Growing Up in Ireland Data Collection (2008-2013)

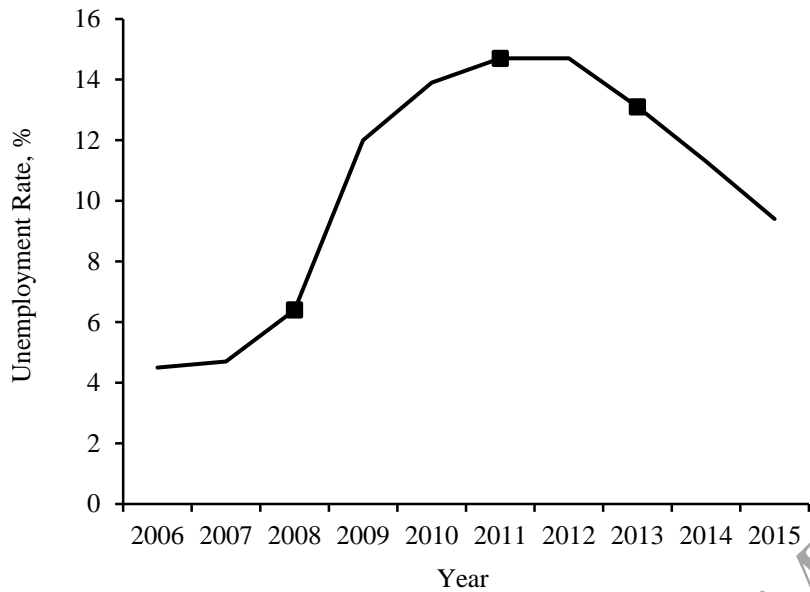


Figure 1 Legend:

The annual unemployment rate among the active population in Ireland, data from Eurostat, 2016. The large increase in the annual unemployment rate after 2008 serves as an indicator of the Great Recession in Ireland. The markers are at waves 1, 2, and 3 of data collection in the Growing Up in Ireland study, which fall prior to, during, and after the Great Recession in Ireland.

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Figure 2: Sample Flow Chart, Growing Up in Ireland Infant Cohort (2008-2013)

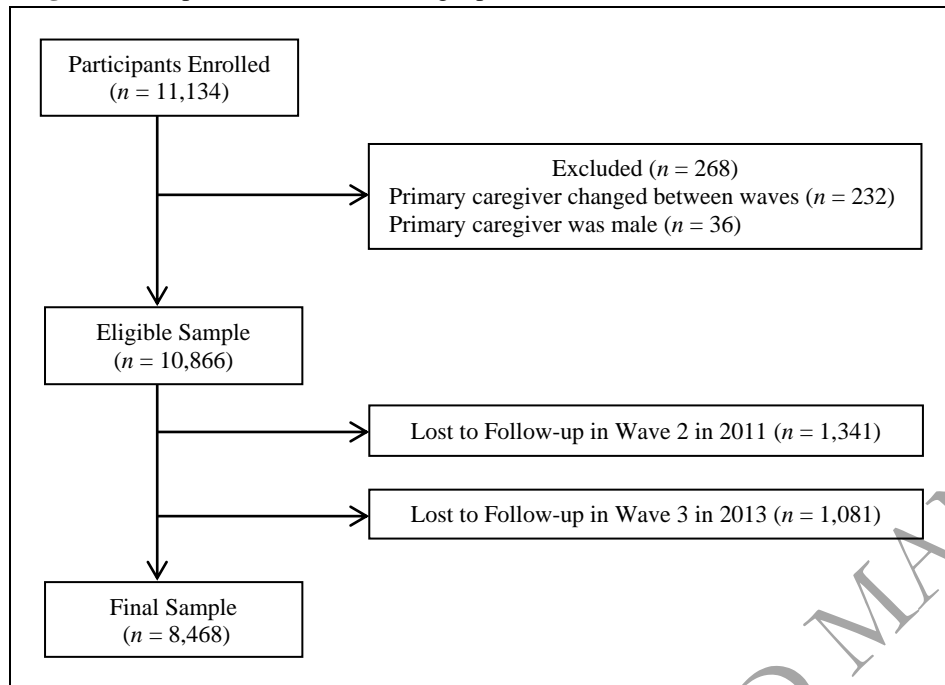


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Flowchart illustrating follow-up in GUI from Wave 1 in 2008 through Wave 3 in 2011 and exclusion criteria for the analytic sample.

