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Child Health, Maternal Marital and Socioeconomic Factors, and Maternal Health

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Abstract

While maternal socioeconomic status and health predict in part children's future health and socioeconomic prospects, it is possible that the intergenerational association flows in the other direction such that child health affects maternal outcomes. Previous research demonstrates that poor child health increases the risk of adverse maternal physical and mental health outcomes. We hypothesize that poor child health may also increase the risk of poor maternal health outcomes through an interaction between child health and factors associated with health outcomes, such as marital status, marital quality, and socioeconomic status. Using data on women in the National Longitudinal Study of Youth 1979 cohort ($N = 2,279$), we find evidence that the effects of certain maternal marital quality and socioeconomic factors on maternal physical and mental health depend on child health status and vice versa.

Keywords

child health; maternal health; depressive symptoms; activity limitations; socioeconomic status; marital quality; NLSY

The prevalence of childhood chronic conditions and activity limitations has substantially increased over the last several decades, due to treatment advances, improved survival, and the emergence of new childhood conditions (Hogan et al., 1997; Perrin, Bloom, & Gortmaker, 2007; Van Cleave, Gortmaker, & Perrin, 2010). With the rise in chronic conditions among children, there is a critical need to understand the impact of child health on families.

Systems theory predicts that having a child in poor health in the family is a stressor that is associated with the well-being of members of the family system across multiple life domains, such as parenting, health, work, and marriage (Bronfenbrenner, 1977; Diez Roux, 2007). In addition to the balance of family needs experienced by all parents, parents of children with health conditions or activity limitations experience greater care burden compared to parents of children with no limitations: they are responsible for more of the physical care of their children, helping children cope physically and emotionally with their

condition, negotiating medical, educational, recreational, and other services, and experiencing concerns about their child's well-being and future prospects (Raina et al., 2004).

Many studies focus on the impact of child health on maternal physical and mental health outcomes, because mothers are most often the primary caregivers of children and as a result are more likely to be affected by child health or functional status as well as the member of the family on whom parent-child data are collected. Clinical and population-based studies have demonstrated a risk for adverse maternal physical and mental health outcomes for mothers of children with developmental disabilities, chronic health conditions, and activity limitations, as well as a higher risk for adverse physical and mental health outcomes compared to mothers of children with no disabilities, health conditions, or activity limitations (Abbeduto et al., 2004; Early et al., 2002; Glidden & Schoolcraft, 2003; Hastings et al., 2006; Kuhlthau et al., 2010; Miller et al., 2002; Raina et al., 2005; Seltzer et al., 2001; Singer, 2006; Witt et al., 2009; Witt et al., 2010). The effect of child health on maternal physical and mental health outcomes can be explained in terms of a stress process perspective, where the stressors associated with having a child with a health condition or activity limitation are conceptualized as chronic strains which produce physiological and psychological distress (Pearlin, 1989; Pearlin et al., 2005). When an individual perceives a chronic environmental challenge as stressful, these challenges lead to adverse physiological and psychological outcomes through chronic exposure to fluctuating or heightened neural, neuroendocrine, and immune system responses (Adler et al., 1994; McEwan & Seeman, 1999; Taylor & Seeman, 1999).

Previous research has shown that child activity limitations are negatively associated with maternal labor force participation (Lukemeyer et al., 2000; Porterfield, 2002). Although the causal direction is not always clear, previous research has shown that child health and socioeconomic status are clustered together such that children with health conditions or activity limitations are more likely to live in economically disadvantaged families than are children with no health conditions or activity limitations (Kuhlthau & Perrin, 2001; Porterfield, 2002; Witt, Riley, & Coiro, 2003; Witt et al., 2009). Children with activity limitations are also more likely to have divorced, separated or never married parents and less likely to have married parents, and poor marital quality is higher among parents of children with activity limitations (Risdal & Singer, 2004; Witt, Riley, & Coiro, 2003).

The idea that child health and functioning is associated with the well-being of other family members across multiple life domains corresponds to the concept of stress proliferation. Stress proliferation is the process by which an initial stressor leads to a) the expansion of the initial stressor, b) additional stressors in other life domains, c) additional stressors across the life course, and d) additional stressors across generations (Grzywacz, Almeida, & McDonald, 2002; Pearlin, Aneshensel, & LeBlanc, 1997; Pearlin et al., 2005; Thoits, 2010). Stress proliferation is a useful conceptual tool for noting that stressors tend to cluster and that researchers interested in particular stressors should account in some way for other stressors.

Research in both the stress process and cumulative advantage literatures supports the notion that there may be a multiplicative effect of multiple stressors on individual health and well-being. Research on the social patterning of stressors finds some evidence that the effects of chronic stressors on various measures of health are exacerbated in the face of episodic stressors (Lepore, Miles, & Levy, 1997; Marin et al., 2007, 2009; Pike et al., 1997; Serido, Almeida, & Wethington, 2004). Researchers posit that the presence of one stressor reduces the resources available to the individual for coping with other stressors, such as resolving issues before they become larger problems and reducing negative and promoting positive

appraisals of issues (Lazarus, 1999; Serido, Almeida, & Wethington, 2004). Furthermore, research on mechanisms for altering stress effects demonstrates that certain positive factors -- such as sense of control over life, high self-esteem, and social support -- may weaken the effect of stressors on health (Lazarus & Folkman, 1984; Taylor & Stanton, 2007; Thoits, 2010). Thus, it is plausible that the presence of one stressor may exacerbate the effect of another stressor on health. Finally, stratification research on cumulative advantage in the relationship between socioeconomic status and health demonstrates interactions between socioeconomic status and factors such as race, ethnicity, and health behaviors in predicting health outcomes (Pampel & Rogers, 2004; Shuey & Willson, 2008).

Ample evidence exists demonstrating that marital status (Carr & Springer, 2010; Waite & Gallagher, 2000), marital quality (Gallo et al., 2003; Umberson et al., 2006; Wickrama et al., 1997; Wickrama et al., 2001), and socioeconomic status (Adler et al., 1994; Kitagawa & Hauser, 1973; Link & Phelan, 1995) are independent predictors of physical and mental health. However, it is unclear how maternal marital and socioeconomic factors are associated with child health in terms of deleterious maternal physical and mental health effects. We hypothesize that there is a multiplicative effects of multiple stressors on maternal physical and mental health outcomes, such that the effects of maternal marital and socioeconomic factors on maternal physical and mental health depend on child health status and vice versa.

METHODS

Data

Data come from the National Longitudinal Study of Youth 1979 (NLSY), a nationally representative sample of 12,686 men and women who were between the ages of 14 and 22 when first surveyed in 1979 (<http://www.bls.gov/nls/nlsy79.htm>). Data were collected yearly from 1979 to 1994, and biennially from 1996 to the present, initially to chronicle the labor force experience of this cohort. However, other sets of questions have been added over the years and broadened the scope of the survey. Starting in 1986, data on the children of NLSY 1979 female respondents have been collected from both the mothers and children (<http://www.bls.gov/nls/nlsy79ch.htm>).

When the women from the original cohort turned 40, they were asked a range of health questions in the subsequent wave of the NLSY (between 1998 and 2006). In order to maximize use of the NLSY sample, data were pooled across waves so that it included all the women who participated in this health module in one of the five waves and were mothers of a child aged 18 and under for whom data on child activity limitations existed ($N = 2,279$, see *Independent Variables below*). Among households where only one child had an activity limitation, we selected that child to represent the household. Using a random number generator, we randomly selected one child with a limitation in households where more than one child had a limitation, and we randomly selected one child to represent households where no children had activity limitations.

Measures

Dependent variables—Maternal *physical health* was measured as the physical component summary of the 12-item Short Form (SF-12), a brief inventory of twelve physical and mental health questions that captures functional health and well-being from the respondent's point of view (Ware, Kosinski, & Keller, 1996). The inventory includes questions on self-reported health, limitations and pain hindering various activities, and how often the respondent experiences various emotional states. The physical component summary score was constructed by the NLSY from the twelve items using the physical

health regression weights available in Ware, Kosinski, and Keller (1995). Scores were calibrated so that respondents with a score above 50 have better health than the typical person in the general U.S. population (age is not held constant), and each one-point difference above or below 50 corresponds to one-tenth of a standard deviation; the NLSY sample has a slightly higher mean score and slightly lower standard deviation compared to general U.S. population. The scores range from 0 to 100 in the population and from 13.66 to 66.63 in the analytic sample. Because the raw score was negatively skewed, we reversed the distribution to make it positively skewed by subtracting each SF-12 physical component score from one plus the maximum SF-12 physical component score in the sample, and used the natural log of this reversed score to correct for non-normality. Thus, higher scores indicate worse maternal physical health in this analysis. (See *Additional Analyses* for results using the mental component summary score from the SF-12 as a dependent variable.)

The maternal *depressive symptoms* index was constructed as the sum of seven items from the Center for Epidemiologic Studies Depression scale (Radloff, 1977). This index was constructed by summing the seven items about how often the respondent felt each depressive symptom, with answers ranging from not at all (1) to most days (4). Scores ranged from 7 to 28 with a higher score indicating more depressive symptoms. The natural log of the index was used for analysis because the raw score was positively skewed.

Independent variables—Researchers have begun to move away from the “categorical” or “disease-specific” approach to defining child health based on evidence of commonalities across childhood illnesses in terms of child functional status and the experiences of the children’s families (Kohen et al., 2007; Stein et al., 1993). Defining child health using survey questions about activity limitations captures how children are physically, emotionally, or cognitively limited in a way that affects their age-appropriate activities, and improves upon the disease-specific approach because a diagnosis from a medical professional is not necessary, so that measures of child health are not limited to those who have medical care.

Child health was defined in terms of *child activity limitation status* in this study. Mothers of children under age 15 reported whether the child currently had a condition that affected regular school attendance, regular school work, and usual childhood physical activities, and whether the child had a condition that required frequent attention or treatment from a health professional, the use of medicine or drugs, or the use of any special equipment.¹ Children age 15 and over reported on whether they currently had a condition that limited their ability to attend school regularly or do regular schoolwork, whether they had a condition that required frequent attention or treatment from a health professional, the use of medicine or drugs, or the use of any special equipment, and whether they were or would be limited in the kind or amount of work they could do for pay because of their health.² If any one of these items had a “yes” response, the child was coded as having an activity limitation. If all of the items had a “no” response, the child was coded as having no activity limitation. The assumption was made that there was no difference in maternal and child reports of activity limitations for the purposes of this study, as we wanted to describe the relationships for all children and adolescents with data available on their activity limitation status.

¹The distribution of the types child activity limitations for children under age 15 were as follows: limits school attendance (13%); limits school work (19%); limits physical activities (18%); requires medical attention (46%); requires medication (60%); or requires the use of special equipment (11%). Note that the percentages do not add to 100% as more than one type of limitation could be reported in this survey instrument.

²The distribution of the types child activity limitations for adolescents age 15 through 18 were as follows: limits school attendance or school work (12%); requires medical attention, medication, or the use of special equipment (48%); or limits or would be limited in work (40%). Note that the percentages add to 100% as only one type of limitation could be reported in this survey instrument.

In order to assess how changes in child activity limitation modified the effect of marital and socioeconomic factors on maternal physical and mental health and vice versa, *child activity limitation persistence* dummy variables were constructed using data from two waves of the study. The child activity limitation persistence variables were operationalized as no limitation (no limitation reported in either wave), newly reported limitation (no limitation reported in the first wave and a limitation reported in the subsequent wave), resolved limitation (limitation reported in the first wave and no limitation reported in the subsequent wave), and ongoing limitation (limitation reported in both waves) (Witt et al., 2009).

Among all mothers in the sample ($N = 2,279$), we were interested in examining whether child activity limitations moderated the effect of maternal marital status (being divorced, separated, widowed or never married compared to being married) on maternal physical and mental health. Among married mothers ($N = 1,542$), we were interested in whether child activity limitations altered the effect of maternal marital quality factors on maternal physical and mental health. Based on prior research (see, e.g., Amato & Rogers, 1999; Rogers & Amato, 1997; Tach & Halpern-Meekin, 2009), a series of marital quality items were compiled into three indices: marital unhappiness, lack of quality time, and marital arguing. *Marital unhappiness* was constructed from one item that asked “would you say that your marriage is very happy, fairly happy, or not too happy?” *Lack of quality time* index was constructed as the sum of three items about the frequency with which the mothers did the following with their spouse: have calm discussions, laugh together, and talk about their day, with answers range from once a week (0) to less than once a month (3). A higher score (ranging from 0 to 9) indicates that quality time happened infrequently; Cronbach’s alpha for the scale was .66. The *marital arguing* index was constructed as the sum of ten items about the frequency with which mothers argued with their spouses about different topics, with answers ranging from never (0) to often (3). A higher score on the arguing index (ranging from 0 to 30) indicates that the mother argued often with her spouse about several different topics; Cronbach’s alpha for the scale was .71. The continuous variables—lack of quality time and marital arguing—were mean-centered in order to remedy the multicollinearity between the interaction terms and their first-order effects.

Among all mothers in the sample ($N = 2,279$), we were also interested in examining whether child activity limitations moderated the effect of maternal socioeconomic factors on maternal physical and mental health. *Family poverty status* was defined as total family income being below the poverty level for the last year, as issued by the U.S. Department of Health and Human Services and based on Census Bureau poverty guidelines. Two measures of employment status were used in the current analysis: any time unemployed and any time out of the labor force. *Any time unemployed* was defined as not employed but available for work at least one week in the last year. *Any time out of the labor force* was defined as not employed and unavailable for work at least one week in the last year, where “unavailable” means that the person was not looking for work, for example because they were engaged in housework, in school, unable to work because of long-term physical or mental illness, retired, or voluntarily idle. Because the statuses were defined as occurring for at least one week in the past year, a respondent could be both unemployed and out of the labor force in the same year.

Sociodemographic variables—Certain sociodemographic variables were introduced as control variables in the analysis if they had previously been shown to be potential confounders in the relationship between child health and maternal outcomes (see, e.g., Witt et al., 2009). The control variables include child age and sex and maternal race, age, education, smoking, body-mass index (BMI), marital status, poverty status, any time unemployed, any time out of the labor force, health condition that limits working for pay, depressive symptoms, and number of children in the household.

Analytic approach

The analyses were conducted using Stata 10.1 (StataCorp LP, College Station, Texas). The values for missing data were derived from the multiple imputation technique of multivariate imputation by chained equations, and the results reported were generated using Stata's "micombine" command, which averaged coefficients across the five imputed datasets and adjusted their standard errors using Rubin's (1987) formula that combines the estimated variability within and across replications with a small correction factor to the variance. The descriptive statistics in Table 1 were weighted using custom weights from the NLSY to adjust for the multiple survey years from which the data were drawn as well as the oversampling of certain populations in the NLSY 1979.

The empirical models examined focus on child activity limitations, maternal marital and socioeconomic factors, and the interactions between the two in their effects on maternal physical and mental health: $\log(MH) = \beta_0 + \beta_1 AL + \beta_2 MF + \beta_3 AL * MF + \beta_k X_k + \varepsilon$, where the natural log of each maternal outcome of interest (maternal physical and mental health; MH) is regressed on child activity limitation status (AL), a maternal marital or socioeconomic factor (MF), the interaction between child activity limitations and the maternal factor of interest, and a vector of sociodemographic control variables (X). When captured at the same point in time, the interaction between child activity limitations and a maternal marital or socioeconomic factor (β_3) is statistically equivalent, such that child health moderates the effect of the maternal factor on maternal health and vice versa. Because child activity limitation persistence is an ordinal variable, partial *F* tests were conducted to ascertain whether the additional parameters used to estimate the interaction terms significantly improved the estimation of poor maternal physical health and depressive symptoms compared to the first-order effects models.

Since maternal health outcomes were measured in the wave after mothers turned 40 (between 1998 and 2006), data were pooled across the five waves so that it included all the women who participated in the over-40 health module and were mothers of a child aged 18 and under for whom data on child activity limitations existed ($N = 2,279$). In order to minimize reverse causality, child activity limitation status and maternal marital factors were measured in the wave before the maternal health outcomes were reported. (The socioeconomic factors were measured in the same wave as the maternal health outcomes because they refer to income and employment patterns in the previous year.) Child activity limitation persistence was measured using data from one and two waves before the maternal health outcomes were reported. Sociodemographic control variables were measured two waves prior to the maternal outcomes of interest.

Models including maternal socioeconomic factors (poverty, unemployed, out of the labor force) as independent variables of interest do not control for the baseline measure of that socioeconomic factor of interest (when the baseline measure is included, the results are substantively and statistically the same as those reported). Models including marital quality factors (marital unhappiness, lack of quality time, marital arguing) as independent variables of interest are restricted to mothers who were married at the time marital quality was measured ($N = 1,542$).

RESULTS

Table 1 presents the descriptive statistics for the analytic sample, weighted to adjust for the multiple survey years from which the data were drawn as well as the oversampling of certain populations in the NLSY 1979. Overall, 19.5 percent of mothers had a child aged 18 or younger with an activity limitation reported one wave before maternal health status was reported. In terms of child activity limitation persistence, about 72 percent of mothers had a

child with no limitation in either wave, 8.5 percent of mothers had a child with a resolved limitation, 10.4 percent of mothers had a child with a newly reported limitation, and 9.1 percent of mothers had a child with persistent activity limitations.

Main effects on maternal physical and mental health

Our study accords with results from previous studies which found that having a child with activity limitations led to worse physical and mental health outcomes for mothers (see Table 2). Child activity limitations are associated with worse physical health and increased depressive symptoms compared to mothers of children with no activity limitations (Model 1). Having a child with persistent activity limitations across two waves of data is associated with worse maternal physical and mental health compared to mothers of children with no limitations in either wave, and having a child with newly reported activity limitations is significantly associated with worse physical health compared to having a child with no activity limitations in either wave (Model 2). Additional analyses (not shown) reveal that having a child with persistent activity limitations is also significantly associated with worse physical health and increased depressive symptoms compared to having a child with resolved and newly reported activity limitations.

Interaction effects

Tables 3 and 4 report the regressions of maternal poor physical health and depressive symptoms on child activity limitations and each maternal marital and socioeconomic factor of interest. Model 1 regresses the maternal outcome on child activity limitation status, the maternal marital or socioeconomic factor of interest, and sociodemographic control variables. Model 2 includes the interaction between child activity limitation status and the maternal factor of interest. Models 3 and 4 replicate Models 1 and 2 with the measure of child activity limitation persistence, comparing persistent activity limitations to no limitations. (New and resolved child activity limitations do not have significant interactions with maternal marital and socioeconomic factors in their effects on maternal physical and mental health compared to mothers of children with no limitations; results available from the authors.)

There is a significant marital unhappiness by child activity limitation persistence interaction effect for poor maternal physical health (Table 3, Model 4). Because poor physical health is log transformed, the coefficients can be interpreted in terms of percent change, such that poor physical health changes by $100 \times [\exp(\beta) - 1]$ percent for a one unit increase in the independent variable, holding all other variables in the model constant (Wooldridge, 2009). Compared to mothers of children with no limitations and who report they are “veryhappy” in their marriage, there is a 13 percent increase in poor physical health for mothers of children with persistent activity limitations who are “very happy” in their marriage ($100 \times [\exp(.12) - 1]$), and no change in poor physical health for mothers of children with no limitations who report that they are “not too happy” in their marriage (the coefficient for “not too happy” is not statistically significant). However, there is a 46 percent increase in poor physical health for mothers who both have a child with a persistent activity limitation and are “not too happy” in their marriages compared to mothers who both have a child with no limitations and who are “very happy” in their marriages ($100 \times [\exp(.12 - .05 + .31) - 1]$). The significant interaction term indicates that the effect of marital unhappiness on poor physical health is greater for mothers of children with persistent activity limitations; conversely, the interaction may also be interpreted as the effect of persistent child activity limitations on poor physical health being greater for mothers who are “not too happy” in their marriages.

The effect of marital arguing on poor maternal physical health is exacerbated by child activity limitations and vice versa (see Table 3). There is no change in maternal physical

health for a one-unit increase in marital arguing when the child has no limitations ($100 * [\exp(0) - 1]$), but each one-unit increase on the marital arguing scale is associated with a 1 percent increase in poor physical health among mothers of children with activity limitations (in Model 2; $100 * [\exp(.00 + .01) - 1]$) and a 2 percent increase in poor physical health among mothers of children with persistent activity limitations (in Model 4; $100 * [\exp(.00 + .02) - 1]$).

There is a significant child activity limitation persistence by poverty status interaction effect for poor maternal physical health (Table 3, Model 4). Compared to mothers of children with no limitations and not in poverty, there is a 12 percent increase in poor physical health for mothers of children with persistent activity limitations and not in poverty ($100 * [\exp(.11) - 1]$), a 7 percent increase in poor physical health for mothers of children with no limitations and in poverty ($100 * [\exp(.07) - 1]$), and a 46 percent increase in poor physical health for mothers of children with persistent activity limitations and in poverty ($100 * [\exp(.11 + .07 + .20) - 1]$). Thus, the effect of poverty on poor physical health is greater for mothers of children with persistent activity limitations; conversely, the effect of persistent child activity limitations on poor physical health is greater for mothers in households below the poverty line.

There is also a significant child activity limitation persistence by labor force status interaction effect for poor maternal physical health (Table 3, Model 4), such that the effect of being out of the labor force on poor physical health is exacerbated by having a child with persistent activity limitations and vice versa. Compared to mothers of children with no limitations and who spent no time out of the labor force, there is a 12 percent increase in poor physical health for mothers of children with persistent activity limitations who spent no time out of the labor force ($100 * [\exp(.11) - 1]$), a 13 percent increase in poor physical health for mothers of children with no limitations who spent any time out of the labor force ($100 * [\exp(.12) - 1]$), and 51 percent increase in poor physical health for mothers of children with persistent activity limitations and who spent any time out of the labor force ($100 * [\exp(.11 + .12 + .18) - 1]$).

The effect of marital unhappiness on maternal depressive symptoms is exacerbated by child activity limitations and vice versa. Compared to mothers of children with no limitations and who report they are “very happy” in their marriage, there is a 43 percent increase in depressive symptoms for mothers who both have a child with an activity limitation and are “not too happy” in their marriages ($100 * [\exp(.02 + .11 + .23) - 1]$) (Table 4, Model 2). Compared to mothers of children with no limitations and who are “very happy” in their marriages, there is a 27 percent increase in depressive symptoms for mothers who both have a child with persistent activity limitations and who are “fairly happy” in their marriages ($100 * [\exp(.01 + .08 + .15) - 1]$) and a 60 percent increase in depressive symptoms for mothers who both have a child with persistent activity limitations and who are “not too happy” in their marriages ($100 * [\exp(.01 + .11 + .35) - 1]$) (Table 4, Model 4).

There are significant lack of quality time by child activity limitation status (Table 4; Model 2) and persistence (Table 4; Model 4) interaction effects for maternal depressive symptoms. These interaction effects reveal a pattern where each one-unit increase on the lack of quality time scale is not associated with changes depressive symptoms among mothers of children with no limitations (the coefficient is not statistically significant), but is associated with a 5 percent increase in depressive symptoms among mothers of children with activity limitations ($100 * [\exp(.01 + .04) - 1]$) (Table 4, Model 2), and a 6 percent increase in depressive symptoms among mothers of children with persistent activity limitations ($100 * [\exp(.01 + .05) - 1]$) (Table 4, Model 4). Finally, there is a significant marital arguing by child activity limitation persistence interaction effect for maternal depressive symptoms (Table 4, Model 4), where

each one-unit increase on the marital arguing scale is associated with a 2 percent increase in depressive symptoms among mothers of children with persistent activity limitations ($100 * [\exp(.01 + .01) - 1]$).

Partial *F* tests (not shown) reveal that a more parsimonious coding of child activity limitation persistence improves the fit of the models predicting maternal poor physical health and depressive symptoms. (For simplicity, the results of the less parsimonious models are reported, and the results are substantively the same as the more parsimonious models.) In the models predicting poor maternal physical health, combining no limitations with resolved limitations resulted in significantly ($p < 0.05$) improved model fit when poverty status is the exposure of interest, and combining no, resolved, and new limitations results in significantly ($p < 0.05$) improved model fit when marital unhappiness, marital arguing, and time out the labor force are the exposures of interest (“very happy” and “fairly happy” were also combined in the marital unhappiness model). In the models predicting maternal depressive symptoms, combining no limitations with resolved limitations results in significantly ($p < 0.05$) improved model fit when lack of quality time is the exposure of interest, and combining no, resolved, and new limitations results in significantly ($p < 0.05$) improved model fit when marital unhappiness and marital arguing are the exposures of interest (“very happy” and “fairly happy” were also combined in the marital unhappiness model).

Additional Analyses

The analyses discussed above were repeated with other measures of maternal physical and mental health and showed no significant interaction effects: SF-12 mental component score, whether the mother had any limitations that would or could inhibit her ability to work, maternal self-reported health in a multinomial logistic regression, and maternal self-reported health dichotomized as fair or poor health vs. excellent, very good, or good health in a logistic regression. An ordinal logistic regression of maternal self-reported health showed significant interactions of persistent child activity limitations with marital arguing and maternal time out of the labor force. However, this model violated the proportional odds assumption underlying an ordinal logistic regression model.

It is also plausible to examine whether maternal marital and socioeconomic factors mediate the effect of child activity limitations on maternal physical and mental health. We used two tests of mediation available in Stata (*sgmediation* and *binary_mediation*, both with bootstrapped standard errors and confidence intervals) to examine whether the effects of child activity limitations on maternal physical and mental health were mediated by the marital and socioeconomic factors of interest, controlling for additional covariates. The effect of child activity limitations on poor maternal physical health was significantly mediated by maternal poverty status, and the effect of poverty status on poor maternal physical health was significantly mediated by child activity limitations. The effect of child activity limitations on maternal depressive symptoms was significantly mediated by lack of quality time and poverty status, and the effects of lack of quality time and poverty status on maternal depressive symptoms were significantly mediated by child activity limitations. However, the indirect effects in these models were substantively small and at most make up 9% of the total effect of child activity limitations on maternal physical or mental health.

Limitations

The relationships between child activity limitation status and maternal physical and mental health may be overestimated to the extent that the maternal reports of child health were influenced by maternal physical or mental health or unobserved underlying variables. This study mitigated these potential biases by using longitudinal data to control for measures of baseline maternal physical and mental health status as well as baseline measures of other

covariates that could lead to a spurious relationship. However, to the extent that these controls were not exhaustive or were imperfect measures of the constructs they proxy, the results may be biased.

DISCUSSION

This study confirms that having a child with activity limitations in the family is a stressor that directly influences the physical and mental health of the mother, and expands upon prior research to account for the possible moderating role that child health may play in determining maternal physical and mental health outcomes. The effects of marital unhappiness, marital arguing, household poverty status, and maternal time out of the labor force on poor maternal physical health are greater when the mother has a child with persistent activity limitations compared to having a child with no limitations (Model 4); the effect of marital arguing on poor maternal physical health is greater when the mother has a child with an activity limitation compared to mothers of children with no limitation (Model 2). The effects of marital unhappiness, lack of quality time with one's spouse, and marital arguing on maternal depressive symptoms are greater when the mother has a child with persistent activity limitations compared to having a child with no limitations (Model 4); the effects of marital unhappiness and lack of quality time on maternal depressive symptoms are also greater when the mother has a child with an activity limitation compared to mothers of children with no limitations (Model 2). Overall, having a child with activity limitations exacerbates the effects of some maternal marital quality and socioeconomic factors on maternal poor physical health and depressive symptoms and vice versa, particularly when child activity limitations are persistent.

Our findings speak to both role theory and stress process models and their implications for the well-being of members of the family. Stress may be produced when there are strains within particular roles such as parenthood, marriage, or work particularly because these roles are important for individuals and the society at large (Avison & Turner, 1988; Pearlin, 1989; Wheaton, 1999). Our findings point to the importance of strains *within and across* parental, marital, and socioeconomic roles for maternal well-being, in that multiple role strains appear to have a multiplicative adverse effect on maternal physical and mental health. Future research should investigate the implications of poor child health for other members of the family in terms of the multiplicative effect of multiple role strains, as well as whether coping mechanisms and social support (Lazarus & Folkman, 1984; Taylor & Stanton 2007; Thoits, 2010) can buffer against the effects of these multiple role strains on the physical and mental health of family members. Given the importance of race and ethnicity in predicting differences in socioeconomic status and health outcomes in the cumulative advantage literature (see, e.g., DiPrete & Eirich, 2006; Kelly-Moore & Ferraro, 2004; Shuey & Willson, 2008), future research should also examine the role of maternal race and ethnicity in the multiplicative effect of multiple role strains. Finally, future research should examine how maternal and child reports of child activity limitations differ and the implications of these differences for the multiplicative effect of multiple role strains.

Any time spent out of the labor force -- out of work and not looking for work -- is a potentially heterogeneous category, in that some women choose to be out of the labor force during childbearing and childrearing years and are able to do so without financial impediments. We found that any time out of the labor force was significantly associated with poor maternal physical and mental health outcomes in this sample, and that the negative effect of maternal time out of the labor force on maternal physical health was exacerbated by having a child with persistent activity limitations and vice versa. These findings complement research on respite effects, which demonstrates that working outside the home provides mothers of children with activity limitations, disabilities, or chronic

health conditions a buffer against the stressful effects of caregiving (see, e.g., Morris, 2011; Thyen et al., 1999; Warfield, 2001, 2005). Future research should continue to examine how the heterogeneous components of maternal labor force participation may have both positive and negative consequences for maternal well-being in the presence of child activity limitations.

The findings of this study have particular policy implications. In general, a measure of activity limitations is likely more relevant for policy decisions where functionality, rather than diagnosis, is the target. This study supports prior studies which have found that child activity limitations, and especially ongoing child activity limitations, are associated with adverse maternal physical and mental health outcomes. Thus, policies that promote health and health care for family members are necessary to prevent the adverse physical and mental health outcomes associated with caring for a child with activity limitations, especially persistent activity limitations. We envision such policies as targeting family members for additional health screenings and health care once one member of the family is identified as having a health condition, disability, or activity limitation. Particular to this study, it appears that additional socioeconomic and marital or relationship support for mothers of children with activity limitations is also necessary in order to help buffer against the synergistic effects of child activity limitations with marital quality and socioeconomic factors on maternal physical and mental health. Such policy initiatives could target family members once one member of the family is identified as having a health condition, disability, or activity limitation, and provide marital and relationship counseling through health care services. Additionally, policies that promote flexible work schedules and adequate and affordable childcare may reduce the impact of a child's limitation on a mother's ability to work (Parish & Cloud, 2006; Smith et al., 2002), thereby reducing the synergistic effects of child health and socioeconomic factors on maternal physical health outcomes.

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REFERENCES

- Abbeduto L, Seltzer MM, Shattuck P, Krauss MW, Orsmond G, Murphy MM. Psychological well-being and coping in mothers of youths with Autism, Down Syndrome, or Fragile X Syndrome. *American Journal on Mental Retardation*. 2009; 109(3):237–254. [PubMed: 15072518]
- Adler NE, Boyce T, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL. Socioeconomic status and health: The challenge of the gradient. *The American Psychologist*. 1994; 49(1):15–24. [PubMed: 8122813]
- Amato PR, Rogers SJ. Do attitudes toward divorce affect marital quality? *Journal of Family Issues*. 1999; 20(1):69–86.
- Avison WR, Turner RJ. Stressful life events and depressive symptoms: disaggregating the effects of acute stressors and chronic strains. *Journal of Health and Social Behavior*. 1988; 29(3):253–264. [PubMed: 3241066]
- Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*. 1986; 51:1173–1182. [PubMed: 3806354]
- Bronfenbrenner U. Toward an experimental ecology of human development. *American Psychologist*. 1977; 32:513–531.

- Carr D, Springer KW. Advances in families and health research in the 21st century. *Journal of Marriage and Family*. 2010; 72:743–761.
- Diez Roux AV. Integrating social and biologic factors in health research: A systems view. *Annals of Epidemiology*. 2007; 17(7):569–574. [PubMed: 17553703]
- DiPrete TA, Eirich GM. Cumulative advantage as a mechanism for inequality: A review of theoretical and empirical developments. *Annual Review of Sociology*. 2006; 32(1):271–297.
- Early TJ, Gregoire TK, McDonald TP. Child functioning and caregiver well-being in families of children with emotional disorders. *Journal of Family Issues*. 2002; 23(3):374–391.
- Gallo LC, Troxel WM, Kuller LH, Sutton-Tyrrell K, Edmundowicz D, Matthews KA. Marital status, marital quality, and atherosclerotic burden in postmenopausal women. *Psychosomatic Medicine*. 2003; 65:952–962. [PubMed: 14645772]
- Glidden LM, Schoolcraft SA. Depression: Its trajectory and correlates in mothers rearing children with intellectual disability. *Journal of Intellectual Disability Research*. 2003; 47(4–5):250–263. [PubMed: 12787157]
- Grzywacz JG, Almeida DM, McDonald DA. Work-family spillover and daily reports of work and family stress in the adult labor force. *Family Relations*. 2002; 51(1):28–36.
- Hastings RP, Daley D, Burns C, Beck A. Maternal distress and expressed emotion: Cross-sectional and longitudinal relationships with behavior problems of children with intellectual disabilities. *American Journal on Mental Retardation*. 2006; 111(1):48–61. [PubMed: 16332156]
- Hogan DP, Msall ME, Rogers ML, Avery RC. Improved disability population estimates of functional limitation among American children aged 5–17. *Maternal and Child Health Journal*. 1997; 1(4): 203–216. [PubMed: 10728246]
- House, JS.; Williams, DR. Understanding and reducing socioeconomic and racial/ethnic disparities in health. In: Smedley, BD.; Syme, SL., editors. *Promoting health: Intervention strategies from social and behavioral research*. Washington, DC: National Academy Press; 2000. p. 81-124.
- Kitagawa, EM.; Hauser, PM. *Differential mortality in the United States: A study in socioeconomic epidemiology*. Cambridge, MA: Harvard University Press; 1973.
- Kelley-Moore JA, Ferraro KF. The black/white disability gap: Persistent inequality in later life? *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*. 2004; 59(1):S34–S43.
- Kohen DE, Brehaut JC, Garner RE, Miller AR, Lach LM, Klassen AF, Rosenbaum PL. Conceptualizing childhood health problems using survey data: A comparison of key indicators. *BMC Pediatrics*. 2007; 7(1):40–52. [PubMed: 18053253]
- Kuhlthau KA, Perrin JM. Child health status and parental employment. *Archives of Pediatrics and Adolescent Medicine*. 2001; 155(12):1346–1350. [PubMed: 11732954]
- Kuhlthau K, Kahn R, Hill KS, Gnanasekaran S, Ettner SL. The well-being of parental caregivers of children with activity limitations. *Maternal and Child Health Journal*. 2010; 14(2):155–163. [PubMed: 19034635]
- Lazarus, RS. *Stress and emotion: A new synthesis*. New York: Springer Publishing; 1999.
- Lazarus, RS.; Folkman, S. *Stress, appraisal and coping*. New York: Springer; 1984.
- Lepore SJ, Miles HJ, Levy JS. Relation of chronic and episodic stressors to psychological distress, reactivity, and health. *International Journal of Behavioral Medicine*. 1997; 4:39–59. [PubMed: 16250741]
- Link BG, Phelan J. Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, Extra Issue. 1995:80–94.
- Lukemeyer A, Meyers MK, Smeeding T. Expensive children in poor families: Out-of-pocket expenditures for the care of disabled and chronically ill children in welfare families. *Journal of Marriage and Family*. 2000; 62(2):399–415.
- Marin TJ, Martin TM, Blackwell E, Stedler C, Miller GE. Differentiating the impact of episodic and chronic stressors on hypothalamic-pituitary-adrenocortical axis regulation in young women. *Health Psychology*. 2007; 26:447–455. [PubMed: 17605564]
- Marin TJ, Chen E, Munch JA, Miller GE. Double-exposure to acute stress and chronic family stress is associated with immune changes in children with asthma. *Psychosomatic Medicine*. 2009; 71:378–384. [PubMed: 19196805]

- Marmot MG, Shipley MJ, Rose G. Inequalities in death-specific explanations of a general pattern? *Lancet*. 1984; 5(1):1003–1006. [PubMed: 6143919]
- McEwen BS, Seeman T. Protective and damaging effects of mediators of stress: Elaborating and testing the concepts of allostasis and allostatic load. *Annals of the New York Academy of Sciences*. 1999; 896:30–47. [PubMed: 10681886]
- Miller GE, Cohen S, Ritchey AK. Chronic psychological stress and the regulation of pro-inflammatory cytokines: A glucocorticoid-resistance model". *Health Psychology*. 2002; 21:531–541. [PubMed: 12433005]
- Morris LA. Testing respite effect of work on stress among mothers of children with special needs. *Journal of Family and Economic Issues*. 2011 (forthcoming).
- Pampel FC, Rogers RG. Socioeconomic status, smoking, and health: A test of competing theories of cumulative advantage. *Journal of Health and Social Behavior*. 2004; 45(3):306–321. [PubMed: 15595509]
- Parish SL, Cloud JM. Financial well-being of young children with disabilities and their families. *Social Work*. 2006; 51(3):223–232. [PubMed: 17076120]
- Pearlin LI. The sociological study of stress. *Journal of Health and Social Behavior*. 1989; 30:241–256. [PubMed: 2674272]
- Pearlin LI, Aneshensel CS, Leblanc AJ. The forms and mechanisms of stress proliferation: The case of AIDS caregivers. *Journal of Health and Social Behavior*. 1997; 38(3):223–236. [PubMed: 9343962]
- Pearlin LI, Schieman S, Fazio EM, Meersman SC. Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*. 2005; 46(2):205–219. [PubMed: 16028458]
- Perrin JM, Bloom SR, Gortmaker SL. The increase of childhood chronic conditions in the United States. *Journal of the American Medical Association*. 2007; 297(24):2755–2759. [PubMed: 17595277]
- Pike JL, Smith TL, Hauger RL, Nicassio PM, Patterson TL, McClintock J, Costlow C, Irwin MR. Chronic life stress alters sympathetic, neuroendocrine, and immune responsivity to an acute psychological stressor in humans. *Psychosomatic Medicine*. 1997; 59:447–457. [PubMed: 9251165]
- Porterfield SL. Work choices of mothers in families with children with disabilities. *Journal of Marriage and Family*. 2002; 64(4):972–981.
- Radloff LS. The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977; 1:385–401.
- Raina P, O'Donnell M, Rosenbaum P, Brehaut J, Walter SD, Russell D, Swinton M, Zhu B, Wood E. The health and well-being of caregivers of children with cerebral palsy. *Pediatrics*. 2005; 115(6):e626–e636. [PubMed: 15930188]
- Raina P, O'Donnell M, Schwellnus H, Rosenbaum P, King G, Brehaut J, Russell D, Swinton M, King S, Wong M, Walter S, Wood E. Caregiving process and caregiver burden: Conceptual models to guide research and practice. *BMC Pediatrics*. 2004; 4(1):1. [PubMed: 14723791]
- Risdal D, Singer GHS. Marital adjustment in parents of children with disabilities: A historical review and meta-analysis. *Research and Practice for Persons with Severe Disabilities*. 2004; 29(2):95–103.
- Rogers SJ, Amato PR. Is marital quality declining? The evidence from two generations. *Social Forces*. 1997; 75(3):1089–1100.
- Rubin, DB. Multiple imputation for nonresponse in surveys. New York: Wiley; 1987.
- Seltzer MM, Greenberg JS, Floyd FJ, Pettee Y, Hong J. Life course impacts of parenting a child with a disability. *American Journal of Mental Retardation*. 2001; 106(3):265–286. [PubMed: 11389667]
- Serido J, Almeida DM, Wethington E. Chronic stressors and daily hassles: Unique and interactive relationships with psychological distress. *Journal of Health and Social Behavior*. 2004; 45:17–33. [PubMed: 15179905]
- Shuey KM, Willson AE. Cumulative disadvantage and black-white disparities in life-course health trajectories. *Research on Aging*. 2008; 30(2):200–225.

- Singer GHS. Meta-analysis of comparative studies of depression in mothers of children with and without developmental disabilities. *American Journal on Mental Retardation*. 2006; 111(3):155–169. [PubMed: 16597183]
- Smith LA, Romero D, Wood PR, Wampler NS, Chavkin W, Wise PH. Employment barriers among welfare recipients and applicants with chronically ill children. *American Journal of Public Health*. 2002; 92(9):1453–1457. [PubMed: 12197972]
- Stein REK, Bauman LJ, Westbrook LE, Coupey SM, Ireys HT. Framework for identifying children who have chronic conditions: The case for a new definition. *The Journal of Pediatrics*. 1993; 122(3):342–347. [PubMed: 8441085]
- Tach L, Halpern-Meekin S. How does premarital cohabitation affect trajectories of marital quality? *Journal of Marriage and Family*. 2009; 71(2):298–317.
- Taylor SE, Seeman TE. Psychosocial resources and the SES-health relationship. *Annals of the New York Academy of Sciences*. 1999; 896:210–225. [PubMed: 10681899]
- Taylor SE, Stanton AL. Coping resources, coping processes, and mental health. *Annual Review of Clinical Psychology*. 2007; 3(1):377–401.
- Thoits PA. Stress and health: Major findings and policy implications. *Journal of Health and Social Behavior*. 2010; 51(1 suppl):S41–S53. [PubMed: 20943582]
- Thyen U, Kuhlthau K, Perrin JM. Employment, child care, and mental health of mothers caring for children assisted by technology. *Pediatrics*. 1999; 103(6):1235–1242. [PubMed: 10353935]
- Umberson D, Williams K, Powers DA, Liu H, Needham B. You make me sick: Marital quality and health over the life course. *Journal of Health and Social Behavior*. 2006; 47:1–16. [PubMed: 16583772]
- Van Cleave J, Gortmaker SL, Perrin JM. Dynamics of obesity and chronic health conditions among children and youth. *Journal of the American Medical Association*. 2010; 303(7):623–630. [PubMed: 20159870]
- Waddington SR, Busch-Rossnagel NA. The influence of a child's disability on mother's role functioning and psychological well-being. *Genetic, Social, and General Psychology Monographs*. 1992; 118(3):293–311.
- Waite, LJ.; Gallagher, M. *The case for marriage: Why married people are happier, healthier, and better off financially*. New York: Doubleday; 2000.
- Ware, J., Jr; Kosinski, M.; Keller, SD. *SF-12: How to score the SF-12 physical and mental health summary scales*. 2nd edition. Boston: The Health Institute, New England Medical Center; 1995.
- Ware J Jr, Kosinski M, Keller SD. A 12-Item Short-Form Health Survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care*. 1996; 34(3):220–233. [PubMed: 8628042]
- Warfield ME. Employment, parenting, and well-being among mothers of children with disabilities. *Mental Retardation*. 2001; 39:297–309. [PubMed: 11448252]
- Warfield ME. Family and work predictors of parenting role stress among two-earner families of children with disabilities. *Infant and Child Development*. 2005; 14(2):155–176.
- Wheaton, B. Social stress. In: Aneshensel, CS.; Phelan, JC., editors. *Handbook of the Sociology of Mental Health*. New York: Cambridge University Press; 1999. p. 277–300.
- Wickrama KAS, Lorenz FO, Conger RD, Elder GH. Marital quality and physical illness: A latent growth curve analysis. *Journal of Marriage and Family*. 1997; 59:143–155.
- Wickrama KAS, Lorenz FO, Wallace LE, Peiris L, Conger RD, Elder GH. Family influence on physical health during the middle years: The case of onset of hypertension. *Journal of Marriage and Family*. 2001; 63:527–539.
- Witt WP, Gottlieb CA, Hampton J, Litzelman K. The impact of childhood activity limitations on parental health, mental health, and work days lost. *Academic Pediatrics*. 2009; 9(4):263–269. [PubMed: 19487173]
- Witt WP, Litzelman K, Wisk LE, Spear HA, Catrine K, Levin N, Gottlieb CA. Stress-mediated quality of life outcomes in parents of childhood cancer and brain tumor survivors: a case-control study. *Quality of Life Research*. 2010; 19(7):995–1005. [PubMed: 20473638]

- Witt WP, Riley AW, Coiro MJ. Childhood functional status, family stressors, and psychosocial adjustment among school-aged children with disabilities in the United States. *Archives of Pediatric and Adolescent Medicine*. 2003; 157(7):687–695.
- Wooldridge JM. *Introductory econometrics: A modern approach*. Cengage Learning. 2009

Table 1Descriptive Statistics for Analytic Sample, NLSY 1979^a

Variables	Analytic Sample (<i>N</i> = 2,279) ^b			
	Year	Mean or %	s.d.	% imputed ^c
Physical health (SF-12) ^d	1998–2006	52.14	9.11	0.00%
Physical health (SF-12, reverse coded, natural log)	1998–2006	2.64	0.47	0.00%
Depressive symptoms (CES-D) ^e	1998–2006	10.68	4.36	0.18%
Depressive symptoms (CES-D, natural log)	1998–2006	2.30	0.35	0.18%
Child activity limitation status(1 = <i>limitation</i>)	1996–2004	19.53%		0.00%
Child activity limitation persistence	1994/1996 –2002/2004			0.00%
No limitation		71.99%		
Resolved		8.47%		
Newly reported		10.40%		
Persistent		9.14%		
Marital factors				
Marital status	1996–2004			0.01%
Married		74.90%		
Never married		5.83%		
Divorced		14.74%		
Separated		3.87%		
Widowed		0.66%		
Marital unhappiness	1996–2004			1.10%
Very happy		69.53%		
Fairly happy		27.19%		
Not too happy		3.28%		
Lack of quality time	1996–2004	0.74	1.49	1.17%
Marital arguing	1996–2004	8.93	4.71	1.30%
Socioeconomic factors				
Poverty (1 = <i>yes</i>)	1998–2006	13.64%		14.13%
Unemployed (1 = <i>yes</i>)	1998–2006	8.44%		1.89%
Out of the labor force (1 = <i>yes</i>)	1998–2006	32.28%		1.89%
Maternal baseline characteristics				
Age	1998–2006	45.69	2.60	0.00%
Race (1 = <i>black</i>)	1992–2000	12.70%		0.00%
Ethnicity (1 = <i>Hispanic</i>)	1992–2000	5.77%		0.00%
Education	1992–2000	13.53	2.51	0.89%
Body Mass Index	1992–2000			6.89%
Under/normal weight		49.82%		
Overweight		27.16%		
Obese I		13.74%		
Obese II or more		9.28%		

Variables	Analytic Sample ($N = 2,279$) ^b			
	Year	Mean or %	s.d.	% imputed ^c
Smoking status (1 = <i>yes</i>)	1992–2000	50.58%		2.15%
Health condition limiting work (1 = <i>yes</i>)	1992–2000	9.42%		0.92%
Depressive symptoms (natural log)	1992	3.35	0.30	1.05%
Marital status (1 = <i>not married</i>)	1992–2000	24.25%		0.83%
Poverty (1 = <i>yes</i>)	1992–2000	13.81%		16.28%
Unemployed (1 = <i>yes</i>)	1992–2000	9.28%		2.15%
Out of the labor force (1 = <i>yes</i>)	1992–2000	40.53%		2.15%
Number of children in household	1992–2000	2.25	1.07	0.83%
Child baseline characteristics				
Child sex	1998–2006	48.14%		0.00%
Child age	1998–2006	16.94	5.23	0.00%

^a Analytic sample averaged across the five imputed datasets.

^b $N = 1,542$ for marital unhappiness, lack of quality time, and marital arguing.

^c Imputation restricted to married mothers for marital quality characteristics.

^d SF-12 is the physical component score of the 12-item Short Form (Ware, Kosinski, & Keller, 1996).

^e CES-D is the Centers for Epidemiologic Studies Depression Scale (Radloff, 1977).

s.d.: standard deviation

Table 2Effects of Child Activity Limitations on Maternal Physical and Mental Health^{a b}

	Physical Health (SF-12) ^c		Depressive Symptoms (CES-D) ^d	
	Coefficient	s.e.	Coefficient	s.e.
Model 1				
Child activity limitation status (1=yes)	0.12	0.02 ***	0.05	0.02 **
R^2	0.21		0.19	
Model 2				
Child activity limitation persistence (No limitation omitted)				
Resolved limitation	0.02	0.03	0.02	0.02
New limitation	0.08	0.03 **	0.03	0.02
Persistent limitation	0.16	0.03 ***	0.09	0.02 ***
R^2	0.21		0.19	

^a Coefficients averaged across the five multiply-imputed datasets; standard errors adjusted according to Rubin (1987).^b All models control for child age; maternal age, race, ethnicity; and various maternal baseline characteristics: education, BMI, smoking status, health conditions limiting work, depressive symptoms, marital status, poverty status, unemployment status, time out of the labor force, and children in the household.^c SF-12 is the physical component score of the 12-item Short Form (Ware, Kosinski, & Keller, 1996).^d CES-D is the Centers for Epidemiologic Studies Depression Scale (Radloff, 1977).

s.e.: standard error

* $p < 0.05$.** $p < 0.01$.*** $p < 0.001$.

Main and Interaction Effects of Child Activity Limitations and Maternal Marital and Socioeconomic Factors on Maternal Physical Health (SF-12)^{a b c}

Table 3

	Model 1		Model 2		Model 3		Model 4	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Child activity limitation	0.12	0.02 ***	0.11	0.03 ***	0.16	0.03 ***	0.15	0.03 ***
Not married	0.04	0.02 *	0.04	0.02	0.04	0.02	0.04	0.02
Interaction			0.01	0.05			0.03	0.07
Child activity limitation	0.11	0.03 ***	0.09	0.03 ***	0.15	0.04 ***	0.12	0.04 **
Fairly happy [vs. very happy]	-0.01	0.02	-0.02	0.02	-0.01	0.02	-0.01	0.03
Interaction			0.04	0.05			0.01	0.08
Not too happy [vs. very happy]	-0.05	0.05	-0.08	0.06	-0.05	0.05	-0.05	0.06
Interaction			0.13	0.11			0.31	0.15 *
Child activity limitation	0.11	0.02 ***	0.11	0.03 ***	0.15	0.04 ***	0.14	0.04 ***
Lack of quality time	-0.01	0.01	-0.01	0.01 *	-0.01	0.01	-0.01	0.01
Interaction			0.02	0.01			0.02	0.02
Child activity limitation	0.11	0.02 ***	0.11	0.02 ***	0.14	0.04 ***	0.15	0.04 ***
Marital arguing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Interaction			0.01	0.01 *			0.02	0.01 *
Child activity limitation	0.11	0.02 ***	0.09	0.02 ***	0.15	0.03 ***	0.11	0.03 **
Poverty	0.08	0.02 **	0.06	0.03 *	0.08	0.02 **	0.07	0.03 *
Interaction			0.09	0.06			0.20	0.08 **
Child activity limitation	0.11	0.02 ***	0.12	0.02 ***	0.15	0.03 ***	0.16	0.03 ***
Unemployed	-0.04	0.03	-0.03	0.03	-0.04	0.03	-0.01	0.03
Interaction			-0.06	0.07			-0.07	0.10
Child activity limitation	0.12	0.02 ***	0.11	0.03 ***	0.16	0.03 ***	0.11	0.03 **
Out of the labor force	0.13	0.02 ***	0.12	0.02 ***	0.13	0.02 ***	0.12	0.02 ***
Interaction			0.03	0.04			0.18	0.06 **

^a Coefficients averaged across the five multiply-imputed datasets; standard errors adjusted according to Rubin (1987).

^bModel 1 regresses maternal poor physical health on child activity limitation status, the maternal marital or socioeconomic factor of interest, and controls. Model 2 includes the interaction between child activity limitation status and the maternal factor of interest. Models 3 and 4 replicate Models 1 and 2 with the measure of child activity limitation persistence (comparing persistent child limitations to no child activity limitations). With the exceptions noted below, models control for child age, maternal age, race, ethnicity, and various maternal baseline characteristics: education, BMI, smoking status, health conditions limiting work, depressive symptoms, marital status, poverty status, unemployment status, time out of the labor force, and children in the household. Models including maternal socioeconomic factors (poverty, unemployed, out of the labor force) as independent variables do not control for the socioeconomic factor of interest. Models including marital quality factors (marital unhappiness, lack of quality time, marital arguing) as independent variables are restricted to mothers who were married at the time marital quality was measured.

^cSF-12 is the physical component score of the 12-item Short Form (Ware, Kosinski, & Keller, 1996).

Coef.: coefficient; s.e.: standard error.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.

Main and Interaction Effects of Child Activity Limitations and Maternal Marital and Socioeconomic Factors on Maternal Depressive Symptoms^a *b c*

Table 4

	Model 1		Model 2		Model 3		Model 4	
	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.	Coef.	s.e.
Child activity limitation	0.05	0.02**	0.05	0.02*	0.08	0.02***	0.09	0.03**
Not married	0.05	0.02**	0.05	0.02*	0.04	0.02**	0.04	0.02*
Interaction			0.01	0.04			-0.01	0.05
Child activity limitation	0.04	0.02	0.02	0.02	0.07	0.03**	0.01	0.04
Fairly happy [vs. very happy]	0.09	0.02***	0.09	0.02***	0.09	0.02***	0.08	0.02***
Interaction			0.03	0.04			0.15	0.06*
Not too happy [vs. very happy]	0.16	0.04***	0.11	0.05*	0.16	0.04***	0.11	0.05*
Interaction			0.23	0.09**			0.35	0.12**
Child activity limitation	0.04	0.02*	0.04	0.02	0.08	0.03**	0.07	0.03*
Lack of quality time	0.02	0.01***	0.01	0.01	0.02	0.01***	0.01	0.01
Interaction			0.04	0.01***			0.05	0.01***
Child activity limitation	0.04	0.02*	0.04	0.02*	0.09	0.03**	0.09	0.03**
Marital arguing	0.01	0.00***	0.01	0.00***	0.01	0.00***	0.01	0.00***
Interaction			0.00	0.00			0.01	0.01*
Child activity limitation	0.05	0.02**	0.05	0.02*	0.08	0.02**	0.07	0.03**
Poverty	0.05	0.02*	0.05	0.02*	0.05	0.02*	0.04	0.03
Interaction			0.01	0.04			0.05	0.06
Child activity limitation	0.05	0.02**	0.05	0.02**	0.09	0.02**	0.09	0.03***
Unemployed	0.07	0.02**	0.07	0.03*	0.07	0.02**	0.06	0.03*
Interaction			0.03	0.06			-0.02	0.08
Child activity limitation	0.05	0.02**	0.04	0.02*	0.09	0.02**	0.07	0.03*
Out of the labor force	0.05	0.01***	0.05	0.02**	0.05	0.02**	0.04	0.02*
Interaction			0.02	0.04			0.06	0.05

^a Coefficients averaged across the five multiply-imputed datasets; standard errors adjusted according to Rubin (1987).

^bModel 1 regresses maternal depressive symptoms on child activity limitation status, the maternal marital or socioeconomic factor of interest, and controls. Model 2 includes the interaction between child activity limitation status and the maternal factor of interest. Models 3 and 4 replicate Models 1 and 2 with the measure of child activity limitation persistence (comparing persistent child limitations to no child activity limitations). With the exceptions noted below, models control for child age, maternal age, race, ethnicity, and various maternal baseline characteristics: education, BMI, smoking status, health conditions limiting work, depressive symptoms, marital status, poverty status, unemployment status, time out of the labor force, and children in the household. Models including maternal socioeconomic factors (poverty, unemployed, out of the labor force) as independent variables do not control for the socioeconomic factor of interest. Models including marital quality factors (marital unhappiness, lack of quality time, marital arguing) as independent variables are restricted to mothers who were married at the time marital quality was measured.

^dCES-D is the Centers for Epidemiologic Studies Depression Scale (Radloff, 1977).

Coef.: coefficient; s.e.: standard error.

* $p < 0.05$.

** $p < 0.01$.

*** $p < 0.001$.