The Intergenerational Consequences of Poor Maternal Health

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EXTENDED ABSTRACT

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INTRODUCTION

Inequality in children's development and wellbeing are of major concern in the United States. Prior research has demonstrated that family poverty (Bauman, Silver, and Stein 2006), poor neighborhood conditions (Beyers, Bates, Pettit, and Dodge 2003), maternal depression (Goodman 2007, Turney 2011a), and family conflict and upheaval (Conger, Conger, and Martin 2010) are all negatively associated with children's wellbeing. Less well understood, however, is the association between maternal physical health and children's wellbeing. Some prior work has addressed the family as a setting for health promotion and urged greater attention to the interconnections between family members' health and wellbeing (Christensen 2004; Novilla et al. 2006). However, very few empirical studies have established a connection between these factors, and most of these have used small samples and focused on specific parental health conditions (e.g. Davey et al. 2005; Hogan et al. 2007; Mikail and von Baeyer 1990; Osborn 2007). Two large-scale studies have demonstrated associations between mothers' and children's health (Hardie and Landale 2013; Minkovitz, O'Campo, Chen, and Grason 2002), but used cross-sectional data. To our knowledge, only one study has utilized longitudinal data to examine the relationship between maternal health and child wellbeing. Garbarski (2014) used data from the National Longitudinal Study of Youth 1979 to show that the relationship between children's activity limitations and mother's health limitations is reciprocal over time. None of these studies have addressed other aspects of children's wellbeing besides health, however. Extant research has also not considered how the relationship between these factors varies by the timing and chronicity of mothers' health problems, nor what family and environmental factors account for the relationship between mothers' health and children's wellbeing.

The current study uses panel data from the Fragile Families and Child Wellbeing survey to examine the relationship between maternal health and children's externalizing and

internalizing behavior problems. Using a large, prospective data set that follows mothers and children from birth to age 9 allows us to pinpoint how changes in maternal health are associated with changes in children's behavioral outcomes across time, as well as identify the mechanisms underlying this relationship and variations in the relationship between these factors by children's age. Children's externalizing and internalizing behavior problems are key indicators of development and wellbeing in childhood, and are predictive of poor academic achievement and attainment, problems with peers, illegal drug use, and poor mental health in adolescence (Colder et al. 2012; Hinshaw 1992; Masten et al. 2005; Rosenfeld, Lennon, and White 2005; van Lier et al. 2012). Therefore, they make ideal outcomes of interest for a study of the relationship between maternal health and children's wellbeing.

THEORETICAL BACKGROUND

The ecological model articulated by Bronfenbrenner (1979) argues that human development must be understood in terms of the larger ecological context within which a child grows up. According to Bronfenbrenner, proximal processes, or the reciprocal interactions that take place between a child and those around him or her throughout the life course, are shaped by the environment in which these interactions take place (Bronfenbrenner 1994). The environment can be thought of as a series of five overlapping contexts, ranging from the most immediate (developmental settings such as the family, school, and classroom) to the most distant (overarching developmental settings such as the time period). Similarly, the life course perspective (Elder 1998) urges researchers to consider the importance of historical time and geographical place in generating explanations for social patterns. The life course perspective also highlights the role of linked lives in understanding patterns of associations among individuals.

Ecological and life course theories are important for understanding the potential role that parents play in children's development and wellbeing. Parents—particularly mothers—repeatedly interact with children throughout their lives, passing on skills, habits, and cultural repertoires. They teach their children how to see the world and themselves, which can in turn shape behavioral habits and actions (Rosenfield, Lennon, and White 2005). These proximal processes are further contextualized by the resources parents provide, such as books, games, and participation in educational activity groups. Finally, by choice of neighborhood, school, and home, parents are responsible for the larger context within which children experience and interpret these proximal processes.

The ecological and life course perspectives draw attention to the interactional processes through which families, schools, and communities shape children's outcomes, but neither theory offers a conceptual model for how maternal health may affect children's development. For this, we use the family stress model (Conger, Elder et al., 1990; Conger, Rueter, & Elder, 1999). According to this model, economic strain produces stress on adult family members, which has cascading impacts on family member interactions and wellbeing. Although the family stress model focuses specifically on economic strain (poverty and job loss) as stressors, we argue that this model explains potential interrelationships between parental health and children's outcomes. Parental health problems are associated with a decline in family income and time (Frech and Kimbro 2011; Hogan, Shandra, and Msall 2007; Wagmiller, Lennon, and Kuang 2008), and can result in the loss of a job. Research has also shown that maternal mental and physical health problems are associated with a decrease in social support (Harknett and Hartnett 2011), which can further reduce families' interpersonal and economic resources. Furthermore, health problems

can directly impact parents' and children's stress (Armistead, Kein, & Forehand, 1995; Osborn, 2007).

Poor parental health can therefore impact children's wellbeing through three important pathways: family processes, resources, and environmental contexts. Family processes include patterns of interaction between family members, such as parenting styles and relationship quality. Resources include economic, social, cultural, and health resources parents provide for children. Finally, the wider community has independent effects on children's outcomes (Beyers et al. 2003). In the current study, we use insights gleaned from the ecological perspective, life course theory, and the family stress model to understand the relationship between maternal health and children's outcomes. We focus specifically in behavioral problems as a key indicator of child development and wellbeing. We use longitudinal data, which will allow us to identify developmental periods of greater or lesser sensitivity to maternal health problems on the part of children, and we examine potential mediators in the relationship between maternal health and children's behavior problems, including family processes, resources, and environmental contexts.

Maternal Health and Child Wellbeing

Health problems are a major cause of concern in the United States. Over one-tenth of adults (12% of men and 12.9% of women) report activity limitations that interfere with their ability to work, live independently, or participate in community activities[3]. Furthermore, 16.1% rate themselves as having fair or poor health (Zack 2013), although this varies greatly by age, race/ethnicity, and socioeconomic status. For example, 38.4% of adults without a high school degree reported being in fair or poor health compared to 7.3% of college graduates. Similarly,

fair or poor health among Whites (13.3%) was substantially lower than among Blacks (23.3%) and Hispanics (28.1%).

Few studies have examined the relationship between parental physical health and children's outcomes, however. Some theoretical work has suggested that such a relationship exists (Christensen 2004; Novilla et al. 2006). One recent study used the National Health Interview Surveys to show that maternal health problems are closely associated with a range of children's health outcomes (Hardie and Landale 2013). Another longitudinal study demonstrated that children's activity limitations and mothers' health limitations are interrelated over time (Garbarski 2014). Finally, a great deal of research has demonstrated that maternal depression has a negative impact on children's health and wellbeing (e.g. Goodman 2007; Turney 2011a, 2011b). The independent associations between maternal physical health and children's outcomes are less well-known, however.

Self-rated Health and Health Limitations

A number of maternal health problems could be related to children's wellbeing, either through the strain they place on family life or through the resources diverted to care for mother's health problems. Furthermore, the combination of health problems and other sources of stress in the household, such as financial difficulty, may play a role in children's outcomes (Hardie and Landale 2013). In this study, we focus on one global measure of health (mother's self-rated health) and one indicator of the degree to which health problems interfere with mother's day-to-day activities (health limitations). Overall health measures have limitations, in that they rely on the respondent to report his or her health and to do so accurately, they rely on the point-in-time indicator to be representative of global physical health for the respondent, and they may conflate

[3] http://www.cdc.gov/nchs/data/hus/hus13.pdf#listtables

physical and mental health (Schnittker 2005). However, self-rated health is a powerful measure because it reflects internal sensations of corporal wellbeing that are the purview of the individual (Jylhä 2009). Furthermore, self-rated health is a good predictor of a number of health outcomes, including mortality (Idler and Benyamini 1997). Although prior research suggests that this measure does a better job of predicting mortality among the most educated and highest earners (Dowd and Zajacova 2007), reviews of the measure conclude that it is worth using—and, indeed, an important and reliable measure—in studies of health (Huisman and Deeg 2009; Idler and Benyamini 1997; Jylhä 2009).

Children's Externalizing and Internalizing Behavior Problems

Children's behavioral functioning is a key developmental outcome of interest in the child development literature. Behavioral problems are generally thought of as one of two types: externalizing behavior problems, which are behaviors associated with a lack of control of one's emotions, and internalizing behavior problems, which represents a circumstance in which children over-control their emotions (Guttmannova, Szanyi, and Cali 2008; Hinshaw 1992). Although these problems are interrelated throughout childhood and adolescence (van Lier et al. 2012), each have slightly separate manifestations and implications. Externalizing behavior problems are often signaled by rule breaking behavior such as theft or aggression, and early indicators of these behaviors can predict later (or continuing) problems with peer and adult interactions, poor academic achievement, and substance abuse (Barker et al. 2008; Colder et al. 2013; Masten et al. 2005; van Lier 2012). Internalizing behavior problems often manifest as anxiety or low self-esteem, and have been linked to later problems with depression (Rosenfield, Lennon, and White 2005).

Considering Selection Into Poor Health

Any study considering the relationship between maternal physical health and children's behavior problems must consider selectivity into fair/poor health and health limitations. Mothers' physical health is correlated with additional measures of disadvantage, such as economic resources. Health problems and socioeconomic disadvantage cluster within families (Hardie and Landale, 2013; Link and Phelan, 1995), and both are expected to influence parental stress, parenting practices, and family resources. Therefore, it is important to disentangle the causal ordering of parental health problems, possible antecedents and mediators, and children's outcomes, a strategy we implement in our preliminary results and will further interrogate during future analyses.

DATA AND METHODS

Data

We use data from the Fragile Families and Child Wellbeing Study, a cohort of 4,898 urban children born to mostly unmarried mothers in 1998-1999 and followed over nine years (Reichman et al. 2001), to estimate the relationship between maternal health and children's behavioral problems. Mothers and fathers were first interviewed immediately after birth, usually in the hospital, and were again interviewed by telephone when children were one, three, five, and nine years old. Response rates, especially for mothers, were relatively high, with 86% of sampled mothers participating in the baseline survey and, of these, 90%, 88%, 87%, and 76% completed the one-, three-, five-, and nine-year surveys, respectively. The analytic sample comprises 3,337 observations. We first delete the 1,383 observations that did not participate in the nine-year

survey, when our outcome variables are measured, and then delete the additional 178 observations missing data on our dependent variables.

Measures

Children's behavioral problems. Children's internalizing behaviors and externalizing behaviors, measured at the nine-year survey, are ascertained with the Child Behavior Checklist (CBCL), an established and commonly used measure for assessing problem behaviors in children (Achenbach 1992). Children's primary caregivers, nearly always their mothers, were asked to rate various aspects of the children's behaviors (0 = not true, 1 = somewhat or sometimes true, 2 = very or often true). We average caregivers' responses to 32 questions about internalizing behaviors (e.g., child cries a lot, child feels worthless or inferior; $\alpha = .88$) and 34 questions about externalizing behaviors (e.g., child destroys his or her own things, child is impulsive or acts without thinking; $\alpha = .91$) and standardize the measures to have a mean of 0 and a standard deviation of 1.

Mothers' health. We consider two measures of mothers' health, both measured at the nine-year survey. First, fair/poor health is a dummy variable indicating the mother report her general health is fair or poor (1 = fair/poor health, 0 = excellent, very good, or good health). Second, health limitations is a dummy variable indicating the mother reports having a serious health problem that limits the amount of kind of work she can do.[4] About 17% of mothers report fair/poor health and about 13% of mothers report health limitations at the nine-year survey.

[4] Mothers who answered affirmatively to this question were also asked to identify the health problem that limits work. These conditions include diabetes (8% of mothers who report health limitations), asthma (17%), high blood pressure (12%), pain (14%), seizures/epilepsy (5%), heart disease (6%), back problems (21%), mental health (13%), arthritis (5%), recovering from injury or surgery (6%), overweight (2%), joint problems (6%), pregnant (2%), chronic disease or illness (6%), muscle problems (2%), neurological problems (4%), gastrointestinal or urinary problems (3%), and heart and blood problems (3%).

Control variables. The multivariate analyses adjust for an array of characteristics associated with both mothers' health and children's behavioral problems. These include mother's race (non-Hispanic White, non-Hispanic Black, Hispanic, non-Hispanic other race), mother and father mixed-race couple, mother's foreign-born status, mother's age, mother's family structure at age 15, mother's relationship to child's biological father (married, cohabiting, non-residential romantic, no relationship), mother's and father's educational attainment (less than high school, high school diploma or GED, some college, college degree), mother's and father's material hardship, mother's and father's employment status, mother's cognitive ability (measured by the Weschler Adult Intelligence Scale), mother's and father's depression, child's gender, and child's low birth weight. All control variables are measured at the survey wave when they are first asked (usually at the baseline or one-year surveys). See Table 1 for means and standard deviations of all variables used in the analysis.

[Table 1 about here.]

Analytic Strategy

The analytic strategy is straightforward and proceeds in two steps. First, we examine descriptive differences in children's behavioral problems by two indicators of mother's health: fair/poor health and health limitations. Second, we estimate ordinary least squared (OLS) regression models to estimate children's behavioral problems as a function of mother's health. Model 1 adjusts for the two measures of mother's health. Model 2 adjusts for the two measures of mother's health and the control variables described above. Missing covariates are retained with multiple imputation. We produce 20 imputed data sets and average results across them.

PRELIMINARY RESULTS

Descriptive Differences in Children's Behavioral Problems

Table 2 presents means of children's behavioral problems by mother's health. Children of mothers in fair/poor health have internalizing behavioral problems (0.263 compared to -0.055, $p < .001$) and externalizing behavioral problems (0.274 compared to -0.057, $p < .001$) that are about one-third of a standard deviation higher than children of mothers in good, very good, or excellent health. Additionally, children of mothers with health limitations have internalizing behavioral problems (0.339 compared to -0.049, $p < .001$) and externalizing behavioral problems (0.038 compared to -0.044, $p < .001$) that are about one-third of a standard deviation higher than children of mothers who do not report a health limitation.

[Table 2 about here.]

Estimating Children's Behavioral Problems as a Function of Mother's Health

Table 3 presents findings from the OLS regression models estimating children's behavioral problems as a function of mother's health. In Model 1, essentially the unadjusted association, we find that both indicators of mother's health—fair/poor health and health limitations—are associated with internalizing and externalizing behavioral problems. These associations are reduced in Model 2, which adjusts for a host of covariates, but remain statistically significant. Across both outcomes, the coefficients for fair/poor health and health limitations are not statistically different from one another. In additional analyses (not presented), we find that fair/poor health—but not health limitations—remains a statistically significant predictor of children' internalizing and externalizing behavior problems when adjusting for both

a lagged dependent variable and maternal depression at the nine-year survey (when the dependent variables are measured).

[Table 3 about here.]

The control variables work in the expected direction. For example, children of parents in non-residential romantic relationships, compared to children with married parents, have greater internalizing and externalizing behavior problems. Internalizing and externalizing behavior problems are less common among children with mothers or fathers with college degrees (compared to their counterparts with parents who have less than a high school degree). Mother's material hardship, mother's depression, and father's depression are associated with greater internalizing and externalizing behavior problems.

Next steps

Our next steps for these analyses are to: 1) exploit the longitudinal data to examine the relationship between mother's health and children's externalizing and internalizing behavior problems over time, 2) identify how the relationship between maternal health and children's behavior problems varies by children's developmental stage, and 3) investigate mediators that may explain the relationship between maternal health problems and children's behavior problems. In order to accomplish our first goal, we will estimate two types of analytical models: lagged dependent variable models and fixed effects models. Both models improve upon the simple OLS model by accounting for omitted variables. In the lagged dependent variable model, the dependent variable (behavior problems) is expected to vary based not only on mother's health, but also on time-varying health and behavior problems over the life course of the child. By including an indicator of child's behavior problems at time t-1, the lagged dependent variable

essentially adjusts for these early auto-regressive factors. Fixed effects models, on the other hand, adjusts for time invariant factors in order to isolate the association between change in the independent variable and change in the dependent variable over time. Together, these two types of models provide useful upper and lower bound estimates of the effect of mother's health on children's wellbeing.

After isolating the association between maternal health and children's outcomes, we will then test for differences in the relationship between these factors by the child's developmental stage (timing) and length of exposure (chronicity). This is an important step for identifying developmental periods in which children are most sensitive to mother's health problems, as well as whether there is variation in the relationship by exposure period.

Finally, we will investigate potential mechanisms explaining the relationship between maternal health and children's wellbeing. In particular, we expect that poor health will influence child wellbeing through its association with parental resources (e.g. time and money) as well as family processes (e.g. parenting practices). A preliminary conceptual model is provided in Figure 1. This model accounts for the interrelationships between health and economic factors as well as the way health may operate through resources, both economic and otherwise, to impact child wellbeing.

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Table 1. Descriptive Statistics of All Variables Included in Analyses

	Mean	S.D.
Child internalizing behaviors (y9)	0.000	1.000
Child externalizing behaviors (y9)	0.000	1.000
Mother fair or poor health (y9)	0.172	
Mother health condition that limits work (y9)	0.126	
Mother race (b)		
Non-Hispanic White	0.208	
Non-Hispanic Black	0.502	
Hispanic	0.257	
Non-Hispanic other race	0.033	
Mother and father are mixed-race couple (b)	0.143	
Mother foreign born (b)	0.138	
Mother age (b)	25.036	(5.994)
Mother lived with both biological parents at age 15 (b)	0.413	
Mother and father relationship status at birth (b)		
Married	0.230	
Cohabiting	0.363	
Non-residential romantic	0.279	
Separated	0.129	
Mother educational attainment (b)		
Less than high school	0.331	
High school diploma or GED	0.318	
Some college	0.251	
College degree	0.101	
Father educational attainment (b)		
Less than high school	0.321	
High school diploma or GED	0.380	
Some college	0.205	
College degree	0.093	
Mother material hardship (y1)	1.175	(1.624)
Father material hardship (y1)	0.444	(1.108)
Mother employed (y1)	0.547	
Father employed (y1)	0.767	
Mother cognitive ability (y3)	6.746	(2.664)
Mother depression (y1)	0.156	
Father depression (y1)	0.114	
Child male (b)	0.525	
Child born low birth weight (b)	0.095	
N	3,337	

Notes: Timing of measurement of all variables in parentheses (b = baseline interview, y1 = one-year interview, y3 = three-year interview, y5 = five-year interview, y9 = nine-year interview).

Table 2. Children's Test Scores and Behavioral Problems at Age Nine, by Mothers' Health

	Fair or poor health			Health limitations		
	Yes	No		Yes	No	
Child internalizing behaviors	0.263	-0.055	***	0.339	-0.049	***
Child externalizing behaviors	0.274	-0.057	***	0.308	-0.044	***
N	575	2,762		419	2,918	

Notes: Asterisks compare differences between groups. *** $p < .001$.

Table 3. OLS Regression Models Estimating Children's Test Scores and Behavioral Problems as a Function of Mother's Health

	Internalizing problems						Externalizing problems					
	Model 1			Model 2			Model 1			Model 2		
Mother fair or poor health	0.234	(0.051)	***	0.168	(0.051)	**	0.241	(0.051)	***	0.180	(0.051)	***
Mother health condition that limits work	0.286	(0.057)	***	0.248	(0.057)	***	0.250	(0.058)	***	0.176	(0.057)	**
Mother race (reference = non-Hispanic White)												
Non-Hispanic Black				-0.174	(0.051)	**				-0.097	(0.051)	
Hispanic				-0.013	(0.058)					-0.180	(0.057)	**
Non-Hispanic other race				0.111	(0.107)					0.067	(0.106)	
Mother and father are mixed-race couple				-0.078	(0.052)					-0.002	(0.052)	
Mother foreign born				0.091	(0.061)					-0.127	(0.060)	*
Mother age				0.004	(0.003)					-0.005	(0.003)	
Mother lived with both biological parents at age 15				0.030	(0.038)					0.001	(0.037)	
Mother and father relationship status at birth (reference = married)												
Cohabiting				0.092	(0.053)					0.065	(0.052)	
Non-residential romantic				0.131	(0.059)	*				0.140	(0.058)	*
Separated				0.140	(0.068)	*				0.122	(0.067)	
Mother educational attainment (reference = less than high school)												
High school diploma or GED				-0.020	(0.045)					-0.004	(0.045)	
Some college				-0.110	(0.054)	*				-0.086	(0.053)	
College degree				0.069	(0.087)					-0.042	(0.086)	*
Father educational attainment (reference = less than high school)												
High school diploma or GED				-0.061	(0.044)					-0.046	(0.044)	***
Some college				-0.014	(0.056)					-0.061	(0.055)	
College degree				-0.230	(0.085)	**				-0.193	(0.083)	**
Mother material hardship				0.042	(0.012)	**				0.053	(0.012)	
Father material hardship				-0.014	(0.021)					-0.024	(0.021)	
Mother employed				-0.074	(0.037)	*				-0.109	(0.037)	
Father employed				-0.002	(0.053)					-0.051	(0.051)	
Mother cognitive ability				-0.007	(0.007)					0.008	(0.007)	
Mother depression				0.239	(0.052)	***				0.172	(0.052)	**
Father depression				0.137	(0.065)	*				0.239	(0.063)	***
Child male				-0.002	(0.034)					0.196	(0.034)	***
Child born low birth weight				0.009	(0.059)					0.019	(0.058)	
Intercept	-0.075			-0.106			-0.072			0.015		
N	3,337			3,337			3,337			3,337		

Notes: * $p < .05$, ** $p < .01$, *** $p < .001$.

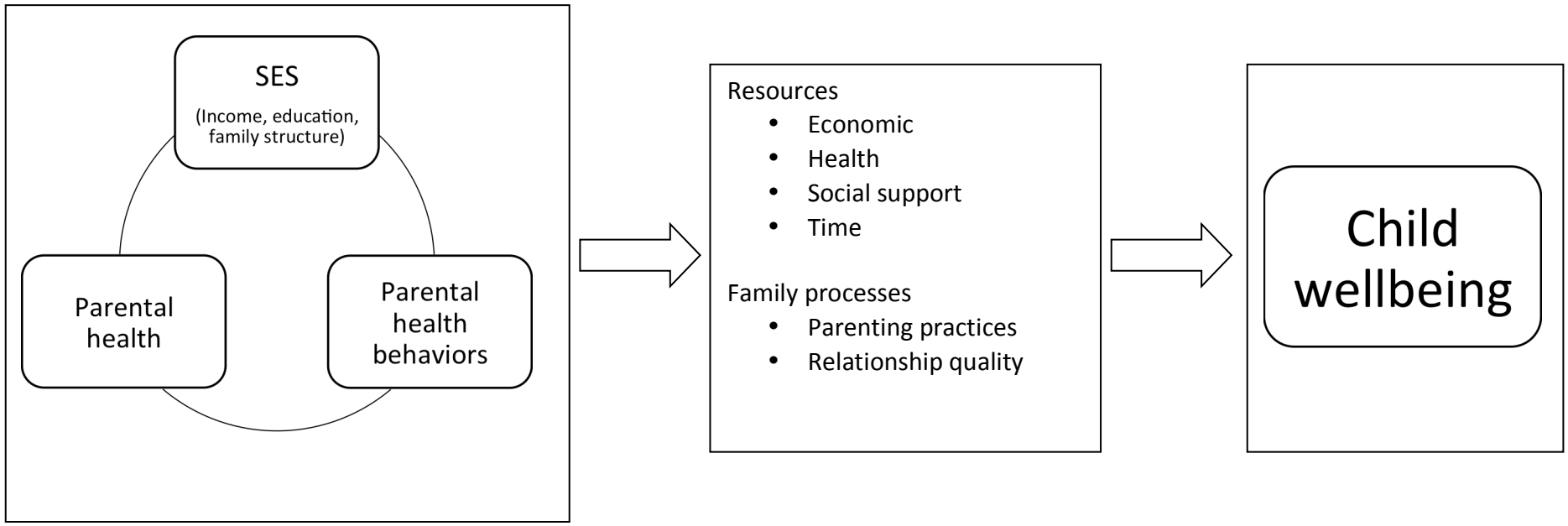

Figure 1: Conceptual model of relationship between maternal health and children's wellbeing