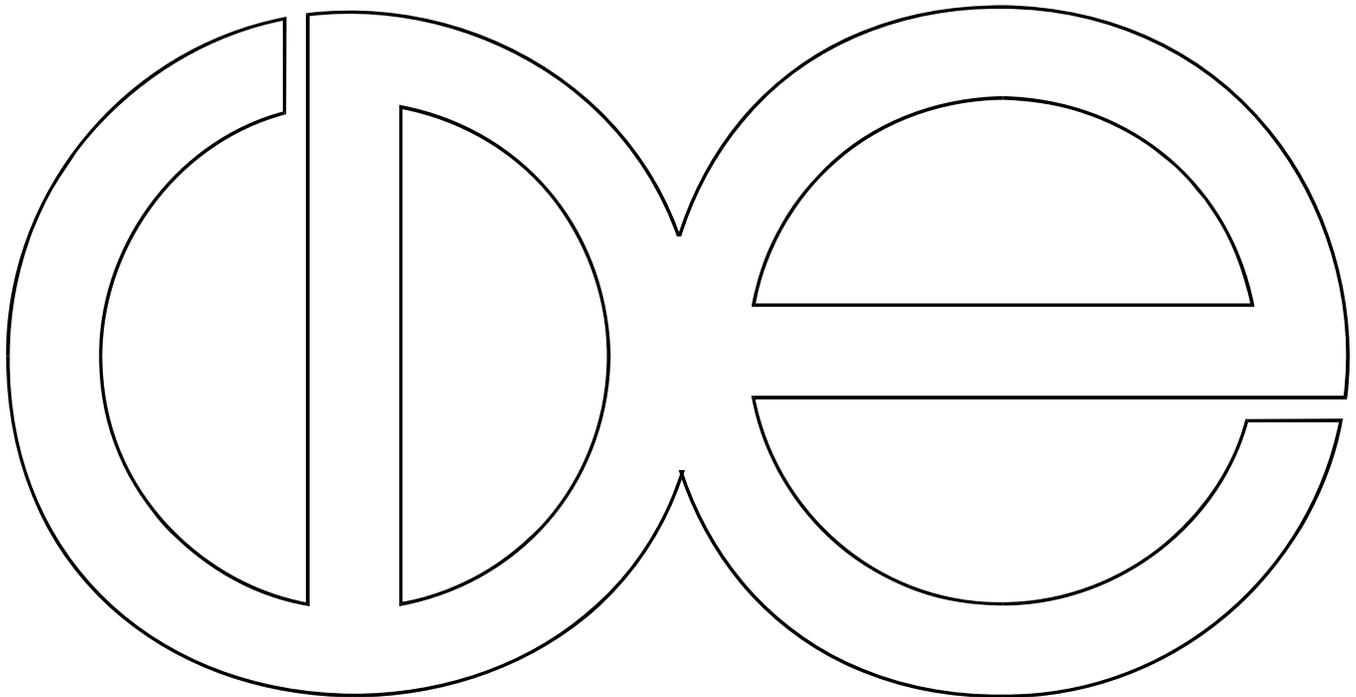


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**Childhood Physical Abuse as a Fundamental  
Social Cause of Mid-Life Physical Health:  
Testing a Multi-Pathway Life Course Model**

**Kristen W. Springer**

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**CHILDHOOD PHYSICAL ABUSE AS A FUNDAMENTAL SOCIAL CAUSE OF MID-LIFE PHYSICAL  
HEALTH: TESTING A MULTI-PATHWAY LIFE COURSE MODEL**

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## ABSTRACT

This study combines an ecological approach with a life course perspective to examine the multifaceted mediating pathways linking childhood physical abuse with mid-life physical health. Childhood physical abuse has a strong and persistent effect on mid-life physical health net of family background and age, with women more adversely affected than men. Smoking, obesity, mental illness, and self-rated health are consistent mediators whereas social relations and cognition are inconsequential. The importance of particular paths varies by specific disease outcome indicating that childhood physical abuse acts through a variety of proximate causes, including unhealthy coping strategies and decreased immunity to infections. These findings suggest that childhood physical abuse should be viewed as a fundamental social cause of ill health among adults.

## INTRODUCTION

Increasingly, scholars are beginning to look toward childhood to understand how early life experiences shape and affect adult health. Life course research has found that, for example, early socioeconomic status, childhood poverty, prenatal health, and parental divorce have life-long health consequences for those who experience them (Cherlin, Chase-Lansdale, and McRae 1998; Hayward and Gorman 2004; Holland et al. 2000; Wadsworth 1997). By combining an ecological approach (Berkman and Kawachi 2000; Burris et al. 2004; Link and Phelan 1995) with a life course perspective it is possible to examine childhood adversity as a fundamental social cause of adult ill health—a cause that precipitates an accumulation of risky behaviors, poor mental health, and disadvantageous social conditions that coalesce to create an increase in adult morbidity.

Examining childhood physical abuse as a fundamental social cause of adult morbidity has not been emphasized in the social and life course literature (Link and Phelan 1995) despite the fact that childhood abuse has reached epidemic proportions in the United States and internationally (Djeddah, Facchin, Ranzato, and Romer 2000; Halperin et al. 1996; MacMillan et al. 1997) and has been identified as a key public health challenge by the World Health Organization (WHO 1999), the Centers for Disease Control and Prevention (Foege, Rosenberg, and Mercy 1995; Foege William H. 1998), and the American Medical Association (AMA 1995). As a social relationship, abuse of children (relatively powerless individuals) has biological effects as well as social ones. For sociologists interested in understanding the complex and multi-directional influences of social systems and biological ones, the long-term routes by which abuse affects the later physical health of individuals provides an important case.

Though childhood abuse is recognized as a public health problem there are numerous gaps in the literature investigating the relationship between childhood abuse and adult health. Most of the research on the long-term health consequences of childhood abuse focuses on mental

health outcomes, examines composite measures of childhood adversity or examines sexual abuse only, does not control for family background, does not examine sex differences or examines women only, and relies heavily on clinical samples. Most notably, scant literature has assessed *how* childhood abuse has lifelong health effects and no research has systematically assessed the competing effects of multiple pathways. As Kendall-Tackett, a leading scholar of childhood abuse, notes: “Recent studies have established that childhood abuse makes people sick. The next logical question to ask is ‘Why’” (Kendall-Tackett 2003; p. xiii). Childhood physical abuse may directly cause poor adult health—especially in cases of extreme abuse. Yet it is also likely that childhood physical abuse acts indirectly as the catalyst for a range of social, behavioral, and emotional factors that are more proximate causes of mid-life morbidity. Although there are two disparate bodies of literature that together suggest how childhood physical abuse may be linked with adult physical health, these potential pathways have not been systematically tested, compared in one model, or assessed net of each other.

In this paper, I address these limitations by testing a multi-pathway model examining how childhood physical abuse impacts adult physical health. Specifically, my objectives are threefold: 1) establish the relationship between childhood physical abuse and adult physical health using a large, population-based sample of men and women while controlling for a large array of family background variables, 2) trace the behavioral, self-evaluative, cognitive, mental health and social relations pathways through which childhood physical abuse may exert its lifelong deleterious effects on physical health and 3) examine sex differences in outcomes and pathways.

I analyze childhood physical abuse alone to ascertain how one common form of abuse works to produce deleterious health effects. I examine three outcomes—a scale of medical diagnoses, a bronchitis/emphysema diagnosis and an ulcer diagnosis—because each outcome is hypothesized to link with childhood physical abuse through different mechanisms. Analyzing

multiple pathways allows me to assess the multifaceted and dynamic processes through which childhood physical abuse impacts adult physical health. Rather than analyzing mental health as an outcome, I include it as a mediating pathway. This allows me to directly assess how much of the association between childhood physical abuse and adult physical health is caused by the mental health problems abuse produces, and how this mediating effect compares with the impact of other social factors. Finally, assessing the effect of childhood physical abuse on multiple outcomes through multiple mechanisms can illuminate the pervasiveness of childhood physical abuse as a fundamental cause of adult morbidity (Link and Phelan 1995).

## CHILDHOOD ABUSE AND ADULT HEALTH OUTCOMES

Childhood abuse is linked with poor adult health outcomes; moreover, many of the epidemiological criteria for asserting this is a causal relationship have been met (Springer, Sheridan, Kuo, and Carnes 2003). Still, most of the existing literature focuses on mental health outcomes (Browne and Finkelhor 1986; Jumper 1995; Kendler et al. 2000; MacMillan et al. 2001; Neuman and Houskamp 1996; Paolucci, Genuis, and Violato 2001; Polusny and Follette 1995; Saunders, Villepontoux, Lipovsky, Kilpatrick, and Veronen 1992; Wise, Zierier, Krieger, and Harlow 2001), examines the impact of sexual abuse or composite measures of abuse (Browne and Finkelhor 1986; Felitti et al. 1998; Jumper 1995; Kendler et al. 2000; Neuman and Houskamp 1996; Paolucci et al. 2001; Polusny and Follette 1995; Saunders et al. 1992), and draws from clinical samples (Hall, Tice, Beresford, and Wooley 1989; Read 1998; Walling et al. 1994). In addition, most of the existing research focuses only on women (Hill et al. 2000; Hillis, Anda, Felitti, and Marchbanks 2001; Kendler et al. 2000; Mullen, Romans-Clarkson, Walton, and Herbison 1988; Neuman and Houskamp 1996; Romito, Crisma, and Saurel-Cubizolles 2003; Thompson, Arias, Basile, and Desai 2002) or does not rigorously examine sex differences

despite a call for such research by the National Research Council's Panel on Child Abuse and Neglect (NRC: Panel on Research on Child Abuse and Neglect 1993).

Investigations into the life-long effects of childhood physical abuse on physical health outcomes are much scarcer, are often based on small clinical samples, and are frequently limited to bivariate analyses. These studies have shown that childhood physical abuse is associated with length of hospital stays, fibromyalgia, liver disease, and a physical symptoms scale (Dong, Dube, Felitti, Giles, and Anda 2003; Read 1998; Walker et al. 1997; Walling et al. 1994). Population-based studies are beginning to demonstrate relationships between childhood physical abuse and chronic conditions, migraines, ulcers, poor health perception, sustaining a physical injury and stomach problems (Goodwin, Hoven, Murison, and Hotopf 2003; Shaw and Krause 2002; Thompson et al. 2002; Thompson, Kingree, and Desai 2004), though none of these studies control for family background which may be independently related to both childhood physical abuse and adult physical health (Gillham et al. 1998; Hayward and Gorman 2004; Kessler and Magee 1994; Poulton et al. 2002; Power 2002) and one of these studies focuses only on women (Thompson et al. 2002). In addition, few studies have examined sex differences in health outcomes of childhood physical abuse. Thompson et al. (2004) recently examined the differential effect of childhood physical abuse on a host of health outcomes by sex and found that childhood physical abuse was significantly associated with mental health problems and unfavorable health perceptions among women but not men. Thompson et al. (2004) did not find sex differences in the effect of physical abuse on physical health nor did they trace the paths through which physical health could be affected.

Although this research demonstrates the lifelong burden of childhood adversities, much of it fails to rigorously assess the long-term physical health effects of childhood physical abuse in a population-based sample of men and women. Especially important for sociological understanding of this process, we still know very little about the physical and social mediating

pathways by which early traumatic experiences leave their scars on adults many years after the abuse has ended.

## PATHWAYS LINKING CHILDHOOD ABUSE AND ADULT HEALTH

The life course pathways linking childhood physical abuse and adult physical health are just beginning to be explored (Goodwin et al. 2003; Shaw and Krause 2002). Most of the literature on possible pathways is merely suggestive and must be drawn from two bodies of literature: one examining how childhood adversity is related to mediators and another examining how these mediators affect adult health. This first body of literature is primarily composed of small samples using composite measures of adversity or focusing only on sexual abuse. However, by piecing these two bodies of literature together we are able to determine *plausible* mechanisms that would link childhood abuse and adult health (c.f. Kendall-Tackett 2002; Kendall-Tackett 2003)—but this is, of course, not the same as examining the actual mediating pathways connecting the two. Very few studies have begun to analytically assess any pathway which links childhood physical abuse and adult physical health, let alone the competing effect of multiple pathways (Goodwin et al. 2003; Shaw and Krause 2002).

### *Behavioral Pathway*

Childhood adversities have been linked with high-risk health behaviors such as substance use, smoking, drinking, high-risk sexual activities, suicide, obesity and eating disorders (Anda et al. 1999; Felitti et al. 1998; Hillis et al. 2001; Kendall-Tackett 2003; Kendler et al. 2000; Springs and Friedrich 1992; Williamson, Thompson, Anda, Dietz, and Felitti 2002). For example, Anda and colleagues (1999) have found that HMO members with many adverse childhood experiences (including but not limited to childhood physical abuse) had substantially higher risks of ever smoking, early smoking, current smoking and heavy smoking. Using the same HMO sample as Anda, Hillis and colleagues (2001) found that both physical and sexual abuse predicted early

onset of sexual activities and larger numbers of sexual partners. Williamson and colleagues (2002) found that physical and verbal abuse were strongly related to obesity. In a population-based sample Kendler and colleagues (2000) found that childhood sexual abuse predicted drug dependence net of confounding family factors. In addition, the connection between these health behaviors and negative health outcomes has been well-established (McGinnis and Foege 1993).

Dong et al. (2003) assessed the mediating effect of risk behaviors on the relationship between childhood adversity (including abuse and other adversities) and liver disease using an HMO sample. They found that the relationship between childhood adversities and liver disease was reduced by up to 50% when health-endangering activities such as drinking, use of illegal drugs, and risky sexual behavior were controlled. However, the authors used a combination of adversities making it difficult to ascertain the exact cause of the liver disease, they rely on an HMO sample restricting the generalizability of the findings and creating concerns about selection effects, and they do not control for family background variables possibly biasing their findings.

### *Emotional Pathway*

The association between childhood abuse and depression is well-established (Ballenger et al. 2000; MacMillan et al. 2001; Saunders et al. 1992; Weiss, Longhurst, and Mazure 1999) as is the association between childhood abuse and post-traumatic stress disorder (PTSD) (Heim, Ehlert, Hanker, and Hellhammer 1998; Heim, Owens, Plotsky, and Nemeroff 1997; Saunders et al. 1992). Childhood abuse is also associated with an array of psychological outcomes including anxiety, eating disorders, obsessive compulsive disorder, and phobias (Kendler et al. 2000; Kessler and Magee 1994; MacMillan et al. 2001; Saunders et al. 1992). That these emotional effects would then affect physical illness is plausible since poor mental health has been solidly linked with poor physical health (Katon 2003; Rudisch and Nemeroff 2003)

Goodwin et al. (2003) assessed the association between childhood physical abuse and several physical health outcomes using a population-based sample while controlling for mental health status. The authors found that after controlling for panic attacks, generalized anxiety disorder, major depression, and alcohol/substance use disorders, the relationship between frequent childhood physical abuse and recurring stomach problems, ulcers, and migraines remained significant but was substantially attenuated. The authors do not control for family background characteristics and note in their discussion that the absence of these variables may confound their results. In addition, the authors note that although they determined a relationship between childhood physical abuse and select physical disorders “the mechanism of the observed association is not known” (Goodwin et al. pg. 1066).

### *Social Pathway*

The social pathway literature generally suggests that childhood abuse survivors report poorer marital quality, social isolation, chronic interpersonal family stress, negative family interactions, less family support, more divorce and are more likely to adopt a dysfunctional interpersonal style which in turn can negatively affect adult health (Doucet and Aseltine 2003; Kendall-Tackett 2002; Kendall-Tackett 2003; Kessler and Magee 1994; Romito et al. 2003; Shaw and Krause 2002). These social relations factors have been associated with a variety of health outcomes including disease, hypertension, depression, health behaviors, and mortality (Felitti et al. 1998; Kessler and Magee 1994; Turner and Butler 2003)

Some social relations appear to mediate the link between childhood abuse and adult physical health (Shaw and Krause 2002). For example, Shaw and Krause (2002) used a count of 32 chronic health problems as their dependent variable and found the mediating effect of psychosocial variables including personal control and family negative interaction explain almost

43% of the relationship between childhood physical abuse and physical health status. Shaw and Krause (2002) did not control for family background.

### *Cognitive Pathway*

A cognitive pathway includes the effect of abuse on educational and intellectual achievements, though most of the research is on small class samples, focuses on young children, and includes multiple types of abuse (Cahill, Kaminer, and Johnson 1999; Colton, Heath, and Aldgate 1995; Kantor and Jasinski 1997; Kendall-Tackett and Eckenrode 1997). Childhood abuse is associated with poor educational outcomes (Gibby-Smith 1995; Kinard 1999; Perez and Widom 1994; Solomon and Serres 1999) and there is an extensive body of literature linking education with adult health (Bopp and Minder 2003; Marmot et al. 1998; Monden, van Lenthe, and De Graaf 2003). Childhood and adult intelligence are also associated with adult health status (Waldstein 2000; Whalley and Deary 2001).

### *Self-Evaluative Pathway*

A self-evaluative pathway includes concepts like shame, attributional style, self-esteem, self-efficacy, self-assessed health and personal control. There is an association between childhood abuse and each of the social-psychological outcomes though much of the research is on sexual abuse, uses small samples, and focuses on children (Bolger, Patterson, and Kupersmidt 1998; Feiring, Taska, and Lewis 2002; Golding, Cooper, and George 1997; Shaw and Krause 2002; Turner and Butler 2003). Shame and self-esteem can affect health indirectly by making people more vulnerable to revictimization, PTSD, depression and eating disorders. Attributional style (the way people interpret events) can also differ. Abuse survivors are more likely to be pessimistic, resulting in poor immune function and slower recovery from illness (Brennan and Charnetski 2000; Segerstrom 2000). Self-efficacy (perceived competence in performing a task)

influences one's ability to adapt to illness, comply with treatment, and engage in health behaviors (Chen, Neufeld, Feely, and Skinner 1999; Hay et al. 2003; Tolma, Reininger, Ureda, and Evans 2003; Tuma, Smith, Kirk, Hagmann, and Zemel 2002). Childhood abuse has been linked with poor self-assessed health, and self-assessed health might affect clinical health in a number of ways. For example, those with lower perceived health might engage in preventive health behaviors less often or might experience the health consequences of excessive worry (Bailis, Segall, and Chipperfield 2003; Kendall-Tackett 2003). As discussed in the social relations section, one study found that personal control along with negative family interactions mediated the relationship between childhood physical abuse and chronic conditions--accounting for 43% of the association (Shaw and Krause 2002).

## PATHWAYS MODEL

Overall, the literature suggests an array of possible mechanisms for mediating the effects of childhood abuse that cluster into behavioral, emotional, social, cognitive, and self-evaluative categories. What we lack is a demonstration that they apply to the relationship between childhood physical abuse and physical health in mid-life and any indication of which of these mechanisms would be most important. I bring these diverse mechanisms into a single model, presented in Figure 1.

---Figure 1 about here---

This model contains five pathways including health behaviors, health perception, cognition, mental health, and social relations. The health behaviors pathway includes obesity, regular smoking and having a drinking problem. The health perception pathway includes an ordinal self-evaluated health item. The cognition pathway includes education, IQ in high school

and mid-life cognitive ability. The mental health pathway includes scales of depression, anxiety and anger. Finally, for social relations, I assess marital quality, social support, sharing private feelings, activities with family, and activities with friends.

I focus on the effects of childhood physical abuse alone because childhood physical abuse has been shown to have lifelong deleterious health effects (Goodwin et al. 2003; MacMillan et al. 1999; Shaw and Krause 2002; Thompson et al. 2002; Thompson et al. 2004). Studies combining physical abuse with other adversities make it impossible to determine the exact source of negative health outcomes, and pathways likely vary by type of abuse—for example, one might expect sexual abuse survivors to have more difficulty with intimate relationships than physical abuse survivors. In addition, childhood physical abuse is common for both men and women (MacMillan et al. 1997; Thompson et al. 2002). With a substantial prevalence of childhood physical abuse among both men and women I am able to assess whether pathways vary by gender. This would be plausible since men in general are more likely to engage in risky health behaviors (Burrows and Nettleton 1995; Palosuo 2000) and since the relationship between social support and health outcomes is often found to vary by sex (Burrows and Nettleton 1995; Fuhrer and Stansfel 2002; Kawachi and Berkman 2001; Matthews, Stansfeld, and Power 1999). For purposes of effective treatment it is also important to see if the effects of trauma are gender specific.

I analyzed a scale of medical diagnoses as well as diagnoses of bronchitis/emphysema and ulcer rather than the more common outcome variable of mental health or other measures of physical health for several reasons. First, specific diagnoses often have well-known physiological and psychosocial causes allowing for evidentiary-based, multi-disciplinary pathway analyses. Second, by including mental health as a pathway, rather than outcome, I am able to directly weigh the relative effect of mediating psychosocial states against other factors such as educational performance and obesity that are also outcomes of childhood violence.

Third, some more subjective physical health measures such as symptom reports are more susceptible to bias associated with current mental health status (Bridges and Goldberg 1985; Henningsen, Zimmermann, and Sattel 2003; Kroenke 2003; Simon, VonKorff, Piccinelli, Fullerton, and Ormel 1999; Springer, Kuo, Sheridan, and Carnes 2003) making them less reliable indicators of actual physical health. Finally, a medical diagnosis scale can be seen as a measure of general health whereas bronchitis/emphysema and ulcer diagnoses have well-understood, yet very different etiologies, allowing for a direct validity test of the model.

## DATA AND METHODS

The data for the current project come from a large, community-based, longitudinal study of education, careers, health, and aging. The Wisconsin Longitudinal Study (WLS) is a long-term study of graduates from Wisconsin high schools in 1957 and their siblings, and has been described in detail elsewhere (Sewell, Hauser, Springer, and Hauser 2003). Briefly, the WLS began with a 1/3 random sample (N=10,317) of adolescent males and females who graduated from Wisconsin high schools in 1957 with subsequent waves of data collected in 1964, 1975 and 1992-94. In 1975, from a roster of living siblings, one random sibling was selected for each graduate. Many of these siblings were interviewed in 1977 and all were invited to participate in 1994. My analyses are based on data from these sibling respondents.

Data collection in 1977 focused on education, occupation and family demographics whereas data collection in 1994 focused on health, well-being and aging, in addition to education, occupation and family. The 1994 mail survey of siblings included questions on childhood physical abuse derived from the Conflict Tactics Scale (Straus, Gelles, and Steinmetz 1981; Straus, Hamby, Finkelhor, Moore, and Runyan 1998). In addition to survey data, WLS data include IQ scores taken during high school.

The WLS is uniquely suited for exploring the lifelong effects of childhood abuse because it is a random community-based sample of participants selected without regard to health status. The WLS has extensive data on possible mediators of the abuse/adult health relationship, which permits comparison of the relative mediating effect of several possible pathways. In addition, the WLS has extensive family background variables allowing me to control for an important set of potentially confounding variables.

### *Independent Variable*

*Childhood physical abuse.* Childhood physical abuse is the main independent variable of interest and was measured with questions derived from the Conflict Tactics Scale (Straus et al. 1981; Straus et al. 1998). In separate questions about each parent, respondents were asked whether their mother or father “slapped, shoved, or threw things at them” before age 17. Those who reported “some” or “a lot” of abuse by either or both parents as opposed to “a little” or “not at all” were counted as having experienced childhood physical abuse. Dichotomizing childhood physical abuse to exclude infrequent abuse is common practice in the literature (Dong et al. 2003; Drossman et al. 1990; Felitti et al. 1998; Goodwin et al. 2003) and helps assure that the measure captures abuse rather than corporal punishment parenting practices there were common during the time individuals in WLS sample were children.

### *Dependent Variable*

*Medical diagnoses.* For medical diagnoses, I used a modified version of the Duke Older Adults Research Survey (OARS) (Duke University Center for the Study of Aging and Human Development 1978) that was included in the 1994 mail survey. Respondents reported whether “a medical professional has ever said you have,” followed by the following list of 17 conditions: allergies, anemia, arthritis/rheumatism, asthma, serious back trouble, bronchitis/emphysema,

cancer, circulation problems, colitis, diabetes, heart trouble, high blood pressure, high cholesterol, kidney/bladder problems, chronic liver trouble, multiple sclerosis, and ulcer.<sup>1</sup> A count of self-reported medical diagnoses was used as one dependent variable. In addition, I analyzed self-reported diagnoses of bronchitis/emphysema and ulcers as dichotomous outcomes.

### *Mediators*

All of the mediating variables were measured during the 1994 survey, except IQ (which was measured during high school) and education taken from the 1977 surveys. When 1977 data on education was not available, largely because the participant didn't join the study until 1994, the 1994 variable was substituted.

I assessed three potential mediating health behavior variables: BMI categories calculated at the CDC recommended cut points (underweight < 18.5, overweight 25-29.9; obese > 29.9), whether the respondent reported that they ever smoked regularly (dummy variable), and whether they reported any one of five drinking problems (dummy variable). Examples of the possible drinking problems include: "Has drinking caused a problem for you at work" and "Has drinking created problems between you and your spouse, children, parents, or other near relatives?"

Self-evaluated health was a single ordinal item; the question asked "how would you rate your health at the present time" with the response categories "very poor," "poor," "fair," "good" and "excellent."

Cognition variables included IQ during high school, mid-life cognitive ability measured by the WAIS cognitive ability items, and education (years).

Mental health measures included scales for depression, anxiety and anger. Depression was assessed with 20 items from the Center for Epidemiologic Studies Depression Scale (CES-D); anxiety and anger were each assessed with 10 items from the Spielberger's Anxiety and

Anger scale (Radloff 1977). Respondents were asked to report how many of the days in the past week they experienced each item. Respondents were included in the depression analyses if they answered at least 10 of the 20 questions. To construct each of these scales I divided the total score by the number of items answered, multiplied this value by the number of items in the scale, and rounded the result.<sup>2</sup>

I included several measures for the social relations pathway. Marital closeness was coded high if the respondent reported they felt very close or close to their current spouse, compared to not at all or somewhat (low). Someone was considered to have social support if they had someone other than a spouse from whom they could borrow \$250, ask for help with a personal problem, *and* ask for help if sick for a week or more. Sharing private feelings was coded as 1 if someone had both a person in their family and a friend outside of their family with whom they could “really share your private feelings and concerns.” Finally, I included two measures of social activities. One question ascertained “how many times during the past four weeks have you gotten together with friends?” and the other asked about social activities with relatives during the past four weeks.

### *Control variables*

I included controls for sex and age at the time of the 1994 mail survey, and included five indicators of family background: mother’s education (years), father’s education (years), parental income (log transformed), father’s occupational standing (occupational education scores (Hauser and Warren 1997)), and farm background. When direct reports were not available because of the sampling design or missing data, I substituted reports from the graduate sibling if they lived together most of their childhood.

## ANALYTIC STRATEGY

Three sets of equations are needed to determine whether a variable qualifies as a mediator (Baron and Kenny 1986). First, childhood physical abuse must predict a mediator net of control variables. Second, childhood physical abuse must predict the outcome net of controls. Finally, a mediator must significantly predict the outcome net of controls and childhood physical abuse. Each of these three equations was run for the full sample, men separately, and women separately to determine which variables were true mediators. These equations were run for each outcome.

A scale of diagnoses is a useful outcome because it illuminates how the mediating model works for a gradational general health outcome—a measure that shows health being progressively worse overall. However, it is also important to see how the mediating model works for specific diagnoses because we would expect childhood physical abuse to be linked with different diagnoses through different mechanisms. Selecting particular diagnoses can also serve as a validity check because variables that are well-known causes of the outcome should have relatively substantial mediating effects. In these cases, the effect of childhood physical abuse can be compared to an epidemiologically established cause. In addition, examining a diagnosis with a well-established causal variable provides suggestive evidence of the longitudinal nature of the pathways despite largely cross-sectional data.

The two specific diagnoses examined were selected from those that were significantly predicted by childhood physical abuse. Of these, the ones with more clearly defined diagnostic criteria (i.e. ulcer vs “serious back trouble”) are more likely to represent the same diagnosis across respondents and therefore should have similar causal agents making reliable estimation of the pathways more likely. Bronchitis/emphysema was selected as one outcome because it is known to be caused primarily by one of the mediators—smoking. According to the Centers for Disease Control and Prevention, chronic bronchitis and emphysema account for 59% of all smoking-attributable diseases (CDC 2003). Ulcers were chosen as the second diagnostic outcome. Though physicians used to believe peptic ulcers were caused by stress and spicy

foods, they now know that most peptic ulcers are primarily caused by a bacterium called *Helicobacter pylori* (Munnangi and Sonnenberg 1997; NIH Consensus Development Panel on *Helicobacter pylori* in Peptic Ulcer Disease 1994). Given this new understanding of how ulcers develop we would expect that the pathways won't mediate much of the relationship between abuse and adult physical health, though some research indicates that ulcers can be triggered or exacerbated by smoking and stress (Levenstein 1999).

I ran three sets of regression models (OLS for the diagnoses scale and logistic regression for specific diagnoses) for each outcome to see if abuse significantly related to higher levels of health problems/greater odds of diagnoses—one set for the full sample, one for men and one for women. The first model in each set included the control variables and childhood physical abuse. Each subsequent model included childhood physical abuse, controls and the significant mediator variables of one cluster. The final model included childhood physical abuse, all mediating variables as well as the control variables. A reduction in the abuse coefficient when mediator variables were added indicated that the variables mediated some of the relationship between childhood physical abuse and adult physical health.

Because the medical diagnoses scale was highly skewed, a started natural log was used to make it more normally distributed. Un-logged mental health variables were used as mediators because diagnostics indicated this functional form was more homoskedastic. Models were run on a sample that contained complete data on all variables in order to assure that coefficient differences were the result of model changes rather than sample differences. All analyses were carried out using Stata version 8.

## RESULTS

### *Mediator Variables*

With the number of medical diagnoses as the dependent variable, the variables that met the inclusion criteria for mediators for the pooled sample of men and women were BMI, smoking, self-evaluated health, depression, anxiety and anger. For the male and female subsamples, BMI, smoking, depression, anxiety and anger qualified as mediators. For the subsample of women, self-evaluated health also qualified as a mediator. The relationship between physical abuse and number of medical diagnoses was not mediated by alcohol problems, any cognition variables, or any social relations variables.

For explaining a bronchitis/emphysema diagnosis, BMI, smoking, self-evaluated health, depression, anxiety and anger qualified as mediators in the full sample and the women only sample. Among men, childhood physical abuse did not predict bronchitis/emphysema net of age and family background variables. For explaining an ulcer diagnosis, smoking, self-evaluated health, depression, and anxiety qualified as mediators for the full sample and only self-evaluated health and depression qualified for women. Among the men, childhood physical abuse did not predict ulcers net of age and family background variables. These sex difference findings support recent research by Thompson et al. (2004) who found that women's health is more adversely affected by childhood physical abuse. Again, neither alcohol problems nor any cognition or social relations variables qualified as mediators in any of the models.

### *Descriptive Statistics*

Table 1 presents the descriptive and bivariate statistics comparing abused and non-abused participants for outcomes, control variables and mediating variables included in the analyses. Table 1 is discussed here, following the mediating analyses, because it includes only the mediating variables that were significant in at least one of the models. Overall 11.6% of all respondents reported childhood physical abuse with slightly, though not significantly, more women abused. The average age of respondents was 55 and did not differ significantly based on

abuse status. Abused participants grew up in families that were more socioeconomically disadvantaged than non-abused children—though only the difference in mother’s education was significant.

---Table 1 about here---

The abused respondents, on average, had statistically worse mental health, physical health and higher health risks. On average, abused respondents reported 2.7 medical diagnoses compared to 2.1 for non-abused respondents. Over 18% of physically abused respondents reported having been diagnosed with bronchitis or emphysema compared to less than 13% of non-abused respondents. Ulcers were more common among abused respondents with almost 15% of abused respondents reporting an ulcer diagnosis compared to only 8% of non-abused respondents.

Abused respondents also fared worse when looking at the mediating variables. The abused respondents are more likely to have ever smoked regularly (63%) and to be obese (32%) compared to non-abused respondents (55% and 20% respectively). Abused respondents also reported slightly lower self-evaluated health. The average score for the depression scale was 21.4 for abused respondents and 16.1 for non-abused respondents; for the anger scale it was 9.3 for abused respondents and 7.0 for non-abused respondents; for the anxiety scale it was 15.9 for abused but 12.8 for non-abused respondents. The bivariate results show that abused respondents have worse physical and mental health, lower self-assessed health, and great health risks.

#### *Multi-Pathway Model and the Effect of Childhood Physical Abuse on Medical Diagnoses*

Table 2 lists the estimates for the health behavior, health perception, mental health and full pathways models for a pooled sample of men and women. The first row (italicized) lists the

results from the model controlling for only sex, age and family background variables. This allows a direct comparison of how the abuse coefficient is attenuated when the mediating pathways are controlled. Controlling for sex, age and family background, abuse is associated with a 19% increase<sup>3</sup> in medical diagnoses.

---Table 2 about here---

Respondents from a physically abusive family reported 15% more medical diagnoses than other respondents, net of health behaviors, sex and age, body size, and smoking. This constitutes a 19% reduction in the effect of abuse on medical diagnoses. As expected, being overweight, obese and having ever smoked regularly are associated with increased medical diagnoses. The coefficient for abuse is approximately two times the size of regularly smoking or being overweight, though obesity has the largest coefficient indicating that obesity is associated with a 29% increase in medical diagnoses net of other health behaviors, childhood physical abuse and controls.

The health perception pathway has approximately the same size mediating effect as the health behavior pathway. Specifically, childhood physical abuse is associated with a 16% increase in medical diagnoses net of controls and self-evaluated health. This means a 17% reduction in the effect of childhood physical abuse on medical diagnoses, when self-evaluated health is controlled. Self-evaluated health is, as expected, negatively associated with medical diagnoses.

The mental health pathway has the largest mediating effect of all pathways—controlling for anger, anxiety and depression accounts for 27% of the relationship between childhood physical abuse and medical diagnoses. Childhood physical abuse is still associated with a 14%

increase in medical diagnoses net of the full range of controls, depression, anxiety and anger. Only depression and anger are associated with medical diagnoses net of abuse and controls.

Childhood physical abuse predicts increased medical diagnoses net of sex, age, family background and *all* mediators—though each pathway does mediate some of the relationship between childhood abuse and medical diagnoses. This model produces a 40% reduction in the relationship between childhood abuse and number of medical diagnoses, with obesity, self-evaluated health, depression, anger and abuse remaining significant in the full model. This indicates that childhood physical abuse adversely affects mid-life physical health largely through behaviors such as excessive eating and lack of exercise along with poor psychological health manifesting itself as depression and anger. It is also possible that negative perceptions of one's health is a main link between childhood abuse and number of medical diagnoses, but this is also possibly a methodological effect—a point to which I return in the discussion.

---Tables 3 and 4 about here--

Tables 3 and 4 compare the effects of different models for the male and female subsamples. The effect of childhood physical abuse was larger for women than for men, with the baseline model demonstrating a 22% increase in the number of medical diagnoses for women compared to a 16% increase for men. The relative mediating effect of the pathways was similar for men and women with approximately 41% of the relationship between childhood physical abuse and number of medical diagnoses accounted for in the full model. This suggests that although mid-life women are more adversely affected by childhood physical abuse, the mechanisms through which abuse damages health are similar in type and magnitude for men and women. In the full model the significant effect of childhood physical abuse persists for women

but not for men, indicating that for men the significant relationship between childhood physical abuse and medical diagnoses can be completely accounted for by BMI, depression and anger.

### *Multi-Pathway Model and the Effect of Childhood Physical Abuse on a Bronchitis/Emphysema Diagnosis*

As with the OLS models examining number of medical diagnoses, the effect of abuse on bronchitis/emphysema was larger for women compared to men—so much so that abuse did not significantly predict bronchitis/emphysema for men net of family background and age. Tables 5 and 6 show the results of the bronchitis models for the pooled sample of men and women and for women alone. For the pooled sample I found that childhood physical abuse was associated with a 52% increase in the odds of a bronchitis/emphysema diagnosis net of age, sex and family background variables. Health behaviors and mental health—anger in particular—accounted for the significant relationship between childhood abuse and bronchitis/emphysema. Also, as expected, regular smoking had a very large and consistent effect on bronchitis/emphysema—ever having smoked regularly increased the odds of a bronchitis/emphysema diagnosis by 68% net of all other mediators, childhood physical abuse, age, sex and family background. In the medical diagnoses model, the coefficient for obesity was about three times the size of regular smoking indicating that for a general health outcome obesity had a much larger negative effect than smoking. This is in contrast to the bronchitis/emphysema model where regular smoking and obesity have a similar size coefficient indicating the relative importance of smoking for this diagnosis.

In addition, results from the bronchitis/emphysema model support inferring a longitudinal effect, despite using largely cross-sectional data. Since smoking is a leading cause of bronchitis/emphysema, and I did indeed find a large and significant effect, the inference that

these mediating variables are causal factors is plausible. It is quite unlikely that respondents became regular smokers after being diagnosed with bronchitis/emphysema.

---Table 5 about here---

Examining the results of the bronchitis model for women I found that childhood physical abuse had the same size effect as smoking—with both childhood physical abuse and smoking predicting a 62% increase in the odds of bronchitis/emphysema—net of each other, age and family background. These results underscore the devastating effect of childhood physical abuse on poor adult health—the impact of childhood physical abuse is the same magnitude as the leading cause of bronchitis/emphysema among women. Even in the full mediator model, childhood physical abuse was significantly associated with a 53% increase in the odds of a bronchitis/emphysema diagnoses.

---Table 6 about here---

#### *Multi-Pathway Model and the Effect of Childhood Physical Abuse on an Ulcer Diagnosis*

Childhood physical abuse had a much larger effect on an ulcer diagnosis for women than for men—and as with bronchitis/emphysema, childhood physical abuse predicted ulcers net of controls among women and in the pooled sample, but not for men alone. For the pooled sample, childhood physical abuse predicted a 93% increase in the odds of having an ulcer diagnosis, net of controls. This figure was even larger for women—with childhood physical abuse predicting a 126% increase in the odds of an ulcer, net of controls. As expected, very few of the proposed mediating variables actually mediated the relationship between abuse and ulcer diagnoses. For example, among women, only self-evaluated health and depression were significant mediators.

The consistent mediating effect of depression for the combined and women-only sample suggests that depression might be a proxy for stress and act as a trigger for symptoms among those with *Helicobacter pylori*. In addition, smoking is a known trigger for ulcer symptoms and the findings from the combined sample provide evidence for the mediating effect of smoking on ulcers at mid-life. Though the mediator models did account for some of the abuse/ulcer relationship, most of the effect persisted indicating that there are important pathways linking childhood physical abuse and ulcers that are not included in this model.

---Tables 7 and 8 about here---

#### *Mediating Effect of Each Pathway by Outcome*

Table 9 shows a direct comparison of the mediating effect of each pathway by outcome. As expected, the health behaviors pathway—which contains smoking—explains more of the association for bronchitis/emphysema than for the other two outcomes. In addition, every pathway in the ulcer model explains less of the association between abuse and mid-life physical health than in the models for the diagnosis scale or for bronchitis/emphysema. The full model for ulcers accounts for only 21% of the association between abuse and an ulcer diagnosis compared to over 40% for both other outcomes. These results support several of my hypotheses. First, they indicate that abuse impacts different health outcomes through different mechanisms. Second, as predicted, smoking is a key mediator linking childhood physical abuse and bronchitis/emphysema. Third, the relationship between childhood physical abuse and ulcers is less susceptible to social causes likely because of its bacteriological etiology—though the results support the inference that stress and impaired immune functioning are relevant mediators.

---Table 9 about here---

## DISCUSSION

By combining a life course perspective with an ecological approach I was able to demonstrate that childhood physical abuse can be seen as a fundamental social cause of adult

morbidity (Link and Phelan 1995). As with other fundamental social causes, childhood physical abuse adversely affected multiple physical health outcomes through a variety of mechanisms demonstrating how childhood physical abuse may jumpstart the accumulation of disadvantage, producing an undue health burden for abuse survivors.

I also found that the effect of childhood physical abuse on each health outcome was larger for women compared to men. Most studies that find gender differences in health usually examine mental health outcomes and often include multiple types of abuse (Batten, Aslan, Maciejewski, and Mazure 2004; Jumper 1995; Kessler, Davis, and Kendler 1997; MacMillan et al. 2001; Nelson et al. 2002; Thompson et al. 2004). However, in cases where researchers do find gender differences, women are almost always more adversely affected than men (Batten et al. 2004; MacMillan et al. 2001; Thompson et al. 2004). Using a clearly defined measure of childhood physical abuse, multiple physical health outcomes, and extensive controls for family background these results provide clear evidence that women suffer more long-term physical health problems as a result of childhood violence.

A main contribution of the paper is the multi-pathway investigation of *how* childhood physical abuse adversely affects mid-life physical health. Not only was I able to use a representative population sample to rule out the alternative hypothesis that abuse and poor health are both merely outcomes of socio-economic disadvantage, I could affirmatively point to the mechanisms for how childhood physical abuse produces its ill effects—through both poor health behaviors and impaired mental health. This suggests that survivors of childhood physical abuse may try to manage their emotional pain by overeating, not exercising, and smoking regularly. In addition, the results from this analysis go beyond past research to show that while mental illness, such as depression, is a negative outcome of childhood abuse, poor mental health is also a mechanism through which childhood physical abuse wreaks havoc on physical health. The

majority of past research focuses only on mental health outcomes and therefore misses the two-pronged tragedy caused by childhood abuse.

I did not find support for the mediating role of social support or cognitive ability despite an array of measures for both pathways. The unimportance of the social relations pathway stands in contrast with much of the suggestive literature and to Shaw and Krause's (2002) finding that negative interactions with family members was an important mediator. However, the social relations variables I included focused on positive aspects of social relations and, like Shaw and Krause's (2002) emotional support measures, did not mediate the relationship between childhood physical abuse and adult physical health. These strong null findings lead me to conclude that positive social relations such as having a close marriage, financial support, social support and regular social activities do not buffer the negative health effects of childhood physical abuse, though it is still plausible that negative social interactions extend the trauma of childhood physical abuse into adulthood.

I included self-evaluated health as a mediating pathway because as an aspect of one's self-concept it may affect adult physical health through social psychological coping mechanisms and/or propensity to engage in health behaviors (Bailis et al. 2003; Kendall-Tackett 2003). Self-evaluated health did indeed prove to be a significant mediator perhaps suggesting childhood physical abuse survivors have a poorer health self-concept that in turn become a self-fulfilling prophecy. Yet, due to the largely cross-sectional nature of the data, I can't be certain that health perception precedes health outcomes and it is also plausible that self-evaluated health is an assessment, rather than predictor, of adult physical health. If the importance of self-evaluated health as mediator holds using longitudinal data, the psychosocial process of self-evaluation will be a very interesting avenue for further exploration.

Analyzing bronchitis/emphysema and ulcers as specific diagnoses illustrates how childhood physical abuse may predispose survivors to different physical health problems through

a variety of mechanisms. For example, childhood physical abuse survivors who smoke as a coping strategy may be likely to develop bronchitis/emphysema whereas survivors with chronic depression may have weaker immune systems making them more susceptible to pathogens, like *Helicobacter pylori*, which cause peptic ulcers. The implications of these findings are: first, that examining sole outcomes or mechanisms by which abuse affects later health underestimates its influence and second, that public health interventions targeted at specific mediating mechanisms, like smoking, may improve abuse survivors' health but are unlikely to break the link between childhood physical abuse and adult physical health outcomes. Blocking one mediating mechanism may only divert more of the effect of abuse into different pathways. Fundamental social causes of disease arise due to a lack of access to resources and power—an obvious issue for children—and as such the life long effects tend to persist and change to different pathways even when one pathway minimized (Link and Phelan 1995). It is therefore unlikely that health inequalities resulting from childhood physical abuse can be completely ameliorated without focusing on creating safer, healthier environments for children.

## ENDNOTES

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<sup>1</sup> Net of control variables, childhood physical abuse significantly predicted allergies, arthritis/rheumatism, asthma, back troubles, bronchitis/emphysema, circulation problems and ulcers.

<sup>2</sup> I compared the results using this scale to results for people who completed all items and I found no meaningful difference.

<sup>3</sup> Derived from the following: %change in  $y = 100 * (\exp(B) - 1)$

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**Table 1. Sample Characteristics<sup>a</sup>**

Childhood Physical Abuse (%)	<u>Abused</u> n=295 <u>Mean</u>	<u>Non-Abused</u> n=2245 <u>Mean</u>
Childhood Physical Abuse (%)		11.61
Controls		
Sex (% Female)	55.93	51.40
Age	55.08	55.07
Father's Education	9.58	9.90
Mother's Education*	10.20	10.57
Parental Income <sup>b</sup>	4970.46	5175.33
Farm Background	18.64	19.96
Dad's Occupational Education(%) <sup>c</sup>	15.60	17.78
Outcomes		
Number of Medical Diagnoses**	2.66	2.13
Bronchitis/Emphysema (%)*	18.12	12.67
Ulcer (%)**	14.78	8.17
Mediators		
Health Behavior		
Underweight (%)	0.00	1.16
Overweight (%)	38.31	41.78
Obese (%)**	32.20	19.91
Regular Smoker (%)*	62.71	55.19
Health Perception		
Self-Evaluated Health*	4.02	4.13
Mental Health		
Depression**	21.40	16.08
Anger**	9.34	6.97
Anxiety**	15.89	12.78

\*p < .05; \*\*p<.01

<sup>a</sup>Sample containing complete data on illnesses, mediators and controls. Sample sizes for bronchitis/emphysema (n=287 & n=2210) and ulcer (n=291 & n=2216) are slightly smaller.

<sup>b</sup>Parental income is reverse transformed from the mean of the logged score.

<sup>c</sup>Occupational Education is the percentage of persons in the 1970 Census in an occupation, industry, class-of-worker category who completed one year of college or more. In the model this has been transformed per Hauser and Warren's (1997) article. The values in table 1 are obtained from a reverse transformation of the mean of the logged score.

Table 2. Pathways Linking Childhood Physical Abuse and Medical Diagnoses at Mid-life<sup>a</sup>

	<u>Behaviors</u>		<u>Perception</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=2540)</u>								
<i>Original Abuse</i>	<i>0.176**</i>	<i>0.037</i>	<i>0.176**</i>	<i>0.037</i>	<i>0.176**</i>	<i>0.037</i>	<i>0.176**</i>	<i>0.037</i>
Abuse	0.142**	0.037	0.146**	0.035	0.128**	0.037	0.105**	0.035
Underweight	0.042	0.119					-0.063	0.111
Overweight	0.077**	0.028					0.042	0.026
Obese	0.254**	0.033					0.133**	0.031
Smoking	0.077**	0.024					0.031	0.023
Self-Evaluated Health			-0.319**	0.017			-0.273**	0.018
Depression (x100)					0.739**	0.101	0.410**	0.097
Anger (x100)					0.463**	0.179	0.461**	0.170
Anxiety (x100)					-0.002	0.144	-0.159	0.137
Constant	-0.114	0.230	1.343**	0.227	-0.312	0.229	0.901**	0.234
Adjusted R <sup>2</sup>	0.085		0.179		0.106		0.199	

<sup>a</sup>Controlling for age, sex, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

Table 3. Women: Pathways Linking Childhood Physical Abuse and Medical Diagnoses at Mid-life<sup>a</sup>

	<u>Behaviors</u>		<u>Perception</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=1319)</u>								
<i>Original Abuse</i>	<i>0.196**</i>	<i>0.051</i>	<i>0.196**</i>	<i>0.051</i>	<i>0.196**</i>	<i>0.051</i>	<i>0.196**</i>	<i>0.051</i>
Abuse	0.156**	0.051	0.157**	0.048	0.140**	0.050	0.113*	0.048
Underweight	-0.006	0.134					-0.081	0.127
Overweight	0.082*	0.039					0.039	0.037
Obese	0.253**	0.044					0.124**	0.043
Smoking	0.734*	0.034					0.032	0.032
Self-Evaluated Health			-0.308**	0.023			-0.262**	0.025
Depression (x100)					0.724**	0.145	0.350*	0.142
Anger (x100)					0.347	0.244	0.378	0.233
Anxiety (x100)					0.062	0.194	-0.060	0.185
Constant	-0.126	0.322	1.30**	0.322	-0.338	0.321	0.967**	0.330
Adjusted R <sup>2</sup>	0.065		0.153		0.082		0.168	

<sup>a</sup>Controlling for age, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

**Table 4. Men: Pathways Linking Childhood Physical Abuse and Medical Diagnoses at Mid-life<sup>a</sup>**

	<u>Behaviors</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>	<u>Coef.</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=1221)</u>						
<i>Original Abuse</i>	0.152**	0.055	0.152**	0.055	0.152**	0.055
Abuse	0.126*	0.055	0.110*	0.054	0.089	0.054
Underweight	0.240	0.266			0.176	0.260
Overweight	0.074	0.041			0.079*	0.040
Obese	0.251**	0.050			0.228**	0.049
Smoking	0.074*	0.035			0.066	0.035
Depression (x100)			0.738**	0.140	0.707**	0.139
Anger (x100)			0.642*	0.266	0.597*	0.264
Anxiety (x100)			-0.054	0.217	-0.039	0.216
Constant	0.127	0.330	-0.109	0.327	0.674	0.124
Adjusted R <sup>2</sup>	0.065		0.096		0.113	

<sup>a</sup>Controlling for age, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

Table 5. Pathways Linking Childhood Physical Abuse and Bronchitis/Emphysema at Mid-life<sup>a</sup>

	<u>Behaviors</u>		<u>Perception</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=2497)</u>								
<i>Original Abuse</i>	1.519*	0.256	1.519*	0.256	1.519*	0.256	1.519*	0.256
Abuse	1.386	0.237	1.434*	0.246	1.378	0.236	1.300	0.228
Underweight	1.996	0.972					1.662	0.844
Overweight	1.021	0.149					0.953	0.142
Obese	1.658**	0.258					1.330	0.215
Smoking	1.679**	0.214					1.535**	0.199
Self-Evaluated Health			0.537**	0.045			0.582**	0.053
Depression					1.006	0.005	0.998	0.005
Anger					1.024**	0.008	1.023*	0.008
Anxiety					1.001	0.007	0.999	0.007

<sup>a</sup>Controlling for age, sex, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

Table 6. Women: Pathways Linking Childhood Physical Abuse and Bronchitis/Emphysema at Mid-life<sup>a</sup>

	<u>Behaviors</u>		<u>Perception</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=1291)</u>								
<i>Original Abuse</i>	1.758**	0.353	1.758**	0.353	1.758**	0.353	1.758**	0.353
Abuse	1.621*	0.332	1.650*	0.336	1.613*	0.330	1.531*	0.319
Underweight	1.911	1.022					1.778	0.995
Overweight	1.188	0.210					1.132	0.203
Obese	1.516*	0.287					1.242	0.245
Smoking	1.621**	0.248					1.492*	0.232
Self-Evaluated Health			0.596**	0.062			0.639**	0.073
Depression					1.002	0.006	0.996	0.006
Anger					1.025*	0.010	1.024*	0.010
Anxiety					1.005	0.009	1.004	0.009

<sup>a</sup>Controlling for age, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

**Table 7: Pathways Linking Childhood Physical Abuse and Ulcer at Mid-life<sup>a</sup>**

	<u>Behaviors</u>		<u>Perception</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=2507)</u>								
<i>Original Abuse</i>	1.930**	0.353	1.930**	0.353	1.930**	0.353	1.930**	0.353
Abuse	1.870**	0.344	1.850**	0.343	1.749**	0.327	1.732**	0.325
Smoking	1.497**	0.224					1.384*	0.210
Self-Evaluated Health			0.537**	0.051			0.582**	0.058
Depression					1.020**	0.005	1.014**	0.005
Anxiety					0.994	0.007	0.990	0.008

<sup>a</sup>Controlling for age, sex, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

**Table 8. Women: Pathways Linking Childhood Physical Abuse and Ulcer at Mid-life<sup>a</sup>**

	<u>Perception</u>		<u>Mental Health</u>		<u>Full</u>	
	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>	<u>OR</u>	<u>SE</u>
<u>Number of Medical Diagnoses (ln) (n=1298)</u>						
<i>Original Abuse</i>	2.255**	0.539	2.255**	0.539	2.255**	0.539
Abuse	2.127**	0.513	2.047**	0.499	2.034**	0.497
Self-Evaluated Health	0.603**	0.078			0.638**	0.088
Depression			1.014*	0.006	1.008	0.006

<sup>a</sup>Controlling for age, father's education, mother's education, parental income, growing up on a farm, and father's occupational education

\*p < .05; \*\*p<.01

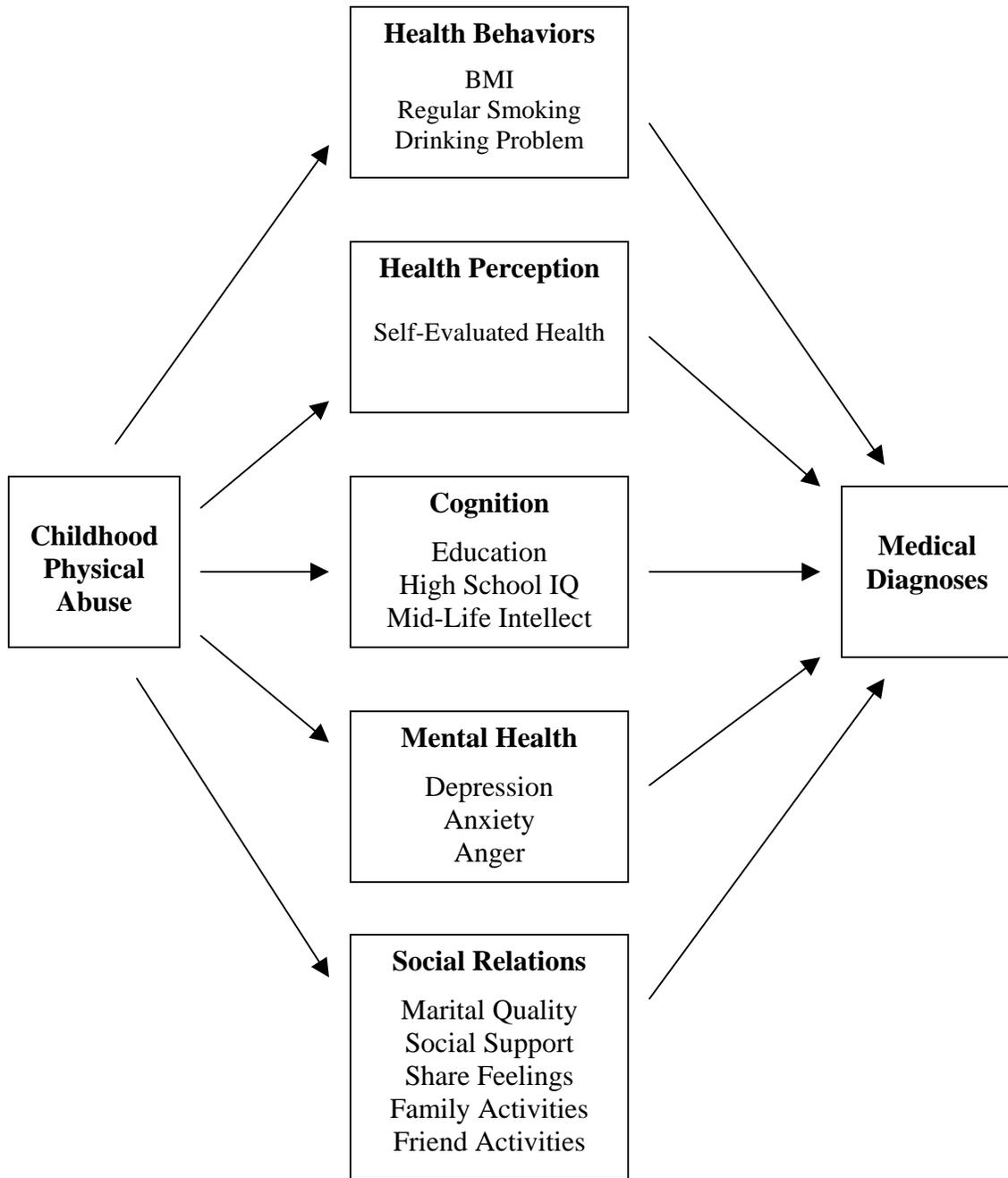
**Table 9. Percent of Association Explained by Each Pathway in the Pooled Sample**

	<u>Diagnoses</u>	<u>B/E</u>	<u>Ulcer</u>
Health Behaviors	19.3%**	25.6%	6.5%**
Health Perception	17.0%**	16.4%*	8.6%**
Mental Health	27.3%**	27.2%	19.5%**
Full	40.3%**	42.2%	21.3%**

\*Indicates childhood physical abuse is still significant at  $p < .05$ ; \*\* $p < .01$

**Figure 1. Multi-Pathway Life Course Model**

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