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From Childhood Maltreatment to Allostatic Load in Adulthood: The Role of Social Support

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Abstract

Although previous research has documented that social support acts as a protective factor for individuals exposed to trauma, most research relies on assessments of social support at one point in time. The present study used data from a prospective cohort design study to examine the stability of social support from childhood through middle adulthood in individuals with documented histories of childhood abuse and neglect and matched controls (aged 0–11) and assessed the impact of social support on allostatic load, a composite measure of physiological stress response assessed through blood tests and physical measurements, in middle adulthood. Maltreated children are more likely to have unstable social support across the life span, compared to matched controls. Social support across the life span partially mediated the relationship between child maltreatment and allostatic load in adulthood, although there were differences by race and sex. These findings have implications for interventions to prevent the negative consequences of child maltreatment.

Keywords

child abuse and neglect; social support; physical health; allostatic load

Introduction

Numerous studies have documented the impact of social support on physical and mental health outcomes across the life span (Taylor, 2011), providing a buffer against the impact of severe trauma or stress (Lin, Ye, & Ensel, 1999). In particular, perceived social support—the extent to which one *believes* that his or her needs for support are fulfilled (Kaul & Lakey, 2003)—has been shown to be protective. Fewer studies, however, have focused on childhood factors that may influence individual perceptions of social support, which may, in turn, mediate the relationship between these childhood factors and health outcomes later in life. The current study builds on the existing literature to examine the stability of perceived social

support across the life span and whether social support provides one of the mediating mechanisms linking childhood maltreatment with negative health outcomes in adulthood. By linking these two separate lines of research, this study has implications for when and how intervention efforts may be effective in mitigating the impact of adverse childhood environments on physical health by increasing social support over the life span.

Social Support Across the Life Span

Most research has examined social support at one point in time, usually with children or elderly populations (Knoll & Schwarzer, 2002), although some research has examined changes in social support over relatively short time spans, in studies designed to evaluate the test–retest reliability of specific measures of social support (Bost, Vaughn, Boston, Kazura, & O'Neal, 2004). These studies have found that social support is relatively stable within specific developmental periods, including childhood (Levitt, Guacci-Franco, & Levitt, 1993), young adulthood (Sarason, Sarason, & Shearin, 1986), and old age (Bergeman, Neiderhiser, Pedersen, & Plomin, 2001; Voils et al., 2007). However, there is sparse research on the stability of social support over longer periods of time and across developmental periods. This is surprising, given that studies have highlighted both the normative and the nonnormative life events (e.g., puberty, geographic relocation, death of a family member, and job change) that may affect the stability of social support, suggesting that social support may be more dynamic than often assumed (Cornwell, 2003; Uchino & Garvey, 1997).

Based on a life span perspective, Kahn and Antonucci's (1980) social convoy model argues that an individual is surrounded by a convoy of other people with whom social support is exchanged either unilaterally or bilaterally. According to this theory, the convoy is dynamic and lifelong and its makeup at any given time is determined jointly by the properties of the person and the situation. As the individual develops, not only do some members of the convoy come and go, but members take on new tasks and new forms of support as needed (Antonucci, Birditt, Sherman, & Trinh, 2011). When the convoy is functioning optimally, it provides protection and socialization for the individual. However, a dysfunctional convoy can result in increased vulnerability and decreased coping resources in the face of stress (Antonucci, Birditt, & Ajrouch, 2011).

Consequences of Child Maltreatment

Children abused or neglected by a family member or other adult within their convoy may also experience less social support during childhood. With development, new members may be added to the convoy to provide support in adolescence and adulthood. On the other hand, it may be difficult for victims of childhood abuse and neglect to maintain highly supportive social networks, given their increased risk for problematic intimate partner relationships (Colman & Widom, 2004; Renner & Slack, 2006). Previous research has found that victims of childhood abuse and neglect report lower levels of support in adulthood (Pitzer & Fingerman, 2010; Sperry & Widom, 2013). In addition, levels of social support have been found to vary by type of childhood maltreatment (Caliso & Milner, 1994; Paolucci, Genuis, & Violato, 2001), sex (Dalgard et al., 2006; Rueger, Malecki, & Demaray, 2010), and race (Bruwer, Emsley, Kidd, Lochner, & Seedat, 2008; Silverstein & Waite, 1993), suggesting the need to examine potential differences in these relationships by these characteristics.

Social support has been shown to play a protective role in the relationship between child maltreatment and mental health outcomes in adulthood, including depression and anxiety (Sperry & Widom, 2013), post-traumatic stress disorder (Hyman, Gold, & Cott, 2003), suicidal ideation (Esposito & Clum, 2002), and self-esteem and psychological distress (Runtz & Schallow, 1997). Perceived social support also serves as a buffer between the more general construct of "stressful life events"—but not specifically child maltreatment—and *physical* health outcomes (Thoits, 2010; Uchino, 2009). Although previous research has reported that child maltreatment has consequences for long-term physical health outcomes (Anda et al., 2006; Springer, Sheridan, Kuo, & Carnes, 2007; Widom, Czaja, Bentley, & Johnson, 2012), to date, none of this research has considered the potential mediating role of social support in the relationship between child abuse and neglect and physical health outcomes in later life.

Previous research has documented associations between exposure to risky childhood environments and later physical health problems using a measure based on four physiological stress response systems—sympathetic nervous, neuroendocrine, hypothalamic–pituitary–adrenal axis, and immune systems. This indicator, known as allostatic load (McEwen, 1998; McEwen & Stellar, 1993), has been widely used to assess the "wear and tear" that the body experiences as a result of exposure to traumatic and stressful experiences, with higher allostatic load scores associated with increased risk for health problems, including cardiovascular disease, declining physical and cognitive functioning, and mortality. More recent research suggests that exposure to risky environments leads to less access to appropriate psychosocial resources later in life, which ultimately leads to higher levels of allostatic load (Taylor, Way, & Seeman, 2011). This raises the question of whether the lack of access to psychosocial resources, such as a strong system of social support, leads to higher allostatic load in children exposed to childhood adversities, including abuse and neglect.

The Present Study

The importance of social support to successful development and functioning throughout the life span has been well documented. The purpose of this study is to determine whether the lack of social support plays a mediating role between childhood abuse and neglect and physical health in adulthood and to extend existing knowledge by addressing the following questions:

1. Do individuals with documented histories of child abuse and neglect report lower levels of perceived social support, compared to matched controls without such histories of child maltreatment, consistent with previous research on levels of perceived support?

2. Is the pattern of social support across the life span different for victims of child abuse and neglect compared to individuals without such histories?

3. Does social support over the life course mediate the relationship between childhood abuse and neglect and physical health outcomes in middle adulthood, as indicated by allostatic load? and

4.   Are there differences in these relationships by type of maltreatment, sex, or race?

Method

Design and Participants

The data are from a prospective cohort design study in which abused and neglected children were matched with nonabused and nonneglected children and followed prospectively into adulthood. The prospective nature of the study disentangles the effects of childhood maltreatment from other potential confounding effects (for a detailed description of the design and sample, see Widom, 1989).

Only court-substantiated cases of child abuse and neglect were included. Cases were drawn from the records of county juvenile and adult criminal courts in a metropolitan area in the Midwest during the years 1967 through 1971 ($N = 908$). Abuse and neglect cases were restricted to those in which children were less than 12 years of age at the time of the abuse or neglect incident. Physical abuse cases included injuries such as bruises, welts, burns, abrasions, lacerations, wounds, cuts, bone and skull fractures, and other evidence of physical injury. Sexual abuse charges ranged from felony sexual assault to fondling or touching in an obscene manner, rape, sodomy, and incest. Neglect cases reflected a judgment that the parents' deficiencies in child care were beyond those found acceptable by community and professional standards at the time. These cases represented extreme failure to provide adequate food, clothing, shelter, and medical attention to children.

A critical element of this design was the establishment of a comparison or control group, matched as closely as possible on the basis of sex, age, race, and approximate family socioeconomic status during the time period under study (1967 through 1971). Children who were under school age at the time of the abuse or neglect were matched with children of the same sex, race, date of birth (+ 1 week), and hospital of birth through the use of county birth record information. For children of school age, records of more than 100 elementary schools for the same time period were used to find matches with children of the same sex, race, date of birth (+ 6 months), same class in same elementary school during the years 1967 through 1971, and home address, within a five-block radius of the abused or neglected child, if possible. Overall, there were 667 matches (73.7%) for the abused and neglected children (see Widom, 1989, for reasons for failure to find matches).

Matching for social class is important because it is theoretically plausible that any relationship between child abuse or neglect and later outcomes is confounded or explained by social class differences (Bradley & Corwyn, 2002; Conroy, Sandel, & Zuckerman, 2010). Shadish, Cook, and Campbell (2002) recommended using neighborhood and hospital controls to match on variables that are related to outcomes, when random sampling is not possible.

If the control group included children who had been officially reported as abused or neglected, at some earlier or later time period, this would jeopardize the design of the study. Therefore, official records were checked, and any proposed comparison group child who had an official record of abuse or neglect before age 12 was eliminated ($n = 11$), and a second

matched child was selected for the control group. No members of the control group were reported to the courts for abuse or neglect. However, it is possible that some may have experienced unreported abuse or neglect.

The first phase of this research involved 1,575 individuals (908 cases of abuse and neglect and 667 matched controls). Although there is considerable discussion in the literature about the extent of overlap among types of child maltreatment, in our sample, only 11% experienced more than one type of maltreatment. Subsequent phases of the research involved locating and interviewing the abused and/or neglected individuals and the matched comparison group at three time points: The first interview was conducted in 1989–1995 (mean age = 29), the second in 2000–2002 (mean age = 40), and the third in 2003–2005 (mean age = 41). These in-person interviews were approximately 2 to 3 hr long and consisted of standardized tests and measures. Throughout all waves of the study, the interviewers were blind to the purpose of the study, to the inclusion of an abused and/or neglected group, and to the participants' group membership. Similarly, the participants were blind to the purpose of the study and were told that they had been selected to participate as part of a large group of individuals who grew up in the late 1960s and early 1970s. Institutional review board approval was obtained for all study procedures, and subjects who participated signed a consent form acknowledging that they understood the conditions of their participation and that they were participating voluntarily.

Although there has been attrition associated with death, refusals, and our inability to locate individuals over the various waves of the study, the composition of the sample has remained about the same. Of the original sample, 620 participated in all three follow-up interviews (52.7% abused/neglected, 54.8% female, and 67.6% White, non-Hispanic). This subsample did not differ significantly in individual demographic characteristics from the overall study sample.

Measures

Child abuse and neglect—Official reports of physical and sexual abuse and neglect, based on records of county juvenile (family) and adult criminal courts from 1967 to 1971, were used to operationalize maltreatment. Only court-substantiated cases involving children between the age of 0 and 11 at the time of abuse or neglect were included.

Social support—Three measures of social support are used in this research, all representing "perceived" social support. To assess social support in childhood, in the first interview (1989–1995), participants were asked, "Was there any adult in your childhood with whom you felt really close?" If participants answered yes, they were then asked to identify their relationship with that person. Seventy-eight percent of the participants reported experiencing a close relationship with at least one adult in childhood ($n = 925$).

Second, to assess social support in young adulthood, in the first interview (1989–1995), participants were asked whether they had an intimate and confiding relationship with a supportive partner or spouse and, if so, they were asked to respond to nine statements about this person (e.g., "you can really talk to [your spouse/partner] about things that are important to you") with response options from 1 (*not at all*) to 4 (*almost always*; adapted from

Procidano & Heller, 1983). Scale scores ranged from 10 to 36 (M = 31.23, SD = 4.19), and Cronbach's a for the current sample is .79.

Third, to assess social support in middle adulthood, in the second interview (2000–2002), the Interpersonal Support Evaluation List (17 items; Cohen, Mermelstein, Kamarck, & Hoberman, 1985) was administered. The following four subscales were used: (1) appraisal support ("There are several people that I trust to help solve my problems"; M = 3.68, SD = 1.27); (2) belonging support ("When I feel lonely, there are several people I can talk to"; M = 4.21, SD = 1.15); (3) tangible support ("If I were sick, I could easily find someone to help me with my daily chores"; M = 4.30, SD = 1.19); and (4) self-esteem ("Most people I know think highly of me"; M = 3.68, SD = 1.16). These subscales were moderately correlated (r's = .34–.58), and a total score was created by summing across all items (range = 2–19; a = .76).

Physical health outcomes: Allostatic load—Physical health outcomes were assessed during the third interview (2003–2005). A licensed registered nurse performed a medical status exam in the participant's home or other quiet location of the person's choosing, including drawing of blood that was sent to a hospital laboratory for testing and measured health outcomes (see Widom et al., 2012, for details). The results from the blood tests and physical measurements were used to create an allostatic load variable composed of nine indicators: (1) systolic blood pressure; (2) diastolic blood pressure; (3) high-density lipoprotein(HDL)—molecules that remove cholesterol from the bloodstream and carry to the liver; (4) total cholesterol to HDL ratio; (5) hemoglobin A1c—a measure that reflects the average blood glucose level over a period of months and is related to risk for diabetes; (6) C-reactive protein—a protein that appears in the blood in certain acute inflammatory conditions, associated with risk for arthritis and cardiovascular disease; (7) albumin—protein found in blood serum, plays a role in transporting amino acids and regulating distribution of water, indicative of nutritional status, including protein deficiency, and liver function; (8) creatinine clearance—volume of blood plasma cleared of creatinine per unit of time, assesses the excretory function of the kidneys; and (9) peak air flow—a measure of how well and fast a person can exhale air, commonly used to assess and monitor lung diseases such as asthma, chronic obstructive pulmonary disease or bronchitis, or emphysema. The allostatic load variable was computed by counting the number of indicators (out of the 9 possible) for which the participant's scores were in the highest risk quartile. Scores on the allostatic load composite, which ranged from 0 to 7 (M = 1.94, SD = 1.61), were comparable to scores reported in other studies using this index (Crimmins, Johnston, Hayman, & Seeman, 2003; Schulz et al., 2012).

Statistical Analyses

First, logistic and linear regressions were used to examine differences in perceived social support between maltreated and nonmaltreated participants at each of the three time points (childhood and young and middle adulthood), controlling for sex, race, and age, given that previous research has identified differences in both maltreatment and social support by these demographic characteristics. Next, bivariate analyses examined differences in patterns of social support across the three time points between the abuse/neglect and control groups as

well as differences in sex and race. Then analysis of covariance was used to examine differences in allostatic load by pattern of social support, controlling for these demographic characteristics. To ensure that the three measures of social support were on the same scale, partner social support at age 29 and general social support at age 39 were dichotomized for this analysis by recoding scores in the bottom quartile of the range of scores as 0 (*low social support*) and the rest as 1 (*high social support*).

The last step involved path analysis using MPlus 7.0 (Muthén & Muthén, 1998–2012) to examine pathways from childhood abuse and neglect to allostatic load in middle adulthood through social support at earlier time points (see Figure 1). Paths were included to control for participant sex, race, and age at the first interview. Model fit was assessed first for the full sample, and then separately by type of child maltreatment (i.e., physical abuse, sexual abuse, and neglect), sex, and race (White vs. Black). Multiple fit indices were considered in assessing overall model fit (critical ratio [w^2], root mean square error of approximation [RMSEA], comparative fit index [CFI], weighted root mean square residual [WRMR]), as were individual path estimates and indirect effects. In addition, R^2 provided a measure of effect size. Full information maximum likelihood was used to handle missing data, and all information available for each case was used to avoid bias and loss of power (Allison, 2003).

Results

Child Abuse and Neglect and Levels of Social Support

Regression analyses indicated that individuals with histories of abuse and neglect were less likely to report having a close relationship with an adult during childhood than controls (odds ratio [*OR*] = 1.80, 95% confidence interval [CI] = [1.35, 2.41], $p < .001$). Abused and neglected individuals also reported lower levels of partner or spouse support in young adulthood ($B = -0.78$, $p < .01$) and lower levels of general social support in middle adulthood than the controls ($B = -1.31$, $p < .001$).

Stability of Social Support

Next, participants were classified into five groups based on the pattern of social support across these three time points (see Table 1). For this set of analyses examining patterns across time, social support in young and middle adulthood were dichotomized at the mean so that they were consistently scaled to the construct operationalizing social support in childhood. Almost half of the participants (46.5%) reported consistently high social support across the three time points, whereas few participants reported consistently low social support (2.4%). Sixteen percent reported an increase and 16.3% reported a decrease in social support across the three time points, while 19.2% reported inconsistent (fluctuating) social support across the three time points.

Table 1 also shows the results of analyses examining patterns of social support by child abuse or neglect and demographic characteristics. More than half of the control group (56.0%), but only 37.9% of the abused and neglected group experienced consistently high social support across the three time points ($w^2 = 20.25$, $p < .001$). In contrast, almost 60% of the abused and neglected group reported changes in perceived social support over time,

compared to about 40% of the control group ($w^2 = 14.47$, $p < .001$). Sex differences were found, with more males reporting consistently high social support and more females reporting consistently low, decreasing, or fluctuating social support ($w^2 = 9.84$, $p < .05$). Race differences were also found, with more Whites reporting consistently low social support or increases in social support over time and more Blacks reporting decreasing or fluctuating social support ($w^2 = 15.18$, $p < .001$).

Social Support and Allostatic Load

An analysis of covariance indicated that these patterns of social support were differentially related to allostatic load in middle adulthood ($F = 2.99$, $p < .05$), controlling for sex, race, and age. Specifically, Scheffe's post hoc analyses indicated that there were trend-level differences in allostatic load between those who experienced consistently low social support ($M_{\text{allostatic load}} = 3.15$) and those who experienced either consistently high social support ($M_{\text{allostatic load}} = 1.82$) or inconsistent (fluctuating) social support ($M_{\text{allostatic load}} = 1.76$).

Social Support as a Mediator

Prior to testing the mediation models, we examined whether childhood abuse and neglect predicted higher allostatic load at approximate age 41 and found that individuals with histories of child abuse and/or neglect have higher allostatic load than controls in middle adulthood, controlling for sex, race, and age ($B = 0.40$, $p < .001$, $R^2 = .07$). We then tested the full structural model, and examination of the fit statistics indicated that this model provided an acceptable fit to the data, $w^2(3) = 15.03$, RMSEA = 0.06, 90% CI [0.03, 0.09], CFI = 0.93, WRMR = .70, and explained 6.9% of the variance in allostatic load. All of the paths included in the model were significant (see Figure 2), with the exception of the path from perceived social support in childhood to perceived social support in young adulthood, which was only significant at the trend level ($p < .10$).

Differences by maltreatment type—When tested separately for each of the three types of maltreatment—neglect, physical abuse, and sexual abuse—the model results were similar to those of the overall model. Each type of maltreatment significantly predicted allostatic load, when controlling for sex, race, and age (for neglect, physical abuse, and sexual abuse, respectively, $B = 0.42$, $p < .001$, $R^2 = .06$; $B = 0.49$, $p < .01$, $R^2 = .05$; $B = 0.49$, $p < .05$, $R^2 = .05$). In the full path models (see Table 2), model fit and individual path estimates were similar across all three types of maltreatment with one exception—having a close, supportive relationship with an adult during childhood was significantly related to higher levels of partner support for victims of neglect but not for victims of physical or sexual abuse.

Sex differences—When examined separately by sex (Table 2), the initial model examining the direct relationship between child abuse and neglect and allostatic load without any of the social support variables indicated that there was a significant relationship for females ($B = 0.61$, $p < .001$, $R^2 = .04$) but not for males ($B = 0.16$, $p = .29$, $R^2 = .02$). Examination of the full model with females only indicated a similar fit to the model with the total sample, $w^2(3) = 13.66$, RMSEA = 0.08, 90% CI [0.04, 0.12], CFI = 0.89, WRMR = .70, and explained 4.4% of the variance in allostatic load. All individual paths were

significant ($p < .05$) as were the indirect effects from group (child abuse or neglect vs. control) to allostatic load ($B = 0.15$, $p < .01$).

For males, the results were different. The full model for males indicated an acceptable fit to the data, $w^2(3) = 5.66$, RMSEA = 0.04, 90% CI [0.00, 0.09], CFI = 0.96, WRMR = .48, although it only explained 2.6% of the variance in allostatic load and indirect effects were only significant at the trend level ($B = -0.05$, $p < .10$). In males, child abuse and neglect was not significantly related to partner social support in early adulthood or to allostatic load in middle adulthood and having a close, supportive relationship with an adult in childhood was not related to experiencing high levels of partner social support in young adulthood. For males, the significant relationship between social support at age 39 and allostatic load at age 41 was in the opposite direction than it was for females—that is, higher perceived social support predicted *higher* levels of allostatic load.

Race differences—When examined separately by race (Table 2), the initial direct path model showed that child abuse and neglect predicted allostatic load for White participants ($B = 0.57$, $p < .001$, $R^2 = .11$) but not for Black participants ($B = 0.12$, $p = .50$, $R^2 = .06$). When the full structural model was examined separately by race, results also differed for White and Black participants. For White participants, the model provided an acceptable fit with a significant indirect effect from child abuse and neglect to allostatic load through social support ($B = .02$, $p < .05$) and the model accounted for 11.4% of the variance in allostatic load. In contrast, for Black participants, the model did not provide a significant direct or indirect association from child abuse and neglect to allostatic load through social support and only accounted for 5.5% of the variance in allostatic load.

Discussion

Using a prospective design, this study examined the extent to which perceived social support in individuals with documented histories of abuse and neglect and matched controls was stable over time and whether social support mediated the relationship between childhood maltreatment and physical health outcomes in adulthood. As hypothesized, individuals with histories of childhood maltreatment reported lower levels of social support in childhood, young adulthood, and middle adulthood compared to nonmaltreated controls. In addition, the maltreated group was more likely to report either consistently low support or fluctuating support and less likely to report consistently high social support across these three time points compared to the controls. These new findings also indicate that social support partially mediated the relationship between child maltreatment and allostatic load in middle adulthood, suggesting that the perceived lack of close and supportive relationships throughout life may represent one of the mechanisms leading to the negative health consequences in adulthood.

This study provides some empirical support for the convoy model (Kahn & Antonucci, 1980), suggesting that the lack of support in early childhood lays the groundwork for continued suboptimal relationships and therefore fewer social resources across young and middle adulthood. Over time, this lack of social support leads to more health problems in middle adulthood. Particularly for victims of child abuse and/or neglect then, these results

suggest the importance of interventions designed to help individuals to identify reliable members of their changing social convoy that can provide consistent, optimal support to mitigate the long-term impact of the maltreatment.

These new findings revealed that the role of social support differed by the sex of the person and that social support played a different role in the lives of abused and neglected men and women. Social support acts as an important mediator between childhood maltreatment and adult physical health outcomes for women. For men, other factors may play a role in this relationship. For example, in earlier work with this sample (Sperry & Widom, 2013), although child abuse and neglect predicted lower levels of social support in general, when the type of social support was examined, maltreated males and females differed in two ways. Maltreated males did not report lower levels of belonging and tangible support than control males, whereas maltreated females did. Maltreated males reported lower levels of self-esteem support, whereas maltreated females did not, compared to control males and females, respectively. These results were based on an assessment in middle adulthood, similar to the last assessment studied here. However, the current results indicate that child abuse and neglect had a negative impact on females in young adulthood in terms of partner support, whereas there was no impact on maltreated males compared to control males. Together, these two sets of findings (Sperry & Widom, 2013, and the current study) suggest that the relationship between social support and this particular type of childhood stressor may have differential impacts on males and females and may depend on the type of social support and the time period under investigation. While the current study cannot determine what leads to these lower levels of perceived social support or the point in these lives when the perceptions begin, the current findings suggest that there is some variability in levels of social support over time and that these variations may lead to different outcomes.

Surprisingly, the directionality of the relationship between social support and allostatic load was reversed—higher social support was related to *more* physical health problems—for men in this sample. This finding contradicts extant literature that has identified a link between low levels of social support and physical health problems in the face of stress (Repetti, Taylor, & Seeman, 2002; Uchino, 2009) and suggests that these relationships may be more complex than originally conceptualized. This finding for maltreated males in our sample cannot be explained by the convoy model and, thus, some consideration of other possible explanations is warranted and might be profitably explored in future research. For example, the gender social role perspective (Gove & Tudor, 1973) and work–family role system theory (Byron, 2005; Pleck, 1977) suggest that high levels of perceived social support among males may be representative of the traditional, gendered roles that they have historically played in society, wherein males encountered more work- and finance-related stressors based on their roles as providers for their families. Although this traditional role perspective may be less relevant today than in the past, this difference in the apparent protective role of social support for men and women warrants attention. Evolutionary theory suggests that males and females seek social support for very different functions (Baumeister & Sommer, 1997; Taylor et al., 2000) and might be considered as well.

Our results also identified race differences, with social support mediating the relationship between child maltreatment and allostatic load for White participants but not for Black

participants. This is perhaps not surprising, given that prior research has identified race differences in social support and physical health outcomes. For example, Black adults have reported more reliance on support from family members and church-based support than White adults (Krause, 2002), but they also report having smaller social networks and fewer social engagements (Barnes, de Leon, Wilson, Bienias, & Evans, 2004). From an epidemiological perspective, Black adults also show higher prevalence rates of physical health conditions, such as hypertension (Flack, Ferdinand, & Nasser, 2003), diabetes (Golden et al., 2012), and cardiovascular disease (Gillum, 1996), compared to White adults. These differences suggest that the health of Black adults may be more dependent on external factors (e.g., discrimination and racism), rather than internal factors, such as perceptions of one's social relationships. Future research should consider the roles of such external factors as well as race disparities in other social determinants of health, such as income, wealth, employment, and education (Marmot, 2005; Sorlie, Backlund, & Keller, 1995).

Future research should also examine the role of other individual and contextual factors more generally and how these influence perceptions of social support by different groups. For example, prior research assessing the impact of environmental stressors on physical and mental health outcomes suggests that factors such as perceived discrimination, socioeconomic status, social capital, and support provider (i.e., familial vs. nonfamilial) may moderate these relationships (Griffin, Amodeo, Clay, Fassler, & Ellis, 2006).

This research leaves two related issues unanswered: Although perceived support is important, how important is actual *received* support? And who are the most effective providers of this support? Prior research suggests that not all types of support are necessarily beneficial (Freisthler, Holmes, & Wolf, 2014), particularly if primary providers of support include perpetrators of abuse. Therefore, future research can build on the present work by examining actual receipt of specific types of support (tangible, emotional, financial, etc.) in the relationship between maltreatment and physical health outcomes, and whether this relationship differs based on who is providing the support, such as family members, friends, organizations (e.g., religious institutions or social service agencies), and the nature of these relationships.

This study has numerous strengths, including an unambiguous operationalization of child abuse and neglect; a prospective design, separate abused and neglected groups; a large sample; a comparison group matched as closely as possible on age, sex, race, and approximate social class background; and assessment of the long-term consequences of abuse and neglect beyond adolescence and into adulthood. Nonetheless, limitations should also be noted. Because these are court-documented cases of child abuse and neglect, these findings may not be generalizable to cases that are not reported to authorities or cases of abuse and neglect in middle- or upper-class families, or cases involving maltreatment during adolescence. In addition, although retrospective bias was avoided regarding child abuse/ neglect due to our reliance on official records, it is possible that participants in the control group were exposed to unreported abuse and/or neglect. The sample represents individuals who were abused or neglected between the age of 0 and 11 and grew up in the late 1960s and early 1970s in the Midwest part of the United States. Thus, caution must be used in generalizing from these findings to individuals from other generations or geographic regions

or maltreatment at different ages. On the other hand, the fact that earlier findings on the cycle of violence were replicated in diverse studies across the United States differing in geographic region, time period, youths' ages, sex of the children, definition of child maltreatment, and assessment measures supports the generalizability of the findings and increases confidence in them. Finally, although the information about perceived social support was collected across multiple time points over the waves of this study, the use of different measures at each time point, and particularly the relatively simple, dichotomous measure in childhood, prevented the use of more sophisticated analytic techniques, such as latent curve growth analysis or generalized mixture modeling to examine the trajectories of social support.

Despite these limitations, this study provides an important contribution to the field by identifying differential associations between child maltreatment, social support, and later physical health problems for males and females and Blacks and Whites. This study also has important clinical implications for practitioners working to ameliorate the negative consequences often associated with child abuse and neglect. Evaluations by health professionals or trained interventionists should include concerted efforts to assess perceived as well as actual received social support. For those with low levels of perceived social support, intervention efforts may be most effective if they focus on assisting individuals in identifying sources of support in the hopes that this will lead to strengthened perceptions of support. This may involve not only increasing skills in inviting support from others but also addressing symptoms often present as a result of exposure to traumatic experiences, such as avoidance, emotional numbing, and feelings of detachment (Evans, Steele, & DiLillo, 2013). A number of interventions have been identified as effective means of enhancing perceived and received social support (Spilsbury & Korbin, 2013; Steese et al., 2005). Examinations of the use of these programs specifically for children with histories of abuse and neglect may highlight their generalizability and offer a promising avenue for future research with this vulnerable population. Additionally, application of the health belief model (Becker, 1974; Henshaw & Freedman-Doan, 2009) to future research may also provide a relevant framework for considering alternative intervention techniques aimed at increasing perceived social support among vulnerable populations.

Acknowledgments

References

Allison PD. Missing data techniques for structural equation modeling. Journal of Abnormal Psychology. 2003; 112:545. [PubMed: 14674868]

Anda RF, Felitti VJ, Bremner JD, Walker JD, Whitfield CH, Perry BD, … Giles WH. The enduring effects of abuse and related adverse experiences in childhood. European Archives of Psychiatry and Clinical Neuroscience. 2006; 256:174–186. [PubMed: 16311898]

Antonucci, TC., Birditt, KS., Ajrouch, KJ. Convoys of social relations: Past, present and future. In: Fingerman, K.Berg, C.Antonucci, TC., Smith, J., editors. Handbook of life span development. New York, NY: Springer; 2011. p. 161-182.

Antonucci TC, Birditt KS, Sherman CW, Trinh S. Stability and change in the intergenerational family: A convoy approach. Ageing and Society. 2011; 31:1084–1106.

Barnes LL, De Leon CM, Wilson RS, Bienias JL, Evans DA. Social resources and cognitive decline in a population of older African Americans and whites. Neurology. 2004; 63:2322–2326. [PubMed: 15623694]

Baumeister RF, Sommer KL. What do men want? Gender differences and two spheres of belongingness: Comment on Cross and Madson (1997). Psychological Bulletin. 1997; 122:38–44. [PubMed: 9204778]

Becker MH. The health belief model and personal health behavior. Health Education Monogram. 1974; 2:324–508.

Bergeman CS, Neiderhiser JM, Pedersen NL, Plomin R. Genetic and environmental influences on social support in later life: A longitudinal analysis. International Journal of Aging and Human Development. 2001; 53:107–136. [PubMed: 11758722]

Bost KK, Vaughn BE, Boston AL, Kazura KL, O'Neal C. Social support networks of African-American children attending Head Start: A longitudinal investigation of structural and supportive network characteristics. Social Development. 2004; 13:393–412.

Bradley RH, Corwyn RF. Socioeconomic status and child development. Annual Review of Psychology. 2002; 53:371–399.

Bruwer B, Emsley R, Kidd M, Lochner C, Seedat S. Psychometric properties of the Multidimensional Scale of Perceived Social Support in youth. Comprehensive Psychiatry. 2008; 49:195–201. [PubMed: 18243894]

Byron K. A meta-analytic review of work–family conflict and its antecedents. Journal of Vocational Behavior. 2005; 67:169–198.

Caliso JA, Milner JS. Childhood physical abuse, childhood social support, and adult child abuse potential. Journal of Interpersonal Violence. 1994; 9:27–44.

Cohen, S., Mermelstein, R., Kamarck, T., Hoberman, HM. Measuring the functional components of social support. In: Sarason, IG., Sarason, BR., editors. Social support: Theory, research and applications. Dordrecht, the Netherlands: Martinus Nijhoff Publishers; 1985. p. 73-94.

Colman RA, Widom CS. Childhood abuse and neglect and adult intimate relationships: A prospective study. Child Abuse & Neglect. 2004; 28:1133–1151. [PubMed: 15567020]

Conroy K, Sandel M, Zuckerman B. Poverty grown up: How childhood socioeconomic status impacts adult health. Journal of Developmental & Behavioral Pediatrics. 2010; 31:154–160. [PubMed: 20145476]

Cornwell B. The dynamic properties of social support: Decay, growth, and staticity, and their effects on adolescent depression. Social Forces. 2003; 81:953–978.

Crimmins EM, Johnston M, Hayward M, Seeman T. Age differences in allostatic load: An index of physiological dys-regulation. Experimental Gerontology. 2003; 38:731–734. [PubMed: 12855278]

Dalgard OS, Dowrick C, Lehtinen V, Vazquez-Barquero JL, Casey P, Wilkinson G. … ODIN Group. Negative life events, social support and gender difference in depression. Social Psychiatry and Psychiatric Epidemiology. 2006; 41:444–451. [PubMed: 16572275]

Esposito CL, Clum GA. Social support and problem-solving as moderators of the relationship between childhood abuse and suicidality: Applications to a delinquent population. Journal of Traumatic Stress. 2002; 15:137–146. [PubMed: 12013065]

Evans SE, Steel AL, DiLillo D. Child maltreatment severity and adult trauma symptoms: Does perceived social support play a buffering role? Child Abuse & Neglect. 2013; 37:934–943. [PubMed: 23623620]

Flack JM, Ferdinand KC, Nasser SA. Epidemiology of hypertension and cardiovascular disease in African Americans. The Journal of Clinical Hypertension. 2003; 5:5–11.

Freisthler B, Holmes MR, Wolfe JP. The dark side of social support: Understanding the role of social support, drinking behaviors and alcohol outlets for child physical abuse. Child Abuse & Neglect. 2014; 38:1106–1119. [PubMed: 24726583]

Gillum RF. The epidemiology of cardiovascular disease in black Americans. The New England Journal of Medicine. 1996; 335:1597. [PubMed: 8900095]

Golden SH, Brown A, Cauley JA, Chin MH, Gary-Webb TL, Kim C, … Anton B. Health disparities in endocrine disorders: Biological, clinical, and nonclinical factors—An Endocrine Society scientific statement. The Journal of Clinical Endocrinology & Metabolism. 2012; 97:E1579–E1639. [PubMed: 22730516]

Gove WR, Tudor JF. Adult sex roles and mental illness. American Journal of Sociology. 1973; 78:812–835.

Griffin ML, Amodeo M, Clay C, Fassler I, Ellis MA. Racial differences in social support: Kin versus friends. American Journal of Orthopsychiatry. 2006; 76:374. [PubMed: 16981816]

Henshaw EJ, Freedman-Doan CR. Conceptualizing mental health care utilization using the health belief model. Clinical Psychology: Science and Practice. 2009; 16:420–439.

Hyman SM, Gold SN, Cott MA. Forms of social support that moderate PTSD in childhood sexual abuse survivors. Journal of Family Violence. 2003; 18:295–300.

Kahn RL, Antonucci TC. Convoys over the life course: Attachment, roles, and social support. Life-Span Development and Behavior. 1980; 3:253–286.

Kaul M, Lakey B. Where is the support in perceived support? The role of generic relationship satisfaction and enacted support in perceived support's relation to low distress. Journal of Social and Clinical Psychology. 2003; 22:59–78.

Knoll, N., Schwarzer, R. Gender and age differences in social support: A study on East German refugees. In: Weidner, G.Kopp, M., Kristenson, M., editors. Heart disease: Environment, stress, and gender. NATO science series, series I: Life and behavioural sciences. Vol. 327. Amsterdam: IOS Press; 2002. p. 198-210.

Krause N. Church-based social support and health in old age exploring variations by race. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 2002; 57:S332–S347.

Levitt MJ, Guacci-Franco N, Levitt JL. Convoys of social support in childhood and early adolescence: Structure and function. Developmental Psychology. 1993; 29:811–818.

Lin N, Ye X, Ensel WM. Social support and depressed mood: A structural analysis. Journal of Health and Social Behavior. 1999; 40:344–359. [PubMed: 10643160]

Marmot M. Social determinants of health inequalities. The Lancet. 2005; 365:1099–1104.

McEwen BS. Stress, adaptation, and disease: Allostasis and allostatic load. Annals of the New York Academy of Sciences. 1998; 840:33–44. [PubMed: 9629234]

McEwen BS, Stellar E. Stress and the individual: Mechanisms leading to disease. Archives of Internal Medicine. 1993; 153:2093–2101. [PubMed: 8379800]

Muthén, LK., Muthén, BO. Mplus user's guide. 7. Los Angeles, CA: Author; 1998–2012.

Paolucci EO, Genuis ML, Violato C. A meta-analysis of the published research on the effects of child sexual abuse. The Journal of Psychology. 2001; 135:17–36. [PubMed: 11235837]

Pitzer LM, Fingerman KL. Psychosocial resources and associations between childhood physical abuse and adult well-being. The Journals of Gerontology Series B: Psychological Sciences and Social Sciences. 2010; 65:425–433.

Pleck JH. The work-family role system. Social Problems. 1977; 24:417–427.

Procidano ME, Heller K. Measures of perceived social support from friends and from family: Three validation studies. American Journal of Community Psychology. 1983; 11:1–24. [PubMed: 6837532]

Renner LM, Slack KS. Intimate partner violence and child maltreatment: Understanding intra- and intergenerational connections. Child Abuse & Neglect. 2006; 30:599–617. [PubMed: 16782195]

Repetti RL, Taylor SE, Seeman TE. Risky families: Family social environments and the mental and physical health of offspring. Psychological Bulletin. 2002; 128:330–366. [PubMed: 11931522]

Rueger SY, Malecki CK, Demaray MK. Relationship between multiple sources of perceived social support and psychological and academic adjustment in early adolescence: Comparisons across gender. Journal of Youth and Adolescence. 2010; 39:47–61. [PubMed: 20091216]

Runtz MG, Schallow JR. Social support and coping strategies as mediators of adult adjustment following childhood maltreatment. Child Abuse & Neglect. 1997; 21:211–226. [PubMed: 9056101]

Sarason IG, Sarason BR, Shearin EN. Social support as an individual difference variable: Its stability, origins, and relational aspects. Journal of Personality and Social psychology. 1986; 50:845.

Schulz AJ, Mentz G, Lachance L, Johnson J, Gaines C, Israel BA. Associations between socioeconomic status and allostatic load: Effects of neighborhood poverty and tests of mediating pathways. American Journal of Public Health. 2012; 102:1706–1714. [PubMed: 22873478]

Shadish, WR., Cook, TD., Campbell, DT. Experimental and quasi-experimental designs for generalized causal inference. Boston, MA: Houghton-Mifflin; 2002.

Silverstein M, Waite LJ. Are Blacks more likely than Whites to receive and provide social support in middle and old age? Yes, no, and maybe so. Journal of Gerontology. 1993; 48:S212–S222. [PubMed: 8315245]

Sorlie PD, Backlund E, Keller JB. US mortality by economic, demographic, and social characteristics: The National Longitudinal Mortality Study. American Journal of Public Health. 1995; 85:949–956. [PubMed: 7604919]

Sperry DM, Widom CS. Child abuse and neglect, social support, and psychopathology in adulthood: A prospective investigation. Child Abuse & Neglect. 2013; 37:415–425. [PubMed: 23562083]

Spilsbury JC, Korbin JE. Social networks and informal social support in protecting children from abuse and neglect. Child abuse & neglect. 2013; 37:8–16. [PubMed: 24268713]

Springer KW, Sheridan J, Kuo D, Carnes M. Long-term physical and mental health consequences of childhood physical abuse: Results from a large population-based sample of men and women. Child Abuse & Neglect. 2007; 31:517–530. [PubMed: 17532465]

Steese S, Dollette M, Phillips W, Hossfeld E, Matthews G, Taormina G. Understanding girls' circle as an intervention on perceived social support, body image, self-efficacy, locus of control, and self-esteem. Adolescence. 2005; 41:55–74.

Taylor, SE. Social support: A review. In: Friedman, HS., editor. The handbook of health psychology. New York, NY: Oxford University Press; 2011. p. 189-214.

Taylor SE, Klein LC, Lewis BP, Gruenewald TL, Gurung RA, Updegraff JA. Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. Psychological Review. 2000; 107:411. [PubMed: 10941275]

Taylor SE, Way BM, Seeman TE. Early adversity and adult health outcomes. Development and Psychopathology. 2011; 23:939–954. [PubMed: 21756443]

Thoits PA. Stress and health: Major findings and policy implications. Journal of Health and Social Behavior. 2010; 51:S41–S53. [PubMed: 20943582]

Uchino BN. Understanding the links between social support and physical health: A life-span perspective with emphasis on the separability of perceived and received support. Perspectives on Psychological Science. 2009; 4:236–255. [PubMed: 26158961]

Uchino BN, Garvey TS. The availability of social support reduces cardiovascular reactivity to acute psychological stress. Journal of Behavioral Medicine. 1997; 20:15–27. [PubMed: 9058176]

Voils CI, Allaire JC, Olsen MK, Steffens DC, Hoyle RH, Bosworth HB. Five-year trajectories of social networks and social support in older adults with major depression. International Psychogeriatrics. 2007; 19:1110–1124. [PubMed: 17433120]

Widom CS. Child abuse, neglect and adult behavior: Research design and findings on criminality, violence, and child abuse. American Journal of Orthopsychiatry. 1989; 59:355–367. [PubMed: 2764070]

Widom CS, Czaja S, Bentley T, Johnson MS. A prospective investigation of physical health outcomes in abused and neglected children: New findings from a 30-year follow-up. American Journal of Public Health. 2012; 102:1135–1144. [PubMed: 22515854]
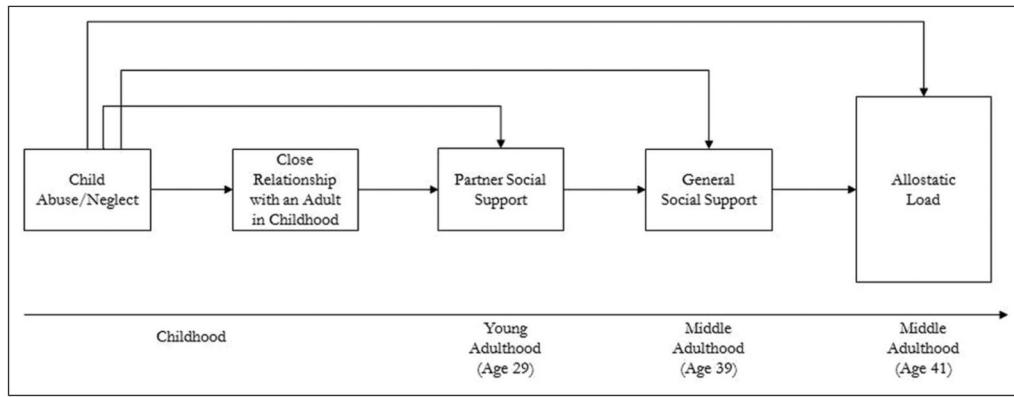
Figure 1.
Theoretical path model of the hypothesized mediating role of social support in the relationship between child abuse and neglect and allostatic load in middle adulthood.
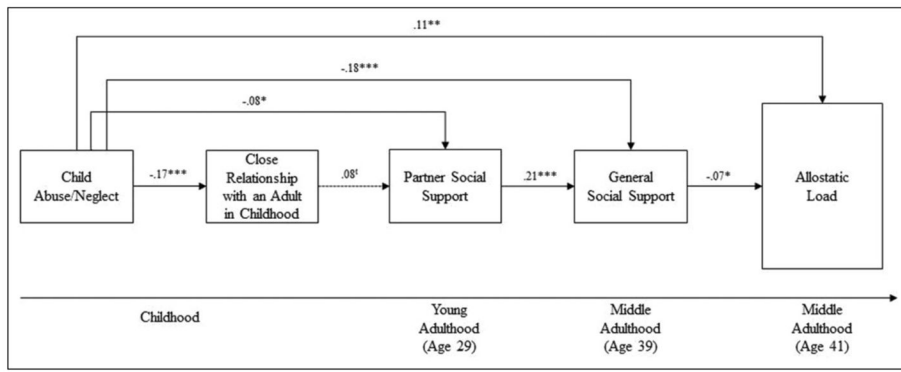
Figure 2.
Results of the path model examining the mediating role of social support in the relationship between child abuse and neglect and allostatic load in middle adulthood for the total sample. $^{\dagger}p < .10.$ $*p < .05.$ $**p < .01.$ $***p < .001.$

Table 1

Differences by Group (Abuse/Neglect *vs.* Control) and Demographic Characteristics in Patterns of Social Support Across the Life Span.

	n	Pattern of Social Support in Childhood, Young Adulthood, and Middle Adulthood					
		Consistently High	Consistently Low	Increasing Over Time	Decreasing Over Time	Inconsistent Over Time	
		(%)	(%)	(%)	(%)	(%)	w²
Total sample	620	46.5	2.4	16.1	16.3	18.7	—
Abused/neglected	327	37.9	2.8	18.3	19.3	21.7	20.37***
Control	293	56.0	2.0	13.7	13.0	15.4	
Sex							
Male	281	51.6	1.1	16.7	13.9	16.7	9.84*
Female	339	42.2	3.5	15.6	18.3	20.4	
Race							
White	419	47.3	3.1	18.6	13.4	17.7	15.18**
Black	201	44.8	1.0	10.9	22.4	20.9	
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	F
Age		29.24 (3.63)	29.95 (3.39)	29.51 (4.15)	29.74 (3.92)	29.32 (3.79)	0.45
SES		0.01 (0.48)	−0.18 (0.37)	−0.24 (0.55)	−0.03 (0.43)	−0.07 (0.45)	1.06

Note. M = mean; *SD* = standard deviation; SES = socioeconomic status.

*
  p < .05.

**
  p < .01.

***
  p < .001.

Table 2

Path Coefficients and Model Fit for All Path Models.

Path	Total b	Type of Abuse/Neglect: Physical Abuse b	Sexual Abuse b	Neglect b	Gender: Male b	Female b	Race: White b	Black b
CAN → close adult (childhood)	−.17***	−.21***	−.10†	−.16***	−.20**	−.14*	−.13**	−.24**
CAN → partner SS (age 29)	−.08*	.03	−.14**	−.08*	ns	−.14**	−.09*	ns
CAN → ISEL (age 39)	−.18***	−.21***	−.20***	−.18***	−.17***	−.19***	−.14**	−.24***
CAN → allostatic load (age 41)	.11**	.11*	.10*	.12**	ns	.14**	.16***	ns
Close adult (childhood) → partner SS (age 29)	.08†	.04	.05	.11*	ns	.16*	ns	ns
Partner SS (age 29) → ISEL (age 39)	.21***	.25***	.19***	.23***	.21***	.22***	.23***	.14**
ISEL (age 39) → allostatic load (age 41)	−.07*	−.06	−.07	−.07*	.10*	−.19***	−.11**	ns
Model Fit	Total	Physical Abuse	Sexual Abuse	Neglect	Male	Female	White	Black
w²(df = 3)	15.032	8.286	11.613	9.008	5.664	13.662	8.071	7.014
RMSEA	0.058	0.053	0.068	0.043	0.038	0.078	0.048	0.054
CFI	0.932	0.950	0.912	0.964	0.960	0.892	0.953	0.913
WRMR	0.702	0.516	0.662	0.539	0.476	0.704	0.544	0.529
R^2	.069	.049	.053	.067	.026	.078	.114	.055
Standardized indirect effect	.014*	.012	.015	.015*	−.017†	.044*	.018*	.004

Note. CAN = child abuse and neglect; SS = social support; ISEL = Interpersonal Support Evaluation List; RMSEA = root mean square error of approximation; CFI = comparative fit index; WRMR = weighted root mean square residual.

†
$p < .10$.

*
$p < .05$.

**
$p < .01$.

***
$p < .001$.