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Lifetime Trauma, Personality Traits, and Health: A Pathway to Midlife Health Status

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Objective: This study investigated whether lifetime experience of trauma is related to personality through instrumental and reactive trait processes, and whether lifetime trauma is a mechanism underlying the association between childhood conscientiousness and objectively assessed adult physical health. ***Method:*** Participants ($N = 831$) were 442 women and 389 men from the Hawaii longitudinal study of personality and health. Teacher assessments of personality were obtained when the participants were in elementary school. Self-reported adult personality assessments, lifetime histories of trauma experience, and objectively assessed physiological dysregulation were obtained between ages 45–55. ***Results:*** Women tended to report more high-betrayal trauma than men, whereas men reported more low-betrayal trauma than women. Women who were judged by their teachers to be less agreeable and less conscientious in childhood reported more lifetime trauma, suggesting instrumental trait processes. For both genders, neuroticism and openness/intellect/imagination in adulthood, but not in childhood, were associated with lifetime trauma, suggesting reactive trait processes. For both genders, trauma experience was correlated with dysregulation and with Body Mass Index (BMI). The indirect paths from childhood conscientiousness to adult dysregulation and BMI through total teen and adult trauma were significant for women, but not for men (indirect effect for women's dysregulation = −.025, $p = .040$, 95% confidence interval [CI] = −.048, −.001; indirect effect for women's BMI = −.037, $p = .009$, 95% CI = −.067, −.008). ***Conclusion:*** Teen and adult trauma experience appears to be a hitherto unidentified mechanism in women underlying the association between conscientiousness and health.

Keywords: trauma experience, childhood conscientiousness, personality-health mechanisms

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The associations among trauma experience, personality traits, and health from childhood to adulthood have not been extensively studied. Separate lines of research have established that trauma exposure has long-term negative consequences for physical as well as mental health (Felitti et al., 1998; Freyd, Klest, & Allard, 2005), and that childhood personality, specifically conscientiousness, predicts adult physical health (Hampson, Edmonds, Goldberg, Dubanoski, & Hillier, 2013). Lifetime experience of trauma may be implicated in mechanisms that account for the association between childhood personality and health outcomes. In addition, personality traits may increase the likelihood of trauma exposure, and the experience of trauma may affect personality development. The present study investigated child and adult personality in relation to lifetime trauma and health in a childhood sample followed-up four decades later in midlife.

There is now a wide consensus among personality researchers that the five-factor or Big Five approach to personality provides a comprehensive framework for describing and measuring personality traits in both children and adults (Digman, 1990; Goldberg, 1993; John, Naumann, & Soto, 2008; McCrae & Costa, 2008; Ozer & Benet-Martínez, 2006). Personality is measured on five empirically established trait dimensions, which indicate the extent to which a person is extraverted (e.g., sociable, energetic), agreeable (e.g., kind, cooperative), conscientious (e.g., planful, hardworking), neurotic (e.g., anxious, unstable), and open/intellectual/imaginative (e.g., creative, intelligent). Numerous studies have demonstrated associations between the Big Five traits in adulthood, particularly conscientiousness, and physical health and longevity (Bogg & Roberts, 2013; Jokela et al., 2013; Kern & Friedman, 2008). In addition, associations have been found between traits of childhood conscientiousness and biomarkers of adult health as-

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sessed decades later (Hampson et al., 2013), including longevity (Friedman et al., 1995).

Childhood trauma is associated with various adult morbidities including diabetes, cancer, heart disease, and obesity (e.g., Felitti et al., 1998; Kendall-Tackett & Marshall, 1999; Romans et al., 2002; Williamson et al., 2002). Studies have also related childhood traumas to cardiovascular and metabolic risk factors in adulthood (Danese, Pariante, Caspi, Taylor, & Poulton, 2007; van Reedt Dortland, Giltay, van Veen, Zitman, & Penninx, 2012). In a U.S. study, women who reported childhood abuse had approximately double the risk of developing metabolic syndrome over a 7-year period in midlife (Midei, Matthews, Chang, & Bromberger, 2013). In this latter study, physical abuse but not emotional or sexual abuse was associated with the metabolic syndrome, suggesting that not all forms of trauma have equivalent effects on health. In the present study, we used a theoretical framework that distinguishes between different kinds of traumas.

According to betrayal-trauma theory (Freyd, 1996), traumatic events that involve a betrayal of trust, which is most extreme when the perpetrator of the trauma is a caregiver, have more adverse consequences than ones that do not. In such relationships, the victim is dependent on the perpetrator, which limits how they can respond to the event. High-betrayal traumas, such as physical abuse by a close family member, should have more impact on physical and psychological outcomes than ones low in betrayal, such as being in an earthquake. In support of the theory, some studies have found associations between high- but not low-betrayal trauma and physical and mental health outcomes (Edwards, Freyd, Dube, Anda, & Felitti, 2012; Goldsmith, Freyd, & DePrince, 2012). However, these studies have relied on self-reports of physical symptoms, functional status, or mental health. Betrayal-trauma theory has yet to be tested using objective measures of physical health.

Personality, Trauma, and Health Mechanisms

Personality could be associated with trauma as a result of instrumental or reactive processes (Hampson, 2012). Instrumental processes refer to the tendency for thoughts feelings or behaviors to increase the likelihood that a person will find themselves in particular environments or situations. In contrast, reactive processes refer to the tendency to perceive situations in a particular way. Traits may be instrumental in trauma experience by increasing the risk of trauma victimization. Through instrumental processes, the victim's traits and related behaviors may elicit trauma, or place the victim in environments more conducive to traumatic events. For example, teacher ratings of aggressive/disruptive behavior in first grade, indicative of low agreeableness and low emotional stability, predicted the likelihood of experiencing assaultive violence by young adulthood (Storr, Ialongo, Anthony, & Breslau, 2007). By contrast, those with the highest scores on a test of reading ability—a possible correlate of conscientiousness—had a lower risk of exposure to assaultive violence than their peers. Of note, there is evidence suggesting that parental depression and antisocial behavior—associated with parental neuroticism and low agreeableness—constitute heritable risk factors for exposure to traumatic events (e.g., Koenen et al., 2002). Thus, although it is unclear to what extent these traits are inherent versus an interaction with problematic family environment, childhood personality does appear to impact exposure to traumatic events into adolescence and beyond.

Through reactive trait processes, children and adults with certain traits (e.g., those who are more neurotic) may respond more strongly to the experience of trauma (Borja, Callahan, & Rambo, 2009), which may influence subsequent personality development (i.e., they may become more neurotic). This in turn could increase neurotic instrumental processes leading to greater risk of subsequent trauma (Breslau, Davis, & Andreski, 1995). Research examining retrospective reports of trauma in childhood and measures of adult personality has found that individuals reporting a history of trauma report significantly higher levels of neuroticism and openness to experience (Allen & Lauterbach, 2007). Maltreatment in children is associated with poor emotion regulation, a construct similar to neuroticism (Kim & Cicchetti, 2010). Together, these studies suggest that experiencing trauma impacts personality, most notably neuroticism, but studies with measures of personality before and after trauma exposure are needed.

Trauma may impact health through a variety of mechanisms. Trauma may have a direct impact on regulation of the stress response system, and dysregulation of this system has been linked with a variety of markers of health such as immune response and inflammation (Fagundes, Glaser, & Kiecolt-Glaser, 2013; Schrepf, Markon, & Lutgendorf, 2014). Trauma is also linked to mental health problems, lower educational attainment, and poverty (Hatch & Dohrenwend, 2007), all of which may lead to poorer access to and utilization of appropriate preventative health care (Kirby & Kaneda, 2005; Levinson Miller, Druss, Dombrowski, & Rosenheck, 2003). Trauma exposure in childhood has been linked to poor health behaviors, such as engaging in alcohol abuse, or disordered eating (Davis, Combs-Lane, & Smith, 2004). Thus there is not one single clear path leading from childhood trauma to adult poor health, but rather many possible paths converging on the same outcome.

The Present Study

The Hawaii Longitudinal Study of Personality and Health (Hampson et al., 2001) includes child and adult personality assessments, and life-histories of traumatic events. Previously, Klest, Freyd, Hampson, and Dubanoski, (2013) demonstrated an association between trauma and self-rated physical health for participants in the Hawaii cohort. Edmonds, Hampson, Côté, Hill, and Klest (2015) reported on the relations among childhood trauma, childhood conscientiousness, and leukocyte telomere length (a potential marker of cellular aging), in the Hawaii cohort. The current study differs from these previous investigations by examining hypotheses concerning associations between child and adult personality and trauma experience, and between trauma and objective physical-health outcomes. To investigate instrumental processes, it was hypothesized that children viewed by their teachers as less agreeable (e.g., more hostile), less conscientious (e.g., less self-controlled), and more neurotic would be more at risk for interpersonal trauma. To investigate reactive processes, the associations between childhood and adult personality traits and lifetime trauma were compared. If the adult trait was significantly associated with lifetime trauma but the same childhood trait was not, this observation may indicate reactive processes: the experience of lifetime trauma may have been one factor that led to change on that

trait. Those who had experienced more trauma, and possibly more high-betrayal trauma, were hypothesized to have worse physical health as adults. The experience of trauma across the life span was predicted to explain some of the previously reported effects of childhood conscientiousness on adult health for the Hawaii cohort (Hampson et al., 2013). In that study, childhood conscientiousness was the only Big Five trait to be related to adult health; therefore, only childhood conscientiousness in relation to lifetime trauma and adult health was examined here. It was hypothesized that instrumental process involving (low) conscientiousness would place the victim at greater risk for trauma, which would in turn result in poorer health. Previous research suggests that women tend to experience more traumatic events of an interpersonal nature, and more high-betrayal trauma, than men (Edwards et al., 2012; Goldberg & Freyd, 2006). It was hypothesized that women would tend to experience more high-betrayal trauma than men, with adverse consequences for their subsequent physical health.

Method

Participants

The sample comprised members of the Hawaii cohort participating in the Hawaii longitudinal study of personality and health. In the 1960s, over 2,000 children in elementary school on the Hawaiian islands of Oahu and Kauai were comprehensively assessed on their personality characteristics by their teachers. Since 1998, 1,942 (84%) of 2,321 members of this cohort have been located (Hampson et al., 2001). Of the 1,904 located and available for recruitment, 1,396 (73%) agreed to participate in further studies. For the present report, the sample ($N = 831$) comprised 442 women and 389 men who provided responses on the Brief Betrayal Trauma Survey, which assesses the experience of traumatic events varying in the degree to which they involve a betrayal of trust between the perpetrator and the victim (BBTS; Goldberg & Freyd, 2006). A subset of the sample ($n = 556$) also attended the clinical examination. The mean age for both women and men at the time of their clinical examination was 51 years.

This subsample included a higher proportion of women (53%) than the entire adult sample (41%), but was more comparable with the original child cohort (47% girls). Compared with the entire adult sample, the subsample included similar proportions of Whites (20% vs. 18%), somewhat fewer Native Hawaiians and part Hawaiians (18% vs. 28%), somewhat more Japanese Americans (35% vs. 28%), and comparable proportions of other ethnicities (27% vs. 26%). As children, this subsample was viewed by teachers as somewhat more conscientious (measured in standard scores) than the entire adult sample ($M = .12$, $SD = .98$ vs. $M = -.03$, $SD = 1.02$, $t = 2.84$, $df = 1380$, $p = .005$, confidence interval [CI] = .262, .048). They had somewhat higher levels of educational attainment than the entire adult sample ($M = 6.97$, $SD = 1.77$ vs. $M = 6.36$, $SD = 2.02$ on a nine-point scale, $t = 5.67$, $df = 1300$, $p = .000$, CI = .262, .048).

Measures

Teacher assessments of personality for this subsample were obtained in 1965 or 1967 when participants were in Grades 1, 2, 5, or 6 (M age = 10.23, $SD = 2.11$, range = 6–14 years). The adult clinical examinations were conducted between 2003 and 2011. The questionnaire containing the trauma and adult personality measures was administered in 2008.

Child personality traits. Using a fixed nine-step quasi-normal distribution, teachers rank-ordered all the children in their classroom on each of a comprehensive set of personality attributes. The number of attributes differed slightly between Oahu and Kauai schools and ranged from 43–49, with a common core of 39 items. Definitions of each attribute, developed by focus groups of teachers, were provided (e.g., "Persevering: Keeps at his/her work until it is completed; sees a job through despite difficulties, painstaking and thorough"). The Big Five personality traits were recovered in analyses of the original childhood cohort (Goldberg, 2001), and orthogonal factor scores for each of the Big Five (extraversion, agreeableness, conscientiousness, neuroticism, and openness/intellect/imagination) were derived for each participant (see the Supplementary Materials for further details) with α reliabilities ranging from .60–.75 (Edmonds, Goldberg, Hampson, & Barckley, 2013).

Adult personality traits. Participants completed a 120-item self-report personality questionnaire to assess the broad Big Five and their more narrow facets (http://www.ipip.org). The coefficient α reliabilities reported on the website for the IPIP Big Five scales (120-item inventory) range from .77–.86, and the mean coefficient α for the facet scales is .80.

Trauma. In the same questionnaire, participants also completed the BBTS. For each of 14 traumatic events, participants indicated whether they had experienced it before age 12, between ages 12 and 17, and at age 18 and older. There were 5 high-betrayal events (i.e., events, including sexual abuse and physical attack, perpetrated by someone very close), and 7 low-betrayal events (the same five events perpetrated by someone not close, plus natural disasters and accidents). In addition, one item asked about the death(s) of the participants' own children (asked for teen and adult periods only), and one item asked about any other seriously traumatic event to be specified by the participant (for each of the three time periods). Response options for all 41 items were "Yes," "No," "Don't know/can't remember," and "Prefer not to respond." The following trauma scales were derived by summing "Yes" responses to the relevant items. There were three scales for each of the three age ranges: (a) high betrayal, (b) low betrayal, and (c) total trauma (high + low + other for child; high + low + death of child + other for teen and adult). Summing across age ranges created three further scales: total high betrayal, total low betrayal, and overall total trauma (all 41 items).

Adult physical health. The examinations were conducted at the Kaiser Permanente Center for Health Research Hawaii. The biomarkers used in the present analyses were systolic and diastolic blood pressure (mean of two measurements), HDL cholesterol (reversed), total cholesterol/HDL, triglycerides, fasting blood glucose, Body Mass Index (BMI; kg/m^2), waist/hip ratio, urine protein, and whether or not the participant was taking medications for cholesterol or blood pressure. Physiological dysregulation was measured by standardizing each measure within gender and summing these standard scores across the measures. Higher scores indicated greater dysregulation (Hampson, Goldberg, Vogt, Hillier, & Dubanoski, 2009). Combining small effects across several biomarkers may yield effects that would not be observed with any one biomarker alone.

Results

Trauma Reporting

Given the nature of the BBTS items, some missing data and use of the options "Prefer not to respond" and "Don't know/can't remember" was to be expected, but their actual frequency of use was relatively low. The majority of participants (76%) had no missing data; 20% had between 1 and 4 missing responses. "Prefer not to respond" was only used by 6% of participants, and "Don't know/can't remember" by 10%.

Table 1 in the Supplementary Materials shows the mean levels for each of the 12 trauma scales by gender. The level of reporting for the various kinds of trauma was low. At each age category, the means suggested that women experienced more high-betrayal trauma than men, and men experienced more low-betrayal trauma than women. These differences were significant for traumas in adulthood, and the totals for overall high- and low-betrayal trauma.

Trauma Reporting and Adult Personality

The correlations between the trauma scale and the adult Big Five traits are provided in Table 2 in the Supplementary Materials. The two adult traits most consistently related to trauma reporting were neuroticism and openness. For women, all but one of the trauma scales were significantly positively correlated with adult neuroticism, and all of the 12 trauma scales correlated with adult openness. For men, all the trauma scales were significantly positively correlated with adult neuroticism and seven trauma scales correlated positively with adult openness.

Neuroticism, the tendency to experience negative affect, is associated with greater recall of negative autobiographical memories (Denkova, Dolcos, & Dolcos, 2012), suggesting that those with higher levels of neuroticism may be biased to recall more lifetime trauma than more emotionally stable people. The observed correlations for men and women indicated that neuroticism in adulthood could have biased the retrospective reporting of trauma. Alternatively, higher levels of lifetime trauma could have led to higher levels of adult neuroticism. To address the potential for overreporting without controlling for all the effects of neuroticism, the trauma scales were residualized with respect to the vulnerability facet of neuroticism (i.e., the effect of vulnerability was removed from each trauma scale by regressing the trauma scale on vulnerability and using the residual). This facet was consistently more highly correlated with the trauma scales for both men and women than the other neuroticism facets, and its items have face validity as a potential source of biased reporting (e.g., "Become overwhelmed by emotions"). These residualized trauma scales were used in all subsequent analyses reported here.

Trauma Reporting and Child Personality

The correlations between childhood personality and the residualized trauma scales are shown in Table 1, separately for women and men. For women, those who were perceived by their teachers as less agreeable in childhood reported more trauma on 11 of the 12 trauma scales, and those who were perceived as less conscientious in childhood reported more trauma on 10 of the 12 trauma scales. In contrast, there were only a few significant correlations for men, predominantly with traumas experienced in childhood. Men who were viewed as less agreeable in childhood reported more trauma on the three child trauma scales, and on the total betrayal trauma scale. Men who were viewed as more neurotic in childhood reported more trauma on two of the child trauma scales, and those who were viewed as less conscientious in childhood reported more total trauma as adults.

Trauma as a Mechanism for the Influence of Child Conscientiousness on Adult Health

The correlations between the 12 residualized trauma scales and two indicators of adult health (dysregulation and BMI, both assessed at the clinical examination) are also shown in Table 1. For both men and women, nearly all the trauma scales were correlated

Table 1
Correlations Between Residualized Trauma Scales and Child Personality Traits, and Measures of Adult Health, for Women and Men

	Child personality and adult health													
	Women							Men						
Trauma scale	E	A	C	N	O	Dysreg	BMI	E	A	C	N	O	Dysreg	BMI
Child high betrayal	−.02	−.16**	−.14**	−.06	.05	.17**	.20**	−.06	−.11*	−.07	.09	.05	.11	.06
Child low betrayal	−.02	−.04	−.06	−.06	.09	.12*	.17**	−.04	−.11*	−.07	.12*	.08	.15*	.10
Child total	−.00	−.12*	−.13**	−.07	.08	.16**	.21**	−.06	−.12*	−.09	.13*	.08	.15*	.08
Teen high betrayal	−.04	−.22**	−.12*	−.00	.05	.14*	.22**	−.00	−.08	−.05	.06	−.01	.12	.16**
Teen low betrayal	.02	−.15**	−.07	−.07	.07	.18**	.22**	.01	−.05	−.04	.05	.06	.14*	.21**
Teen total	.00	−.19**	−.11*	−.04	.07	.17**	.26**	.01	−.07	−.05	.06	.03	.14*	.20**
Adult high betrayal	.04	−.10*	−.14**	−.00	.10*	.09	.16**	−.07	−.10	−.08	.03	.01	.17**	.23**
Adult low betrayal	.08	−.15**	−.17**	−.01	.09	.14*	.18**	−.02	−.00	−.07	.03	.02	.11	.21**
Adult total	.08	−.14**	−.17**	−.00	.11*	.14*	.19**	−.03	−.04	−.11*	.03	.04	.14*	.22**
Total high betrayal	−.00	−.19**	−.16**	−.02	.08	.16**	.24**	−.05	−.11*	−.08	.07	.02	.15*	.18**
Total low betrayal	.04	−.14**	−.13**	−.04	.10*	.18**	.24**	−.02	−.06	−.07	.07	.06	.15*	.21**
Total trauma	.03	−.18**	−.16**	−.04	.11*	.18**	.26**	−.02	−.08	−.09	.08	.05	.16	.19**

Note. E = child extraversion; A = child agreeableness; C = child conscientiousness; N = child neuroticism; O = child openness/intellect/imagination; Dysreg = physiological dysregulation (systolic and diastolic blood pressure, HDL cholesterol, total cholesterol/HDL, triglycerides, fasting blood glucose, BMI, waist/hip ratio, urine protein, and medication for cholesterol or blood pressure); BMI = Body Mass Index (kg/m^2).
* $p < .05$. ** $p < .01$.

with both dysregulation and BMI, and the correlations tended to be larger with BMI.

To test whether trauma experience served as a mechanism to explain the association between child conscientiousness and adult health, teen and adult trauma were summed. The assessment of child personality at mean age 10 occurred during the child trauma-assessment period (defined as "before age 12"). Excluding child trauma from this sum preserved the temporal ordering of child conscientiousness, later trauma experience, and adult health.

Four path models were tested, two for women and two for men. For each gender, one model predicted dysregulation and the other predicted BMI. All models included the following direct paths: child conscientiousness to trauma, childhood conscientiousness to health (dysregulation or BMI), and trauma to health (dysregulation or BMI), and the indirect path from childhood conscientiousness to health (dysregulation or BMI) through trauma (see Figure 1). These models were tested using Mplus Version 7.0 (Muthén & Muthén, 1998–2012) with maximum likelihood estimation for missing data. The significance of the indirect path was tested using the bootstrapping method within Mplus. In bootstrapping, the indirect effect is estimated thousands of times based on resampling with replacement to generate a sampling distribution from which a CI and p value can be determined (Bollen & Stine, 1990). An advantage of this method is that it provides a nonparametric test of the indirect effect, retaining statistical power in instances where the sampling distribution of the indirect effect is nonnormal. The results for these models are shown in Table 2. For both women and men, the paths from trauma to dysregulation and BMI were significant. No other direct or indirect paths were significant for men. For women, the indirect paths from childhood conscientiousness to both dysregulation and BMI were significant. When BMI was removed from the biomarkers comprising the measure of dysregulation, the indirect path to this modified version of dysregulation was no longer significant for women (indirect effect = −.018, p = .104, CI = −.041, .004).

Table 2
Direct and Indirect Standardized Effects for Paths From Childhood Conscientiousness to Adult Health Outcomes Through Trauma

	Effect	p	95% CI
Women			
C → Trauma → Dysreg	−.025	.040	[−.048, −.001]
C → Trauma	−.156	.001	[−.248, −.065]
C → Dysreg	−.098	.100	[−.214, .019]
Trauma → Dysreg	.158	.009	[.039, .276]
Men			
C → Trauma → Dysreg	−.012	.174	[−.030, .005]
C → Trauma	−.085	.094	[−.184, .014]
C → Dysreg	−.092	.125	[−.209, .026]
Trauma → Dysreg	.145	.015	[.029, .262]
Women			
C → Trauma → BMI	−.037	.009	[−.067, −.008]
C → Trauma	−.156	.001	[−.248, −.065]
C → BMI	−.096	.090	[−.208, .015]
Trauma → BMI	.239	.000	[.128, .351]
Men			
C → Trauma → BMI	−.018	.140	[−.043, .006]
C → Trauma	−.085	.094	[−.184, .014]
C → BMI	−.073	.213	[−.187, .042]
Trauma → BMI	.216	.000	[.104, .329]

Note. C = childhood conscientiousness; Dysreg = physiological dysregulation (systolic and diastolic blood pressure, HDL cholesterol, total cholesterol/HDL, triglycerides, fasting blood glucose, BMI, waist/hip ratio, urine protein, and medication for cholesterol or blood pressure); BMI = Body Mass Index (kg/m^2); Trauma = total teen and adult trauma; CI = confidence interval.

Discussion

The associations between childhood personality and the trauma scales indicated that girls seen by their teachers as less agreeable and less conscientious were more likely to report trauma across the three age periods. These associations are consistent with our hypothesis that certain childhood traits are instrumental in increasing the probability of trauma experience. Less agreeable (i.e., more hostile) girls may be more vulnerable to trauma as a consequence of their interpersonal behavior, and less conscientious (i.e., more impulsive) girls may gravitate to situations that place them at increased risk of trauma. Hostility and impulsivity may be more acceptable in boys than girls, so these traits may not have instrumental effects on boys' trauma experience. External factors, including gender roles and ethnic stereotypes, may result in men being exposed to life-threatening trauma such as community violence, regardless of their personality traits (Hatch & Dohrenwend, 2007). Further research on gender differences would provide more insight into which kinds of trauma are associated with or independent of childhood traits for men and women across the life span.

Evidence for reactive processes was observed for two adult traits. Self-reported neuroticism in adulthood was strongly associated with reports of lifetime trauma, whereas teachers' evaluations of children's neuroticism were not, suggesting that childhood neuroticism is not instrumental in leading to trauma but that adult neuroticism may indicate reactive processes to trauma experience as well as bias in trauma reporting. For both men and women, but particularly for women, the substantial associations between adult levels of openness/intellect/imagination and lifetime trauma con-

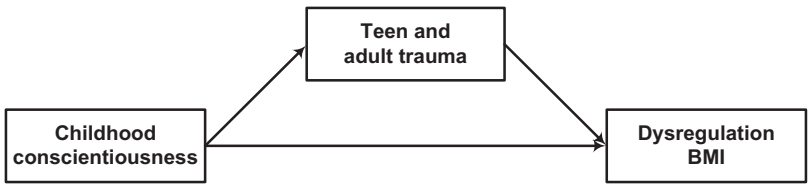

Figure 1. Path model from childhood conscientiousness to adult physical health outcomes (dysregulation or Body Mass Index [BMI]) showing the direct path, and the indirect path through teen and adult trauma.

trasted with the absence of such associations in childhood. Previous research has associated childhood trauma with increased adult openness (Allen & Lauterbach, 2007). Adult openness includes two facets, imagination and emotionality, that are associated with fantasy and strong emotional experience, suggesting that lifetime trauma may be associated with increases on these facets. The tendency to fantasize may be a coping process in response to repeated trauma. Consistent with this view, exposure to trauma has been associated with disassociation (Briere, 2006; Putnam, 1985), which is a way to retreat from reality through fantasy, as well as with coping strategies that employ disengagement such as wishful thinking (Leitenberg, Gibson, & Novy, 2004).

The path models for women, but not for men, supported the hypothesis that lower levels of childhood conscientiousness may lead to more experience of trauma for women in their teens and adulthood, resulting in poorer health outcomes. An alternative account is that childhood conscientiousness was associated with childhood trauma, and childhood trauma led to greater exposure to teen and adult trauma, which led to poor health. However, conscientiousness may contribute independently to the association between childhood trauma exposure and later trauma exposure. These associations are likely complex and multidirectional, and should be a continued avenue of research exploration.

When BMI was removed from the summary measure of dysregulation, the indirect path from women's childhood conscientiousness to dysregulation was no longer significant, indicating that BMI may have been driving the associations with dysregulation. Obesity is likely to have a negative impact on the other components of dysregulation over time. As the Hawaii cohort ages, the indirect path from childhood conscientiousness to these metabolic and cardiovascular biomarkers may become larger as obesity takes its toll more generally on health.

Obesity is, in part, the result of unhealthful eating habits and low levels of physical activity. Both men and women who have experienced childhood adversity are more likely to engage in these and other health-damaging behaviors across the life span (Anda et al., 2006; Strine et al., 2012). Recently, Solis et al. (2015) demonstrated that childhood adverse experiences influenced adult allostatic load (a combination of biomarkers similar to physiological dysregulation) through different health-risk behaviors for men and women: BMI was a mediator for women but not for men. Further research to investigate whether men and women differ in their health behaviors related to trauma would be valuable. Previously, for the Hawaii sample, we reported that a history of lifetime health-damaging behaviors (a combination of BMI, smoking, and physical activity) accounted for some of the association between childhood conscientiousness and a measure of adult dysregulation that excluded BMI, for both men and women (Hampson, Edmonds, Goldberg, Dubanoski, & Hillier, 2015). The present findings suggest that future research should examine whether the associations between low childhood conscientiousness and later health-damaging behaviors are more likely to be mediated by trauma experience for women than for men. Whereas women may use health damaging behaviors as a way to cope with the effects of trauma, men may engage in health damaging behaviors because of educational and cognitive limitations. In both cases, these mediators may be partially explained by child levels of conscientiousness. Consistent with this suggestion, we have prior evidence from the Hawaii cohort that for men, but not women, the effects of conscientiousness on health behaviors were mediated by cognitive ability (Hampson et al., 2015).

One limitation of this study was the low frequency of traumatic events, so it was not possible to compare the health consequences of high- versus low-betrayal trauma. Other limitations suggest directions for future research. The path model did not include other factors known to influence health, such as health behaviors or educational attainment, which are also related to childhood conscientiousness. Evaluating the relative contributions of different life span mechanisms is an important direction for future research in personality, trauma, and health. This study did not determine whether trauma experienced during different age periods has different consequences for health. The measurement of betrayal trauma could be improved by obtaining specific information about when a trauma occurred and how often, and the subjective experience of the trauma. To preserve the temporal order of variables consistent with a life span mechanism linking childhood personality to health outcomes, childhood trauma was excluded from the path models. However, stress resulting from childhood trauma is likely to adversely influence brain development at this vulnerable age with potential long term consequences for personality as well as physical and mental health (Anda et al., 2006; De Bellis, 2001; Miller, Chen, & Parker, 2011).

In conclusion, this study adds to previous work on trauma by demonstrating its association with objectively measured health status, and child and adult personality traits, in an older and diverse community sample. The findings suggest that personality traits may be related to trauma experience through both instrumental and reactive processes, and that the experience of trauma as a teen and adult serves as a mechanism by which childhood personality for women influences their adult physical health. These initial findings provide a starting point from which to conduct further investigations into the complex associations among personality development, trauma experience, and health change over the life span, which may be of particular importance for girls and women.

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