IMPLICIT MEASURES OF EARLY-LIFE FAMILY CONDITIONS: RELATIONSHIPS TO PSYCHOSOCIAL CHARACTERISTICS AND CARDIOVASCULAR DISEASE RISK IN ADULTHOOD

by
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Abstract

An implicit measure of early-life family conditions was created to help address potential biases in responses to self-reported questionnaires of early-life family environments. We investigated whether a computerized affect attribution paradigm designed to capture implicit, affective responses (anger, fear, warmth) regarding early-life family environments was a) stable over time, b) associated with self-reports of childhood family environments, c) able to predict adult psychosocial profiles (perceived social support, heightened vigilance), and d) able to predict adult cardiovascular risk (blood pressure) either alone or in conjunction with a measure of early-life socioeconomic status. Two studies were conducted to examine reliability and validity of the affect attribution paradigm (Study 1, N = 94) and associated adult psychosocial outcomes and cardiovascular risk (Study 2, N = 122). Responses on the affect attribution paradigm showed significant correlations over a 6-month period, and were moderately associated with self-reports of childhood family environments. Greater attributed negative affect about early-life family conditions predicted lower levels of current perceived social support and heightened vigilance in adulthood. Attributed negative affect also interacted with early-life socioeconomic status to marginally predict resting systolic blood pressure, such that those individuals high in early-life SES but who had implicit negative affect attributed to early-life family conditions had SBP levels that were as high as individuals low in early-life SES. Implicit measures of early-life family conditions are a useful approach for assessing the psychosocial nature of early-life environments and linking them to adult psychosocial and physiological health profiles.

Preface

This paper was primarily written by me with supervision from Drs. Edith Chen and Gregory E. Miller. Collaborators include Anita S. Hibbert and Jennifer H. K. Wong, who were research assistants in the first study that was managed by me, and are listed as coauthors on the empirical manuscript. I implemented and coordinated the first study in this paper, which served as a springboard for the second larger community study. A portion of this paper (Chapters 2 to 5) is a manuscript with the title of this thesis (Chan, Chen, Hibbert, Wong, & Miller, 2011) in press for publication at Health Psychology.

The first study was approved by the Behavioral Research Ethics Board (H06-80865), and the second study was approved by the Clinical Research Ethics Board (H08-02773).

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1 Introduction

1.1 Health trajectories: the importance of early experiences

Accumulating bodies of evidence across multiple disciplines, both clinical and epidemiological, provide support for the notion that exposure to adversity in the early environment may underlie vulnerability to future expression of chronic medical illnesses (Leserman, Drossman, Li, Toomey, Nachman, & Glogau, 1996; Stratakis & Chrousos, 1995) and psychopathology (Ambelas, 1987; Brown, Bifulco, & Harris, 1987; Caldji, Liu, Sharma, Diorio, Francis; Meaney, & Plotsky, 2001; Cui & Valliant, 1996; DeBellis, Chrousos, Dom, Burke, Helmers, Kling, Trickett, & Putnam, 1994; Heim, Owens, Plotsky, & Nemeroff, 1997; Heim, Plotsky, & Nemeroff, 2004; Kendler, Kessler, Neale, heath, & Eaves, 1993; Ladd, Huot, Thrivikraman, Nemeroff, Meaney, & Plotsky, 2000; Young, Abelson, Curtis, & Nesse, 1997).

Adversity in the early years of life can take an array of forms, with the most salient forms in humans being sexual, physical, and emotional maltreatment, in addition to parental loss (Heim et al., 2004). Less salient adverse experiences may include unstable family environments, inadequate parental care, dysfunctional relationships within the family, and poverty or living with low socioeconomic status (SES). These various forms of early-life adversity are typically ongoing and often exist simultaneously (Heim et al., 2003; Conger & Donnellan, 2007). Young individuals living in these adverse environments are raised under stressful circumstances, with pronounced neurological, behavioural, and biological consequences appearing throughout the lifespan (De Bellis & Thomas, 2003a; Gutman & Nemeroff, 2002; Gorman, 2002; Heim & Nemeroff, 2001; Repetti, Taylor, & Seeman, 2002; Teicher, 2000).

There is currently converging evidence from animal and human studies suggesting that

adversity in the early years of life cause permanent brain dysfunction that sequentially impacts mental and physical health throughout the lifespan. Specifically, the impact of early adversity on both mental and physical health is believed to be mediated by the substantial plasticity of the develop central nervous system as a function of surrounding experiences. During critical periods of development, theorized to take place well before individuals reach sexual maturation (Heim et al., 2004), certain brain regions are especially sensitive to adverse experiences. These surrounding experiences may lead to significant irregularities in the central nervous system that are sometimes irreversible (Weiss & Wagner, 1998; Repetti et al., 2002; Sanchez, Ladd, & Plotsky, 2001). Thus, it is plausible that adversity or stress during development permanently shapes the brain regions that mediate stress and emotion, leading to altered emotional processing and heightened responsiveness to stress that evolve into chronic disorders, especially in individuals that may already be genetically vulnerable (Heim et al., 2004; Repetti et al., 2002).

Importantly, the various forms of adversity that has been documented in the early years of human life, including physical and emotional maltreatment, parental loss, unstable family environments, inadequate parental care, dysfunctional relationships within the family, and living with low socioeconomic status (SES), all tend to occur within the background of early-life family environments (Sanchez et al., 2001; Rowe & Rodgers, 1997). Further, certain specific types of adversity in the early years of life, such as living in poor socioeconomic conditions or in a difficult family environment, tend to exist simultaneously and are interrelated, this paper will add to this growing body of literature by examining two early-life factors (SES and the family environment) and associations with health-relevant characteristics through a novel measure of early childhood adversity.

1.2 Early-life socioeconomic status

Growing evidence suggests that low early-life SES is a determinant of susceptibility to chronic diseases later in life, setting individuals who grow up in poor economic conditions on a damaging trajectory early on. Markers of low early-life SES has been associated with decreased resistance to upper respiratory infections (Cohen, Doyle, Turner, Alper, & Skoner, 2004), poorer cardiovascular health (Poulton et al., 2002), elevated inflammation levels, clustering of metabolic risk markers, and a greater number of age-related disease risks (Danese et al., 2009). In addition, individuals from low early-life SES backgrounds are more likely to suffer from chronic diseases, including respiratory and cardiovascular diseases, arthritis, certain cancers and dental diseases (Blane, Bartley, & Davey-Smith, 1997; Galobardes, Lynch, Davey, & Smith, 2004; Galobardes, Smith, & Lynch, 2006; Lawlor, Ronalds, Macintyre, Clark, & Leon, 2006; Poulton et al., 2002). These relationships between low early-life SES and poor are generally true irrespective of SES in adulthood (Kittleson, Meoni, Wang, Chu, Ford, & Klag, 2006; Kuh, Hardy, Langenberg, Richards, & Wadsworth, 2002; Poulton et al., 2002), suggesting that early-life SES is not merely serving as a proxy for current socioeconomic conditions. In particular, some studies suggest there may be a "sensitive period," whereby SES during the first five years of life predicts later life health outcomes in an especially strong manner (Cohen et al., 2004; Miller & Chen, 2007). Thus, examining the nature of early-life experiences may help shed light on and potentially modify this damaging trajectory.

1.3 Early-life family environment

The early-life family environment serves as a background for young children's development (Repetti et al., 2002). Understanding the psychosocial conditions during the first

years of life may help shed light on why low early-life SES impacts adult health in such a profound manner (Conger & Donnellan, 2007; Matthews & Gallo, 2011; Shonkoff, Boyce, & McEwen, 2009). In particular, low SES has been closely tied to an adverse family environment characterized by overt family conflict that is manifested in frequent episodes of anger and aggression, harsh and restrictive parenting styles, chaotic or neglectful parenting, as well as inadequate emotional nurturing, manifested as family relationships that are cold, neglectful, and lacking support (Dodge, Pettit, & Bates, 1994; Emery & Laumann-Billings, 1998; Lehman et al., 2005; McLoyd, 1998). Children raised in these environments are at risk for a wide variety of short-term and long-term health problems (Repetti et al., 2002). Of note, multiple early-life factors, such as lower SES and an adverse family environment, can have a cumulative negative effect on children's psychosocial functioning, health behavior, and physical health (Larson, Russ, Crall, & Halfon, 2008), pointing to the importance of examining multiple early-life factors.

1.3.1 Psychosocial consequences

There is an abundance of research documenting mental consequences for children raised in a family environment marked by overt conflict and aggression. Children from these families are consistently at an increased risk for a wide array of current emotional and behavioral problems, such as aggression, conduct disorder, delinquency and antisocial behavior, anxiety, depression, and suicide (Emery, 1982, 1988; Grych & Fincham, 1990; Kaslow, Deering, & Racusia, 1994; Reid & Crisafulli, 1990; Wagner, 1997). In addition, inadequate emotional nurturance, or in other words family relationships that are cold, unsupportive, and neglectful, have also been shown to put children at risk for psychosocial problems, such as depression, suicidal behavior, anxiety disorders, aggression, hostility, and delinquent and oppositional

behaviors (Barber, 1996; Chorpita & Barlow, 1998; Kaslow et al., 1994; Rothbaum & Weisz, 1994; Steinberg, Lamborn, Darling, Mounts, & Dombusch, 1994). These current emotional and behavioral problems observed in children from adverse family environments tend to have lasting effects into the adult years (Repetti et al., 2002).

Although genetic predispositions appear to explain some of the associations between an adverse early-life family environment and children's mental health (Plomin, 1994), there is evidence to suggest both direct and indirect effects of parenting styles. For example, a longitudinal adoption study found that children at genetic risk for behavioral problems were more likely to receive negative parenting than children not at risk. Yet the genetic risk did not explain association of negative parenting and externalizing behaviors in children, indicating that environmentally mediated parenting effects on children's behaviors may be one plausible pathway (O'Connor, Deater-Deckard, Fulker, Rutter, & Plomin, 1998). Further, other longitudinal data document a significant association between maladaptive parental behavior and an increased risk of psychiatric disorder in offspring during late adolescence and early adulthood, above and beyond the children's own history of psychiatric disorders and temperament problems, as well as parental psychopathology (Johnson, Cohen, Kasen, Smailes, & Brook, 2001).

1.3.2 Physical health consequences

In turn, there is also increasing evidence that individuals who reported adverse family conditions during childhood have increased rates of both mild and severe physical health problems throughout childhood, with enduring consequences in adulthood (Repetti et al., 2002). These health issues can range from lower height and weight attainment in childhood, to worse self-reported health in adulthood, or even a greater risk of suffering from a diagnosed age-related

disease (Repetti et al., 2002).

The first signs of physical consequences of being raised in a family environment characterized by overt anger and aggression can be seen in early ages of childhood. In a study of twelve to 14 month old infants and their mothers, more observed conflict during mealtime was associated with lower infant weight attainment, after controlling for birth weight and mothers' height (Stein, Woolley, Cooper, & Fairburn, 1994). In a large national birth cohort study of British children, exposure to family conflict based on a health visitor's report of family difficulties (e.g. domestic tension, separation) was associated with lower height attainment at ages 7 and in adulthood 26 years later; those children who had been exposed to conflict in the family were more likely to be in the lowest fifth percentile of height distribution in childhood and in adulthood (Montgomery, Bartley, & Wilkinson, 1997).

As individuals' developmental trajectories extend to adolescence and young adulthood, self-reported physical symptoms of chronic health problems is documented among those from an adverse early-life family environment. Among adolescents between the ages of 12 to 14, self-reported quarrelling or fighting in the family has been documented to be associated with more self-reported physical symptoms one year later (Mechanic & Hansel, 1989). Parents' report of conflict in the family, including the extent of openly expressed anger and aggression as well as conflictual interactions, have also been associated with poorer health characteristics among male youth with an average age of 12; these boys from a high-conflict family environment had an unfavorable plasma lipid profile, suggesting a greater risk of developing coronary heart disease (Weidner, Hutt, Connor, & Mendell, 1992).

Undesirable health characteristics, such as a greater risk of developing age-related

chronic diseases, have been documented in adults raised in an adverse early-life family environment. Adults between the ages of 17 to 62 who reported severe conflict in the family during upbringing showed an increased risk of self-reported illnesses (e.g. aches, pains, high blood pressure) and other indicators of distress (i.e. anxiety) 13 years later, above and beyond individuals' own history of psychological distress and mental health (Lundberg, 1993). Adult women who reported a history of both sexual or nonsexual maltreatment during their childhood also reported more physical symptoms during the six months prior to study entry; based on medical records, these adult women also suffered from a greater number of physician diagnosed minor infectious diseases (e.g.. urinary tract infections, upper respiratory infections) and other diseases (e.g. hypertension, diabetes), relative to women who did not report childhood maltreatment (Walker et al., 1999). In general, exposure to abuse during childhood has been linked with a heightened risk of neurological problems, respiratory problems, ischemic heart disease, cancer, skeletal fracture, and liver disease (Dong et al., 2004; Felitti et al., 1998; Wegman & Stetler, 2009). Individuals who reported a 'risky family environment' during upbringing show elevated physiological responses to stress (e.g. autonomic and cortisol), compromised metabolic functioning (Lehman, Taylor, Kiefe, & Seeman, 2005; Luecken, Rodriguez, & Appelhans, 2005; Taylor, Lerner, Sage, Lehman, & Seeman, 2004), and have elevated inflammatory profiles (Danese et al., 2009; Taylor, Lehman, Kiefe, & Seeman, 2006; Miller & Chen, 2010).

Further, children from cold, unsupportive, or neglectful families have also been shown to be at risk for a wide array of physical health problems in childhood and as adults. Young children between the ages of 4 and 5 who had parents that interacted with them in a style that

was unstructured, cold, and unresponsive (during an observed laboratory interaction) also had higher rates of illness, based on mothers' reports (Gottman & Katz, 1989). Over time, these young children who had mothers that were rated by an interviewer to be less accepting and assisting when the child feels anger and sadness (e.g. comforting, intervening) also had higher rates of illness 3 years later (Gottman, Katz, & Hooven, 1996, 1997). Among youth aged 12, more hostile and less supportive parent behavior during observed interactions (e.g. derogatory, insulting behavior), as well as youths' reports of less positive parent behavior (e.g. threats, ignoring), predicted increases in adolescents' physical health complaints (e.g. headaches, sore throat, congested nose, skin rash) over the next 4 years (Wickrama, Lorenz, & Conger 1997).

These adverse characteristics in the family also impact children already suffering from a chronic illness. Lower levels of self or parent reported family organization and cohesion have been tied to more severe symptoms in children (average of 7) being treated for severe atopic dermatitis (Gil, Keefe, Sampson, McCaskill, Rodin, & Crisson, 1987). Among children (average age of 13) under treatment for diabetes, those who had parents that were less nurturing during interactions (as observed by a third party) also had poorer metabolic control over diabetes (Martin, Miller-Johnson, Kitzmann, & Emery, 1998).

Adults from an early-life family environment characterized by neglect and a lack of support suffer from a wide array of chronic physical health problems. In a longitudinal cohort study of children aged 9 to 10, those who had parents that were unsupportive (as rated by a teacher) or neglectful (based on a hygiene rating provided by school medical service) were at 18-26% greater risk of developing obesity 10 years later in early adulthood, even after controlling for body mass index in childhood and gender (Lissau & Sorensen, 1994). Male adults who

described more negative and less positive relationships between family members during upbringing were at an increased risk of developing future cancer, after controlling for health risk factors (Shaffer, Duszynski, & Thomas, 1982). Also, men who described having a negative (e.g. tolerant, cold) relationship with either of their parents were 40% more likely to have a diagnosed disease 35 years later, including cardiovascular disease, duodenal ulcer, alcoholism, compared to those who reported having positive relationships with either of their parents (Russek & Schwartz, 1997).

1.3.3 Potential biases in retrospective accounts

In sum, diverse research literatures consistently point to the long-term impact of adverse early-life family conditions on both current and later life health. Both overt conflict in the family or unsupportive parenting appear to have independent effects of children's health trajectories. Some birth cohort or longitudinal studies were able to obtain assessments during childhood that would not be subject to recall biases later in life (e.g. Danese et al., 2009). However, many studies assess health status in adulthood and are constrained to asking adults to retrospectively describe the nature of their family environments during upbringing (e.g. Dong et al., 2004; Felitti et al., 1998). In general, these approaches are particularly vulnerable to respondent biases, especially when recalling interpersonal information (Metts, Sprecher, & Cupach, 1991). Specifically, retrospective reports may be subjective reconstructions that vary in accuracy and objectivity as a function of current emotional arousal and other contextual factors at encoding and retrieval (Metts et al., 1991; Sillars & Scott, 1983). A review of previous studies using retrospective accounts of childhood adversity revealed that measurement error and bias exist in these reports (Hardt & Rutter, 2004). Importantly, reporting on one's feelings about family

conditions can be a sensitive issue, and it may be difficult for some people to be completely open and honest. Thus, retrospective self-report measures may not represent the optimal approach for assessing early-life family environments. This paper introduces an implicit measure of early-life family conditions (affect attribution) and discusses its implications for health research.

1.4 Implicit attitude assessments

One method in the social psychology literature that is sometimes used in lieu of self-report measures (particularly for sensitive issues such as prejudice) is implicit attitude assessments, which are paradigms designed to capture attitudes that are expressed when individuals are unable to overtly monitor and control the influence of their attitudes on judgments (Fazio & Olson, 2003; Gawronski & Bodenhausen, 2006). Since monitoring and control is limited, implicit measures are extremely useful for investigating socially sensitive attitudes such as prejudice (Fazio, Jackson, Dunton, & William, 1995; Greenwald, McGhee, & Schwartz, 1998; Wittenbrink, Judd, & Park, 1997). Common examples of implicit measures include the Implicit Association Test and the "bona fide pipeline" priming technique, which both generally assess the impact of a prime (e.g. African-American vs. White) on categorization behavior or judgments of adjectives, and have both been used to consistently predict race-related behaviors (Fazio & Olson, 2003). Implicit measures have also been used to predict drug, alcohol, and tobacco use (Palfai & Ostafin, 2003; Sherman, Rose, Koch, Presson, & Chassin, 2003; Wiers, Van Woerden, Smulders, & De Jong, 2002). However, to our knowledge implicit measures have yet to be adopted within health studies of physiological risk markers.

We developed a behavioral paradigm based on that by Payne, Cheng, Govorun, and Stewart (2005) to measure implicit affect elicited by early-life family conditions. The original

Affect Misattribution Procedure is a computer-based implicit attitude assessment tool that combines projective testing with computer-based quantitative measurements of evaluations. Affect-laden pictures are presented visually and then paired with ambiguous stimuli, which participants in turn rate on dimensions like attractiveness or pleasantness. Misattributions of affect onto the ambiguous stimuli indicate unintentional expression of attitudes. The Affect Misattribution Procedure can predict outcomes such as intended voting behavior and attitudes toward political candidates, as well as actual voting behavior during presidential elections (Payne et al., 2005; Payne, Krosnick, Pasek, Lelkes, Akhtar, & Tompson, 2010).

In the present set of studies, we created a novel application of the Affect Misattribution Procedure in which we used a modified version to probe participants' feelings about their early-life family conditions. Participants' own childhood family photographs were used as the affect-laden picture, and the evaluative judgments of ambiguous images in our paradigm were made on three affect dimensions – anger, fear, and warmth. These dimensions were chosen based on the Risky Families model that posits a central role for conflict and aggression in the home (generating anger and fear) and to cold, unsupportive, and neglectful environments (indicating a lack of parental warmth) in risky family environments (Taylor et al., 2004). We examined the stability and validity of our affect attribution paradigm across two studies.

2 Study 1 Method

In the first study, we tested the stability of the paradigm across a six month period, and tested whether this implicit measure of early-life family conditions correlated with explicit measures of childhood family environments and parenting styles. After establishing test-retest consistency and construct validity in this first study, predictive validity was explored in a subsequent study.

2.1 Participants

Ninety-four participants aged 18 to 43 (M = 22.21, SD = 5.069) participated in a three-wave study. Participants were recruited at the University of British Columbia (UBC), and represented a variety of ethnic groups, socioeconomic classes, as well as both student and non-student populations. The sample included 79.8% female participants, with the majority of participants being of Chinese descent (53.2%), followed by European descent (23.4%), and other ethnicities (23.4%). Eighty-six (91%) participants completed the second visit 1 month later, and 85 (90%) participants completed all 3 time points over the course of 7 months.

2.2 Measures

2.2.1 Affect attribution

Developed by Payne, Cheng, Govorun, and Stewart (2005), the Affect Misattribution Procedure is a computer-based implicit attitude assessment tool that combines projective testing with computer-based quantitative measurements. The 'attitude object' image is presented for 75 ms, then a blank screen for 125 ms, then the ambiguous pictograph for 100 ms. Following this, the participant is asked to make an affective judgment of the ambiguous pictograph. They are

instructed that the 'attitude object' image is a warning signal for the ambiguous pictograph and that they should not respond to it. Of note, Payne at al. (2005) highlighted that across all studies, the task was unaffected by direct warnings to avoid influence of the affect-laden pictures, suggesting that it is resistant to correction attempts. In Payne's work, the Affect Misattribution Procedure has proven to have excellent psychometric characteristics, with attitude ratings showing high levels of internal consistency ($\alpha = .88$) and reliable correlations with criterion variables like self-reported political attitudes and intended voting behavior.

Our study involved a modified version of the original affect misattribution paradigm. First, our 'attitude object' of interest consisted of two early childhood family photographs meant to elicit implicit affect toward one's early-life family conditions. Participants were asked to bring their own personal photographs for inclusion in the experiment, with the stipulations that each picture had to contain an image of themselves age 0-5, and include at least one primary caregiver. This age range was selected based on previous research pointing to a "sensitive period" that impacts health later in life (Cohen et al., 2004; Miller & Chen, 2007). Second, participants were asked to evaluate ambiguous images of Jackson Pollock-style splatter paintings, rather than the Chinese pictographs used in the original Affect Misattribution Procedure studies, due to the large number of Chinese descent individuals (for whom the Chinese pictographs would have had meaning, rather than being ambiguous) in the Greater Vancouver community. Finally, we asked participants to rate each splatter painting on three affect dimensions – anger, fear and warmth – rather than the ratings of pleasantness made in the original Affect Misattribution Procedure studies because of the relevance of these emotions to childhood family psychosocial environments.

In an initial study to validate the splatter paintings, eighty unique splatter paintings were generated. These splatter paintings were then evaluated by 10 psychology-trained raters on a 9-point scale ranging from unpleasant to pleasant. The 40 splatter paintings with the most 'neutral' ratings (mean ratings of 4.2 to 5.8) were selected for inclusion in the task. An additional 7 paintings were excluded because of high variance in their ratings. The remaining 33 splatter paintings were then reversed and rotated to create 6 images each, which led to a total of 198 splatter paintings that were included in the paradigm.

Participants completed 72 trials in our paradigm, which took on average five minutes to complete. Each trial involved a family photograph or a grey-colored control image followed by a spatter painting that had been randomly selected from the pool. The participant was then asked to indicate whether the painting did vs. did not convey a target affect (anger, fear, warmth). The trials varied in terms of the prime that was used (3 possibilities: 1 of 2 family photographs or a grey control image) and the affect rating that was made (3 possibilities: anger, fear, or warmth). There were a total of 8 trials for each combination of prime and rating. Ratings were averaged within each category to form separate attribution scores for the active and control primes. Values could range from 0 – 1.

2.2.2 Family environment

The 13-item Risky Families measure (RF) assesses early-life family environment (Taylor et al., 2004). Participants are asked to think about their family life between the ages of 5 and 15, and answer questions on a scale ranging from 1 ('Not at All') to 5 ('Very Often' or 'Very Much'). Question items include: "How often did a parent or other adult in the household swear at you, insult you, put you down, or act in a way that made you feel threatened?", and "How often would

you say you were neglected while you were growing up, that is, left on your own to fend for yourself?". The RF measure has been shown to have high agreement and reliability with clinical interviews conducted and coded by trained clinical interviews (Taylor et al., 2004).

2.2.3 Parenting

Paternal and maternal warmth in the first 16 years of the participants' lives were measured using the 25-item Parental Bonding Instrument (Parker, Tupling, & Brown, 1979). Participants filled out the questionnaire for maternal and paternal bonding separately and had to rate how true the statements were on a 5-point Likert-type scale. Scores for the warmth subscale (12 items; e.g. "Spoke to me in a warm and friendly voice") were computed for each parent and higher scores indicated higher levels of parental warmth. This questionnaire has been shown to have good test-retest reliability, and has been validated with actual parental behavior recorded by family observers and expert judges (Wilhelm & Parker, 1990).

2.2.4. Procedure

After arriving at the laboratory and providing informed written consent, participants were taken to a private room and seated at a computer. Participants were asked to bring in two childhood family photographs, and these were inserted into the affect attribution computer program. Participants completed the affect attribution task and questionnaires described above via MediaLab software, version 2008.1.22 (Jarvis, 2008). Participants were invited back to the lab one month (Visit 2) and six months (Visit 3) after their first visit. The same family photographs were used and the same study procedure was repeated. To thank them for their time, each participant received $10 for each of three visits, with a $10 bonus for completing all three visits. The study was approved by the Behavioral Research Ethics Board of the University

of British Columbia.

3 Study 1 Results

3.1 Stability across visits

Overall, correlations of affect attribution tendencies over all three visits during the six month study period were highly significant. Pearson correlations revealed that attribution of anger in the first and second visits (one month apart), and the first and last visits (six months apart) were significant respectively, $r = .458$, $p < .001$ and $r = .522$, $p < .001$. Similarly, attribution of fear in the first and second visits, and the first and last visits were significantly correlated, $r = .670$, $p < .001$ and $r = .463$, $p < .001$. Lastly, attribution of warmth in the first and second visits, and the first and last visits were significantly correlated, $r = .524$, $p < .001$ and $r = .467$, $p < .001$. These correlations were somewhat weaker than the correlation over the same time period of a questionnaire, self-report measure of family environment, r's > .891, p's < .001. However, the stability estimates of our implicit paradigm are comparable to those of other implicit tasks (Cunningham, Preacher, & Banaji, 2001). Affect attribution responses were subsequently aggregated across the three visits to create a more reliable indicator.

3.2 Affect attribution analyses

Attribution of affect was computed by summing up the number of times participants attributed the different emotions towards the splatter paintings following a family photograph, and as well, following the grey colored control image. A percentage score was calculated (number of times participants endorsed an emotion divided by the number of trials probing that emotion) per each emotion for family photographs and for the control image. Attribution of affect following the two different family photographs were averaged to obtain one family affect attribution score per each affect dimension. In all analyses examining associations between

affect attribution and other measures, affect attribution after the control image were subtracted out from affect attribution after a family photograph. This controlled for individual differences in the tendency to endorse the various affect descriptors.

After their own early childhood family photograph, participants attributed significantly less anger and fear in comparison to the control image, $M_{diff} > 3.089$, t's > 2.021, p's < .04. Also, participants attributed significantly more warmth after a family photograph, $M_{diff} = -14.259$, $t = -7.821$, $p < .001$.

Table 3.1. **Study 1 descriptive information.** Affect attribution tendencies (percent) in the first sample.

	Min.	**Max.**	**Mean**	**Std. Deviation**
Study 1				
Anger attributed to family photo (%)	0	87.50	24.81	22.84
Fear attributed to family photo (%)	0	87.50	24.48	22.58
Warmth attribute to family photo (%)	0	100.00	45.58	27.64
Anger attributed to control image (%)	0	100.00	27.90	25.01
Fear attributed to control image (%)	0	100.00	29.42	26.60
Warmth attributed to control image (%)	0	100.00	31.32	25.40

3.2.1 Relationships among the three affect dimensions

Attributions of anger correlated with attributions of fear, $r = .659$, $p < .001$, but neither correlated with attribution of warmth, r's < .002, p's > .380.

3.3 Affect attribution and the family

3.3.1 Family environment

Pearson correlation analyses were conducted to examine the association between affect attribution and explicit measures of childhood family environment (Risky Family (RF) scores). Participants who reported more negative childhood family environments on the Risky Family measure also significantly attributed more anger after a family photograph, $r = .256$, $p < .001$. Similarly, these participants also significantly attributed more fear after a family photograph, $r = .188$, $p = .002$. However, higher Risky Family scores were only marginally correlated with attribution of warmth, $r = -.110$, $p = .077$.

3.3.2 Parenting

Paternal warmth during childhood was significantly correlated with less attribution of anger, indicating that participants who had warmer fathers during childhood also attributed significantly less anger after a family photograph, $r = -.270$, $p < .001$. Paternal warmth was also significantly correlated with less attribution of fear, $r = -.205$, $p = .001$. Furthermore, paternal warmth was marginally associated with greater attribution of warmth, $r = .122$, $p = .050$. Similarly, maternal warmth was correlated with less attribution of anger, $r = -.179$, $p = .004$, less attribution of fear, $r = -.124$, $p < .05$, but not attribution of warmth, $r = .027$, $p = .663$.

3.3.3 Study 1 summary

In sum, these findings indicate that a new measure of implicit attributed affect about childhood family conditions was associated with explicit self-report measures of childhood family environments and parenting styles during upbringing, and showed consistency over a 6 month period.

4 Study 2 Methods

A second study was then conducted with a healthy sample of adults to examine the validity of this measure by testing whether this implicit early life measure could predict adult psychosocial and physiological profiles. In particular, individuals who grow up in adverse early-life environments have been found to display more negative affect, to perceive greater threat, and to have less social support as adults (Luecken, Appelhans, Kraft, & Brown, 2006; Repetti et al., 2002). In addition, adverse early life environments have been associated with greater cardiovascular risk profiles in adulthood (Repetti et al., 2002; Wegman & Stetler, 2009). As such, we tested associations of our implicit childhood family environment measure with adult depressive symptoms, vigilance for threat, social support, and resting blood pressure. In addition to the main effects of implicit affect on these adult psychosocial and physiological outcomes, we also tested the hypothesis that the quality of early childhood family environments might interact with broader social environment characteristics, such as socioeconomic status (SES) to impact outcomes. Previous research has documented that childhood family relationship quality can moderate or buffer the effects of socioeconomic status (SES) on cardiovascular and inflammatory profiles (Chen, Miller, Kobor, & Cole, in press; Evans, Kim, Ting, Tesher, & Shannis, 2007). Hence we tested whether implicit attributions about early childhood environments might also interact with early-life SES in predicting adult characteristics.

4.1 Participants

Participants were recruited from Vancouver, BC, Canada, through postings in local media and public transit as part of a larger study examining the biological embedding of early-life socioeconomic status. To be eligible, they had to be 1) between 15–55 years of age, 2) North

American born, 3) fluent in English, 4) in good health, defined as being free of acute infectious disease the past 2 weeks, and without a history of chronic disease, and 5) from high or low socioeconomic categories. Socioeconomic status (SES) was obtained using the National Statistics Socio-economic Classification guide (NS-SEC, 2005) to code current occupation (9-point scale), as well as early-life (age 0 to 5) occupation of parents. Those in mid-range SES categories (3 to 4 on 9-point scale) were excluded from the larger study to better contrast low and high SES. One hundred and twenty two individuals (M_{age} = 32.46, SD = 10.92) participated in this study, with 52.5% of individuals in the low early-life SES category. The sample consisted of 54.1% female participants, with the majority of participants being of European descent (68.0%), followed by Chinese descent (13.1%), and other ethnicities (18.9%).

4.2 Measures

4.2.1 Attribution of affect

The same modified affect attribution paradigm from Study 1 was used. We replaced the grey colored control image in Study 1 with an image of a neutral face obtained from a face database created in the Karolinska Institute in Sweden (Lundqvist, Flykt, & Ohman, 1998; Oosterhof & Todorov, 2008), so that both the image of interest (early childhood family photograph) and the control image would contain faces. This face database contains previously established images of different emotional expressions and we used an image drawn from their neutral expression database.

4.2.2 Social support

An abbreviated version of the Interpersonal Support Inventory List (ISEL) developed by Cohen, Mermelstein, Kmack and Hoberman (1985) was used. The 12-item version of ISEL

provides a global measure of perceived social support, with higher scores indicates greater support. The ISEL has demonstrated validity with moderate correlations to other social support measures, such as the Moos Family Environment Scale (FES) (Moos & Moos, 1981). Adequate internal and test–retest reliabilities have been found for the total ISEL scale and the subscales in several samples (Cohen et al., 1985).

4.2.3 Depression

Depressive symptoms were assessed using the Center for Epidemiological Studies Depression (CES-D) Scale (Radloff, 1977), which has been widely used in clinical trials in both general and psychiatric populations and has excellent psychometric characteristics with a Cronbach's alpha of .85. The 10-item version included items assessing the frequency of experiencing depressive cognitions, affect, and behaviors during the past one week (e.g., feeling depressed and lonely, having poor appetite and sleep). Responses range from 0 = none of the time or rarely (less than 1 day) to 3 = most or all of the time (5–7 days). Scores are summed, with higher scores reflecting greater depressive symptoms.

4.2.4 Vigilance of threat

To assess vigilance for threat, we administered a slightly modified version of Payne's weapon identification procedure (Payne et al., 2001). The original paradigm measures the tendency to misidentify neutral objects (e.g., tools) as threatening (e.g., guns) after presentation of African-American vs. European-American faces. Participants are asked to decide whether the second image is a gun or a tool. Incorrect responses, or in other words false-positives, occur when participants misidentify a tool as a gun (Payne et al., 2001).

In our modified version of this paradigm, we probed the tendency to perceive threat after

either neutral (i.e. a parrot) or threatening (i.e. snake) images which were selected from the International Affective Picture System, and which were presented prior to images of a gun or a tool (Lang, Bradley, & Cuthbert, 2008). False-positives occur when participants misidentify a tool as a gun. In this study, we focused on the percentage of false-positives that occur after the neutral image, which provides a general measure of automatic heightened vigilance tendencies.

4.2.5 Blood pressure

Blood pressure was recorded with a standard occluding cuff on the participant's non-dominant arm. The VSM-100 BpTRU automatic blood pressure monitor is a reliable non-invasive device. Validation studies indicate that its measurements are within 5 mm Hg of a gold standard auscultatory mercury sphygmomanometer measurements 89.2% of the time, and within 10 mm Hg 96.4% of the time (Mattu, Heran, & Wright, 2004). Following a 5-minute period where participants acclimated to the device, blood pressure readings were taken every two minutes over a 6-minute period, totaling three readings that were averaged.

4.3 Procedure

Participants were seated in a private room to rest for five minutes. Blood pressure readings were then taken by placing the occluding cuff on the upper aspect of the participant's non-dominant arm with the microphone placed above an area where the brachial artery could be palpated. Participants were then seated at a computer and completed the same Study 1 affect attribution task and questionnaires described above via MediaLab software, version 2008.1.22 (Jarvis, 2008). This study was approved by the Clinical Research Ethics Board of the University of British Columbia.

5 Study 2 Results

5.1 Affect attribution analyses

Attributions of anger and fear after a family photograph were significantly correlated with each other, $r = .565$, $p < .001$. However, attribution of warmth after a family photograph was not associated with attribution of anger and fear, r's < .064, p's > .487, similar to Study 1. Hence anger and fear attributions were aggregated to create a more reliable indicator of negative affect attribution. Warmth was retained as a separate indicator of positive affect attribution.

Table 5.1. **Study 2 descriptive information.** Resting blood pressure (mmHg) and heart rate (bpm), self-reported depressive symptoms and current perceived support, and vigilance tendencies (percent).

	Min.	Max.	Mean	Std. Deviation
Study 2				
Negative affect attributed to family photo (%)	0	78.13	17.62	20.12
Warmth attributed to family photo (%)	0	100	49.49	32.42
Negative affect attributed to control image (%)	0	100	26.79	27.71
Warmth attributed to control image (%)	0	100	30.94	29.69
Systolic blood pressure (mmHg)	84	150	107.49	12.35
Diastolic blood pressure (mmHg)	49	120	70	11.18
Heart rate (bpm)	42	93	68.64	9.90
Depressive symptoms	0	26	7.85	5.00
Current perceived social support	20	48	39.95	6.34
Vigilance of threat (%)	0	100	18.56	19.03

5.2 Psychosocial analyses

Multiple regression analyses were conducted to test whether attribution of negative affect towards early-life family conditions could predict adult psychosocial profiles. In all analyses, affect attribution after the control image was subtracted out from affect attribution after a family photograph. Covariates of age, gender, ethnicity, early-life and current SES were included.

5.2.1. Social support

Greater attribution of negative affect significantly predicted lower levels of current perceived social support, such that individuals who attributed more anger and fear after their own childhood family photographs reported lower levels of current perceived social support on the ISEL, β = -.191, p = .028.

5.2.2. Depression

Attribution of negative affect did not significantly predict levels of depressive symptoms as measured by the CES-D Scale, β = .097, p = .287.

5.2.3 Vigilance of threat

Greater attribution of negative affect significantly predicted higher vigilance scores, such that individuals who attributed more anger and fear after their own childhood family photograph exhibited greater tendencies to automatically overinterpret cues as threatening as adults, β = .217, p < .018.

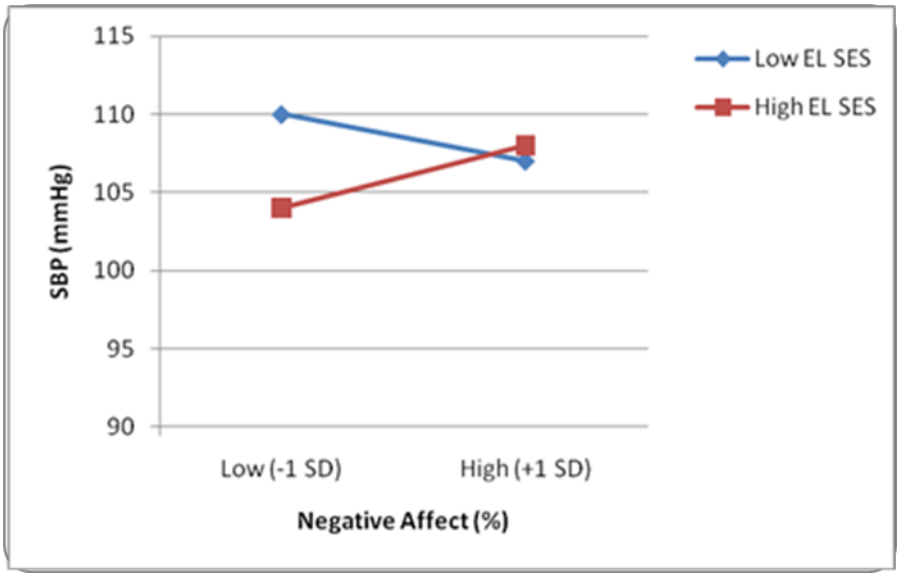
In addition to main effects, we also tested for interactions between affect attribution and early-life SES, using the procedures recommended by Aiken and West (1991). No significant interactions were found for adult psychosocial outcomes, β's < |.118|, p's > .349. To further test the specificity of the main effects, we conducted subsequent analyses in which we included

explicit childhood family environment measures (the Risky Family questionnaire) as a simultaneous predictor of adult psychosocial profiles. Implicit childhood negative affect attributions continued to predict lower levels of adult perceived social support and a greater tendency toward heightened vigilance, above and beyond explicit childhood family environments, β's > |.148|, p's < .074.

5.3 Cardiovascular risk

Multiple regression analyses were conducted to test whether resting blood pressure could be predicted from implicit negative affect attributions. Covariates of age, gender, ethnicity, and current SES were included in each analysis. Systolic and diastolic and blood pressure were not predicted by affect attribution, β's < .085, p's > .354. However, the interaction between negative affect attributions and early-life SES was marginally significant in predicting systolic blood pressure (SBP), β = .210, p = .089. This interaction indicates that SBP levels are lowest for those individuals who are both from a high early-life SES background and who attributed low levels of negative affect after a family photograph. On the other hand, among those from a high early-life SES background, as attributed negative affect increases, SBP also increases, such that those individuals who are from a high early-life SES background but who attributed high levels of negative affect after a family photograph actually have SBP levels similar to individuals from low early-life SES backgrounds (see Figure 1). Subsequent analyses revealed that when entered simultaneously with explicit childhood family measures, the interaction between implicit negative affect toward early life family conditions and SES in predicting SBP remained marginally significant, β = .218, p = .079. In contrast, the interaction between negative affect attribution and early-life SES did not predict diastolic blood pressure (DBP), β = .119, p = .332.

Figure 5.1. **The interaction between negative affect attribution tendencies and early-life (EL) SES predicting resting SBP**. SBP levels are lowest for those individuals who are both from a high early-life SES background and have low levels of attributed negative affect after a family photograph. On the other hand, those individuals who are from a high early-life SES background but have high levels of attributed negative affect after a family photograph have blood pressure levels similar to individuals from low early-life SES backgrounds.



6 Discussion

Across two study samples, we demonstrated reliability and validity for a novel measure of early-life family environments, an implicit affect attribution paradigm which tapped implicit affect about early-life family conditions in adults. Implicit affective judgments of anger, fear, and warmth were significantly correlated over a six month period, and this test-retest estimate was comparable to the consistency of personality traits over a 1 year period (Roberts & DelVecchio, 2000). Our paradigm showed construct validity in being associated with explicit self-report measures of childhood family environments as well as maternal and paternal parenting styles during childhood. Our measure showed predictive validity in implicit negative affect toward one's childhood family environment being associated with unfavorable adult psychosocial profiles, including lower levels of current perceived social support and a greater tendency toward heightened vigilance (overinterpreting threat). Lastly, this measure of implicit affect marginally predicted an indicator of cardiovascular risk (e.g. elevated resting SBP) in conjunction with a measure of early-life family SES.

6.1 Negative affect and psychosocial characteristics

The finding that greater implicit negative affect toward one's own early childhood family photograph was associated with lower levels of current perceived social support and a greater tendency toward heightened vigilance is consistent with a large body of literature documenting damaging psychosocial consequences for individuals from an adverse childhood family environment. For instance, previous research has demonstrated that children reared in a family environment characterized by overt anger and aggression, manifested into family relationships that are conflictual, are at an increased risk of a wide array of current and future emotional or

behavioral problems, such as aggression, conduct disorder, delinquency and antisocial behavior, anxiety, depression, and suicide (Emery, 1982, 1988; Grych & Fincham, 1990; Kaslow, Deering, & Racusia, 1994; Reid & Crisafulli, 1990; Wagner, 1997). Children who experienced inadequate emotional nurturance during upbringing, or in other words family relationships that are cold, unsupportive, and neglectful, are also at risk for psychosocial problems, such as depression, suicidal behavior, anxiety disorders, aggression, hostility, and delinquent and oppositional behaviors (Barber, 1996; Chorpita & Barlow, 1998; Kaslow et al., 1994; Rothbaum & Weisz, 1994; Steinberg, Lamborn, Darling, Mounts, & Dombusch, 1994).

In addition, this finding linking implicit negative affect toward one's childhood family environment with detrimental psychosocial profiles is in line with research noting negative affect as a key vulnerability element for the development of both anxiety and depression (Clark, Watson, & Mineka, 1994; Watson & Clark, 1984). However, the body of research on negative affect and associated mental health consequences involve assessments of current affect. To our knowledge, we are the first to link implicit affect specifically about early childhood circumstances with current psychosocial profiles among adults. This preliminary evidence suggests that the development of negative affect may begin as early as early childhood, when young individuals' psychosocial growth is heavily shaped by their family environment. In turn, this negative affect towards the early-life family environment may extend into adult years, putting individuals on a damaging long-term trajectory and contributing to the development of psychosocial challenges throughout life. More research is warranted to examine whether implicit negative affect help explain the development of emotional and behavioral problems among individuals who grew up in an adverse childhood family environment.

Importantly, our findings document that implicit measures of affect toward one's childhood family circumstances predict adult psychosocial profiles, even after controlling for explicit self-report measures of the childhood family environment, suggesting that implicit measures of childhood environments add unique predictive power beyond what explicit measures can explain. This provides imperative support for the reasoning behind the development of this implicit affect assessment paradigm, a novel tool designed to probe individuals' underlying feelings toward their early-life family environment. Diverse research literatures consistently point to the long-term impact of adverse early-life family conditions on both current and later life health. Both overt conflict in the family or unsupportive parenting appear to have independent effects of children's health trajectories. However, many studies assess health status in adulthood and are thus restricted to asking adults to retrospectively describe the nature of their family environments during upbringing (e.g. Dong et al., 2004; Felitti et al., 1998). In general, these approaches are particularly vulnerable to respondent biases, especially when recalling interpersonal information (Metts, Sprecher, & Cupach, 1991). Specifically, measurement error and respondent biases have been documented in previous studies relying on retrospective accounts of childhood adversity (Hardt & Rutter, 2004). These unfortunate shortcomings of retrospective accounts of individuals' upbringing is understandable and inevitable, as reporting on one's feelings about family conditions can be a sensitive issue, and it may be incredibly difficult for some people to be completely open and honest. Thus, an implicit affect paradigm that has unique predictive power beyond what explicit measures can explain is extremely useful in these situations, in which some individuals' self-reports may not reflect a true account of their history because it is too socially sensitive for them to openly and

honestly respond.

6.2 Negative affect and cardiovascular disease risk

We did not observe a direct association between our measure of implicit affect towards early-life family conditions and blood pressure. However, there was evidence that implicit affect interacted with early-life SES in systolic blood pressure (SBP) levels. Levels of SBP were lowest for those individuals who were both from a high early-life SES background and who implicitly attributed low levels of negative affect after a family photograph. Among those high in early-life SES, as attributed negative affect increased, SBP also increased. Thus, those individuals from a high early-life SES background who attributed negative affect to childhood family photographs actually had SBP levels similar to individuals low in early-life SES. This suggests that implicit affect toward early-life family conditions can at times override the effects of early-life SES on resting blood pressure, and suggests the importance of considering both implicit and explicit assessments when exploring the influences of early-life factors on later life health. All that said, because the findings were only marginally significant, they will need to be replicated in other samples before any definitive conclusions about the value of implicit measures in predicting health-relevant outcomes can be reached.

This finding is in line with a large body of evidence documenting damaging physical health outcomes for individuals who explicitly report adverse early-life family circumstances. For instance, reported exposure to abuse during childhood has been linked with a heightened risk of neurological problems, respiratory problems, ischemic heart disease, cancer, skeletal fracture, and liver disease (Dong et al., 2004; Felitti et al., 1998; Wegman & Stetler, 2009). Individuals who reported a risky family environment during upbringing show elevated physiological

responses to stress (e.g. autonomic and cortisol), compromised metabolic functioning (Lehman et al., 2005; Luecken et al., 2005; Taylor et al., 2004), and have elevated inflammatory profiles (Danese et al., 2009; Taylor et la., 2006; Miller & Chen, 2010). We add to this literature by showing that indirectly measured implicit affect toward early-life family conditions have implications for cardiovascular functioning in adulthood. We unmasked a subgroup of individuals who may be at risk – those who were from a high early-life SES background but had implicit negative affect toward early-life family conditions. Thus, this suggests that our implicit measure may have incremental utility in health research, as this subgroup would not have been identified on the basis of explicit measures alone.

6.3 Why do early adverse experiences impact health?

Multiple factors have been proposed to explain the long-lasting psychosocial and physical health consequences of growing up in an adverse family environment (Repetti et al., 2002). For example, it has been suggested that children reared in adverse family environments develop deficits in emotion processing, social competence, and behavioral self-regulation, while also experiencing disruptions in their physiological and neuroendocrine functioning, particularly in response to stress (Repetti et al., 2002). These disturbances in emotional and social processing, as well as stress-responsive biological regulatory systems, including sympathetic-adrenomedullary and hypothalamic-pituitary-adrenocortical functioning, appear to operate together in a cascade manner, and the course of these developmental processes can be influenced by adverse family environments (Repetti et al., 2002). Early disruptions in these emotional, social, and biological systems continue to have an impact on health development during later stages of life. Thus, although more evidence is still warranted, current converging evidence

regarding these regulatory systems point to an integrated profile of risk, particularly in individuals raised in adverse family environments.

However, this is the first study to our knowledge that used an implicit measure of early-life family conditions to explore associated psychosocial and physical health outcomes in adulthood. Thus, more investigation is necessary to determine whether the mechanisms that link self-reported early-life family circumstances and later life health characteristics are also the mechanisms that underlie the impact of having implicit affect towards the family on later life health. For instance, future studies can examine early-life family conditions implicitly and whether the same psychosocial mechanisms, such as deficits in emotion processing, explain the implications that implicit affect has on adult health.

6.4 Utility of our paradigm

In line with the incremental validity that the original affect misattribution paradigm demonstrated, our implicit measure of early life family conditions was also able to provide nonoverlapping information (Payne et al., 2005). Specifically, the original paradigm used to investigate implicit racial and political attitudes was virtually independent of self-report measures of racial attitudes for individuals who were highly motivated to conceal prejudice, because highly motivated individuals responded differently when explicitly probed about their racial attitudes (Payne et al., 2005). In situations where motivational pressures are high, implicit measures are deemed valuable for their ability to circumvent respondent biases, making the original affect misattribution paradigm a relatively more revealing method when assessing socially sensitive issues like prejudice. Similarly, although our affect attribution paradigm was associated with explicit measures of the early life family environment and parenting styles,

showing that it is indeed a valid measure of family characteristics, it revealed information regarding implicit affect towards early family circumstances that can override the effects of objective SES on resting blood pressure. In other words, for individuals that have the tendency to attribute implicit negative affect when visually reminded of their early-life family environment, our implicit measure revealed information that would have not been apparent in the objective SES and cardiovascular risk associations alone. Given that motivational pressures may also be high in situations in which early-life family characteristics are being explored (similar to situations that investigate prejudice), it may be beneficial to use implicit measures like our affect attribution paradigm to circumvent respondent biases and obtain nonoverlapping information. Further, multiple early life environmental factors, such as lower SES and an adverse family environment, can have a cumulative negative effect on children's psychosocial functioning, health behavior, and physical health (Larson, Russ, Crall, & Halfon, 2008), pointing to the importance of considering both implicit and objective assessments when exploring the influences of early life factors on later life health.

6.5 Limitations

There are several limitations in our two studies. First, we explored a limited selection of criterion variables. Future studies should conduct a broader assessment to determine the scope of our paradigm's associations with psychosocial and psychobiological outcomes relevant to health. Second, our validation study findings were cross-sectional and longitudinal studies are needed to determine whether implicit negative affect truly precede change in health-relevant processes. Third, our two samples were not identical in composition (and consisted primarily of Chinese- and European-descent adults with no chronic health conditions). As has been done in

almost every validation study of implicit attitude measures (Nosek & Smyth, 2007; Payne, Cheng, Govorun, & Stewart, 2005), participants in Study 1 were a sample recruited from the university setting (both students and non-students). In contrast, Study 2 drew on data from a larger, ongoing community study, and hence the demographics of the two studies are different. Future prospective studies should examine our paradigm's temporal stability and associations with health processes in broader, population-based samples. Fourth, because participants self-selected their family photographs, participants from adverse childhood environments may have fewer photographs from which to choose. We are also unable to verify that participants' responses are specific to early childhood. Lastly, although automatic affective responses are less explicitly biased than self-report measures that require participants to recall detailed information from the past, emotional recall may also reflect some bias. Other measures that capture the early-life environment are still warranted.

6.6 Overall conclusion

Across two study samples, our affect attribution paradigm designed to capture implicit affect toward early-life family conditions showed moderate associations with explicit measures of childhood family environment, predicted unfavorable adult psychosocial processes, and interacted with a measure of SES to predict cardiovascular risk. Importantly, our results indicate that implicit characteristics can potentially override the effects of early-life characteristics on adult BP. These findings highlight the potential importance of incorporating implicit measures together with explicit measures when assessing early-life factors, especially given the relative ease with which these measures could be incorporated into future research studies (approximately 5 minutes to administer), the advantage that this approach brings of eliminating

self-presentation biases, and the fact that these implicit measures have predictive power over and above explicit measures of early life family environments. Implicit measures may be useful when exploring socially sensitive situations, such as the early-life family environment, because it can circumvent social desirability pressures. This new affect attribution paradigm as an indirect measure of early-life factors may help address some of the prevailing issues surrounding retrospective assessments of early-life circumstances, thus providing a practical method for further exploring the implications of early-life social environments on later life health.

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