

Mitigating the effects of early experience:
Adolescent social functioning as a predictor of adult physical health

A Dissertation
SUBMITTED TO THE FACULTY OF
UNIVERSITY OF MINNESOTA
BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

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June 2014

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Acknowledgements

Graduate school, like development, is complicated and requires the supportive presence of knowledgeable mentors and a host of friends and family to mitigate the effects of toxic stress. I would first like to thank Andy Collins for introducing me to the field of developmental health psychology and suggesting that I take a look at the Parent-Child data to see what I could do with it; the results has been five years of fantastic research. Many, many, many thanks to Michelle Englund for helping me to become a better thinker, researcher, and statistician; I would not have made it through without her guidance. I would like to thank Judy Cook for being the glue that holds the Parent-Child project together. Many thanks to Jeff Simpson for furthering the study of physical health in the Parent-Child study and for all of his help with papers and publications through the years. Thank you to my dissertation committee: Drs. Megan Gunnar, Jeffry Simpson, Angus MacDonald III, Andy Collins, and Michelle Englund for helping this dissertation take shape. Lastly, thank you to the participants of the parent-child project for their continued participation and contributions to developmental science.

Thank you to my cohort: Sherryse, Anna, Laura, Raquel, Cam, and Momo. I couldn't imagine a finer, more intelligent, more supportive group of people to live and learn beside. A big thanks to my lab mates, Lee Raby, Sally Kuo, and Jessica Salvatore, it has been a privilege working with you and learning from you. Thank you to my family, Julie, Ernie, Jessica, EJ, and Megan you are my touchstones (a.k.a. my secure base and safe haven) and my source of unconditional positive regard, which I am sure that I have taxed these past few years.

Finally, I would like to thank my husband Andre for planning our wedding, house hunting, and taking care of countless other responsibilities in order to give me the time and space to finish this dissertation; you are the best, that's why I married you.

Dedication

This thesis is dedicated to Drs. Esme A.L. Shaller, Anna Tverskoy, Richard Gerrig, and Joe Blader. Through your guidance, wisdom, and encouragement you helped me realize my goal of becoming a child clinical psychologist and gave me the tools that I needed to succeed in graduate school.

Abstract

Researchers examining the etiology of chronic illness in adulthood are increasingly looking back towards early life events to find risk factors for disease. To date, researchers have failed to account for the tremendous amount of social growth and development that takes place in the intervening years between infancy and adulthood. This prospective longitudinal study examines the influence of adolescent and young adult social functioning on adult physical outcomes above and beyond the influence of early life social functioning. This study also examines the relative influence of social functioning, socio-economic status (SES), and health history on adult health outcomes. Participants from this study are a subsample from the Minnesota Longitudinal Study of Parents and Children (N=167) who have been followed from birth to age 34 years. Social functioning was assessed in infancy as the continuity of attachment classifications between ages 12 and 18 months. Adolescent, young adult, and adult social functioning were assessed via qualitative codes of videotaped interactions and interviews. At age 32 and 34 years participants were asked about the presence of or treatment for any physical illness. Results indicated that infant social functioning predicted the likelihood of reporting a physical illness in adulthood above and beyond the effects of later social functioning, early and concurrent SES, physical health, concurrent body mass index, gender, and self-reported neuroticism. These findings indicate that attachment in infancy exerts a powerful influence on later physical health outcomes and suggests that it as a powerful point of intervention.

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Mitigating the effects of early experience:

Adolescent social functioning as a predictor of adult physical health

Medical advancements over the past one hundred years have drastically changed the way much of humanity lives and dies. The advent of modern medicine and vaccinations have diminished the impact of the infectious diseases that drove high infant mortality and large-scale pandemics. This decrease in mortality due to infectious diseases has been accompanied by a rise in mortality due to chronic illness. According to the U.S. Department of Health and Human Services the top three causes of death in the United States in 2006 were: heart disease, cancer, and stroke (Heron et al., 2009). This closely parallels the World Health Organization's (WHO) top three causes of death globally: heart disease, stroke, and lower respiratory infection (WHO, 2003). Factors such as genetic predispositions, environmental toxins, and changing lifestyles have been examined to explain this shifting trend (Frosst et al., 1995; Thun, Lally, Calle, & Heath, 1997; Wannamethee, Shaper, & Walker, 1998). Each factor has come up wanting, leading researchers to forego singular risk factors in favor of more holistic, systemic explanations (e.g., Gortmaker et al., 2011). Social functioning is one broadband risk factor for chronic illness that has garnered much attention (Cohen, 2004; Miller, Chen, & Cole, 2009).

The majority of research on social relationships and physical health has focused on the ways in which *adult* relationships protect *adults* from morbidity and mortality. While research has shed light on the psychosocial aspects of disease etiology, the focus on adults and the elderly does not allow for an examination of the developmental

processes that underlie both the physiological and social pathways to physical illness. The few papers examining the impact of early relationships on adult health hint at these developmental processes but do not test them (e.g., Miller et al., 2011; Puig, Englund, Simpson, & Collins, 2013). The linear relationships reported up to this point mask complex developmental pathways and potential transition points.

The formulation of a coherent developmental theory linking social functioning to physical health outcomes has been stymied due to the lack of cross talk between researchers examining early risk factors and those studying adult social functioning. Equally overlooked by both lines of research is the role of adolescence as a potentially important transition period for change in both trajectories of health and social functioning (see Ertel, Glymour, & Berkman, 2009 for an exception). Adolescence is a period of rapid physical and psychological growth and change (Spear, 2000). This important developmental period linking childhood to adulthood may provide opportunities for the mitigation of adverse early experiences and the correction of deleterious health pathways. However, few studies have examined how social functioning in adolescence and young adulthood influences adult health. In the current study, the direct effects of social functioning in developmentally salient relationships on adult physical health will be examined. Additional analyses will be undertaken to determine whether previously established relations between infant social functioning and adult health (Puig et al., 2013) are mediated through social functioning in adolescent and young adult relationships.

Adult Relationships and Health Outcomes

Early support for the link between adult social relationships and physical health outcomes was established by epidemiological research in the 1970's and 80's. These studies found that lack of involvement in social activities is a risk factor for all-cause morbidity and mortality similar in magnitude to smoking (House, Landis, & Umberson, 1988). Subsequent research has focused on parsing out the ways in which health behaviors spreads through social networks, the ways in which the quality of early and concurrent close relationships influence health, and the biological systems that interface the social milieu and physical health (Christakis & Fowler, 2007; Gouin et al., 2010; Kiecolt-Glaser & Newton, 2001). The notable dearth of research examining the impact of close relationships in adolescence and young adulthood on adult physical health suggests that empirical knowledge of these developmental pathways remains incomplete.

Social networks are defined as the structure of social ties and the relationships that surround a person (Ertel et al., 2009). Findings from numerous studies support a linear relation between larger social networks and better physical health (House et al., 1988). Results from the Tecumesh Community Health Study indicate that marital status, participation in volunteer organizations, spectator event attendance, and lecture attendance interact with gender to predict all-cause mortality (i.e., death from any cause) among men. For women, only church attendance was a significant predictor of health (House, Robbins, & Metzner, 1982). In a similar vein, Barefoot, Grønbæk, Jensen, Schnor, and Prescott (2005) found that decreased diversity of social contacts within a social network was associated with higher mortality and higher rates of ischemic heart

disease in the Copenhagen Heart Study. Social network size has also been examined in relation to the development of specific diseases. The Human Population Laboratory found that social network size predicted the likelihood of death from several diseases including: ischemic heart disease, cancer, and cerebrovascular disease (Berkman, 1984).

Although these longitudinal studies established social functioning as an important risk factor for disease, they do not address the biological processes through which relationships affect health. Biological stress response systems have been identified as the interface between social relationships and physical health. Research examining the effect of close relationships on physiological processes specifically focused on the immune system, Hypothalamic Pituitary Adrenal (HPA) axis, and the sympathetic and parasympathetic nervous systems (Cohen, 2004; Kiecolt-Glaser & Newton, 2001; Roisman, 2007). Studies have found that the quality of close relationships has far reaching implications for physiological reactivity, health behaviors, and the perceived impact of stress on an individual.

Biological stress response systems, relationships, and health.

Biomarkers of inflammation (e.g., C-reactive protein [CRP], Interleukin-6 [IL-6], and Tumor Necrosis Factor- α [TNF]) are associated with chronic illnesses including asthma, metabolic syndrome, cancer, and cardiovascular disease (Deraz, Kamel, El-Kerdany, & El-Ghazoly, 2011; Pearson et al., 2003). Inflammation is a short-term immune response intended to mobilize the adaptive immune system to combat foreign microbes. However, under conditions of chronic stress the body shows signs of long-term systemic inflammation, which suppresses adaptive immunity and leads to both acute and

chronic illness (Danese & McEwen, 2012). For example, one study found that individuals who experienced chronic interpersonal stressors, including marital conflict, were more susceptible to the common cold upon exposure to the rhinovirus than individuals who did not experience chronic interpersonal stressors (Cohen et al., 1998). Another study found that low quality marital interactions were associated with greater systemic inflammation. Individuals who were less willing to have others depend on them and who were uncomfortable depending on others showed greater increases in blood levels of IL-6 during a conflict interaction with their spouse than individuals who were comfortable with reciprocal dependence (Gouin et al., 2008). An examination of conflict characteristics found that couples whose arguments were characterized by hostility showed slower wound healing and increased plasma levels of IL-6 and TNF (Kiecolt-Glaser et al., 2005). Taken together, these studies indicate that general perceptions of relationships and interactional hostility predict observable measures of health (e.g., wound healing) and biological markers of physical illness (e.g., inflammation).

In addition to demonstrating that low quality relationships provoke *dysregulation* of biological systems, research also suggests that high quality close relationships promote *regulation* of these systems. One study examined wives' neurological responses to a threatening situation (e.g., receiving a pinprick) under three conditions: a) alone, b) holding the hand of a male stranger, and c) holding their husband's hand. Results showed that women in high quality marital relationships who were holding their husband's hand during the threat condition demonstrated attenuated activation of brain areas associated with threat response (e.g., anterior insula, superior frontal gyrus, and hypothalamus;

Coan, Shafer, & Davidson, 2006). Another study found that women who rated their partner as being highly supportive had higher levels of blood oxytocin and lower blood pressure after a warm interaction than women who rated their partner as being less supportive (Grewen, Girdler, Amico, & Light, 2005). Taken together, these studies indicate that our individual health and well-being is intimately linked to the health of the relationships that surround us, for better or for worse.

It is increasingly recognized that the capacity to form high quality close relationships in adulthood is strongly influenced by the quality of close relationships formed in infancy and childhood (Ainsworth, 1989; Roisman, Collins, Sroufe, & Egeland, 2005). In addition to being a prototype for subsequent close relationships, attachment relationships in infancy are also an external source of emotion regulation that serves as the foundation for an individual's ability to cope with stressful situations (Sroufe, 2005). Hence, attachment theory provides a developmental framework that explains continuity and change in relationships over time, the conditioning of biological stress response systems, and subsequent changes in health status.

Attachment Relationships and Health Outcomes

Attachment is hypothesized to affect physical health through its dual role as the foundations of later close relationships and of individual differences in emotion regulation (Bowlby, 1973; Schore, 2005). Infant attachment reflects the quality of the relationship between a primary caregiver and infant. There are three main classifications of infant attachment, one secure and two insecure. Infants who receive high quality care and who are confident in their caregiver's ability to care for them are classified as secure.

Infants who inconsistently receive quality care and who distrust their caregiver's ability to care for them are classified as anxious-resistant. Infants who consistently receive unresponsive care and are confident that their caregiver will rebuff their requests for care are classified as anxious-avoidant (Ainsworth, Blehar, Waters, & Wall, 1978).

Attachment theory states that patterns of attachment in infancy become internalized as representations reflecting the individual's expectations for the ability of others to care for them and their worthiness of receiving care, affecting the tenor of subsequent close relationships (Main, Kaplan, & Cassidy, 1985). Within the attachment system, the caregiver also serves as an important external regulator of infant arousal. The coping strategies that the infant learns via interaction with the caregiver become internalized (Schore, 2005) and are believed to have far-reaching effects on later health.

Infant attachment classifications have been linked to numerous aspects of social functioning in adulthood that influence health. Individuals who were secure in infancy are more likely to have secure romantic representations, which predict higher quality marriages and also better health outcomes (Crowell, Treboux, & Waters, 2002; Kiecolt-Glaser & Newton, 2001; Roisman et al., 2005). Perceptions of social support are also associated with health outcomes and with infant attachment. Individuals who perceive lower social support are at higher risk for poor health (Cohen & Herbert, 1996). One longitudinal study found that avoidant attachment in infancy predicts lower levels of perceived emotional and instrumental support in adulthood (Puig & Englund, 2011). This study also showed that infant attachment does not predict social network size, suggesting that individuals with a history of avoidant attachment have the same social resources

available to them as their securely attached counterparts but may not be able to recognize or utilize them (Puig & Englund, 2011).

Recent research also provides evidence for the direct link between infant attachment and physical health in adulthood. Findings indicate that insecurely attached individuals are more likely to report a physical illness in adulthood (McWilliams & Baily, 2010; Puig et al., 2013). Studies looking at the quality of early care and physical health in childhood and adolescence have found that low quality early care predicts lower awakening cortisol levels in teenagers (Roisman et al., 2009) and higher rates of childhood obesity (Anderson & Whitaker, 2011). High quality early care serves as a buffer against the development of metabolic syndrome in middle adulthood among individuals who grew up in poverty (Miller et al., 2011). This research is consistent with developmental theories of physical health stating that early relationship experiences influence later health outcomes via the type and quality of relationships that individuals form in adulthood (Miller, Chen, & Parker, 2011; Repetti, Taylor, & Seeman, 2002).

Attachment researchers have moved beyond the behavioral level of analysis to examine the influence that these relationships have on biological systems. The HPA axis, the sympathetic nervous system (SNS), and innate immunity (i.e., inflammation) are sensitive to physical and psychological stressors and also affect health. Studies examining the relation between attachment and HPA axis functioning indicate that individuals who are insecurely attached demonstrate inflexible physiological reactions to stress and/or atypical diurnal cortisol patterns. Research shows that individuals who have higher levels of attachment anxiety have higher cortisol levels than securely attached individuals in

response to an acute social stressor (Quirin, Preussner, & Kuhl, 2008). A study examining stress reactivity and romantic attachment found that insecurely attached individuals showed higher cortisol levels prior to a conflict interaction with their romantic partner (Powers, Pietromonaco, Gunlicks, & Sayer, 2006). Dysregulated HPA axis functioning is an indicator of increased allostatic load (Danese & McEwen, 2012) and is associated with decreased hippocampal volume, tissue breakdown, and increased inflammation (Gunnar & Quevedo, 2007). These studies indicate that individuals who experience sub-optimal attachment may be persistently on guard to general threats in the environment and psychosocial threats in particular. Heightened reactivity to common situations (e.g., fights with a spouse) over a long period of time may undermine the body's reparative abilities and lead to chronic illness (McEwen, 1998, 2000).

Empirical links have also been established between physiological markers of stress (e.g., activity of the SNS) and developmentally informed measures of relationship perceptions, such as adult attachment representations. Infant attachment reflects the quality of sensitive, responsive, and appropriate care an infant receives from his/her caregiver (Ainsworth et al., 1978). Later on, the quality of care is internalized and reflected in the individual's expectations of care and support in close relationships. These expectations are called attachment representations and are assessed with the Adult Attachment Interview (AAI). This interview asks about the individual's relationship with his/her parents when he/she was younger, and classifies their relationship representations as insecure (i.e., dismissing and preoccupied) or secure (Main et al., 1985). In general, insecure attachment styles are associated with inflexible, maladaptive emotion regulation

characterized by dysregulation of the SNS (Schore, 2005; Sroufe, 1995). Individuals classified as dismissing on the AAI showed physiological signs of emotion suppression via higher electrodermal reactivity (EDR); individuals classified as preoccupied on the AAI showed physiological signs of dysregulation via increased heart rate in a conflict interaction with their romantic partner (Roisman, 2007). This study replicated previous research showing that individuals who were dismissing had higher EDR when discussing memories of their primary attachment relationship (Roisman, Tsai, & Chiang, 2004).

As with all developmental phenomena, the influence of attachment on later relationships and physical health is subject to lawful change in light of disconfirming experiences (Sroufe, Egeland Carlson, & Collins 2005; Waters et al., 2000). For example, entering into a supportive romantic relationship may ameliorate the effects of an insecure parent-child relationship. Adolescents' inexperience with close relationships outside of the family of origin may provide individuals with opportunities to change expectations of close relationships (Furman & Simon, 1999), which could affect later relationship quality and physical health.

Adolescent Friendships and Health

Social development spanning childhood to young adulthood is characterized by a gradual expansion from the family of origin to include friends and romantic partners. Furman and Buhrmester (1992) found a general trend between 4th grade and college in which an individual's dependence on his/her parents for support decreases as dependence on friends and romantic partners increases. Research on adolescent social networks sheds light on early patterns of social interaction that may lay the foundations of their level of

social involvement in adulthood. Moreover, adolescent romantic relationship functioning has long been seen as the precursor for adult romantic relationship functioning (Collins & Sroufe, 1999) and also predicts health-altering behaviors (e.g., Kennedy, Tucker, Pollard, Go, & Green, 2011; van Dulmen et al., 2008).

Studies examining adolescent social networks classify individuals as holding one of three positions in a network. Each social position has theoretical implications for adult social functioning and, subsequently, health. These social positions include: a) group members, individuals who are identified by multiple reporters as members of a particular group, b) liaisons, individuals who are not members of specific groups but who connect multiple groups through their associations with members of multiple groups, and c) isolates, individuals who are not connected to any group (Ennett & Bauman, 1996). Researchers of adult social networks have theorized that adolescent social networks indirectly influence adult health because these experiences lay the groundwork for the individual's functioning in adult social groups (Ertel et al., 2009).

Research on movement in social position within adolescent social networks indicates that there is some fluidity, offering individuals an opportunity to change their status, and that these changes do not occur at random. In general, individuals make lateral moves into social positions. That is, isolates become liaisons and liaisons become group members but it is uncommon for isolates to become group members and vice versa (Cairns, Leung, Buchannan, & Cairns, 1995; Ennett & Baumann, 1996). Among social positions, isolates and group members are more likely to maintain their positions while liaisons are most likely to change position (Ennett & Bauman, 1996). Additionally,

isolates tend to be an exceptionally stable group; one study found that the percentage of isolates in a social network remained constant from elementary to high school (Shrum & Cheek, 1987). However, membership in a particular group is less stable across the high school years, a phenomenon driven by liaisons. It peaks during the middle school years and progressively declines throughout high school with a corresponding rise in the number of liaisons in a social system (Shrum & Cheek, 1987). This trend may be beneficial as loosened social structures may give isolates the opportunity to make more friends and establish higher quality relationships.

Social positions in adolescence may have far reaching effects on health and social connectedness in adulthood. Findings from adult social network research suggest the negative health consequences of being an “isolate” as an adult. For example, among college freshman, those who reported the highest levels of perceived loneliness and the smallest social networks had the lowest levels of antibody response to an influenza vaccination; suggesting sub-optimal immune system functioning (Pressman et al., 2005). Self-reported perceptions of loneliness are inversely associated with survival after coronary artery bypass surgery and diagnosis of breast cancer among women (Fox et al., 1994; Herlitz et al., 1998). Above and beyond perceptions of loneliness, objective indicators of isolation such as small social network size and living alone are associated with increased morbidity and mortality among the elderly (Cornwell & Waite, 2009). The stability of the ‘isolate’ social position that has been found in multiple studies suggests that patterns of social isolation and loneliness may be established relatively early in life

and may have far reaching consequences for stress reactivity, immune functioning, and physical health.

Some of the most problematic adolescent social groups are composed of individuals who are aggressive and rejected by peers (Kupersmidt & Coie, 1990). These individuals may form superficial, transient friendships with one another because their antisocial behaviors cause them to be rejected by their more prosocial peers and may prevent them from forming meaningful relationships with each other (Hartup & Stevens, 1999). This pattern of friendship simultaneously prevents them from learning prosocial behaviors and facilitates deviancy training (Dishion, Spracklen, Andrews, & Patterson, 1996). These individuals are more likely to engage in risk-taking behaviors, some of which overlap with poor health behaviors (Moffitt, 1993), and predict poor adult social functioning (Roisman, Aguilar, & Egeland, 2004). These are likely the individuals who vacillate between isolate and liaison status and instigate the normative increase in antisocial behavior among adolescents (Moffitt, 1993).

Adult social network research also hints at the ways in which grown-up “liaisons” may enjoy good health through their social ties. It has been noted that the friendships of liaisons closely resemble adult friendships, as these individuals are able to maintain connections with people from numerous groups (Shrum & Cheek, 1987). This experience with relationships across groups may be a precursor to adult social network integration that, in turn, predicts good physical health outcomes (House et al., 1988). Similarly, group members may also enjoy good health through their social ties. Group membership provides adolescents with the security of having a relatively stable set of friends on which

they can depend. This stability may predict greater social network connectivity in adulthood and better health outcomes. It is also important to note that adolescent dating typically takes place within the context of social groups (Connolly, Furman, & Konarski, 2000). Group members and liaisons may also benefit from having access to romantic partners and acquiring the requisite experiences to help them foster the high quality adult romantic relationships that are associated with good physical health.

Taken together, these studies on adult and adolescent social networks suggest ways in which adolescent social networks influence individual adult health through establishing norms of adult social behavior. Individuals identified as group members and liaisons in adolescence may enter adulthood with the ability to make and maintain friendships individually and in the context of a group. These experiences may help these individuals foster high quality relationships and maintain involvement in social activities that are associated with good health in adulthood. Conversely, those adolescents identified as isolates may enter adulthood with a less robust relationship history making them less able to form high quality relationships and less likely to participate in social groups in adulthood, which may result in poorer health. It is also noteworthy that adolescent social groups may influence the quality of adult romantic relationships, which is a strong predictor of health, as these groups are main context in adolescent dating occurs (Connolly et al., 2000).

Adolescent Romantic Relationships and Health

Adult romantic relationship functioning can be considered the dynamic endpoint of an emergent process that has its roots in infancy but undergoes a period of rapid

development in adolescence (Ainsworth, 1989; Collins, 2003). Romantic relationships quickly take center stage in the adolescent's social world after a developmental period characterized by gender segregation (Maccoby, 1990). Research indicates that by age twelve 25% of adolescents report having had a 'special relationship' in the past 18 months, this jumps to 50% by age 15, and increases to 70% by age 17 (Carver, Joyner, & Udry, 2003). Furthermore, romantic partners become an increasing source of social support across adolescence and are the main source of support for young adults (Furman & Buhrmester, 1992). Romantic relationship functioning in adolescence has been associated with several physical health related outcomes including adult romantic relationship functioning, mental illness, and risk taking behaviors.

Characteristics of adolescent romantic relationships have important associations with the quality of adult romantic relationships. One longitudinal study found that individuals who had many dating partners in mid-adolescence were more likely to have young adult romantic relationships characterized by negative affect and low quality interactions (Madsen & Collins, 2011). Conversely, individuals who experienced high quality romantic relationships in mid-adolescence were more likely to have young adult romantic relationships that were also high quality and low in negative affect (Madsen & Collins, 2011). Another longitudinal study found that individuals who had preoccupied attachment representations in adolescence were more likely to physically and verbally aggress towards their romantic partner and that individuals who had dismissing representations were more likely to experience verbal and physical aggression in their romantic relationships (Miga, Hare, Allen, & Manning, 2010). These studies suggest that

the characteristics of marital relationships that predict poor physical health (e.g., high hostility and high negative affect; Gouin, Kiecolt-Glaser, Malarkey, & Glaser, 2008) begin to take shape in adolescent romantic relationships.

Adolescent romantic relationships have been found to have direct effects on mental health problems that, in turn, negatively impact physical health. One of the most enduring findings in this literature is the association between involvement in romantic relationships and depression among early adolescent girls (Joyner & Udry, 2000). This association has important health implications due to the links between depression, HPA axis dysfunction, and increased inflammation (Burke, Davis, Ottee, & Muhr, 2005; Miller & Blackwell, 2006). Furthermore, earlier onset of depression predicts greater lifetime incidence of major depressive episodes (Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993) and may also predict greater dysregulation of these biological processes.

Romantic relationships are associated with externalizing behaviors, many of which overlap with health-risk behaviors (e.g., smoking, drinking, drug use, and unprotected sex; Hill, Degnan, Calkins, & Keane, 2006; Silk, Steinberg, & Morris, 2003). One longitudinal study found that late adolescents who were in romantic relationships characterized by high security were less likely to have externalizing problems in young adulthood (van Dulmen et al., 2008). Other longitudinal data indicate that general attachment insecurity in adolescence was linked to increasing patterns of externalizing behavior across adolescence (Allen, Porter, McFarland, McElhaney, & Marsh, 2007). A study of children with both childhood onset and adolescent onset antisocial behavior found that individuals in both of these groups were more likely to experience low quality,

high conflict romantic relationships in adolescence than children who were not antisocial (Woodward, Fergusson, & Horwood 2002). Researchers examining data from the National Longitudinal Study of Adolescent Health have found that having a partner who smokes decreases rates of cessation among previous smokers and increases the likelihood of smoking among non-smokers (Kennedy et al., 2011). Taken together, these studies indicate that romantic relationships can exacerbate externalizing problems and increase health-risk behaviors.

Adolescence and young adulthood are the developmental periods in which people seek out their identity and prepare themselves for adulthood (Arnett, 1999; Erickson, 1963). It is filled with new experiences, new responsibilities, and new opportunities for growth that may lay the foundation of health and relationship functioning in adulthood (Berkman, Glass, Brissette, & Seeman, 2000). Social position in adolescent social networks may influence adult physical health through the establishment of individual norms for adult friendship interaction and group membership (Cacioppo et al., 2000; House et al., 1988). Adolescent romantic relationship functioning may influence health via a variety of means including: influencing adult romantic relationship functioning (Madsen & Collins, 2003), affecting health-risk behaviors (Silk et al., 2003), and affecting the onset of mental illnesses that have been linked to poor physical health (Joyner & Udry, 2000). Although the quality of adolescent friendships and romantic relationships has been linked to the quality of earlier parent-child relationships (Collins & Sroufe, 1999), the capacity for change has been highlighted in several of the aforementioned studies. For example, Cairns and colleagues (1995) noted that social

positions in adolescent social networks are fluid and present opportunities for isolates to become affiliated with a group as a liaison. Furthermore, adolescent romantic relationship researchers have hypothesized that adolescents' inexperience in these relationships provides an opportunity for individuals to change their expectations of close relationships (Furman & Simon, 1999), which could affect the quality of later marital relationships and physical health. It is through this capacity for change that adolescent friendships and romantic relationships may have a unique influence on subsequent close relationships and adult physical health. Unfortunately, this crucial link in the developmental theory of chronic illness development is yet to be elucidated.

Other Broadband Predictors of Health

In addition to social functioning, other broadband risk factors for adult physical illness have been identified in the literature, such as socio-economic status (SES) and history of physical health. There is a clearly defined dose-response relationship between physical illness and SES, such that individuals who are of lower SES are more likely to experience chronic illnesses (Kittelson, et al., 2006) and increased morbidity and mortality (Chen, Matthews, & Boyce, 2002; Matthews & Gallo, 2011; McLoyd, 1998). Furthermore, each of the individual components that are traditionally composited to calculate SES have been independently associated with poor health outcomes; namely, less education, lower job status, and low to no income (Matthews & Gallo, 2011).

There are several theories regarding the mechanism through which low SES influences health outcomes. Gallo and colleagues (2005) found that individuals with low SES might be more vulnerable to psychological distress due to greater exposure to

traumatic life events, greater perceived stress, and increased daily hassles. Research has also found that individuals with low SES have fewer psychological resources including lower levels of perceived support and social capital at the community level (Gallo & Matthews, 2003). Taken together, these studies indicate that individuals with low SES experience greater stress and have fewer resources to buffer the effects of stress, which may lead to poor health (Cohen & Willis, 1985). Researchers have also become more interested in examining the sequelae of low childhood SES on adult health outcomes. The biological embedding of early experience theory of physical health provides a developmental framework that connects these theories mechanistically and across time by linking low SES to physical illness via biological stress response systems. This theory identifies low SES in childhood as a toxic stress that dysregulates biological stress response systems and leads to poor health in adulthood (Miller, et al., 2011; Miller, et al., 2009). Finally, a study by Luo and Waite (2005) points to another, albeit related, way in which low childhood SES influences adult health. This study found that the relation between low childhood SES and adult health was partially mediated by childhood illness.

Research indicates that a history of childhood illness is associated with greater functional limitations among the elderly, increased symptoms of metabolic disorder, and increases the risk for chronic illnesses like cancer, lung disease, cardiovascular disease, and rheumatism (Blackwell, Hayward, & Crimmins, 2001; Margolis, 2010; Haas, 2008). Furthermore, some studies indicate that the effect of low childhood SES on later health outcomes is mediated by childhood health because families with lower SES have limited access to health care (Bradley, & Corwyn, 2002; Heck & Parker, 2002). Taken together,

research indicates that SES, physical health, and social functioning interact in complex ways across time to predict adult health outcomes. However, few studies have compared the independent and transactional effects of these factors across time to determine which of these factors is most predictive of adult physical health.

Current Study

Close relationships in adolescence and young adulthood have clear theoretical implications for physical health. To date, no research has examined the relations between these relationships and adult physical health. The current study fills this gap in the literature through prospectively examining the predictive power of three different types of close relationships at developmentally salient time points in adolescence and young adulthood; parent-child social functioning at age 13, friendship functioning at age 16, and romantic relationship functioning at ages 23 and 32. The types of relationships examined and the specific ages at which they were examined were based on developmental research indicating that early adolescence is a time when people rely on parents for social support, middle adolescence is a time when people rely on close friendships for support, and late adolescence/young adulthood is a time when people begin to rely on romantic partners for support (Furman & Buhrmester, 1992). Socioeconomic status and physical health across development will be included in the models in order to provide discriminant validity for the hypotheses that adolescent social functioning predicts to adult physical health above and beyond the effects of SES and history of physical health.

The current study examines the longitudinal impact of social functioning, socioeconomic status, and physical health beginning in infancy and extending to

adulthood predicting to adult physical health. A series of nested models were tested predicting to physical health in adulthood evaluating within-domain stability across time (Model 1; see Figure 1), cross-lag effects of the transactions between (a) SES, physical health, and later social functioning, (b) physical health on later social functioning, and (c) social functioning on later SES (Model 2; see Figure 2), the direct effect of adolescent parent-child, friendship, and young adult romantic relationship social functioning on adult physical health (Model 3; see Figure 3), the direct effect of infant social functioning on adult physical health (Model 4; see Figure 4), and mediational effects between infant, year 13 parent-child, year 16 friendship, and year 23 romantic relationship social functioning and adult physical health (Model 5; see Figure 5).

The following hypotheses were made:

- 1) Rank order stability will be observed in social functioning, physical health, and SES from infancy to adulthood. Adult romantic relationship social functioning, young adult self-report of physical health, and adult SES will predict adult physical health.
- 2) Cross-lag relations between SES and physical health will be similar to that observed in earlier studies (Chen et al., 2002); specifically, there will be a transactional relation with lower SES predicting poorer health and vice versa across time. Relations between physical health and social functioning will be consistent with previous studies showing that poorer social functioning is associated with poorer health (Cohen, 2004; Cohen, Janicki-Deverts, & Miller, 2007); this relation will be transactional across time with poor health predicting

later low social functioning and vice versa. Consistent with research on relationship quality and economic difficulties (Dakin & Wampler, 2008; Zagorsky, 2003) SES will predict social functioning and social functioning will, in turn, predict later SES (Conger, Conger, & Martin, 2010).

- 3) Higher adolescent parent-child, friendship, and young adult romantic relationship social functioning will predict reporting fewer illnesses in adulthood.
- 4) Consistent with previous research (Puig et al., 2013) continuous secure attachment in infancy will predict reporting fewer illnesses in adulthood. The relations between adolescent and young adult social functioning and health will remain significant.
- 5) Meditational analyses will show that the relation between infant attachment and physical health will become non-significant when the association between infant social functioning and adolescent/young adult social functioning is entered into the model.

Methods

Participants

Participants in this study are a sub-sample from the *Minnesota Longitudinal Study of Risk and Adaptation* (MLSRA). Two hundred and sixty-seven primiparous low-income mothers who were receiving pre-natal care from Minneapolis Public Health clinics were recruited to participate in the study during the years 1975-1977. Although attrition in the first year of the study was high (21%), it has remained relatively stable in the subsequent 33 years averaging about .5 of 1% each year. Initial attrition was due to a

combination of high residential instability and loss of contact. Attrition in the current sample is largely due to loss of contact and declining to participate. The current participants are the first-born children of these mothers who have been followed since birth. Physical health outcome data were gathered from the two most recently completed assessments, which took place at year 32 and year 34 ($N = 167$). Demographic data from the sample indicate that 49.7% of the current sample is female ($N = 83$). The ethnic composition of the sample is predominantly Caucasian (66.5%), 10.2% of the sample is African American, 18% of the sample is multiracial, 2.4% of the sample are other ethnicities, and ethnic data for 3% of the sample is missing due to unknown race of fathers (see Table 1 for birth demographics). Demographic information regarding educational attainment, marital status, employment, and household income of the sample at ages 32 and 34 years can be found on Table 2.

Analyses were run comparing individuals who were in the study at age 32 and 34 years versus those who dropped out of the study at earlier time points on the following variables: gender, race, maternal age at birth, and maternal education. Results indicated that individuals whose mothers were younger at the time of birth were less likely to continue their participation in the study ($F = 3.90, p < .05$), as were individuals whose mothers had less education at the time of their children's birth ($F = 4.90, p < .05$). Females were more likely to continue participating in the study ($\chi^2 = 4.46, p < .05$). No significant differences for continued participation were found on race or maternal marital status at birth. As a result of these analyses, gender was included as a control variable in all analyses. Maternal age and education at birth were not used as controls due to the high

correlations of these variables with prenatal SES ($r_{education} = .60, p < .001$; $r_{age} = .43, p < .001$), which was already included in the analyses.

Comparative analyses were conducted examining the difference between participants who had passed away before the year 32 and year 34 assessments and those who were alive (to our knowledge). No significant differences were found between those participants who were alive and those who had passed away on race, maternal marital status at birth, maternal age at birth, and maternal education at birth. Males were more likely to have passed away before the year 32 and year 34 assessments than females.

Measures

Data for this study were collected from multiple informants at multiple levels of analysis across time. Information about social functioning was coded from videotaped observations and audiotaped interviews. Physical health was assessed via hospital records and self-report. Finally, information about SES was composited based on questionnaire data. Table 3 reports the means and standard deviations of all independent, dependent, and control variables used in this study.

Social Functioning. In this study social functioning is conceptualized as functioning in parent-child relationships in infancy and at age 13 years, friendships at age 16 years, and romantic relationships at ages 23 and 32 years. Parent –child relationship functioning was coded from videotaped interactions and relationship functioning at subsequent ages was coded from audio-recorded interviews. Table 4 presents correlations between social functioning composite variable components. Within each time period, composite components are moderately to highly correlated with each other. Descriptive

statistics for the components of the social functioning composite variables are detailed on Table 5. The interested reader is referred to Appendix C for the descriptions and coding schemes of the social functioning composite components.

Infant social functioning. The quality of the parent-child relationship in infancy was assessed with the Ainsworth Strange Situation Procedure (SSP) when participants were 12 and 18 months old. The SSP is a 20-minute laboratory procedure during which the infant is exposed to a series of stressful separations from and reunions with his or her primary caregiver (see Ainsworth et al., 1978). Certified raters classified each participant's attachment relationship with his/her primary caregiver as secure or insecure: anxious-resistant or anxious-avoidant at both time points. Classifications were coded based on how each participant responded to separations and reunions with his/her mother. Rater agreement for attachment classification at 12 months was 89% and was 93% at 18 months (Egeland & Farber, 1984). The stability of attachment security was calculated by summing the number of times each infant was classified as secure at the 12 and 18-month SSP assessments. Secure attachment was coded 1, and insecure attachment (anxious-avoidant and anxious-resistant) was coded 0 at both the 12 and 18-month assessments. Thus, individuals with a score of 2 were securely attached at both time-points ($N = 66$, 41%), individuals with a score of 1 were securely attached at one time-point ($N = 53$, 33%), and those with a score of 0 were insecurely attached at both time-points ($N = 42$, 26%). Given that this aggregate variable is less prone to measurement error than one individual assessment, it may be a more psychometrically sound measure of attachment security than a measure at one time point.

Year 13 social functioning. The quality of the parent-child relationship in adolescence was assessed via observer ratings of structured interactions between the child and one or both parents at age 13. The interactions were videotaped and coded by trained graduate student researchers to assess different aspects of the parent-child relationship. The following codes were included in the year 13 social functioning composite variable: Emotional Engagement, Positive Affectivity, Balance I, and Conflict Resolution (see Table 6 for a description of the component codes). All scales featured seven points, with higher numbers indicating higher levels of the variable assessed. Two trained coders coded all interviews, inter-rater reliability analyses were run on 100% of the interviews and all final codes were group conferenced. The inter-rater reliabilities ranged from .60 to .68. A principle components analysis was run on the sample of participants who participated in this assessment ($N = 129$) for the purpose of data reduction. A single component emerged including all four scales loading above .75; these scales were composited by arithmetic averaging.

Year 16 social functioning. The quality of participant's friendships in adolescence was assessed via coder ratings of interviews conducted at age sixteen. Trained graduate student coders rated audio recordings of the interviews focused on different aspects of the participants' best friendships. The following scales were used in the year 16 social functioning composite variable: Enjoyment, Disclosure, Conflict Resolution, Security, and Closeness (see Table 6 for a description of the component codes). All scales had seven points; higher scores on each scale indicated better functioning. Two trained coders coded all interviews, inter-rater reliability analyses were

run on 100% of the interviews and all final codes were group conferenced. Cronbach's α ranged from .47-.73 for these ratings. A principle components analysis was run on the sample of participants who participated in this assessment ($N = 165$) for the purpose of data reduction. A single component emerged including all five scales loading above .86; these scales were composed by arithmetic averaging.

Year 23 social functioning. At age 23 years, participants were interviewed about their romantic relationships if they were in a relationship at the time of the interview that was at least of four months duration. Trained graduate student coders rated audio recordings of these interviews on different aspects of the participant's current romantic relationship. The following codes were used in the year 23 social functioning composite variable: Security, Enjoyment, Effectiveness of Engagement, and Conflict Resolution (see Table 6 for a description of the component codes). All scales featured 5 points and higher scores indicated better functioning. Two trained coders coded all interviews, inter-rater reliability analyses were run on 100% of the interviews and all final codes were group conferenced. ICC's ranged from .94 - .99 for these ratings. A principle components analysis was run on the sample of participants who participated in this assessment ($N = 148$) to reduce the data. A single component emerged including all five scales loading above .85; these scales were composed by arithmetic averaging.

Year 32 social functioning. During the year 32 assessment, individuals who had been in their current romantic relationship for six months or longer were asked questions about the characteristics and quality of the relationship. Graduate and undergraduate student researchers rated audio recordings of interviews on coding scales focused on their

current romantic relationship. The following scales were used in the year 32 social functioning composite variable: Enjoyment, Security, Effectiveness of Conflict Resolution, and Effectiveness of Engagement (see Table 6 for a description of the component codes). All scales had five points. Higher scores on these scales indicate better functioning. A subset of interviews (20%) was coded for reliability and ICC's for these rating scales ranged from .95 to .98. A principle components analysis was run on the sample of participants who participated in this assessment ($N = 164$) for the purpose of data reduction. A single component emerged including all seven scales loading above .87; these scales were composited by averaging.

Socioeconomic Status. Socioeconomic status (SES) for the participant's families was assessed prenatally, at age 16, and at age 32. SES was calculated at each time point as a composite of three variables: highest education level attained, household income, and occupational prestige. Job prestige was coded using the Duncan Socioeconomic Index (SEI; Duncan, 1961; Stevens & Featherman, 1981). If a participant reported that his or her partner contributed to the household income, the highest educational level and the highest occupational prestige between the two partners were used in the composite. Household income was calculated by summing maternal and partner income for the prenatal and year 16 SES composites. Participant and partner incomes were summed to calculate the household income for the year 32 SES composite.

Physical Health. Physical health in this study was measured at several time points including birth, adolescence, young adulthood, and adulthood. Measures of birth health risk were derived from hospital records of participant's births. A self-report health

question captured participant's perceptions of their health in adolescence and young adulthood. In adulthood participants were asked to report on whether they had been diagnosed with or treated for specific physical illnesses.

Birth Risk. Medical records documenting the participant's birth were reviewed for risk factors associated with later health outcomes. These risk factors included: low average 1 and 5 minute Apgar scores, low birth weight, premature delivery, use of forceps during delivery, pregnancy complications, labor and delivery complications, and infant anomalies (Barker et al., 1993; Casey, McIntire, & Leveno, 2001; Kramer et al., 2000; Torfs, van den Berg, Oechsili, & Cummins, 1990). Please refer to Table 7 for correlations between the binary birth risk variables. The correlations between birth risk variables ranges from zero to moderate in magnitude, suggesting that each may account for a unique proportion of the variance of early health risk. Table 8 features a full list of conditions included in the pregnancy complications, labor and delivery complications, and infant anomaly variables. A cumulative birth risk factor was calculated by assigning each risk factor a value of '1,' indicating that the complication had occurred or '0,' indicating that the complication had not occurred; the variable ranged from 0-7.

Adolescent/young adult health. Responses to a general self-reported health question were used as a proxy for physical health in adolescence (age 16) and young adulthood (age 26). During the year 16 and year 26 assessments participants were administered a revised version of the Adolescent Health Survey (Blum, Resnick, & Bergeisen, 1989). At age 26 the Adolescent Health Survey was updated to reflect adult health concerns and was re-named the Adult Health Survey. Table 9 contains a summary

of participant's responses at ages 16 and 26. Answers to the self-report health question were coded such that higher scores reflect poorer subjective health (e.g., 4 = "poor," 3 = "fair," 2 = "good," 1 = "excellent"). Research indicates that responses to this question significantly predicted mortality (DeSalvo, Bloser, Reynolds, He, & Muntner, 2005).

Adult Physical Health. At ages 32 and 34 years participants were administered the aforementioned Adult Health Survey. During the year 32 assessment, participants reported whether or not they experienced a number of physical ailments in the preceding 12 months. During the year 34 assessment physical health was assessed with an open-ended question: "In the past two years, have you been diagnosed or treated for a physical or mental health problem?" Reports of *unique* illnesses were summed across time points to create a count variable reflecting the number of physical illness the participant reported at years 32 and 34.

Control variables. Several covariates were identified based on pre-established associates with poor physical health in the literature (e.g., BMI and Neuroticism; Charles, Gatz, Kato, & Pedersen, 2008; Mokdad, Marks, Stroup, & Gerberding, 2005). The remaining covariates were identified due to their correlations with study variables (e.g., gender and race).

Body Mass Index. During the year 32 and year 34 assessments, each participant reported his or her height (without shoes on) and weight, from which a Body Mass Index (BMI) was calculated using the following formula (Center for Disease Control, 2011):

$$\text{BMI} = \text{weight(lb)} * 703 / [\text{height (in)}]^2$$

BMI is associated with increased morbidity and mortality (Mokdad et al., 2005), and it has been linked to the number of environmental changes that have occurred during individuals' lives (Swinburne et al., 2011). The variable used in the current study is an average of year 32 and year 34 BMIs.

Neuroticism (32 years). Negative emotionality was assessed by the Berkeley Personality Profile (BPP; Hararay & Donohue, 1994), a self-report questionnaire. Studies comparing the BPP to other personality profiles (e.g., the NEO Five Factor Inventory; Costa & McCrae, 1985) and the SONSO personality inventory (Kentle, 1994) confirm that the BPP's measure of neuroticism is highly correlated with other neuroticism measures ($r > .70$ for all measures; Kentle, 2002). Questions were asked about emotion regulation abilities and feelings of depression and anxiety ($\alpha = .84$). Participants' self-ratings of neuroticism were moderately correlated with their reports of physical illness in adulthood ($r = .28, p < .01$).

Gender: In previous studies of social functioning and physical health from the MLSRA, gender has been associated with adult physical health (Puig et al., 2013). Furthermore, male gender was associated with greater study attrition and general morbidity for the full study sample. Males were coded '1' and females were coded '2'.

Race: Participant ethnicity was coded as a binary variable in which "1" represents Caucasian and "0" represents all other ethnicities.

Procedures for the 32 and 34-year assessments

Initial consent to participate was provided by participant's mothers when they were infants; participants have given their consent at each assessment wave since they

were 13 years old. The year 32 assessment featured interviews and questionnaires administered by trained graduate students and staff. The interview and questionnaire packet took 2.5-3 hours to complete. Information on romantic relationships, parenting experiences, work, education, and health (both physical and mental) were also gathered. Assessments took place at the University of Minnesota, in participants' homes, or over the phone, depending on the situation. Each participant received \$100 for participating in the assessment.

The year 34 assessment consisted of a 30-minute phone interview in which information regarding the participants' living arrangements, romantic relationships, occupation, education, health, and stressful life events was collected. Participants were compensated \$30 for their time.

Data Analysis Plan

Data analysis proceeded in two steps. First, correlations were run to identify covariates. Second, four nested path analysis models were tested using MPlus version 7.1 (Muthén & Muthén, 1998-2012). Two-part models with an integration algorithm were used due to the zero-inflated nature of the outcome variable; approximately 50% of the sample ($N = 84$) did not report experiencing any physical illness at age 32 and/or age 34. The two-part model provides results predicting to binary outcomes (e.g., reporting an illness vs. reporting no-illnesses) and continuous outcomes (e.g., the number of illnesses people reported) simultaneously. The total amount of missing data was 4.7% with a range of 0-13.2%. To account for missing data, a maximum likelihood with robust standard errors (MLR) estimator was used.

The first model (within domain) examined the stability of relationship quality, physical health, and socioeconomic status over time as predictors of adult physical health. The within domain model is nested within all subsequent models. Intercorrelations between variables at the same time points (e.g., age 16 social functioning, SES, and health) were included in this and all subsequent analyses. The second model (cross domain) examined the cross-domain relations between relationship functioning, health, and SES. This model examined the processes through which these variables interact over time to predict adult health. The third model (adolescent/young adult direct effects) tested the hypothesis that the quality of adolescent parent-child relationships, friendships, and young adult romantic relationships exerted a direct influence on adult physical health. The fourth model (early effects) tested the hypothesis that the quality of infant relationships had a direct effect on adult physical health outcomes in addition to any direct effects from social functioning at ages 13, 16, 23, and 32. The fifth model (mediational effects) examined whether the association between infant social functioning and adult physical health was mediated by year 13, 16, or 23 social functioning.

Results

Correlations

Zero-order correlations are enumerated in Table 10. Female gender, fewer secure attachment classifications in infancy, lower relationship functioning at age 23, lower subjective health ratings at age 26, higher average BMI in adulthood, and higher neuroticism at age 32 were associated ($p < .05$) with reporting more physical health problems in adulthood. Race was found to be a significant predictor of attrition in the

overall sample. Gender and race were statistically controlled in all analyses. BMI and neuroticism were controlled in paths predicting directly to adult health outcomes.

Path Analysis

The relative fit and model comparison tests using chi-square difference testing with robust estimation (Muthén & Muthén, 1998-2012) for the models are reported on Table 11. The model comparison tests between Model 1 (the within domain model) and Model 2 (the cross domain model) found that Model 2 was a significantly better fit than Model 1 ($\Delta\chi^2(21) = 49.54; p < .001$). Tests comparing Model 2 (the cross domain model) to Model 3 (the adolescent/young adult direct effect model) found no statistically significant difference between the models. Model comparison tests between Model 3 (the adolescent/young adult direct effect model) and Model 4 (the infant direct effect model) found that Model 4 was a significantly better fit than Model 3 ($\Delta\chi^2(2) = 7.2; p < .05$). An additional model comparison test was run to compare the fit between Model 2 (the cross domain model) and Model 4 (the infant direct effect model); results indicated that Model 4 was a significantly better fit than Model 2 ($\Delta\chi^2(8) = 16.05; p < .05$). Model 5 was not run as none of the adolescent or young adult social functioning variables significantly predicted to adult health. Model 4, which found that individuals who were continuously securely attached in infancy were less likely to report a physical illness in adulthood above and beyond the influence of later social functioning, adult perceptions of physical health, and adult SES, was determined to be the best fitting model.

Results from path analysis and model comparison testing revealed that the continuity of infant attachment directly predicts the likelihood of reporting a physical

illness in adulthood above and beyond the direct effects of adolescent, young adult, and adult relationship functioning, subjective report of young adult physical health, and adult SES. Table 12 features the standardized and unstandardized parameter estimates, standard errors, and 95% confidence intervals for the infant direct effect model (Model 4). Figure 6 shows the standardized path coefficients for significant paths for the binary and continuous adult physical health outcomes for the infant direct effect model (Model 4). Readers interested in the results from the path analyses run on Models 1-3 are referred to Figures 5-7 in Appendix D. Paths that were not statistically significant ($p < .05$) and significant paths from the covariates were omitted.

Hypothesis1, which examined rank-order stability of social functioning, SES, and Health, was partially supported. Socio-economic status was the only construct that demonstrated continuous stability across the time span under investigation (see Table 12 and Figure 1). Prenatal SES predicted year 16 SES ($\beta = .36, p < .001$) and year 16 SES predicted year 32 SES ($\beta = .42, p < .001$). Year 32 SES did not predict adult physical health outcomes. Within the physical health pathway, year 26 subjective report of physical health predicted the likelihood of reporting a physical illness in adulthood ($\beta = .22, \text{OR} = 2.06, p < .05$). Individuals who rated themselves as having poorer health at age 26 were *two times* more likely to report a physical illness in adulthood than those who rated themselves as having better health. Within the social functioning pathway, higher quality friendships at age 16 significantly predicted higher quality romantic relationships at age 23 ($\beta = .25, p < .001$) and these relationships at age 23 significantly predicted high

quality romantic relationships at age 32 ($\beta = .30, p < .001$). Year 32 romantic relationship functioning did not significantly predict adult physical illness.

Hypothesis 2, which examined the transactional relations between SES, social functioning, and health was partially supported (see Table 12 and Figure 1). As hypothesized, higher prenatal SES predicted continuity of secure attachment classification in infancy ($\beta = .20, p < .001$) and higher SES at age 16 predicted higher quality romantic relationships at age 32 ($\beta = .15, p < .05$). Paths between social functioning and later SES were also significant. Specifically, higher quality parent child relationships at age 13 predicted higher familial SES at age 16 ($\beta = .23, p < .001$) and higher quality romantic relationships at year 23 predicted higher participant SES at year 32 ($\beta = .17, p < .05$). Hypotheses regarding the associations between physical health and social functioning were partially supported. When considering these results, it is important to remember that the year 16 and 26 physical health variables were reverse coded (see Methods section for explanation). Lower ratings of poorer subjective health (i.e., better health) at year 26 significantly predicted higher quality romantic relationships ($\beta = -.17, p < .05$). The hypothesized transactional relations between physical health and SES were partially supported as well. Lower ratings of poorer subjective health (i.e., better health) at age 26 were associated with higher SES ($\beta = -.20, p < .001$) at year 32.

Hypothesis 3, which examined the direct effects of adolescent and young adult relationships on the likelihood of reporting a physical illness in adulthood, was not supported. There were no significant findings after the direct effect of infant attachment was entered into the model (see Table 12 and Figure 1).

Hypothesis 4, which stated that social functioning in infancy has a direct effect on adult physical health was supported. Results indicated that individuals who were securely attached at both 12 and 18 months were less likely to report a physical illness in adulthood than those who were insecurely attached at one or more time points in infancy ($\beta = -.23$, OR = .55, $p < .001$). Other significant predictors of the likelihood of reporting a physical illness in adulthood included Caucasian ethnicity ($\beta = .20$, OR = 2.5, $p < .05$) and BMI ($\beta = .29$, OR = 1.10, $p < .01$). The only significant predictor of the number of physical illness reported in adulthood was female gender ($\beta = .29$, $p < .05$).

Hypothesis 5, which stated that the relation between infant social functioning and adult physical health is mediated by adolescent and young adult social functioning, was not supported. In order for a mediation to occur there must be a direct relation between both infant social functioning and one of the adolescent/young adult social functioning variables. The non-significant findings from Model 3, the direct effect of adolescent/young adult social functioning model, obviated the need for mediational analyses.

Post-Hoc Analyses

The previous analyses determined that infant social functioning predicted the likelihood of reporting a physical illness in adulthood above and beyond the effect of young adult self-report health and adult SES. To verify that attachment predicted above and beyond early measures of health and SES, path analyses were run examining the direct effect of infant social functioning, birth health risk, and prenatal SES. Results from this analysis found that the effect of infant social functioning ($\beta = -.26$, OR = .49, $p < .01$) on the likelihood of reporting a physical illness in adulthood remained significant above

and beyond the effect of birth health risk ($\beta = .03$, OR = 1.05, $p = .75$) and prenatal SES ($\beta = .15$, OR = 1.41, $p = .07$). Neither infant social functioning, birth health risk, nor prenatal SES predicted the number of physical illnesses reported in adulthood.

Discussion

Recent life-span models of the development of chronic illness in adulthood postulate that early life psychosocial experiences influence later health outcomes because these experiences shape both later social functioning and biological stress-response systems (Miller et al., 2011; Repetti et al., 2002). Although these life-span models highlight the importance of early experience in shaping later development, they neglect to account for changes in social functioning that can alter developmental pathways (Cicchetti, 1984; Sroufe, 1997). This prospective longitudinal study sought to contribute to a more developmentally sound theory of adult chronic illness by examining the effect of adolescent and young adult social functioning on adult physical health outcomes, above and beyond the influence of early life social functioning. Furthermore, this study is among the first to examine the relative influence of several broadband risk factors of physical illness in adulthood (e.g., social functioning, SES, and physical health history), in order to determine which factor is the strongest predictor. Four nested, two-part path models were compared examining potential pathways between social functioning, physical health, and SES across development and predicting to adult physical health. The main hypotheses of this study were that adolescent and young adult social functioning would have a direct effect on adult physical health and that the relation between infant social functioning and adult physical health would be mediated through adolescent and

young adult social functioning. Contrary to these hypotheses, attachment in infancy was the only significant social functioning predictor of adult physical health. Furthermore, the best fitting model was the infant social functioning direct effect model in which individuals with continuously secure attachment in infancy were less likely to report a physical illness in adulthood.

Hypothesis 1, stating that rank order stability would be observed in social functioning, SES, and physical health across time, was partially supported. Within the SES pathway, higher parental prenatal SES predicted higher parental SES in adolescence, which, in turn, predicted higher participant SES in adulthood. This result is consistent with research indicating that children who experience low parental SES in early and middle childhood are more likely to experience low SES later in development (Brooks-Gunn & Duncan, 1997; Duncan, Yeung, Brooks-Gunn, & Smith, 1998). It is important to note that rank-order stability of SES was maintained despite the homogeneity of SES in the original sample. The original participants were selected on the basis of low-income, as evinced by receiving prenatal care in a public health clinic, and these results suggest that individuals born into the lowest socioeconomic strata were more likely to remain there in adulthood. Some mechanisms through which low SES is maintained have been identified in the literature. Children who experience low SES, particularly in the preschool and early school years have lower academic achievement, are more likely to experience teenage out of wedlock parenthood, and are more likely to suffer from behavioral and emotional problems, all of which have been associated with lower SES (Brooks-Gunn & Duncan, 1997).

Rank-order stability of social functioning from infancy to adulthood was partially supported. Results showed that higher adolescent friendship social functioning predicted higher romantic relationship social functioning in young adulthood, which later predicted higher romantic relationship social functioning in adulthood. These results are consistent with previous research indicating that the quality of adolescent friendships and young adult romantic relationships predicts the quality of adult romantic relationships (Madsen & Collins, 2011; Simpson, Collins, Tran, & Haydon, 2007).

Stability of physical health across development was also partially supported. Within the domain of physical health, only young adult self-report physical health predicted to adult physical health. This finding is consistent with studies showing that, among adult populations, self-reported perceptions of health are associated with morbidity and mortality (DeSalvo et al., 2005). Contrary to hypothesis and to previous research (Barker et al., 1993), however, early life health did not predict to self-reported health in adolescence or physical illness in adulthood. These findings were puzzling in light of prior research indicating that perinatal health is a strong predictor of adult health (e.g., Barker et al., 1993; Roseboom et al., 2000). In an effort to identify possible causes for these non-significant findings, analyses were run using an attenuated birth risk variable under the assumption that conditions included in the pregnancy, labor and delivery, and infant anomaly risk factors were poorly specified. The attenuated birth risk variable included Apgar scores, use of forceps, low birth weight, and premature delivery. Results from analyses with the attenuated birth risk variable were identical to results with the full birth risk variable. Given that at least 50% of the sample consistently reported

themselves to be in “good” or “excellent” health and did not report a physical illness at year 32 or year 34, it is possible that the sample is not old or sick enough for this association to be statistically significant.

Hypothesis 2, stating that transactional pathways between social functioning and health, social functioning and SES, and SES and health would be significant across time was also partially supported. Paths between SES and social functioning indicated that higher prenatal SES predicted continuity of secure attachment in infancy. Year 13 parent-child social functioning predicted year 16 parental SES, which, in turn, predicted year 32 romantic relationship functioning above and beyond both 23 year young adult romantic relationship functioning and the concurrent effect of year 32 SES. These results are consistent with the Family Stress Model proposed by Conger and Elder (1994), which states that economic problems lead to increased marital discord and place a strain on the family unit. This model completes the transactional loop by stating that distressed family and marital relationships make it more difficult for individuals to make sound economic decisions, which further deepens their economic distress (Conger et al., 2010).

The finding that parent-child social functioning in adolescence predicts parental SES at age 16 is also consistent with clinical research on the Parent Management Training-Oregon Model, a behavioral intervention for children with antisocial behavior problems, that found increased income for mothers following improvements in social interactions with children (Patterson, Forgatch, & DeGarmo, 2010). Path analyses also indicated that higher year 16 parental SES predicted higher romantic relationship social functioning at year 32, which was positively correlated with SES at year 32. These results

are consistent with research indicating that individuals with higher SES are more likely to cultivate high quality romantic relationships because they do not experience the stress associated with low monetary resources on top of the usual stresses that inevitably occur in close relationships (Dakin & Wampler, 2008; Zagorsky, 2003).

Paths examining the links between social functioning and health yielded one significant finding: individuals who rated themselves in poorer health at age 26 also had lower romantic relationship functioning at year 32 after controlling for earlier romantic relationship functioning at year 23. This finding lends support to the theory that illness places a strain on interpersonal relationships, which, ultimately, causes a decrease in the quality of those relationships (Cohen, Sherrod, & Clark, 1986). Paths examining the transactional relations between physical health and SES also yielded one significant finding: higher self-report ratings of physical health were associated with higher SES at age 32 after controlling for family SES at 16 years. This finding could represent the cumulative effect of higher SES across development, as individuals with higher SES have better access to healthcare and utilize the healthcare system more often (Heck & Parker, 2002), and is consistent with a host of previous research indicating that individuals with higher SES tend to enjoy better health (Chen et al., 2002; Matthews & Gallo, 2011).

Hypothesis 3, stating that adolescent parent-child, and young adult romantic relationship social functioning predicts adult physical health, was not supported. Social functioning in adolescence and young adulthood did not have a significant direct effect on adult physical health after controlling for BMI, year 32 neuroticism, gender, year 26 health, and year 32 SES. It is possible that these non-significant results are due to the

large number of stringent controls placed on the analyses. These results could also be due to the relatively short amount of time that independently formed relationships, such as friendships and romantic relationships, served as a source of support for the participants, as compared to primary attachment relationships. It is also noteworthy that the sample used in this study is neither old (early to mid 30's) nor particularly sick (only 50% of the sample reported had any physical ailments). Hence, it is possible that the effects of adolescent and young adult social functioning on adult physical health have yet to emerge and will become evident as this sample ages and becomes more infirm.

Consistent with previous research, hypothesis 4, which stated that infant social functioning would directly predict later health outcomes, was supported. The continuity of attachment in infancy predicted the likelihood of reporting a physical illness in adulthood above and beyond the influence of adult BMI, gender, 32 year self-report neuroticism, and year 26 self-reported physical health, social functioning at ages 13,16, 23, and 32, and year 32 SES (Puig et al., 2013). Post-hoc analyses were conducted to determine whether early social functioning predicted adult health above and beyond prenatal SES and birth health risk. Results from this analysis indicated that the continuity of attachment continued to significantly predict adult physical illness above and beyond the effect of early health risk and prenatal SES.

The finding that the continuity of secure infant attachment predicts later health outcomes is consistent with studies examining the links between adult self-report attachment and physical health outcomes (McWilliams & Bailey, 2010; Scharfe & Eldredge, 2001). McWilliams and Bailey (2010) found that individuals who reported

having insecure romantic attachment relationships were more likely to report a physical illness, whereas secure attachment to a romantic partner was not related to reporting a physical illness. Avoidant attachment was associated with pain conditions (e.g., headache & stomachache) and resistant attachment was associated with a wider variety of ailments including cardiovascular disease. Similarly, Scharfe and Eldredge (2001) found that individuals who rated themselves as securely attached engaged in more health promotive and fewer health-risk behaviors. Individuals who rated themselves as insecurely attached engaged in fewer health promotive behaviors, more health risk behaviors, and insecure attachment rating were associated with poorer sleep. Self-reports of attachment in adulthood are theoretically rooted in infant attachment classifications as assessed in the present study (Bartholomew & Horowitz, 1991; Hazen & Shaver, 1987). Results of the current study provide prospective longitudinal support that strengthens the theory that early social functioning affects later health outcomes, whereas previously only retrospective cross-sectional studies supported this theory.

A recent study by Puig and colleagues (2013), using the same sample as the present study, found that infant attachment classifications and the continuity of attachment security predicted the likelihood of reporting a physical illness at age 32. Specifically, individuals who were avoidantly attached at 18 months were more likely to report an inflammation-based illness at age 32 than those who were securely attached. Individuals who were resistantly attached at 18 months were more likely to report an inflammation-based illness as well as non-specific symptoms at age 32 than their securely attached counterparts. Finally, individuals who were continuously insecurely attached in

infancy were four times as likely to report a physical illness in adulthood. These analyses controlled for concurrent BMI, self-report neuroticism, perceived social support, gender, life stress, and SES. In addition to many of these controls, the current study further controlled for participant's history of social functioning, SES, and physical health. Thus, the present study not only replicates Puig and colleagues (2013) findings but also strengthens them.

Numerous mechanisms have been proposed to explain the process through which parent-child relationships exerts a powerful effect on later health outcomes. One line of thought postulates that infant attachment relationships influence adult health outcomes indirectly via the influence these relationships have on expectations of caregiving in subsequent close relationships (Boyce, 1985; Berkman et al., 2000). Results from the present study do not support this hypothesis as social functioning in adolescent parent-child relationships, adolescent friendships, and young adult and adult romantic relationships were not associated with adult health outcomes. However, it is important to note that infant social functioning was significantly positively correlated with subsequent social functioning variables ($p < .05$ for all correlations). Thus, if the quality of friendships and romantic relationships becomes a significant predictor of health as the sample grows older, then it is plausible that infant attachment influences adult health indirectly through later social functioning.

Infant attachment relationships may also influence adult health outcomes through the crucial role that they play in shaping the development of biological stress response systems (Eisenberger & Cole, 2012; Lupien, McEwen, Gunnar, & Hiem, 2009; Miller et

al., 2011; Puig et al., 2013). Developmental studies of the enduring effects of early adversity converge on the finding that individuals who are exposed to stressful situations that tax their nascent coping abilities, without the presence of a supportive, responsive caregiver, demonstrate behavioral, cognitive, and biological markers of dysregulation (Gunnar, Morison, Chisolm, & Schuder, 2001; Miller et al., 2011; Pollak et al., 2010). A history of insecure attachment is associated with suboptimal caregiver responses (e.g., insensitive or unresponsive) to infant distress within the first year of life (Ainsworth et al., 1978). These experiences may heighten the sensitivity of biological stress response systems, such as the HPA axis and the SNS and lower the threshold for perceived stress.

Chronic dysregulation of the HPA axis has been found to affect aspects of innate immunity, specifically inflammation, that are associated with physical health. Under tolerably stressful conditions, activation of the HPA axis results in the release of cortisol that suppresses inflammation. When individuals encounter toxic stressors for a prolonged period of time the HPA axis becomes chronically activated and weakens cortisol's inhibitory effect on the inflammation response (Gunnar & Quevedo, 2007). This ultimately results in hypercortisolemia and inflammation, which contribute to the development of chronic illness (Miller et al., 2011). Insecure attachment may be a toxic stress that conditions the individual to both perceive lower levels social support in his/her environment and may also dysregulated biological stress response systems (Puig & Englund, 2011; Quirin et al., 2008). Thus, the insecurely attached individual may find themselves in a double bind in which they are more reactive to stressful situations and

have fewer resources to mitigate the effects of stress, eventually leading to chronic inflammation and chronic illness (McEwen, 1998, 2000).

Limitations and conclusions

Confidence in the results of this study is bolstered by its methodological strengths. Specifically, this is a 34-year prospective longitudinal study that utilizes data gathered from multiple respondents including self-report, interviews, qualitative codes, and observational measures. Despite these strengths, the results should be interpreted with caution due to the study's small sample size and the unique characteristics of the sample. Participants in this study were born into poverty, are relatively ethnically homogeneous, and represent the population of the upper Midwestern United States. Increasingly, ongoing longitudinal studies of normative development that began when the participants were relatively young are collecting health-related data in order to shed light on the developmental precursors of chronic disease (e.g., Danese et al., 2007; Friedman & Martin, 2011). Replications of these findings in larger, more representative samples are needed to strengthen these findings.

Results from this study are also limited by a lack of dyadic friendship and romantic relationship social functioning data. Information about the quality of adolescent and young adult friendship and romantic relationships were gathered from only one member of those relationships. Researchers of adolescent relationships have long noted that relationship information gathered from one member of a dyad only captures half of the data needed to understand the quality and characteristics of the relationship (Welsh & Shulman, 2008). This is particularly important when predicting to health outcomes, as

dyadic assessments of conflict interaction and support-giving are associated with health outcomes (Grewen et al., 2005; Kiecolt-Glaser et al., 2005). Additionally, measures of physical health in this study are largely based on self-report and should be interpreted as a proxy for actual physical health. Future research will benefit from collecting physical health data from medical examinations or medical records, as these measures will be more sensitive to prodromal signs of illness.

This study sheds important light on several previously unanswered questions in the field of health psychology; including, comparing the effects of early versus later social functioning on adult health and evaluating the relative impact that history of health, social functioning, and SES have on adult physical health. Although the results of this study did not find adolescent and young adult social functioning to predict to health, it replicated and strengthened previous research findings indicating that the quality of infant relationships predicts health outcomes. This study also identified transactional relations between social functioning and SES that have not been extensively studied in the health psychology literature. The finding that family SES predicts individual social functioning which, in turn, predicts individual adult SES, suggests that interventions aimed at improving either SES or social functioning may have cascading effects that improve other areas of functioning in later development.

It is important to note that the association between infant attachment and later health is not perfect; many individuals with a history of insecure attachment did not report a physical illness and many people with a history of secure attachment were ill. Further examination into risk and protective factors will be needed in order to inform

interventions aimed at improving adult health. Findings from this study suggest that interventions aimed at improving the primary attachment relationship may precipitate long-term benefits in multiple domains including increased SES for the family and improved social functioning and decreased likelihood of physical illness in adulthood for the child. Research has shown that chronic illnesses originate from systemic deficiencies in the social, economic, and physical environment; hence, it will take systemic interventions to remediate this problem. Improving infant-caregiver relationships is one focused intervention with the potential for tremendous gain.

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APPENDIX A:
TABLES

Table 1
Birth demographics for the longitudinal sample (N = 167)

Demographic	N	Percent
Gender		
Male	83	49.7%
Female	84	50.3%
Race of Child		
Caucasian	111	66.5%
African American	17	10.2%
Multiracial	30	18%
Other	4	2.4%
Missing	5	3%
Race of Mother		
Caucasian	140	83.8%
African American	18	10.8%
American Indian	7	4.2%
Hispanic	1	.6%
Asian	1	.6%
Maternal Education		
No Degree	12	7%
High School Diploma/GED	86	52%
Associates degree	36	22%
4-year degree	18	11%
Master's Degree	8	5%
Professional/Graduate Degree	4	2%
Maternal Marital Status		
Single	95	56.9%
Married	65	39.2%
Divorced	2	1.2%
Widowed	1	.6%
Separated	1	.6%

Table 2

Demographics for the longitudinal sample at age 32 (N = 163) and 34 (N = 153)

Demographic	Year 32		Year 34	
	N	Percent	N	Percent
Education				
No Degree	12	7%	10	7%
High School	86	52%	79	52%
Diploma/GED				
Associates degree	36	22%	32	21%
4-year degree	18	11%	18	12%
Master's Degree	8	5%	11	7%
Professional/Graduate	4	2%	3	2%
Degree				
Marital Status				
Single	35	21.3%	38	25%
Dating	34	20.7%	17	11%
Living together/engaged	30	18.2%	20	13%
Married	64	39%	64	42%
Employment				
Employed	132	81%	117	77%
Unemployed	19	13%	36	23%
Earned Household Income				
\$0-25,000	34	21%	35	23%
\$25,001-50,000	48	28%	35	23%
\$50,001-75,000	33	20%	22	14%
\$75,001-100,000	20	12%	19	12%
>\$100,000	30	18%	22	14%

Table 3
Descriptive statistics for study variables.

Variable	N	M	SD	Range	Skewness	Kurtosis	% Missing
1) BMI	167	28.53	6.81	45.61	1.42	3.79	0%
2) Race*	162	.69	.47	-	-	-	0%
3) Gender*	167	1.5	.50	-	-	-	0%
2) Neuroticism (year 32)	158	18.55	6.02	28.00	.41	-.37	5.4%
3) Attachment	162	1.17	.80	2.00	-.31	-1.38	3.0%
4) Year 13 composite	150	4.81	.86	3.75	-.16	-.71	10.2%
5) Year 16 composite	148	4.44	1.20	6.00	-.25	-.06	11.4%
6) Year 23 composite	148	2.71	1.21	4.00	.06	-1.19	11.4%
7) Year 32 composite	164	3.36	1.23	4.00	-.43	-1.00	1.8%
8) Prenatal SES	166	.06	.98	7.36	1.63	6.50	.6%
9) Year 16 SES	151	.02	1.00	5.88	.96	1.21	9.6%
10) Year 32 SES	164	.00	1.00	5.41	1.07	1.49	1.8%
11) Birth Risk	165	1.76	1.51	7.00	.85	.82	1.2%
12) Year 16 Health	151	1.88	.68	3.00	.41	-.04	13.2%
13) Year 26 Health	145	1.98	.66	3.00	.16	-.16	9.6%
14) Adulthood Health	167	1.00	1.36	6.00	1.53	1.82	0%

Note: Race and Gender are binary variables.

Table 4
Relationship composite components correlations.

	Year 13 Parent-Child				Year 16 Friendship				
	1	2	3	4	5	6	7	8	9
1) 13 emotional engagement	-	.58**	.37**	.61**					
2) 13 positive affect		-	.80**	.62**					
3) 13 conflict resolution			-	.60**					
4) 13 balance 1				-					
5) 16 enjoyment					-	.65**	.84**	.83**	.78**
6) 16 disclosure						-	.71**	.80**	.54**
7) 16 security							-	.81**	.83**
8) 16 closeness								-	.70**
9) 16 conflict resolution									-
	Year 23 Romantic Relationship				Year 32 Romantic Relationship				
	10	11	12	13	14	15	16	17	
10) 23 enjoyment	-	.82**	.69**	.63**					
11) 23 security		-	.68**	.70**					
12) 23 conflict resolution			-	.64**					
13) 23 effectiveness				-					
14) 32 enjoyment					-	.82**	.73**	.85**	
15) 32 security						-	.61**	.83**	
16) 32 conflict resolution							-	.79**	
17) 32 effectiveness								-	

Note: * $p < .05$, ** $p < .01$

Table 5
Descriptive statistics for social functioning components.

Variable	N	M	SD	Rang e	Skewness	Kurtosis
1) 13 emotional engagement	173	5.49	1.00	4	-.25	-.72
2) 13 positive affect	173	4.55	1.13	5	-.26	-.45
3) 13 conflict resolution	173	4.14	1.08	6	-.22	-.27
4) 13 balance 1	173	4.98	.96	4	-.20	-.61
5) 16 enjoyment	165	4.84	1.34	6	-.72	.25
6) 16 disclosure	165	4.57	1.56	6	-.29	-.78
7) 16 security	165	4.30	1.48	6	-.19	-.67
8) 16 closeness	165	4.86	1.39	6	-.53	-.06
9) 16 conflict resolution	165	3.68	1.11	6	.20	.93
10) 23 enjoyment	93	3.46	1.40	4	-.56	.25
11) 23 security	93	3.51	1.30	4	-.61	.25
12) 23 conflict resolution	90	2.88	1.08	4	.03	.25
13) 23 effectiveness	162	2.63	1.26	4	.33	.19
14) 32 enjoyment	119	3.94	1.22	4	-1.01	.01
15) 32 security	119	3.73	1.13	4	-.84	.18
16) 32 conflict resolution	119	3.38	1.20	4	-.50	-.66
17) 32 effectiveness	164	3.49	1.34	4	-.36	-1.08

Table 6
Descriptions of Components of Social Functioning Composites

Social Functioning Component	Age Assessed	Description
Emotional Engagement	13	This scale measures the extent to which parent(s) and child maintain emotional connectedness throughout the interactions regardless of the valence of the emotions.
Positive Affect	13	This scale measures the extent to which the parent(s) and child are 1) having fun with the tasks at hand and 2) having fun with each other.
Balance I	13	This scale measures the extent to which the parent-child dyad (or triad) balances self-assertion and self-concealment. High scores on this scale are given to those who are comfortable expressing a wide range of emotions.
Disclosure	16	This scale measures the frequency and ease with which the individual shares emotional and instrumental experiences with his/her friend. Greater weight is given to the disclosure of emotional experiences.
Closeness	16	This scales measures the extent to which the individual feels connected to his/her friend. It includes the exclusivity, specialness, and level of value that the individual places on the friendship.
Effectiveness	23, 32	This scale evaluates the degree to which participants appear to have attained competence in romantic relationships appropriate for their age. It refers to both the ability to establish high quality relationships and the ability to end low quality relationships.
Security	16, 23, 32	This scale measures the extent to which the participant believes his/her partner/friend is available and responsive to his or her needs, and feels able to be wholly her/himself in this friendship/ romantic relationship.
Enjoyment	16, 23, 32	This scale captures the degree to which the participant sees the partner as a source of happiness, pleasure, and good feelings.
Conflict Resolution	13, 16, 23, 32	This scale measures the effective management of conflict in a particular relationship and the use of collaborative conflict resolution strategies.

Table 7
Correlations of binary birth risk variables.

	1	2	3	4	5	6	7
1) Apgar Risk	-	.19**	.16*	.16**	.15*	.29**	.20**
2) Use of forceps		-	-.03	.10	.01	.18**	.14*
3) Low birth weight			-	-.01	.11	-.00	.11
4) Prematurity				-	.04	.18**	.16*
5) Pregnancy complications					-	.17**	.07
6) L & D Complications						-	.20**
7) Infant Anomaly							-

* $p < .05$, ** $p < .01$

Table 8
Conditions included in birth risk variable.

	Pregnancy Complications (N)	Infant Anomaly (N)	Labor and Delivery Complications (N)
1)	None (95)	None (112)	None (78)
2)	Serious infection (21)	Lethargic (1)	Premature rupture of membranes (19)
3)	Extreme weight gain or loss (13)	Respiratory distress at birth (7)	Fetal bradycardia-asphyxia/hypoxia (7)
4)	Drug use (7)	Bilirubin elevated (12)	Contracted mid-pelvis/Gestational hypertension (1)
5)	Hypertension (3)	Infection at birth (1)	Meconium staining (19)
6)	Venereal disease (8)	Potter's syndrome (1)	Hemorrhaging-transfusion (1)
7)	Persistent glycosuria (4)	Intrauterine growth retardation (5)	Oxygen, heart massage (4)
8)	Albuminuria (7)	Abnormal scalp formation (6)	Preeclampsia (10)
9)	Suicide attempt (1)	Hypoglycemia (2)	Fetal blood incompatibility (1)
10)	Rubella titer below 1:8 (7)	Pulmonary flow murmur (1)	Tight nuchal cord (1)
11)	Trauma late in pregnancy (1)	Holt-Oram Syndrome (1)	Infection during labor (2)
12)	Organic Heart Murmur (3)	Minor anomaly or deformity (7)	Poor condition of cord and placenta (1)
13)		Hypocalcaemia (1)	Bladder atony (1)
14)		Bradycardia (1)	Elevated Blood Pressure (5)
15)		Umbilical hernia (1)	Arrest of active stages of labor (7)
16)		Wet Lung Syndrome (1)	Prolonged 1 st or 2 nd stages of labor (10)
17)			Fetal tachycardia (3)
18)			Uterine atony (3)
19)			Post-maturity syndrome (4)

Table 9
Descriptive data for Adolescent/Adult Health Survey.

Response	N	%
Adolescent Health Survey		
Excellent	43	25.7%
Good	85	50.9%
Fair	21	12.6%
Poor	2	1.2%
Missing	16	9.6%
Adult Health Survey		
Excellent	31	18.6%
Good	86	51.5%
Fair	27	16.2%
Poor	1	.6%
Missing	22	13.2%

Table 10
Correlations of all dependent, independent, and control variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1) BMI	-	-.08	-.23**	.03	.01	-.06	-.09	-.12	.04	-.14	.07	-.03	.03	.10	-.22**	.23**
2) Gender		-	.06	.24**	.05	.01	.02	.10	.02	-.14	-.01	.12	-.17*	.17*	-.06	.19*
3) Race			-	.06	-.03	.10	.11	.12	.07	.07	.03	-.02	-.10	.02	-.22**	.07
4) Neuroticism (year 32)				-	-.18*	.02	-.10	-.08	-.30**	-.09	-.06	-.19*	-.03	.16	.29**	.28**
5) Attachment					-	.09	.21*	.26**	.27**	.20*	.20*	.11	.04	-.15	.02	-.22**
6) Year 13 Relationship						-	.16	.02	.10	.07	.26**	.17*	-.07	-.13	.09	.11
7) Year 16 Relationship							-	.26**	.31**	.11	.13	.19*	.07	-.25**	.08	-.06
8) Year 23 Relationship								-	.36**	.11	.08	.21*	.04	-.06	.00	-.17*
9) Year 32 Relationship									-	.15	.17*	.40**	.17*	-.05	-.16	-.14
10) Prenatal SES										-	.36**	.26**	.14	.00	-.07	.05
11) Year 16 SES											-	.40**	-.01	.01	-.03	.04
12) Year 32 SES												-	.07	-.05	-.19*	.02
13) Birth Health Risk													-	-.05	-.09	-.06
14) Year 16 Health														-	.14	.17*
15) Year 26 Health															-	.22**
16) Adulthood Health																-

Note: * $p < .05$, ** $p < .01$

Table 11
Comparison statistics for competing nested models.

Model	df	Loglikelihood Value	Scaling Correction Factor	χ^2 Difference Test (TRd)	AIC	BIC
Model 1: Within-domain	97	-4405.156	1.142		9004.313	9306.758
Model 2: Cross-Domain	118	-4380.855	1.114	49.537 (21)*** (2 vs. 1)	8997.711	9365.634
Model 3: Adol. Relationship	124	-4376.384	1.107	9.225 (6) (3 vs. 2)	9000.767	9387.399
Model 4: Infant Relationship	126	-4373.306	1.103	7.2 (2)* (4 vs. 3) 16.05 (8)* (4 vs. 2)	8998.612	9391.479

Note: * $p < .05$; *** $p < .001$

Table 12
Unstandardized and Standardized Parameter Estimates and Unstandardized Confidence Intervals for Infant Direct Effect Model (Standard Errors in Parentheses; N = 167).

Parameter	Unstandardized Estimates	Standardized	Est./S.E.	Unstandardized 95% C.I.
Mage ↔ Med	3.94 (.80)**	.52	5.33	[1.87, 6.00]
Mage ↔ Race	.23(.10)*	.13	2.35	[-.04, .50]
BMI ↔ N32	-.61(2.91)	-.02	-.21	[-8.10, 6.89]
BMI ↔ SF32	.19(.51)	.03	.37	[-1.21, 1.50]
BMI ↔ SES32	.01(.40)	.00	.03	[-1.03, 1.05]
N32 ↔ SF32	-1.54(.50)**	-.25	-3.23	[-2.82, -.26]
N32 ↔ SES32	-.76(.37)*	-.16	-2.16	[-1.72, .20]
SES32 ↔ SF32	.27(.07)**	.29	4.33	[.09, .46]
SF16 ↔ H16	-.17(.07)8	-.22	-2.70	[-.34, -.00]
SF16 ↔ SES16	.06(.09)	.06	.71	[-.17, .29]
H16 ↔ SES16	.04(.05)	.06	.73	[-.90, .17]
HBirth ↔ SESPRN	.17(.12)	.12	1.57	[-.13, .47]
Sex → ATT	.13(.12)	.08	1.08	[-.19, .45]
Race → ATT	.01(.14)	.01	.07	[-.34, .36]
HBirth → ATT	.02(.04)	.03	.31	[-.09, .12]
SESPRN → ATT	.16(.07)*	.20	2.56	[-.00, .33]
ATT → SF13	.11(.10)	.10	1.06	[-.16, .37]
SESPRN → SF13	.06(.08)	.07	.75	[-.15, .28]
HBirth → SF13	-.04(.04)	-.07	-1.00	[-.15, .07]
Sex → SF13	-.00(.14)	-.00	-.03	[-.36, .35]
Race → SF13	.13(.16)	.07	.85	[-.28, .54]
SF13 → SF16	.20(.13)	.15	1.61	[-.12, .53]
SESPRN → SF16	.10(.09)	.08	1.17	[-.14, .34]

HBirth → SF16	.08(.06)	.10	1.32	[-.08, .25]
Sex → SF16	.05(.19)	.02	.26	[-.45, .55]
Race → SF16	.25(.22)	.10	1.15	[-.31, .81]
H16 → SF23	-.07(.14)	-.04	-.52	[-.42, .28]
SF16 → SF23	.24(.09)*	.24	2.89	[.02, .46]
SES16 → SF23	.06(.10)	.05	.62	[-.19, .32]
Sex → SF23	.19(.19)	.08	1.02	[-.29, .68]
Race → SF23	.23(.20)	.09	1.17	[-.28, .75]
H26 → SF32	-.30(.14)	-.16	-2.12	[-.66, .07]
SF23 → SF32	.35(.08)**	.34	4.64	[.15, .54]
SES16 → SF32	.18(.07)*	.15	2.44	[-.01, .36]
Sex → SF32	-.03(.17)	-.01	-.18	[-.48, .42]
Race → SF32	-.01(.19)	-.00	-.05	[-.50, .48]
Sex → HBirth	-.48(.23)*	-.16	-2.117	[-1.07, .11]
Race → HBirth	-.25(.24)	-.08	-1.05	[-.86, .34]
ATT → H16	-.11(.08)	-.13	-1.50	[-.30, .08]
SF13 → H16	-.10(.06)	-.13	-1.63	[-.27, .06]
HBirth → H16	-.02(.04)	-.04	-.54	[-.12, .08]
SESPRN → H16	.05(.06)	.07	.75	[-.11, .20]
Sex → H16	.26(.11)*	.19	2.47	[-.01, .53]
Race → H16	-.03(.12)	-.02	-.23	[-.34, .28]
SF16 → H26	-.04(.04)	-.06	-.80	[-.15, .08]
SF23 → H26	.02(.05)	.03	.36	[-.10, .13]
H16 → H26	.16(.09)	.17	1.87	[-.06, .39]
SES16 → H26	-.02(.06)	-.03	-.30	[-.16, .13]
Sex → H26	-.09(.11)	-.07	-.82	[-.37, .19]
Race → H26	.32(.12)	-.23	-2.77	[-.63, -.01]
H26 → BMI	1.77(.86)*	.17	2.11	[-.45, 4.00]
Sex → BMI	-.91(.99)	-.07	-.88	[-1.47, 1.65]

Race → BMI	-2.87(1.13)*	-.20	-2.43	[-5.78, .04]
H26 → N32	2.73(.77)**	.30	3.76	[.74, 4.72]
Sex → N32	3.18(.87)**	.26	3.73	[.94, 5.40]
Race → N32	-.17(.98)	-.01	-.17	[-2.69, 2.35]
Sex → SESPRN	-.28(.15)*	-.15	-2.07	[-.66, .10]
Race → SESPRN	.18(.16)	.09	1.17	[-.23, .60]
SESPRN → SES16	.37(.08)**	.36	6.03	[.18, .57]
ATT → SES16	.11(.09)	.09	1.24	[-.12, .34]
SF13 → SES16	.27(.09)**	.23	3.19	[.04, .49]
HBirth → SES16	-.02(.05)	-.03	-.40	[-.15, .11]
Sex → SES16	.03(.15)	.02	.21	[-.35, .41]
Race → SES16	-.16(.17)	-.08	-.99	[-.59, .27]
H26 → SES32	-.30(.12)**	-.20	-2.69	[-.60, -.00]
SES16 → SES32	.41(.07)**	.42	5.79	[.24, .58]
SF23 → SES32	.14(.06)*	.17	2.30	[-.02, .30]
Sex → SES32	.23(.13)	.12	1.80	[-.10, .57]
Race → SES32	.16(.16)	-.07	-.98	[-.58, .26]

Part 1: Binary Health Outcome Model

Illness v. No Illness

Attachment	-.61(.24)*	-.23	-2.67	[-1.21, .00]
Social Functioning	.04(.22)	.02	.17	[-.54, .61]
13				
Social Functioning	-.05(.17)	-.03	-.31	[-.50, .39]
16				
Social Functioning	-.27(.17)	-.15	-1.53	[-.72, .19]
23				
Social Functioning	.14(.17)	.08	.84	[-.30, .58]
32				
Health 26	.72(.32)*	.22	2.28	[-.11, 1.55]

SES 32	.29(.18)	.14	1.64	[-.17, .76]
Sex	.61(.38)	.14	1.34	[-.37, 1.59]
Race	.92(.42)*	.20	2.30	[-.15, 1.99]
Neuroticism 32	.06(.04)	.16	1.60	[-.04, .15]
BMI	.09(.03)**	.30	3.10	[.01, .17]

Part 2: Continuous Health Outcome Model

Number of illnesses reported

Attachment	-.08(.07)	-.11	-1.11	[-.27, .11]
Social Functioning	.11(.07)	.17	1.65	[-.06, .29]
13				
Social Functioning	.05(.05)	.11	1.02	[-.08, .19]
16				
Social Functioning	-.04(.05)	-.09	-.86	[-.18, .09]
23				
Social Functioning	-.07(.06)	-.14	-1.22	[-.21, .08]
32				
Health 26	.13(.11)	.14	1.21	[-.14, .40]
SES 32	.04(.07)	.07	.53	[-.15, .22]
Sex	.33(.12)**	.29	2.66	[.01, .65]
Race	.22(.15)	.18	1.51	[-.16, .60]
Neuroticism 32	.01(.01)	.08	.66	[-.02, .04]
BMI	.01(.01)	.16	1.85	[-.01, .03]

APPENDIX B: FIGURES

Figure 1
Model 1: Within Domains Pathways

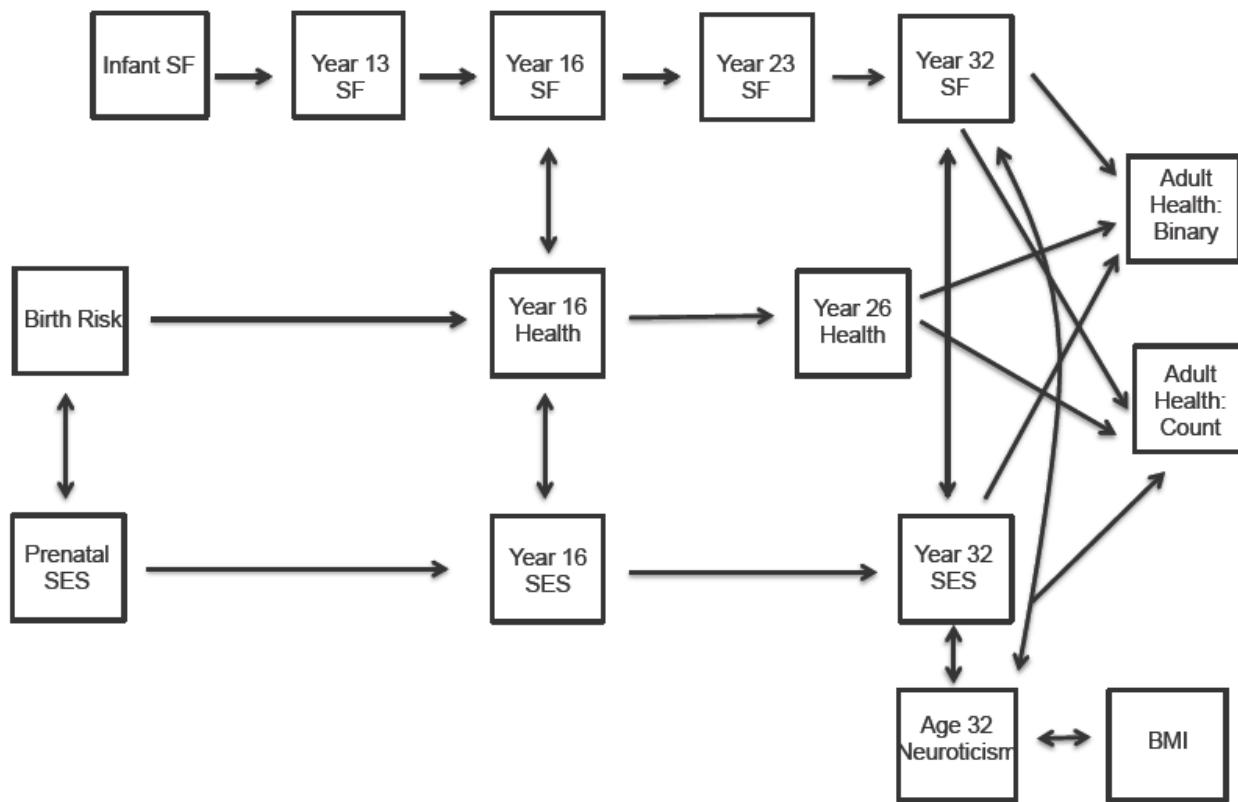


Figure 2
Model2: Cross-Domains Pathways

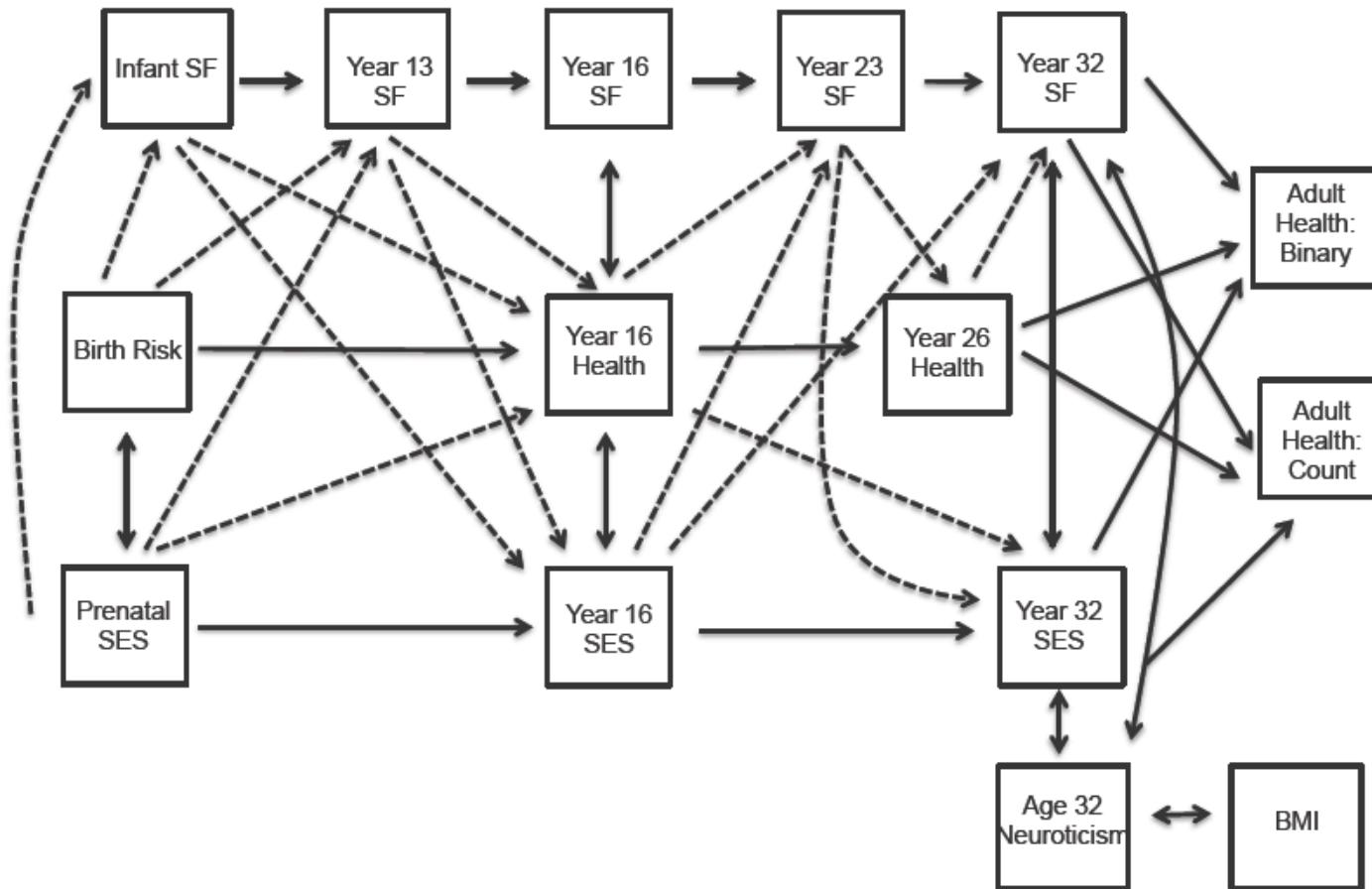


Figure 3
Model 3: Adolescent and Young Adult Direct Effect Pathways

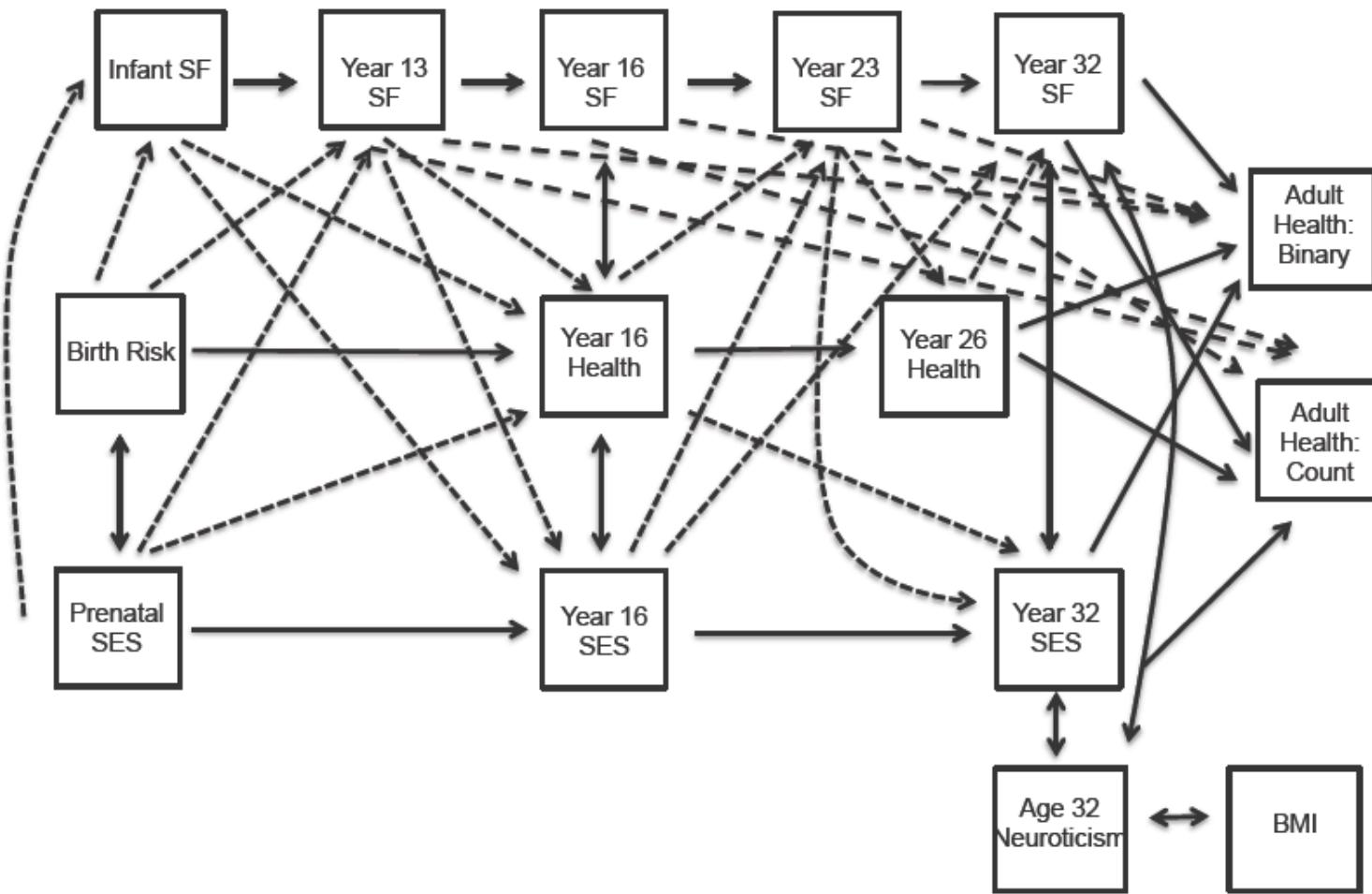


Figure 4
Model 4: Infant Relationships Direct Effects Pathway

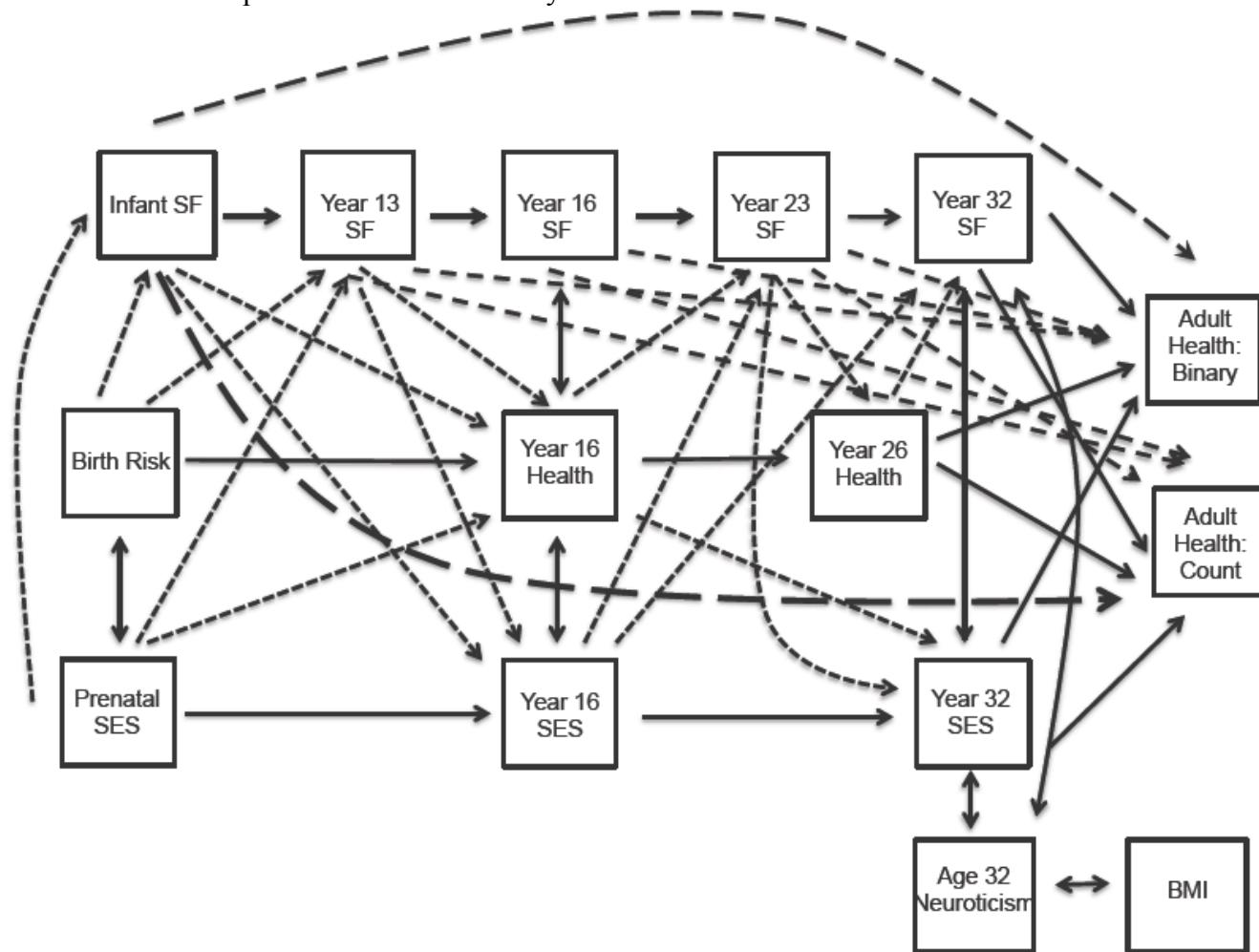


Figure 5

Model 5: Infant Attachment and Adult Physical Health Mediated by Later Social Functioning.

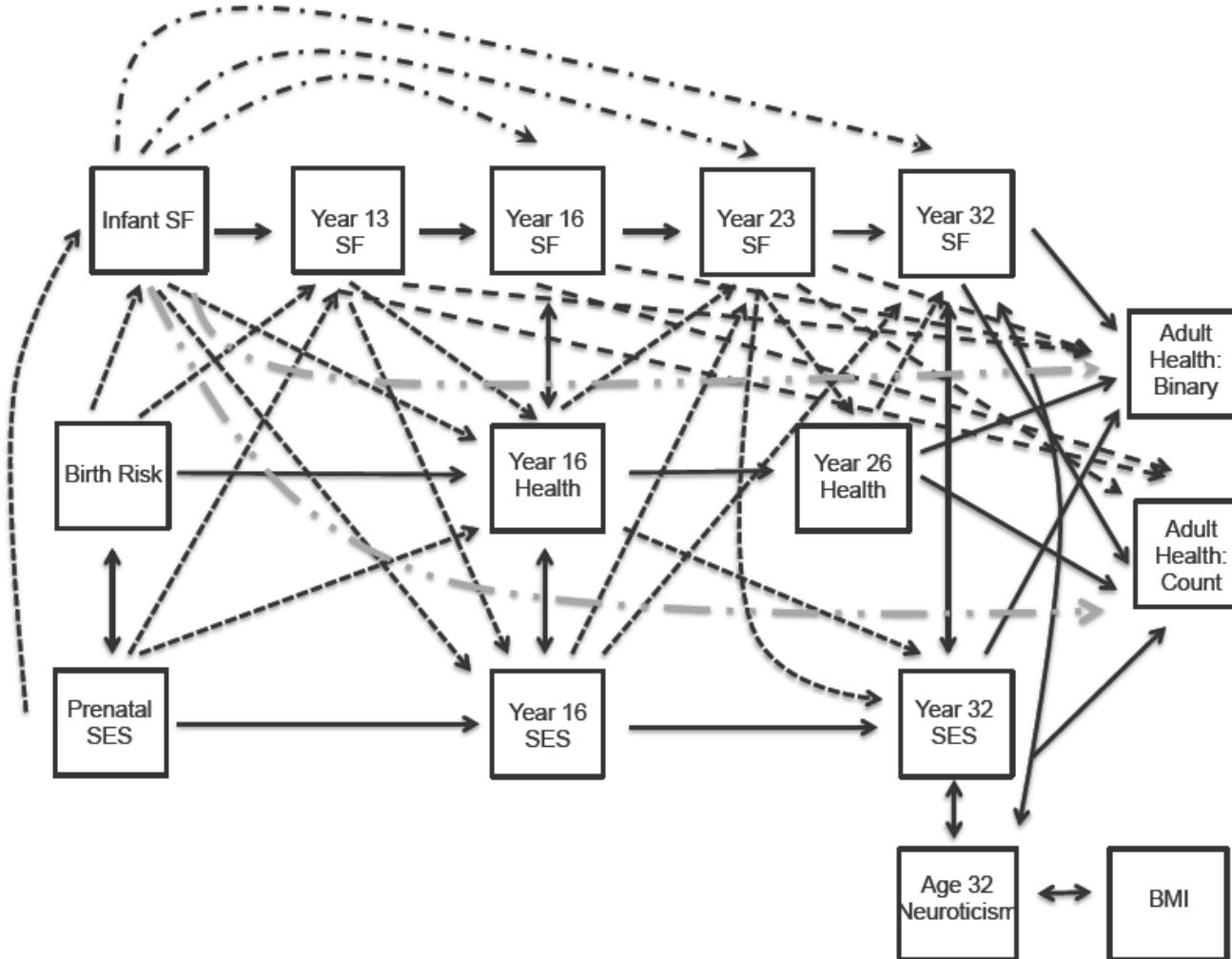
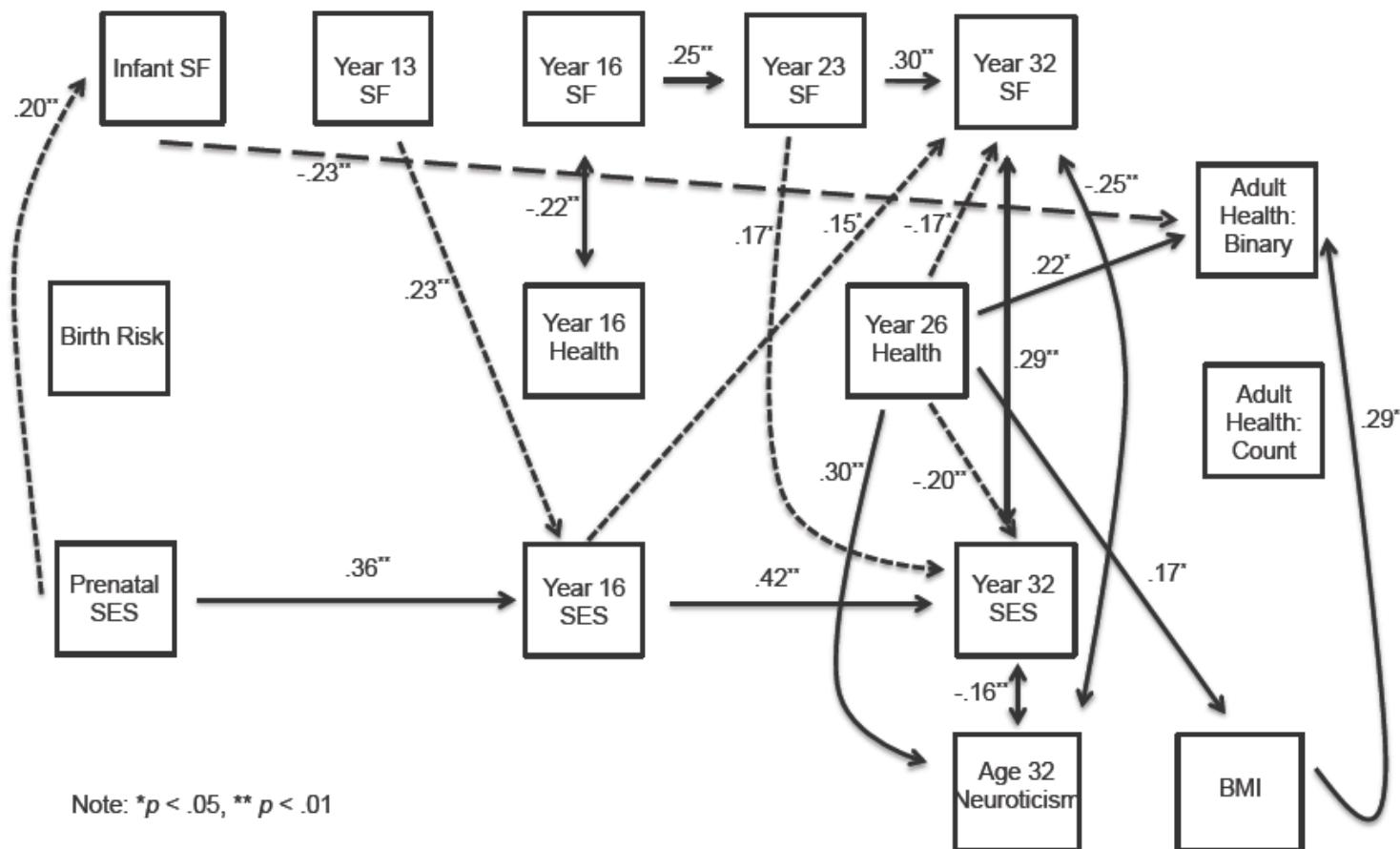


Figure 6
Model 4 Path Analysis Results



APPENDIX C:
Qualitative Codes for Social Functioning Components

Year 13

Year 13: Emotional Engagement

1 - No emotional contact observed.

2 - There is no emotional vulnerability, but the individuals do interact to complete the task. They operate as though complete strangers. No one seems to care.

3 - Evidence of caring (concern) is present as though they do have an emotional history but are not tolerating emotional vulnerability at this point. Primarily interact in non-intimate way.

a - One may look to the other with concern but never when the other will notice. Eye contact is brief and/or impersonal.

4 - This point signifies a mixture of emotional connectedness and distance.

a - A subjective feeling of loneliness or estrangement is present. May share some of the looks and smiles that reflect intimacy but briefly, and may be followed by looking away with a pained expression.

b - Talkativeness may predominate with laughter and some personal interaction but personal vulnerability is very low. Often talk may be of general or abstract quality.

c - One member takes on a tough "I don't care" attitude. Scoffing at the others at times in a somewhat personal way but well-defended against further emotional vulnerability. In this case, personal comments and emotional expressiveness are present but are not shared.

5 - Connectedness predominates but is not sustained throughout the interaction.

a - May start by showing resistance which gradually diminishes over the course of interaction. By the time they are done, these people are operating in a relatively vulnerable, relaxed manner.

b - This pattern subjectively feels like a weaker connection in general. May be seen in lapses where element of loneliness is manifest. Emotional experience is not fully shared.

6 - Diminution of affect on rare occasions when connection weakens but evidence of shared emotional base is clear. These people know each other well and behave in intimate ways, whether negative or positive.

7 - The high end of this scale signifies a clear cut and ongoing shared emotional base. A high level of intimacy is present and marked by interactions that would not be done with

non-intimate associates. The emotional tone may be positive or negative. There may be anger and confrontiveness or sweetness and support.

Year 13: Positive Affectivity

Fun can be scored in two large areas. One is having fun in sharing the process of the task. The other is having fun in being together and is not as highly valued as the first. In this second form, jokes are not made about what "we are currently doing," but refer to either "what we did before" or "how we do things." It tends to take on a stylized form.

Laughter must be carefully evaluated for its function. This may range from positive, high sharing, enhancement of working on the task together to jokes that become "expensive" to someone. Certain people may laugh, but another feels pain and criticism. A third function of laughter (besides fun or hostility) is tension reduction. These bouts of laughter are often abrupt and may be connected to absurdities. That is, there is a less-clear connection to process fun. Furthermore, the tension-reduction laughter does not feel warm.

Dimensions include warmth and caring and fun. Personal regard indicates responsiveness, tenderness, and uncritical acceptance.

1 - No evidence of personal regard; no evidence of fun. The task is a burden. Somber expressions; no warmth.

2 - One or two jokes (tension reduction only or hurtful jokes).

a - Low evidence of personal regard; no fun; no compliments, or said without warmth, as though to control.

b - No fun; low personal regard; courtesy may be what characterizes interaction.

3 - Personal regard is jeopardized.

a - Low personal regard; high fun; no compliments, warmth to speak of, but engage in high interaction with many jokes, often at personal expense.

b - Moderate personal regard; no to low fun.

4 - a - High personal regard; no fun; caring is evident but is not sustained or is interrupted (with conflict). Enjoyment is intermittent.

b - Moderate personal regard; low to moderate fun.

5 - a - Moderate personal regard; moderate to high fun; this fun is not hurtful but is characterized by stylized "need for reassurance quality. Personal regard is evident but is superseded by need for fun.

b - High caring (personal regard); low fun; responsive, caring, serious quality, but fun is rare. Process may be quite subdued (due to task anxiety translated into task seriousness).

6 - a - High personal regard; moderate fun; here the fun may be mixed, fun in task and fun in each other.

b - Moderate to high personal regard; high fun.

7 - High personal regard; high fun (in task); shared process (compromises, outcomes, etc.); fun in partners.

Year 13: Conflict Resolution

Satisfaction. Assessed subjectively; it answers the question of whether and how much each person feels settled and pleased by decisions that are made in the tasks. It is the overarching concept.

Elaboration of practices. Assesses the kind and number of behaviors that are engaged in the process of decision-making in such things as negotiating, holding fast, giving in, backing off, advancing, explaining, compromising, etc. All of these techniques are used in the service of reaching accord or satisfaction. A high score indicates a high number of techniques used by all members and no one style exclusively. A low score indicates overuse of one ritualized pattern for joint decision-making.

Difficulty level. Assesses the amount of effort required to participate in the decision-making process toward reaching accord. This can be high or low with high or low satisfaction.

1 - No satisfaction; high difficulty.

2 - Low satisfaction.

a - Low elaboration; high difficulty.

b - Low elaboration; low difficulty. There is a time avoidance of revealing opinions. No satisfaction occurs because the only point agreed upon is to get finished. Defensiveness is apparent.

3 - Low moderate satisfaction.

a - Low elaboration; low difficulty. In this case, there is little evidence of satisfaction because opinions are not revealed. In fact, opinions are withheld. At times a nod or an "OK" will signify agreement and satisfaction of a moderate level. Techniques are used to avoid conflict.

b - Moderate elaboration; high difficulty. In this case, the level of interaction is high and ideas are discussed in a somewhat elaborated way, but outcomes are won rather than blended in compromise.

4 - Moderate satisfaction.

a - Moderate use of practice; low difficulty. In one case, difficulty is low because one or both persons tend to avoid challenging the other when there is a potential

for conflict. Decisions are arrived at rather easily, and there is evidence that the outcomes are acceptable to both. In another case, one person may withdraw and the other may act less concerned about the importance of the task. This situation reduces the possibilities for satisfaction because few risks are taken.

b - Moderate to high practice; moderate difficulty. These people are verbal and discuss their differing opinions. They arrive at agreements, but the process is somewhat tense or otherwise painful. For example, if many points of conflict occur, the associated discomfort diminishes satisfaction.

5 - Good satisfaction.

a - Moderate elaboration; low difficulty. In this case, little talk occurs, but the participants are very aware of the other's positions and use nonverbal techniques to confirm decisions. Pleasure is taken in the outcomes. Process may have slightly constricted quality that nevertheless leads to good satisfaction.

b - Moderate to high elaboration; some difficulty. In this case, the process is subdued and satisfaction is achieved, but there is also present the sense that the process may fail in some way. In another case, the level of satisfaction is marked by an occasional criticism or putdown of oneself, the other, or the joint work.

6 - High satisfaction; pleasure in the process and the solution. High to moderate elaboration; moderate to low difficulty may include high conflict as long as skills for resolving conflict are obvious. May score this with no or low conflict if obvious participants are in synchrony.

7 - High satisfaction; high elaboration with ease.

Year 13: Balance I: Self-Assertion vs. Self-Concealment

1 - No one becomes vulnerable. Self-assertion is not present in a clear way. What shows is avoidance, apprehension. If one person prods, the other retreats.

2 - Self-concealment is prominent. Child is oriented toward pleasing parent by finding the right answer. Anxiety is very high. Many pauses; minimal interaction.

3 - There may be several examples:

a - High defensiveness within a confronting style that conceals anxiety and prohibits vulnerability, as though the lesson is being taught not to be revealing.

b - Interaction is suppressed. Opinions are rarely volunteered. Pauses are frequent. Individuals seem very guarded.

c - Self-concealment prominent without high tension. Some assertion, but more concealment.

4 - A clear mixture of self-assertion and vulnerability with self-concealment. Child may be assertive in placing cards or offering ideas, but signs of anxiety return or guardedness

creeps in. Some suppression of interaction.

5 - Predominance of confidence, but a few signs of reluctance, concealment, or guardedness. Signs may be in hesitating and physical tension.

- a - May give up ideas quickly.
- b - May have slight contrived quality.
- c - May refuse elaboration at times.
- d - Child may deliberately withhold ideas, but impression is that (s)he would be free to express if chose to.

6 - Fully assertive within limited range. May have parents who desire politeness or hard work or who are controlling (in the sense of a dominant style). Within a particular range are confident, open, etc. May hide vulnerability slightly (i.e., by acting immature).

7 - Wide-ranging vulnerability, openness, spontaneity, declarativeness, confidence, security, relaxation maybe, express a range of feeling (if indicated).

Year 16

Year 16: Disclosure

This scale addresses only the extent to which the adolescent shares his/her experiences with the friend verbally. Self-disclosure of an emotional quality should be weighed more than instrumental disclosure of events. Particularly consider the examples the adolescent provides in order to determine the content, ease, and degree of disclosure. Flat statements such as "Oh, I could tell her anything" are not sufficient evidence for a high score. Likewise, higher-scoring adolescents should supplement their 1 to 5 numerical rating of disclosure with concrete examples. How easy is it for the adolescent to share both good and bad things, personal vulnerabilities, feelings and secrets with her/his friend?

7 - Adolescent feels s/he can tell friend anything and gives convincing examples of emotional, weighty topics s/he has shared with friend. Confides all important events and feelings, both positive and negative. Must have some evidence of self-disclosure of feelings, concerns, dreams, etc. Topics are developmentally appropriate and indicate a willingness to make oneself emotionally vulnerable to the friend.

6 - Wide variety of disclosure occurs in the friendship. May not have the sense of complete soul-sharing necessary for a 7. Provides examples of both positive and negative events that indicate some depth. Still there is an emotional quality to topics discussed.

5 - Adolescent tells friend most things but does not provide strong examples to back this up. Examples are clearly not as good as those to a 6 or 7.

4 - Moderately important topics are shared. There may be an inference that very important things cannot be shared with anyone, but adolescent still provides some evidence of emotional disclosure. Possibly, the adolescent's standards for disclosure are high and s/he does not feel the friendship is meeting them. A score of 4 can also indicate a mixed case: adolescent may be guarded or hesitant to disclose emotionally charged information, but on the other hand, may be capable of sharing some personal information. If there is resistance to the interview or lack of specific information, there must be indirect evidence of emotional disclosure.

3 - No examples of sharing deep or emotional topics. Adolescent does not actively withhold information, however. Mildly positive or negative events may be shared, but there is no emotional investment in the information. For instance, a boy may talk about "girls" in general with the friend, but not a specific girl. Score a 3 if information is lacking. Disclosure may be developmentally inappropriate but it does not have to be so.

2 - Most communication is on a superficial level. Alternately, adolescent may actively withhold information from this specific friend, fearing betrayal. Clear hesitation in self disclosure. Age-inappropriateness quite possible.

1 - No trust in this friendship. In this friendship, the adolescent offers only superficial information that s/he does not mind other people knowing. Also, there is evidence of active withholding of information.

Year 16: Closeness

This scale captures the adolescent's perspective on how close s/he feels toward the friend. Consider not only the adolescent's qualitative rating or global statements, but also, the examples and antecedents provided. This measures how connected the adolescent feels to the friend. If the adolescent has reservations about the friendship, consider the nature (e.g., seriousness) of the reservations. How much does the adolescent value the friend and friendship? How special, exclusive, and essential is this friend for the adolescent?

7 - These two have connected in a meaningful and rare way. They have acquired a profound, heartfelt value for one another. This friend is irreplaceable. Adolescent gives a strong and very personal example of feeling close. S/he may make spontaneous statements about closeness, such as: "He is like a brother to me"; "She is part of me now".

6 - Adolescent feels very close to friend. Examples may be weaker than in 7, but still conviction that there is a bond here. Personal examples of closeness provided. Adolescent feels friend is special.

5 - Adolescent feels close to friend, but does not elaborate. Adolescent's examples compared to her/his global statements may not seem to represent the same level of closeness. No real reservations about the value of the friend, however. This adolescent may have no single unique friend, but does have the ability to connect positively with a number of friends.

4 - This score could indicate one of the following scenarios: 1) There is nothing striking or remarkable about the relationship; the pair seem neither distant nor close. Adolescent could present moderate feelings of closeness without very convincing examples. Friend is not someone special or exclusive or emotionally essential. 2) There is a mix of good statements and reservations concerning the value of the friend. 3) There is insufficient information.

3 - Adolescent provides only weak or impersonal examples of closeness. May be strictly an instrumental relationship. They may have frequent contact but there is no or little indication of an emotional bond in this relationship. If information is minimal, that which is available seems to lean in a slightly negative direction.

2 - Adolescent says explicitly that s/he is only somewhat close, or not very close, to the friend. Adolescent may present serious reservations about the value of the friend. The

adolescent may share activities with the friend, but gives no examples of closeness, or provides some counter-indicators of closeness.

1 - The friend is clearly replaceable, dispensable, exchangeable. The friend seems more like an acquaintance, or an obligatory companion, than a friend. Adolescent does not hang out with the friend. Alternately or additionally, the adolescent provides many counter indicators of closeness.

Year 16: Security

Security entails internalized expectations that significant others will be available (both accessible and sensitive) to one's needs, particularly distress, and that significant others will find one essentially acceptable. This scale measures the extent to which adolescents are able to be wholly themselves in their friendships. Salient issues include: authenticity, mutuality, openness of communication (particularly about distress), availability, help and durability. At the high end of the scale, adolescents feel they can be wholly themselves without hiding or withholding information; exchanges between friends are mutual; friends are available to share both concrete and emotional experience in both good and bad times; adolescents can communicate openly about distress and can openly process interpersonal difficulties they may have with their friends; and friends can be relied upon to be supportive and available, to enjoy mutual activities and help with problems, and to stick by each other barring extreme circumstances. At the low end of the scale, adolescents constrict their exchanges with friends, including actively withholding information, avoiding difficult issues, or indirectly communicating, if at all, their own positive desires for support or negative reactions like embarrassment, irritation, and anger; there may be notable imbalance in friends' exchanges; and friends are relatively unavailable, unresponsive, unreliable, instrumental, opportunistic, or even rejecting and cruel. Middle scores reflect 3 possibilities: inadequate information, mixes of secure and insecure organization, or relatively undeveloped (short-term) relationships. When in doubt, attempt to answer the following question: If the adolescent had to confront her/his friend with a problem, could s/he do so by communicating directly about the problem, would s/he expect that the friend be willing to process the issue with respect and mutuality, and would she expect to be found acceptable despite having the problem?

7 -The adolescent is certain s/he is acceptable to her/his friend. S/he expects the friend to be available and supportive. Friends are able to deal with problems between themselves in open and mutual ways. Friends can be themselves and remain sensitive to each other despite challenges that arise between them. No significant, identifiable indicator of insecurity is present in the interview.

6 -Similar to 7 except that the description involves mild forms of distancing from emotional topics (less remarkable examples, tendencies to avoid answering emotional questions). The sense is that friends are available and supportive to each other, but processes are not elaborated. Even so, at least one section of the interview portrays a

clearly secure set of expectations for relationships.

5 -Interview distance or reluctance to talk about emotional issues leaves somewhat open the determination of security, but the predominant impression that the available details leave is that adolescent expects her/his friend to be available and supportive and would not maintain a relationship that did not meet their needs. The sense here is that the adolescent may be more embarrassed to discuss positive emotional aspects of a friendship rather than that the adolescent is avoiding the discussion because positive emotional ties do not really exist. Nonetheless the description contains essentially no information that would indicate the adolescent has negative expectations of support and availability or a feeling s/he cannot be her/himself in the relationship.

4 -The direction of security in this relationship is difficult to assess because: a) inadequate information about salient issues is present in the interview record (e.g., "no" responses to questions asking about emotional information); b) while secure indices may be predominant, there are some many insecure indices as well as to leave the rater questioning the strength of security; or c) a relatively short-term friendship has yet to develop, and it is unclear what security exists.

3 -The converse of 5: Interview distance or reluctance to talk about emotional issues leaves somewhat open the determination of security, but the predominant impression that the available details leave is that the adolescent avoids providing information because s/he is not sure s/he can ask the friend to be available and supportive and to work with her/him to solve relationship problems. Signs for this rating include instrumental relationships combined with significant things that adolescent does not like about the friend or other negative comments that stand out in considerations of the relatively minimal information the adolescent provides.

2 -Different from 1 only in that some identifiable positive indication of security mitigates against the whole lopsided insecurity. Evidence for insecurity includes unresponsiveness, unavailability, unreliability, or subtle victimization.

1 -This adolescent is uncertain that s/he is acceptable to her/his friend. Friends are unable to deal with their interpersonal problems; rather communication and interpersonal exchanges function to distort, e.g., the tension in the relationship is diverted onto outside problems to draw attention away from interpersonal distress, one person is blamed for all problems, emotional exchange or problem processing is entirely avoided, etc. Friends are not comfortable being themselves and remain to each other unavailable, unresponsive, insensitive, unreliable, opportunistic, or even cruel and rejecting. Such negatives far outweigh any positive indications of security.

Year 23

Year 23: ENJOYMENT

This scale measures the participant's subjective sense of enjoyment in his/her current romantic relationship. Of interest is the degree to which the participant sees the partner as a source of happiness, pleasure, and good feelings. Thus, in evaluating enjoyment consider the participant's needs and interests (e.g., affiliation, prestige, affirmation, romance) regarding the romantic relationship and how this partner meets them. Enjoyment need not require commitment, but rather is evident in the extent to which the couple enjoys spending time together and the degree to which just being with the partner is represented as special. Evidence can come from examples or from direct statements showing the participant's experience of enjoyment in the relationship.

Consider the balance between positive and negative attributes of the relationship. High scores go to participants who see their partner as special and unique – one with whom the participant feels happy and affirmed. There is a predominance of positive attributes mentioned about the partner. Low scoring individuals experience their relationship or partner in a markedly negative manner, possibly raising questions as to why the participant continues the relationship.

5 – Very High Enjoyment

The participant is very positive about the partner and relationship and seems extremely happy with it. The partner is described as special in that he/she clearly makes the participant feel good. No obvious negative features detract from enjoyment. The participant provides clear and strong statements that support feelings of enjoyment.

4 – High Enjoyment

The relationship is described as characteristically pleasant. Minor negativity may be expressed, but the participant clearly enjoys being with the partner.

3 – Moderate Enjoyment

The relationship is moderately enjoyable and considered worthwhile by the participant, but some negative qualities may be emphasized. Although these qualities do not substantially diminish the participant's overall positive sense of the relationship, they detract from the participant's full enjoyment.

2 – Low Enjoyment

The participant finds the relationship with the partner only somewhat enjoyable. While the participant enjoys aspects about the relationship and may mention some positive qualities, clear areas of dissatisfaction are evident. Some negative concerns may be relatively serious and/or chronic.

1 – Very Low Enjoyment

The relationship and partner are described primarily in negative terms. The participant provides almost no statements of satisfaction with the relationship, and lacks a sense of enjoyment with the romantic partner a majority of the time.

Year 23: SECURITY

Security entails expectations that significant others will be available and sensitively responsive to one's needs, particularly in times of distress. Thus, this scale measures the extent to which the participant believes the partner is available and responsive to his or her needs, and feels able to be wholly her/himself in this particular relationship. It follows from secure expectations that: 1) topics are discussed openly with the partner without fear of disregard or rejection, 2) he/she can "be himself/herself" and expect to be accepted by the partner, and, 3) he/she seems confident that the partner will be available and can be approached when needed for emotional support. A history of infidelity alone should not warrant a low score on security, but adjust the score downwards if the aftermath of the infidelity had yet to be completely resolved (e.g., trust is still an issue or there is concern about future faithfulness).

At the **High** end of the scale, the participant can be wholly himself or herself without hiding or withholding information. The participant expects the partner to be available to share concrete and emotional experiences in both good and bad times, to be supportive and available, to help with problems, and to stick by the participant. Any past infidelity has been adequately resolved.

Middle scores reflect the participant's (or the coder's) uncertainty about the partner's consistent reliability. This may be a result of poor examples provided to support the participant's apparent feelings of security. Alternatively, relationships in the midst of changing from low to high (or high to low) security may be given a mid-range score if appropriate (e.g., issues of trust have been a problem in this past but partners seem to be in the process of resolving them).

At the **Low** end of the scale, the participant feels that s/he must be emotionally guarded in exchanges with the partner. The participant's expressions of need for support or some emotions (e.g., embarrassment, irritation, anger) may be communicated indirectly because the participant is uncertain that the partner will be accepting. The coder may sense that the partner is relatively unavailable, unresponsive, unreliable, self-serving, or even rejecting and cruel. The partner may have been unfaithful in the past and gives no indications that that participant can trust their future behavior.

When in doubt, attempt to answer the following question: If the participant had a salient emotional need, would s/he feel free to bring it to this partner and would s/he expect an accepting, supportive reaction with no threat to the relationship?

5 – High Security

- Security: Clearly expressed/demonstrated certainty that the partner can be turned to for emotional support. The participant can bring feelings, tender needs, and problems to the partner and expect the partner to be available and supportive.
- Insecurity: No significant, identifiable indicator of insecurity in this relationship is present in the interview. If infidelity was an issue in the past, it seems to be adequately resolved with no lingering doubts about trust.
- Evidence: Examples or statements are convincing and are not contradicted.

4 – Mostly Secure

- Security: Similar to 5 in terms of strong security. The partner seems available and supportive.
- Insecurity: Mild forms of distancing from emotional topics. The participant may choose to deal with some issues alone rather than bring them to the partner, or the participant may be mildly anxious about how the partner will respond. If infidelity was present, the participant may state that problem has been resolved, but that trust is still an issue.
- Evidence: Examples or statements are somewhat less remarkable and not elaborated; may tend to avoid answering emotional questions. Even so, at least one example or statement given in the interview portrays a clearly secure set of expectations regarding this relationship.

3 – Uncertain Security

- Security & Insecurity: A mix of security and insecurity is evident in the relationship. The participant may feel that the partner can be relied upon, but the coder remains doubtful. Alternatively, the participant may express doubt in the partner's availability, but there are no striking examples of the cause of this doubt in the transcript. In the case of infidelity, perhaps the participant or the coder is not completely confident that the partner will remain faithful in the future, but at present the partner's behavior seems trustworthy.
- Evidence: If security is doubted by:
- Coder → transcript may show slightly contradicting evidence or poor support for apparent feelings of security
- Participant → no supporting examples of their broad, general statements that imply that the relationship is secure

2 – Low Security

- Security: Some minor identifiable positive indication of security mitigates the insecurity. Perhaps the participant is occasionally surprised by a sensitive response. Something in the interview suggests that the partner may on rare occasions be counted upon to be supportive.
- Insecurity: Evidence for insecurity includes unresponsiveness, unavailability, or unreliability. The participant may doubt the partner's future faithfulness and has reasonable cause for concern.

- Evidence: Look for a mostly insecure relationship with rare instances of security.

1 – No Security

- Security: Striking evidence or statements of insecurity outweigh any indications of security.
- Insecurity: The participant cannot count on the partner to respond sensitively to his/her needs. S/he is not comfortable being her/himself with the partner and feels (or provides examples demonstrating) that partner is unavailable, unresponsive, insensitive, unreliable, opportunistic, or even cruel and rejecting. The partner may have been unfaithful on multiple occasions with no or little regard for their partner's feelings, and no evidence of remorse or intent to change.
- Evidence: Convincing examples or statements support these feelings of insecurity.

Year 23: EFFECTIVENESS OF CONFLICT RESOLUTION

This scale measures the effectiveness of conflict resolution. The most important element is the equity of conflict resolutions and the use of collaborative conflict strategies. Frequency of conflict is not a component of this scale except that it may reflect effectiveness or ineffectiveness of resolution strategies. The presence of chronic and persistent conflict may indicate that disagreements are generally not effectively managed. It should be noted that the absence of conflict might mark denial, non-disclosure, or a nascent relationship (i.e. 'honeymoon phase').

At the high end of the scale, the partners are sensitive to each other's concerns and attempt to compromise to reach solutions. Both partners are satisfied with the resolution of conflict, and tension, hurt, and anger do not linger after the resolution. Important subjects in the relationship are actively addressed.

At the middle of the scale, conflict is resolved well most of the time, but there are some problems in the process of conflict resolution. For example, resolution may be achieved without an active effort, or partners may not be completely satisfied with solutions. Partners may use strategies that do not reflect sensitivity to the other's concerns, but in general these strategies seem to satisfy the couple. Alternatively, there may be an absence of conflict, but the coder senses this is due to some denial or non-disclosure.

At the low end of the scale, conflict resolution strategies are problematic. Strategies may not work, such that there is recurrent conflict over subjects. The relationship may revolve around conflict, and partners may express that subjects of concern can not be resolved. Alternatively, strategies may be effective in preventing recurrent conflict, but in a way that is hurtful to one or both partners. For example, one person may have more power in the relationship and dominate and/or victimize the other. Strategies such as physical fighting and disengagement may be used.

5 - Superior

- There is evidence of effective and fair approaches to conflict resolution.
- Areas of conflict are successfully negotiated to the full satisfaction of both people.
- There is evidence of compromise and sensitivity to the needs of both people.
- Subjects of importance to the relationship are actively addressed.
- More minor subjects do not lead to intense or prolonged conflict or tension.
- There is no evidence of a power differential where one person almost always tends to go along with the other.

4 - Above Average

- Examples of conflict or tension may be lacking, but there is no obvious avoidance or inconsistency in the report. A relationship which appears to be in an early developmental stage or in which there may be idealization and/or exaggerated accommodation (i.e. 'honeymoon stage') may receive a score of 4 if there are no indications of underlying tension at this time (otherwise, consider a 3).
- Areas of potential or actual conflict are sometimes, but not always, negotiated to the full satisfaction of both people.
- There are attempts at compromise and sensitivity to the needs of both people, but this process is imperfect.
- There may not be active attempts to address subjects of importance to the relationship, but at least these subjects are not avoided.

3 - Average

- Approaches to conflict resolution are average; that is, within a single conflict or across multiple conflicts the partners use strategies that seem likely to result in resolution, and other times use strategies that seem unlikely to result in resolution.
- Overall, things are worked out, although strategies do not necessarily involve sensitivity and concern for the other.
- Possible situations include:
 - (a) Resolution 'sort of happens' without any active effort. Some resolutions may be made by default. The passive approach does not appear to cause problems or injustices.
 - (b) There is mild disengagement by one or both partners when dealing with conflict.
 - (c) Conflict is not acknowledged; even differences of opinion are not acknowledged, yet it seems likely that there is some denial or non-disclosure.

2 - Below Average

- Approaches are somewhat inadequate in resolving conflict.
- Resolutions may not involve fair compromises.
- There may not be a commitment to resolving subjects of importance to the relationship or mild conflict may be viewed as insurmountable by one or both people.
- Possible situations include:
 - (a) Strategies do not fully resolve conflicts. Tension may remain long after the conflicts. One or both people may become increasingly dissatisfied with the

way various subjects are handled. Previously addressed subjects may resurface periodically.

- (b) There is persistent conflict over trivial subjects. The relationship may appear to revolve around conflict.
- (c) There are active attempts to avoid certain subjects due to the inability to resolve disagreements.
- (d) There is evidence of a clear and pervasive power differential in the relationship that affects conflict management. One person may regularly back-down when conflicts develop.
- (e) There may have been physical fighting on one occasion.
- (f) There is often disengagement by one or both partners when dealing with conflict.

1 - Poor

- Approaches to conflict resolution are very problematic.
- There is no evidence that the relationship involves mutual give-and-take and/or concern for the other.
- One or both people may show insensitivity and/or persistent selfishness in the relationship.
- Possible situations include:
 - (a) Obvious victimization of one person by the other.
 - (b) Escalation of conflict ('getting even', revenge).
 - (c) Perhaps resorting to physical fighting on more than one occasion.
 - (d) There are active attempts to avoid any subject of possible conflict. Even serious problems are avoided and not addressed.
 - (e) One or both people completely emotionally disengage from the relationship.

Year 23: EFFECTIVENESS OF ENGAGEMENT

This scale is an evaluation of the degree to which participants appear to have attained competence in romantic relationships appropriate to 21-23 year olds. "Effectively engaged" refers to forming and maintaining high-quality relationships that appear to contribute to a positive sense of self. Effectively engaged individuals also appear reflective about their relationships, both their positive and negative aspects, and reveal considerable insight into and understanding about their interpersonal dynamics. (NOTE: "Relationships" refers to a current or at least one past relationship of more than 4 months.)

High scores indicate that the individual has a track record of relationships in which there is obviously mutual caring, trust and emotional closeness; concern for, and sensitivity to, the other's needs and wishes; sharing of experience and enjoyment of each other; faithfulness, loyalty, and honesty. Conflicts when they exist are resolved to the mutual satisfaction of both parties.

Individuals that score at the low end of this scale either consistently share relationships that are devoid of the qualities described above or have been unable to maintain romantic relationships for more than a short period of time. On the low end of the scale, relationships are emotionally distant, lacking in trust and mutual caring, and participants and their partners are insensitive to one another's needs and wishes (e.g., there may be unfaithfulness). Alternatively, the participant's relationships may be characterized by strikingly negative features (e.g., victimization, chronic intense conflict, active rejection, controlling behaviors, disrespect, and/or mistrust). It is the coder's opinion that the relationships such individuals have shared in the transition to adulthood have contributed to a negative sense of self, low self-esteem, and self-derogation.

Relationships that receive moderate scores can involve various combinations of insufficiently present positive qualities or the presence of moderately negative qualities.

5 - Very Good Quality of Engagement

- Relationships characterized by mutual deep caring.
- All of the qualities of a positive relationship are obvious: mutual caring, trust, and emotional closeness; willingness to sacrifice self interests; sensitivity to one another's needs and wishes; sharing of experience; enjoyment of each other; loyalty, honesty, and faithfulness.
- Relationship may contribute to a positive sense of self, high self-esteem, and self-respect.
- There is evidence that positive emotional experiences are shared by both parties in the relationship(s).
- Relationship(s) are not necessarily perfect; nonetheless disagreements, when present, are resolved to the mutual satisfaction of both parties and lead to a strengthening of the relationship(s).
- Partners show reflection about their relationship and considerable understanding.

4 - Good Quality of Engagement

- The relationship(s) involve caring on the part of both parties.
- Most of the qualities of positive relationship are present (i.e., mutual caring, trust, and emotional closeness; willingness to sacrifice self interests; sensitivity to one another's needs and wishes, sharing of experience, enjoyment of each other; loyalty, honesty, fidelity, and faithfulness); however, some isolated positive feature may be insufficiently present, or some isolated concern may arise as one listens to the interview.
- Relationship may contribute to a positive sense of self, high self-esteem, and self-respect.
- Both parties share positive emotional experiences in the relationship.
- Disagreements may be present, and more often than not appear to be resolved to the mutual satisfaction of both parties.
- Partners clearly are reflective about their relationship, but also show some obvious lack of understanding

3 - Average Quality of Engagement

- Able to form and maintain relationships for more than a short time (e.g., > 4 months)
- Relationships involve caring on the part of both parties, but there may be a lack of depth.
- Compared to higher scores, positive features are somewhat diminished, or occasional negative features are more clear. Certain positive qualities may be lacking.
- If negative features are present, these remain overbalanced by positive qualities.
- Relationship(s) may contribute to a positive sense of self, self-esteem, and self-respect, but they do not contribute to a negative sense of self, low self-esteem, or self-derogation.
- Disagreements are present and may be resolved, but resolution is not always mutually satisfying.
- Recounts relationship characteristics, but doesn't show deep reflection about them

2 - Fair Quality of Engagement

- Poor track record in terms of being able to maintain relationships
- It is unclear whether the participants' relationship(s) involve caring on the part of both parties, or some degree of caring is evident but appears to be limited.
- Some positive features may be present in the participant's relationship(s); however, the negative features somewhat outweigh the positive.
- Relationship(s) may contribute to a negative sense of self, low self-esteem, or self-derogation.
- May have had little experience in relationships, but speaks positively about those s/he has had.
- One or two instances of violence might have occurred, but so far have not recurred. Constructive efforts to address the problem may be evident.

1 – Low Quality of Engagement

- The coder may question whether the participant is able to maintain relationships, or the relationship is exploitative, hurtful, and/or destructive to one or both parties. Recurring violent incidents may be present.
- Very few positive features are present in relationships. Negative features are clearly evident, e.g., lack of trust or mutual caring, selfishness, insensitivity to one another's needs and wishes, unfaithfulness, disrespect, active rejection, controlling behaviors. (Note: not all negative features need to be present, but negative features clearly characterize this relationship.)
- Relationship(s) contribute to a negative sense of self, low self-esteem, and self-derogation for one or both parties.
- One or both parties may be emotionally distant in the relationship or may experience mostly negative emotions.
- Chronic or intense conflict may be present in the relationship.
- In rare instances, some participants are completely unable to start and maintain romantic relationships.

Year 32

Year 32: ENJOYMENT

This scale measures the participant's subjective sense of enjoyment in his/her current romantic relationship. Of interest is the degree to which the participant sees the partner as a source of happiness, pleasure, and good feelings. Enjoyment need not require commitment, but rather is evident in the extent to which the couple enjoys spending time together and the degree to which just being with the partner is represented as special. Evidence can come from examples or from direct statements showing the participant's experience of enjoyment in the relationship.

Consider the balance between positive and negative attributes of the relationship. High scores go to participants who see their partner as special and unique – one with whom the participant feels happy and affirmed. There is a predominance of positive attributes mentioned about the partner. Low scoring individuals experience their relationship or partner in a markedly negative manner, possibly raising questions as to why the participant continues the relationship.

5 – Very High Enjoyment

The participant is very positive about the partner and relationship and seems extremely happy with it. The partner is described as special in that he/she clearly makes the participant feel good. No obvious negative features detract from enjoyment. The participant provides clear and strong statements that support feelings of enjoyment.

4 – High Enjoyment

The relationship is described as characteristically pleasant. Minor negativity may be expressed, but the participant clearly enjoys being with the partner.

3 – Moderate Enjoyment

The relationship is moderately enjoyable and considered worthwhile by the participant, but some negative qualities may be emphasized. Although these qualities do not substantially diminish the participant's overall positive sense of the relationship, they detract from the participant's full enjoyment.

2 – Low Enjoyment

The participant finds the relationship with the partner only somewhat enjoyable. While the participant enjoys aspects about the relationship and may mention some positive qualities, clear areas of dissatisfaction are evident. Some negative concerns may be relatively serious and/or chronic.

1 – Very Low Enjoyment

The relationship and partner are described primarily in negative terms. The participant provides almost no statements of satisfaction with the relationship, and lacks a sense of enjoyment with the romantic partner a majority of the time.

Year 32 - SECURITY

Security entails expectations that significant others will be available and sensitively responsive to one's needs, particularly in times of distress. Thus, this scale measures the extent to which the participant believes the partner is available and responsive to his or her needs, and feels able to be wholly her/himself in this particular relationship. It follows from secure expectations that: 1) topics are discussed openly with the partner without fear of disregard or rejection, 2) he/she can "be himself/herself" and expect to be accepted by the partner, and, 3) he/she seems confident that the partner will be available and can be approached when needed for emotional support. A history of infidelity alone should not warrant a low score on security, but adjust the score downwards if the aftermath of the infidelity had yet to be completely resolved (e.g., trust is still an issue or there is concern about future faithfulness).

At the **High** end of the scale, the participant can be wholly himself or herself without hiding or withholding information. The participant expects the partner to be available to share concrete and emotional experiences in both good and bad times, to be supportive and available, to help with problems, and to stick by the participant. Any past infidelity has been adequately resolved.

Middle scores reflect the participant's (or the coder's) uncertainty about the partner's consistent reliability. This may be a result of poor examples provided to support the participant's apparent feelings of security. Alternatively, relationships in the midst of changing from low to high (or high to low) security may be given a mid-range score if appropriate (e.g., issues of trust have been a problem in this past but partners seem to be in the process of resolving them).

At the **Low** end of the scale, the participant feels that s/he must be emotionally guarded in exchanges with the partner. The participant's expressions of need for support or some emotions (e.g., embarrassment, irritation, anger) may be communicated indirectly because the participant is uncertain that the partner will be accepting. The coder may sense that the partner is relatively unavailable, unresponsive, unreliable, self-serving, or even rejecting and cruel. The partner may have been unfaithful in the past and gives no indications that that participant can trust their future behavior.

When in doubt, attempt to answer the following question: If the participant had a salient emotional need, would s/he feel free to bring it to this partner and would s/he expect an accepting, supportive reaction with no threat to the relationship?

5 – High Security

- Security: Clearly expressed/demonstrated certainty that the partner can be turned to for emotional support. The participant can bring feelings, tender needs, and problems to the partner and expect the partner to be available and supportive.
- Insecurity: No significant, identifiable indicator of insecurity in this relationship is present in the interview. If infidelity was an issue in the past, it seems to be adequately resolved with no lingering doubts about trust.
- Evidence: Examples or statements are convincing and are not contradicted.

4 – Mostly Secure

- Security: Similar to 5 in terms of strong security. The partner seems available and supportive.
- Insecurity: Mild forms of distancing from emotional topics. The participant may choose to deal with some issues alone rather than bring them to the partner, or the participant may be mildly anxious about how the partner will respond. If infidelity was present, the participant may state that problem has been resolved, but that trust is still an issue.
- Evidence: Examples or statements are somewhat less remarkable and not elaborated; may tend to avoid answering emotional questions. Even so, at least one example or statement given in the interview portrays a clearly secure set of expectations regarding this relationship.

3 – Uncertain Security

- Security & Insecurity: A mix of security and insecurity is evident in the relationship. The participant may feel that the partner can be relied upon, but the coder remains doubtful. Alternatively, the participant may express doubt in the partner's availability, but there are no striking examples of the cause of this doubt in the transcript. In the case of infidelity, perhaps the participant or the coder is not completely confident that the partner will remain faithful in the future, but at present the partner's behavior seems trustworthy.
- Evidence: If security is doubted by:
 Coder → transcript may show slightly contradicting evidence or poor support for apparent feelings of security
 Participant → no supporting examples of their broad, general statements that imply that the relationship is secure

2 – Low Security

- Security: Some minor identifiable positive indication of security mitigates the insecurity. Perhaps the participant is occasionally surprised by a sensitive response. Something in the interview suggests that the partner may on rare occasions be counted upon to be supportive.
- Insecurity: Evidence for insecurity includes unresponsiveness, unavailability, or unreliability. The participant may doubt the partner's future faithfulness and has reasonable cause for concern.
- Evidence: Look for a mostly insecure relationship with rare instances of security.

1 – No Security

- Security: Striking evidence or statements of insecurity outweigh any indications of security.
- Insecurity: The participant cannot count on the partner to respond sensitively to his/her needs. S/he is not comfortable being her/himself with the partner and feels (or provides examples demonstrating) that partner is unavailable, unresponsive, insensitive, unreliable, opportunistic, or even cruel and rejecting. The partner may have been unfaithful on multiple occasions with no or little regard for their partner's feelings, and no evidence of remorse or intent to change.
- Evidence: Convincing examples or statements support these feelings of insecurity.

Year 32 - EFFECTIVENESS OF CONFLICT RESOLUTION

This scale measures the effectiveness of conflict resolution. The most important element is the equity of conflict resolutions and the use of collaborative conflict strategies. Frequency of conflict is not a component of this scale except that it may reflect effectiveness or ineffectiveness of resolution strategies. The presence of chronic and persistent conflict may indicate that disagreements are generally not effectively managed. It should be noted that the absence of conflict might mark denial, non-disclosure, or a nascent relationship (i.e. 'honeymoon phase'). It should also be noted that, for individuals who have been in a long-term relationship, the improvement in conflict resolution skills should be balanced with past poor conflict resolution strategies.

At the high end of the scale, the partners are sensitive to each other's concerns and attempt to compromise to reach solutions. Both partners are satisfied with the resolution of conflict, and tension, hurt, and anger do not linger after the resolution. Important subjects in the relationship are actively addressed.

At the middle of the scale, conflict is resolved well most of the time, but there are some problems in the process of conflict resolution. For example, resolution may be achieved without an active effort, or partners may not be completely satisfied with solutions. Partners may use strategies that do not reflect sensitivity to the other's concerns, but in general these strategies seem to satisfy the couple. Alternatively, there may be an absence of conflict, but the coder senses this is due to some denial or non-disclosure.

At the low end of the scale, conflict resolution strategies are problematic. Strategies may not work, such that there is recurrent conflict over subjects. The relationship may revolve around conflict, and partners may express that subjects of concern cannot be resolved. Alternatively, strategies may be effective in preventing recurrent conflict, but in a way that is hurtful to one or both partners. For example, one person may have more power in the relationship and dominate and/or victimize the other. Strategies such as physical fighting and disengagement may be used.

5 - Superior

- There is evidence of effective and fair approaches to conflict resolution.
- Areas of conflict are successfully negotiated to the full satisfaction of both people.
- There is evidence of compromise and sensitivity to the needs of both people.
- Subjects of importance to the relationship are actively addressed.
- More minor subjects do not lead to intense or prolonged conflict or tension.
- There is no evidence of a power differential where one person almost always tends to go along with the other.

4 - Above Average

- Examples of conflict or tension may be lacking, but there is no obvious avoidance or inconsistency in the report. A relationship which appears to be in an early developmental stage or in which there may be idealization and/or exaggerated accommodation (i.e. 'honeymoon stage') may receive a score of 4 if there are no indications of underlying tension at this time (otherwise, consider a 3).
- Areas of potential or actual conflict are sometimes, but not always, negotiated to the full satisfaction of both people.
- There are attempts at compromise and sensitivity to the needs of both people, but this process is imperfect.
- There may not be active attempts to address subjects of importance to the relationship, but at least these subjects are not avoided.

3 - Average

- Approaches to conflict resolution are average; that is, within a single conflict or across multiple conflicts the partners use strategies that seem likely to result in resolution, and other times use strategies that seem unlikely to result in resolution.
- Overall, things are worked out, although strategies do not necessarily involve sensitivity and concern for the other.
- Possible situations include:
 - (d) Resolution 'sort of happens' without any active effort. Some resolutions may be made by default. The passive approach does not appear to cause problems or injustices.
 - (e) There is mild disengagement by one or both partners when dealing with conflict.
 - (f) Conflict is not acknowledged; even differences of opinion are not acknowledged, yet it seems likely that there is some denial or non-disclosure.

2 - Below Average

- Approaches are somewhat inadequate in resolving conflict.
- Resolutions may not involve fair compromises.
- There may not be a commitment to resolving subjects of importance to the relationship or mild conflict may be viewed as insurmountable by one or both people.
- Possible situations include:

- (g) Strategies do not fully resolve conflicts. Tension may remain long after the conflicts. One or both people may become increasingly dissatisfied with the way various subjects are handled. Previously addressed subjects may resurface periodically.
- (h) There is persistent conflict over trivial subjects. The relationship may appear to revolve around conflict.
- (i) There are active attempts to avoid certain subjects due to the inability to resolve disagreements.
- (j) There is evidence of a clear and pervasive power differential in the relationship that affects conflict management. One person may regularly back-down when conflicts develop.
- (k) There may have been physical fighting on one occasion.
- (l) There is often disengagement by one or both partners when dealing with conflict.

1 - Poor

- Approaches to conflict resolution are very problematic.
- There is no evidence that the relationship involves mutual give-and-take and/or concern for the other.
- One or both people may show insensitivity and/or persistent selfishness in the relationship.
- Possible situations include:
 - (f) Obvious victimization of one person by the other.
 - (g) Escalation of conflict ('getting even', revenge).
 - (h) Perhaps resorting to physical fighting on more than one occasion.
 - (i) There are active attempts to avoid any subject of possible conflict. Even serious problems are avoided and not addressed.
 - (j) One or both people completely emotionally disengage from the relationship.

Year 32 – EFFECTIVENESS OF ENGAGEMENT IN ROMANTIC RELATIONSHIPS

This scale is an evaluation of the degree to which participants appear to have attained competence in romantic relationships appropriate to 32 year olds. When coding this scale, take into consideration all of the relationships that the person has been involved in since age 26, including his/her current relationship. Good “engagement in romantic relationships” refers to forming and maintaining high-quality relationships that appear to contribute to a positive sense of self. Conversely, “bad” relationships are those that are perceived by the participant as negative, that interfere with his/her functioning, and that contribute to a negative sense of self. (NOTE: “Relationships” refers to those lasting more than 6 months.)

These individuals appear reflective about their relationships, both their positive and negative aspects, and reveal considerable insight into and understanding about their interpersonal dynamics.

High scores indicate that the individual has a track record of relationships in which there is obviously mutual caring, trust and emotional closeness; concern for, and sensitivity to, the other's needs and wishes; sharing of experience and enjoyment of each other; faithfulness, loyalty, and honesty. Conflicts when they exist are resolved to the mutual satisfaction of both parties. The dissolution of a negative relationship should not be counted against the participant.

Individuals that score at the low end of this scale either consistently share relationships that are devoid of the qualities described above or have been unable to maintain romantic relationships for more than a short period of time. On the low end of the scale, relationships are emotionally distant, lacking in trust and mutual caring, and participants and their partners are insensitive to one another's needs and wishes (e.g., there may be unfaithfulness). Alternatively, the participant's relationships may be characterized by strikingly negative features (e.g., victimization, chronic intense conflict, active rejection, controlling behaviors, disrespect, and/or mistrust). It is the coder's opinion that the relationships such individuals have shared in adulthood have contributed to a negative sense of self, low self-esteem, and self-derogation. While we are not explicitly examining the participant's ability to recognize and leave a negative relationship, individuals who remain in negative relationships will receive low engagement scores due to their inability to "form and maintain high quality relationships"

Relationships that receive moderate scores can involve various combinations of insufficiently present positive qualities or the presence of moderately negative qualities.

Note: In descriptions the phrase "both parties" refers to both the participant's perception of the item and the participant's report of the partner's perception of that item. For example, "evidence that positive emotional experiences are shared by both parties in the relationship(s)" reflects the participant's experience of positive emotional experiences as well as their report of their partner's experience of positive emotional experiences.

5 - Very Good Engagement

- Relationship(s) characterized by mutual deep caring.
- All of the qualities of a positive relationship are obvious: mutual caring, trust, and emotional closeness; willingness to sacrifice self interests; sensitivity to one another's needs and wishes; sharing of experience; enjoyment of each other; loyalty, honesty, and faithfulness.
- Relationship(s) may contribute to a positive sense of self, high self-esteem, and self-respect.
- There is evidence that positive emotional experiences are shared by both parties in the relationship(s).

- Relationship(s) are not necessarily perfect; nonetheless disagreements, when present, are resolved to the mutual satisfaction of both parties and lead to a strengthening of the relationship(s).
- Participant shows reflection about their relationship and considerable understanding.

4 - Good Engagement

- The relationship(s) involve caring on the part of both parties.
- Most of the qualities of positive relationship are present (i.e., mutual caring, trust, and emotional closeness; willingness to sacrifice self interests; sensitivity to one another's needs and wishes, sharing of experience, enjoyment of each other; loyalty, honesty, fidelity, and faithfulness); however, some isolated positive feature may be insufficiently present, or some isolated concern may arise as one listens to the interview.
- Relationship(s) may contribute to a positive sense of self, high self-esteem, and self-respect.
- Both parties share positive emotional experiences in the relationship.
- Disagreements may be present, and more often than not appear to be resolved to the mutual satisfaction of both parties.
- Participant clearly is reflective about their relationship(s), but also shows some obvious lack of understanding.

3 - Average Engagement

- Able to form and maintain relationship(s) for more than a short time (e.g., > 6 months)
- Relationship(s) involve caring, but there may be a lack of depth.
- Compared to higher scores, positive features are somewhat diminished, or occasional negative features are more clear. Certain positive qualities may be lacking.
- If negative features are present, these remain overbalanced by positive qualities.
- Relationship(s) may contribute to a positive sense of self, self-esteem, and self-respect, but they do not contribute to a negative sense of self, low self-esteem, or self-derogation.
- Disagreements are present and may be resolved, but resolution is not always mutually satisfying.
- Recounts relationship characteristics, but doesn't show deep reflection about them.

2 - Fair Engagement

- Poor track record in terms of being able to maintain relationship(s)
- It is unclear whether the participants' relationship(s) involve caring on the part of the participant, or some degree of caring is evident but appears to be limited.
- Some positive features may be present in the participant's relationship(s); however, the negative features somewhat outweigh the positive.
- Relationship(s) may contribute to a negative sense of self, low self-esteem, or self-derogation.

- May have had little experience in relationships, but speaks positively about those s/he has had.
- One or two instances of violence might have occurred, but so far have not recurred. Constructive efforts to address the problem may be evident.

1 – Low Engagement

- The coder may question whether the participant is able to maintain relationship(s), or the relationship is exploitative, hurtful, and/or destructive to one or both parties. Recurring violent incidents may be present.
- Very few positive features are present in relationship(s). Negative features are clearly evident, e.g., lack of trust or mutual caring, selfishness, insensitivity to one another's needs and wishes, unfaithfulness, disrespect, active rejection, controlling behaviors. (Note: not all negative features need to be present, but negative features clearly characterize this relationship.)
- Relationship(s) contribute to a negative sense of self, low self-esteem, and self-derogation for one or both parties.
- Participant may be emotionally distant in the relationship or may experience mostly negative emotions.
- Chronic or intense conflict may be present in the relationship(s).
- In rare instances, some participants are completely unable to start and maintain romantic relationships.

APPENDIX D:
Figures Representing Significant Path Analysis Results from Models 1-3

Figure 7

Model1: Within Domain Path Analysis Results

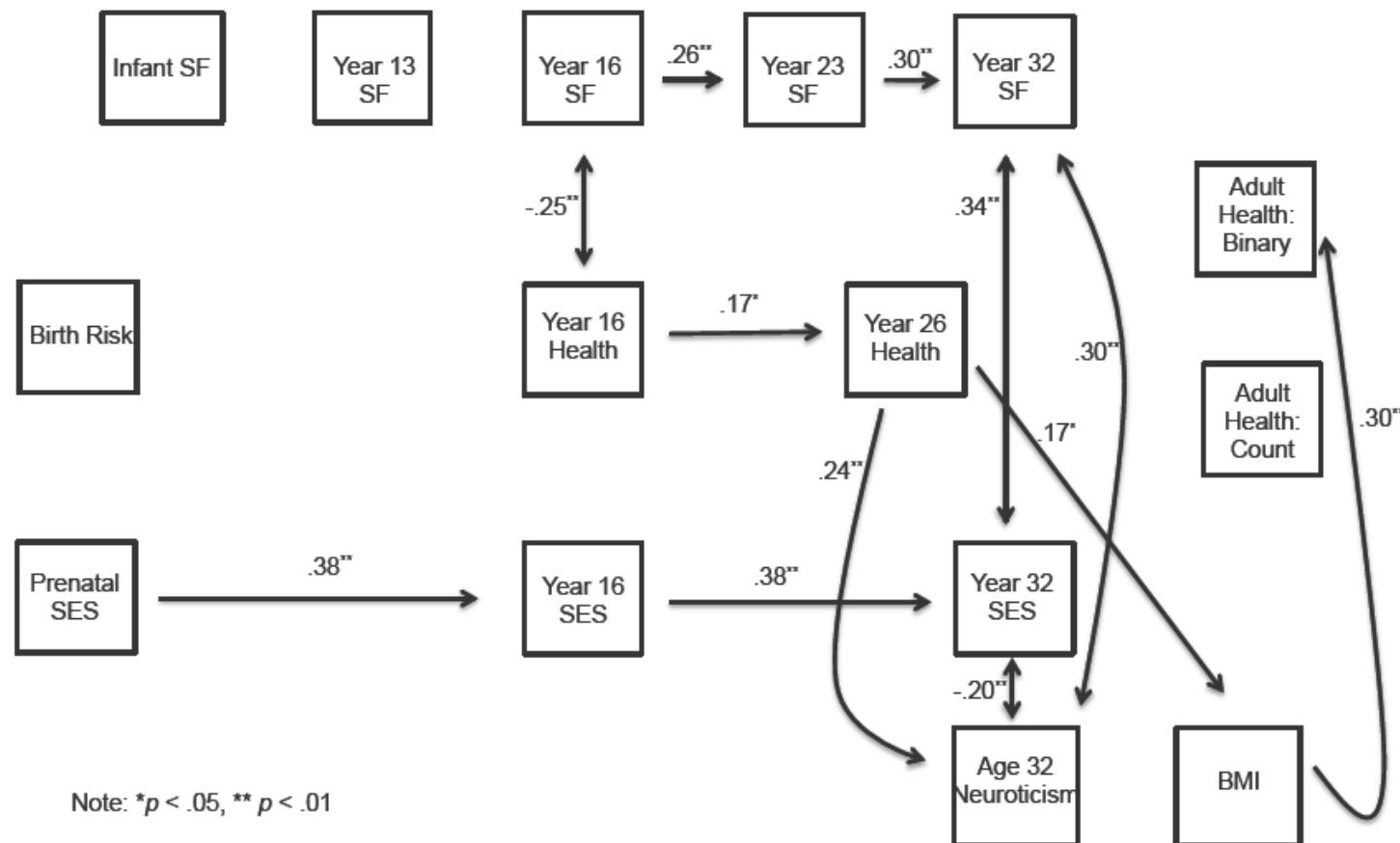


Figure 8
Model 2: Cross Domain Path Analysis Results

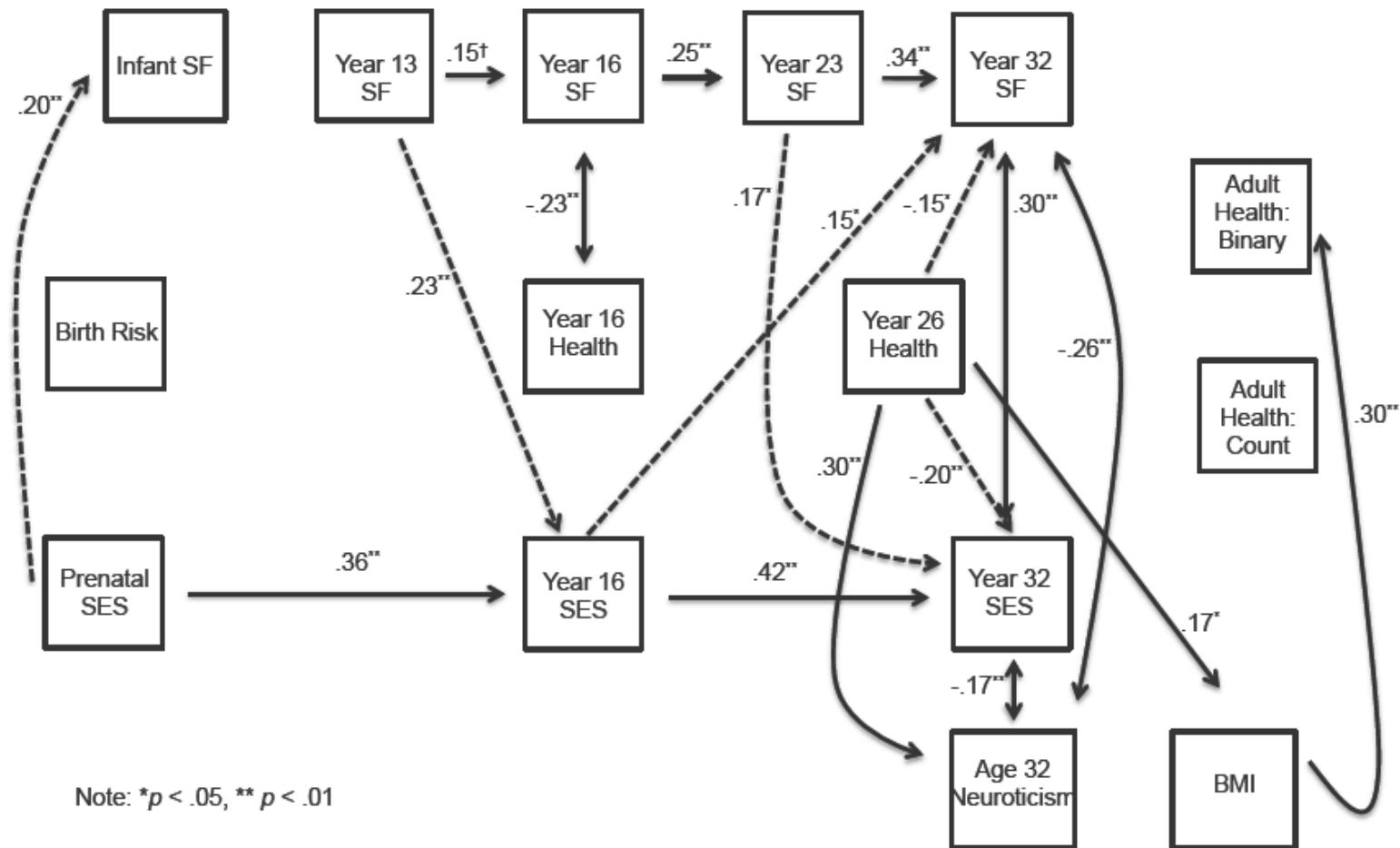
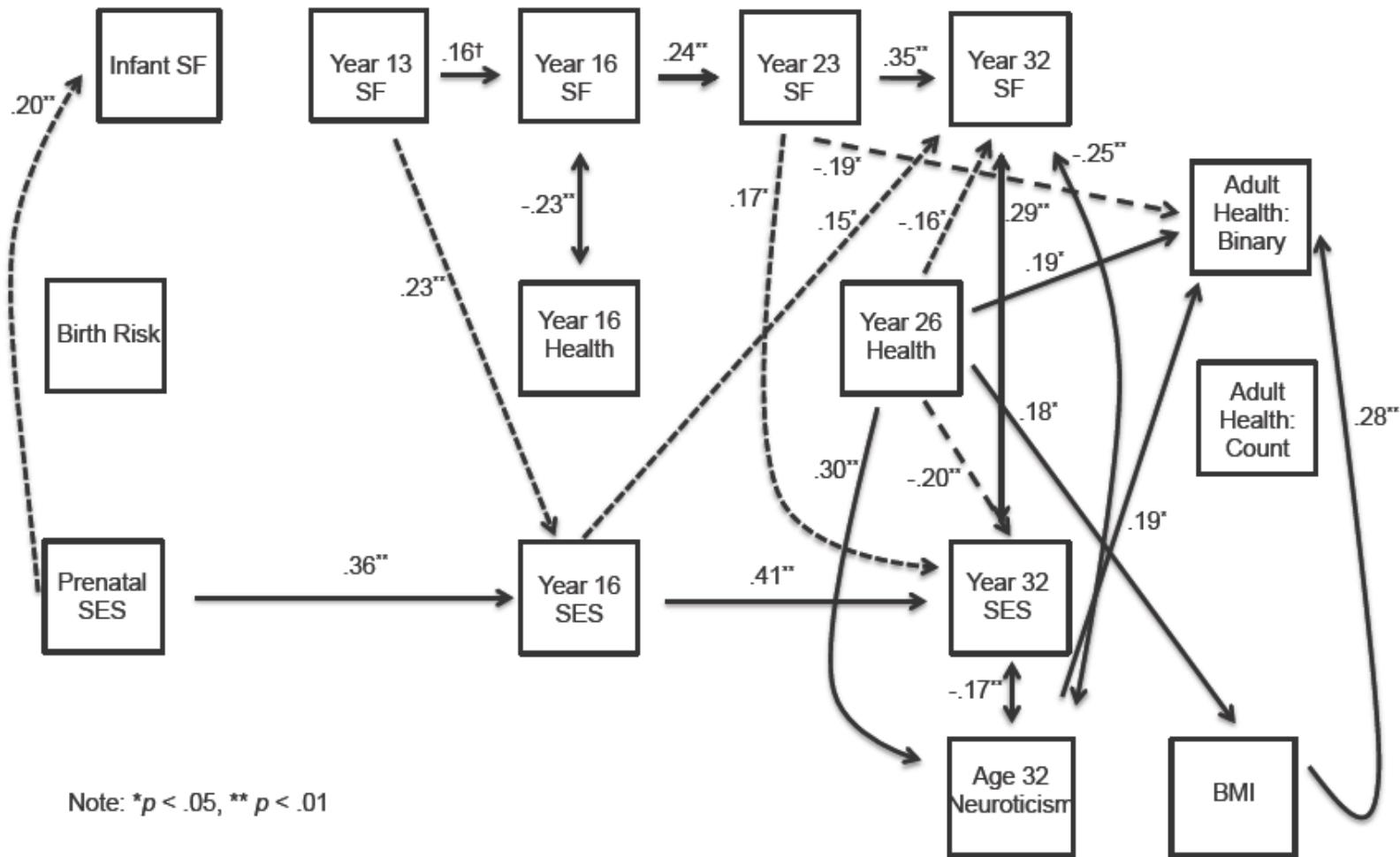


Figure 9
Model 3: Adolescent/Young Adult Relationship Direct Effect



Note: * $p < .05$, ** $p < .01$